Constituency and convergence in the Americas

Edited by

Adam J.R. Tallman

Sandra Auderset

Hiroto Uchihara

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Chapter 1

Introduction: Phonological and morphosyntactic constituency in cross-linguistic perspective

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I provide a brief history of the development of the ideas for the "Constituency-Convergence project", which this volume is a product of. I also motivate the project by discussing the shortcomings of Basic Linguistic Theory and Prosodic Phonology as description languages for studying constituency cross-linguistically. Finally, I briefly summarize the principles of the planar-fractal method and then provide an overview of the chapters in this volume.

1 Introduction

This volume presents a number of studies on constituency (phonological and morphosyntactic) in the languages of the Americas from a novel perspective. Constituency analyses, whether morphosyntactic or phonological, are typically conceptualized as being based on "constituency tests." Generally the constituency tests are used as a means to an end, a tool or a justification, to get at a particular constituency analysis - or more commonly to argue in favor of one constituency analysis over another where the constituency analyses are arrived through theoretical assumptions and intuition ("the factor of judgement", Pike 1943: 75). In this perspective, constituency tests might be "clues" to constituents (at best), but constituents are the units of description and comparison (e.g. Wiltschko 2014: 44).

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In this volume a group of researchers consider phenomena from a variety of languages of the Americas to explore, critique and develop the notion of "constituency *test*" as a unit for language description and comparison. Comparing languages in terms of constituency tests (or domains) is not the same as comparing languages in terms of constituents. Constituents are embedded in constituency analyses which are arrived at by smoothing over (discarding, reinterpreting etc.) constituency tests to fit a set of theoretical positions or assumptions (e.g. binary branching, no-branch crossing, nesting, etc.).

The data are based on original field research by all of the authors and in some cases native speaker judgments. Participants of the volume approach linguistic phenomena from a variety of perspectives, but share the view that cross-linguistic study of constituent structure might be profitably engaged with by comparing languages in terms of constituency test results themselves, rather than only abstract constituency structures proposed in the linguistics literature. This volume was also brought on by a sense that there is a gap in the literature on the relationship between constituent structure and constituency test as a problem in cross-linguistic comparison. The vast majority of introductory syntax texts that introduce and explain the notion of constituency test rely only on examples from (standard) English, for example.

This does not mean that abstract constituency structures are rejected *per se*. Rather the volume is interested in critically engaging with the empirical basis for such constituency structures. Given the ever expanding panoply of competing morphosyntactic geometries found in the literature today, I would suggest that such a methodological orientation is helpful, if not necessary, for getting our bearings.

The notion of constituency test is presented in a deceptively simple way in introductory syntax texts. When one recognizes the possibility that constituency tests can be and have been used in a biased manner in the linguistic literature (Croft 2001, 2010), attempting to overcome this bias opens up a world of intricate complexity with competing structural analyses for language description and comparison. The intuition underlying this project is that this complexity is worth exploring and may lead us to overcome some longstanding epistemic and theoretical impasses in the field. It could lead us to abandon some longstanding, but inhibiting assumptions, and articulate new hypotheses concerning linguistic universals and diversity.

Historically, but especially since the development of (American) structural linguistics, the languages of Americas have been an important source of inspiration for understanding the nature of language variation. Languages of the Americas have not simply served as testing grounds for already established hypotheses, but as laboratories for the development of new perspectives on linguistic architecture. In my view the latter tradition has been attenuated in recent years, because of a strong tendency to presume that "universal" architectures can be derived from studying a few European languages. Novel phenomena from other languages are studied as expressing deviations from the "basic" patterns, but could not be used to challenge the fundamental architecture over which these patterns are described, compared and conceptualized.

It was a staple of the Boasian tradition to criticize traditional linguistic categories for their potential to be implicitly biased towards describing languages and cultures in the terms of languages and cultures which are dominant in European institutions (Stocking Jr. 1974, Rodseth 2022). This critical attitude was applied to traditional grammatical terminology. The issue of "word" and "constituent" are a classic concerns of Americanist linguistics (Boasian, Bloomfieldian, Post-Bloomfieldian) in this regard (Boas 1911, Bloomfield 1914, Hockett 1947, Pike 1972). In a sense, therefore, this volume attempts to reinvigorate the Boasian tradition of empirically based criticism of traditional categories, directing the criticism at the "established" or "basic" categories of general linguistics (phonological and morphosyntactic) "word" and "phrase."[1] The strategy is to take a look at the "diagnostics" for our presupposed structures and assess whether these really support the presumed grammatical architectures.

To avoid descending into a cacophony of conflicting terminologies, multivariate autotypologizing methodology (Bickel & Nichols 2002) is leveraged and modified in service of this goal. The chapters in this volume apply the PLANAR-FRACTAL METHOD, a typological description language coupled with a coding technique developed to visualize, critique, commensurate and measure constituency tests and their interrelations cross-linguistically. This method is not itself unproblematic, and it should be emphasized that it is a tool with its own biases and pitfalls (see Wimsatt 2007 for relevant discussion). Used in conjunction with other approaches, I think it can be a powerful technique for comparing and testing certain aspects of language structure. Moreover, for language description, the growing impression is that it has an obvious heuristic value.

Below I provide a brief history of how this volume came into being (§1). The chapters in this volume reconceptualize some fundamental notions in linguistics and I think that providing a brief history of how the perspective developed is a useful entry point.

[1]Whether the Boasians consistently approached all problems with such a critical stance is another matter (see Anderson 2019 for an important discussion of the shortcomings of the Boasian approach).

The rest of the sections provide brief discussions of the some theoretical ideas, concepts and distinctions that the approach discussed in this volume engages with. Basic Linguistic Theory is discussed in §3. The Prosodic Hierarchy Hypothesis is discussed in §4 and §5 briefly discusses some methodological issues in typology.

Then I turn to providing a brief description of the planar-fractal method. A description of planar structures is provided in §6. The fractal method for describing constituency tests is provided in §7 and a brief summary of the type of domains (constituency tests) used in this study is provided in §8. I then describe the chapters of this volume in §9.

2 Where these ideas come from

This volume came about through ongoing collaboration and conversations between a number of researchers engaged in language description starting in about 2017. The smoothest entry point into understanding the perspective adopted in the volume might be from my own failure to analyze Chácobo, a southern Pano language of Bolivia, according to certain prescribed orthodoxies: Basic Linguistic Theory (Dixon & Aikhenvald 2002), and prosodic phonology (Nespor & Vogel 2007, Anderson 2005).

Verbal word structure or word formation in Pano languages is modelled and described according to the following template (Loos 1999, Fleck 2003, Valenzuela 2003, Fleck 2013, Neely 2019, de Souza 2020).

(1) Pano verbal "word"
PREFIX - VERB ROOT - DERIV. SUFFIXES - INFL. SUFFIXES

Nouns follow a similar template except that inflectional and many derivational elements are understood as occurring at the end of *phrases* rather than words. In the verb complex the prefix codes the body-part (or something analogous for like a "trunk" for a tree) of an S or P argument (typically). The derivational suffixes code a number of concepts such as valence, aspect, emotion, modality, and associated motion. Inflectional suffixes code aspect, tense, evidentiality, temporal distance and (depending on the language) person and number. An example comes from the verb *da-daɨʃ-tsɨk-kid* 'habitually gnawing on trunks' provided in (2): *da-* 'trunk' is the prefix; *daɨʃ* 'eat gnawing' is the verbal root; *tsɨk* 'diminutive' is a derivational suffix; *-kid* 'habitual is an inflectional suffix.

(2) Matses:

kwɨte	*da-daɨʃ-tsɨk-kid*	*madu-n*	*sipi-n*
dicot.tree	trunk-eat.gnawing-DIM-HAB	demon-GEN	tamarin-ERG

‘Pygmy marmosets gnaw the trunks of dicot trees.’ (Fleck 2003: 342)

From Fleck’s description one can discern that the verbal “word” in Matses is itself a minimal free form, cannot be interrupted by another free form or any distributionally “promiscuous” elements such as adverbial clitics and is the domain for stress. There is evidence that in other Pano languages the verbal word has a somewhat “looser” constituency, however. In Shipibo, the verbal word (which has the same *basic* structure as that of Matses) can be interrupted by bound adverbial clitics and second position clitics. Valenzuela (2003: 145–146) refers to the relevant adverbial morphemes as “less-fixed clitics.” An example of a less-fixed clitic is provided with *=ribi* ‘also’ in (3).

(3) Shipibo-Konibo:

ɨ-a	*ka-i-tian*	*resto*	*no-n*	*kaibo-baon-**ribi***	*ɨ-a*	*tʃiban-a*
1-ABS	go-S-DS	rest	1PL-GEN	fellow.Shipibo-PL:ERG-**also**	1-ABS	follow-PP2

iki,	*onan-kas-kin-**ribi***
AUX	know-want-SSSA-**also**

‘When I was going (to the Salt Mountain),the rest of my fellow Shipibo follows me, wanting to know (the way) too.’ (Valenzuela 2003: 145)

Evidence for the looser constituency comes from the fact that some less-fixed clitics such as *=ribi∼=riba* ‘also’ can interrupt the verbal word. This poses problems for some definitions of wordhood, insofar as the word-internal form is regarded as the same morpheme (it is unclear why it should not be); words should be non-interruptable (Martinet 1962: 92 Bauer 2017: 17).

(4) Shipibo-Konibo:

moa	*icha*	*baritia*	*pekao,*	*Shipibo*	*joni-bo*	*moa*
already	many	time	after	Shipibo	person-PL:ABS	already

*kai-**ribi**-kan-a*	*iki*	*ja*	*kimisha*	*joni-nko-ni-a-x*
reproduce-**also**-PL-PP1	AUX	that	three	person-LOC-ligature-ABL-S

‘After many years, the Shipibo reproduced again from these three people.’ (Valenzuela 2003: 146)

Still, the verbal word in Shipibo is a stress domain and cannot be interrupted by any *free form*. It also passes the “free utterance” or minimal free form test

(Bloomfield 1933, Hockett 1958) (as far as I can discern from the available descriptions).

In Chácobo an analogous span of structure is also a minimal free form (boxed in the example below).

(5) Chácobo:
ina hoʂo tsi kiá *ta-nɨʂ-i-tɨkɨ(n)-yamɨ(t)-kɨ*
dog white LNK REP foot-tie-ITR-again-DST-DECL:PST
'The white dog got its feet tied up again.'

In Chácobo, however, the verbal word is interruptable, not just by a free form, but by a whole noun phrase. The prefix and root can front leaving behind the "inflectional suffixes." This is illustrated in the example below.

(6) Chácobo:
ta-nɨʂ-ɨ *tsi kia ina hoʂo* *-tɨkɨ-yamɨt-kɨ*
foot-tie-ITR LNK REP dog white -again DST-DECL:PST
'The white dog got its feet tied up again.'

The question then arises as to how we characterize Chácobo and Matses in terms of their morphological profiles. Perhaps, we should say that Chácobo and Matses display radically different structural organizations vis-à-vis the distribution of elements within morphology or syntax. Chácobo would be isolating and Matses polysynthetic. Such a position, however, ignores the fact that Chácobo is just one step more extreme than Shipibo in terms of the looseness of the analogous span of structure from prefix to inflection. The difference between Matses, Shipibo and Chácobo is not one of drastic differences in structure from one language to the next, but rather a matter of degree regarding how well wordhood tests, or perhaps constituency tests in general, align around a particular domain of structure. Claiming that Chácobo or Matses has taken a drastic jump from polysynthetic to analytic or analytic to polysynthetic structure obscures the structural similarities between the two languages and the fact that Shipibo-Konibo stands somewhere in between.[2]

Perhaps we should claim that all Pano languages are actually like Chácobo and that the relative tightness of the Matses verbal constituent is "superficial." Such a move would obscure interesting typological differences between the languages,

[2] It is not yet known whether Proto-Pano should be regarded as polysynthetic or not, but in a recent talk on Amawaka, another Pano language, at the Association for Linguistic Typology (2022, UT Austin), Pilar Valenzuela suggested that the proto-language was likely more analytic.

however. Yet another approach would be to claim that non-interruption is not a useful test for wordhood (Dixon & Aikhenvald 2002), but such a claim suffers from arbitrariness. It seems that our "basic" categories for linguistic description obfuscate rather than clarify variation and similarity in the Pano languages.

Another take would be to claim that the above discussion focuses too much on non-convergences between specific wordhood tests, rather than looking at how diagnostics for wordhood pattern for a particular language (Tallman 2021c). The tests might show a *tendency to align* over a tendency not to. This is sometimes claimed in the case of wordhood tests (Matthews 2002) and constituency tests in general (Carnie 2010, Bennett & Elfner 2019). But the claims have been made *ex cathedra* in the absence of a systematic typological study.[3]

And a more serious problem arises for language comparison. Even if a meta-study were to be conducted showing that in case after case, researchers did not show a tendency to report nonconvergences, such a result could plausibly arise from "selection bias" - picking just those results and focusing on just those constructions that illustrate convergence and discarding those that do not as irrelevant (Croft 2001, Haspelmath 2011). If a linguist is told that all languages have words as long as one finds the right criteria (Dixon & Aikhenvald 2002), they are going to find them insofar as there are criteria to be found at all, under reporting, if not missing, contradictory results so as not to provoke eye-brow raising from reviewers.[4]

In an attempt to assess the issue of wordhood in Chácobo more globally, I culled the literature for all wordhood tests I could find (Haspelmath 2011 for a useful, but preliminary review). But two problems became apparent. The first is that wordhood diagnostics are often stated in highly ambiguous ways in the literature. A given wordhood test is often vague such that it has multiple interpretations. For instance, when we consider non-interruption, the question arises as to what the interrupting element should be: a free-form (Haspelmath 2011), or some "promiscuous" clitic-like element that can be bound (Bauer 2017). Insofar as these versions of the same test do not give us the same result, which one do we apply? This problem is not necessarily fatal if one rigorously reports all available interpretations of wordhood results in the literature.

[3]As reviewed below, the one typological study that investigated the question provides the opposite result from what is typically claimed regarding convergence (Schiering et al. 2012, Bickel et al. 2009)

[4]The issues brought up by Croft (2001) and Haspelmath (2011) about the possibility that diagnostics are cherry-picked just so they support a favored theory is reminiscent of debates about p-hacking and data dredging in discussions of replicability in the sciences in general (Tallman 2021a), which is why I refer to the phenomenon as "selection bias", rather than using Croft´s term "methodological opportunism."

The second problem is more fatal for a description language that presupposes words versus phrases. It is not clear that there is a distinction between wordhood test and constituency test in general. The latter problem became apparent when I started comparing notes with other field researchers from UT and began to take a closer look at tests for phrase-level constituency. To give one example, non-interruption as a wordhood test is actually not clearly distinct from "movement" or "discontinuity" as a phrasehood test. The difference appears to be one of conceptualization, not empirical reality.[5]

Putting the second problem aside, the results of Chácobo reveal very few convergences given the number of tests applied. To give the reader an idea of how tests decompose the traditional "word", consider the example sentence from Chácobo in (7).

(7) Chácobo:
(ta) nɨʂ ɨ (βɨki) (βona) (tɨkɨ) kɨ (ɾá)
(foot) tie ITR (INTRC) (going:TR/PL) (again) DECL:PST (ASR)
'Again, they (e.g. the dogs) were tying each other by their feet as they went. (e.g. on a leash).'

[5] In the literature on syntax, (non)displacement might be considered an analogue to non-interruption. A phrasal constituent is one that can be displaced with all of its elements remaining adjacent (Kroeger 2005: 25, Levine 2017: 8), or a phrasal constituent is one which cannot be "discontinuous" (Louagie 2021: 114) — distinct formulations which mean the same thing as far as I can see. To illustrate the basic empirical identity between these formulations consider a grammar with just three elements: *a*, *b* and *c*. the grammar outputs the following strings.

(i) a, b, c, ab, ac, ba, ca, bc, abc, bca

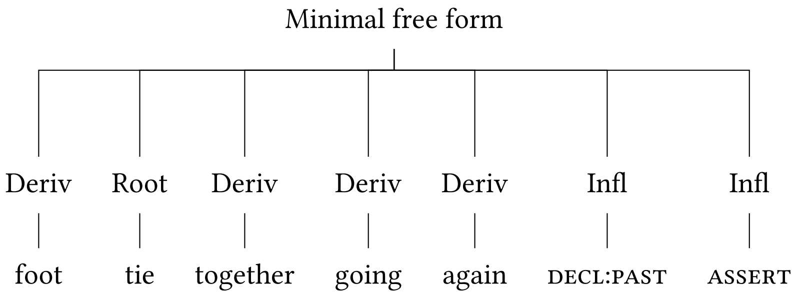
We know that all cases where *b* and *c* occur they cannot be interrupted by *a*. We can formulate the generalization in two ways.

(ii) a. Non-interruption: *ab* is a constituent because it cannot be interrupted (by *a* for example);
b. Displacement: *ab* is a constituent because it can be displaced to the left (or right) side of.

With some reflection, therefore, we can see that (non)displacement or (non)discontinuity can be regarded as formulations of non-interruptability, albeit with a different focus. "Displacement" evokes a metaphor where the candidate constituent "moves" without breaking into pieces. "non-interruption" evokes a metaphor where the candidate constituent does not break to pieces when subjected to the movement of extraneous elements. Likewise in displacement, extraneous elements stand still, whereas in non-interruption the pieces of the candidate constituent stand still.

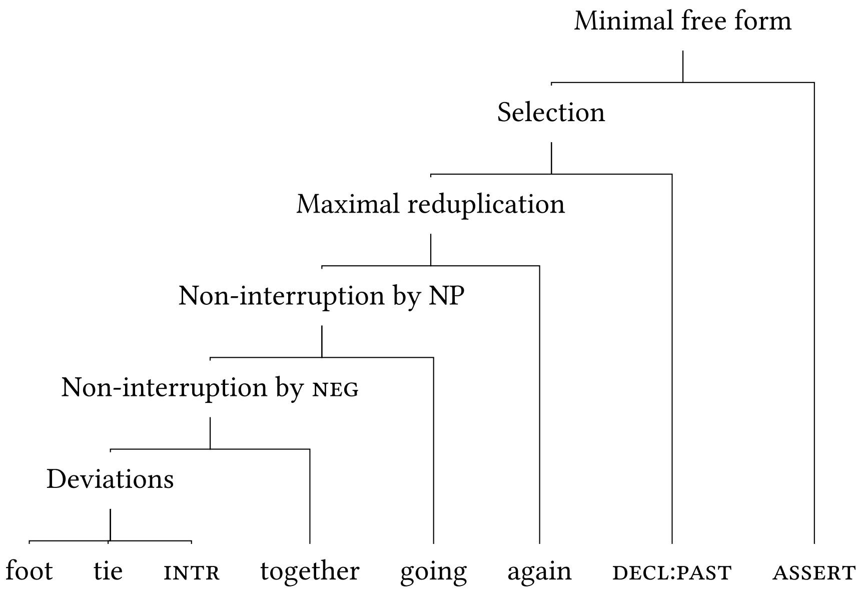
The traditional Panoanist analysis would posit the structure in (8) (see Zingg 1998 for example) (where Deriv is 'derivational' and Infl is 'inflectional').[6]

(8)



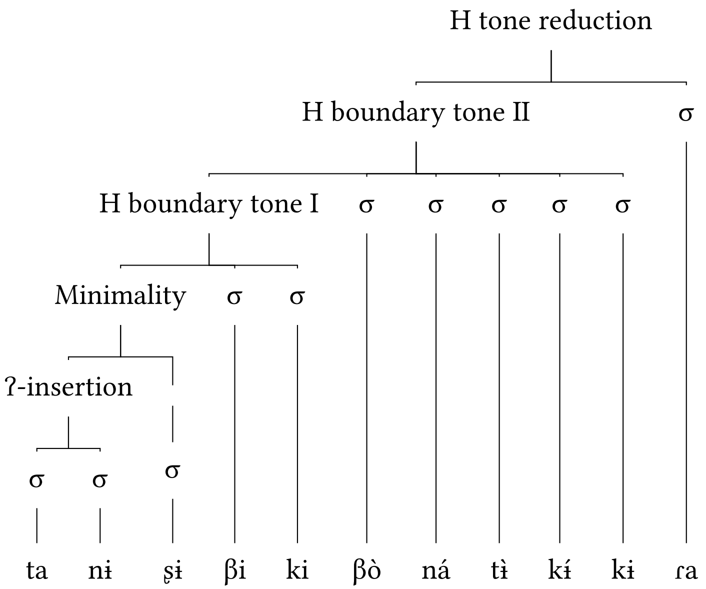
Wordhood (or constituency) tests parse the sentence up as in (9) (see Tallman 2021c for relevant terminology). Thus, if one prioritizes deviations from biuniqueness, Chácobo is analytic, actually close to isolating. If one considers the minimum free form test, Chácobo is polysynthetic.

(9)



[6]Note that in the following discussion trees which have straight rectangular edges are used for representing constituency tests and those with triangular edges are used for representing constituency analyses.

(10)



The situation is not obviously less ambiguous with phonological domains. The diagram in (10) depicts phonological domains in Chácobo showing that the language has relatively small phonological words if glottal stop insertion is chosen as word-identifying and large ones if H-tone reduction is chosen (see Tallman 2018 for a complete description of the relevant phonological processes).[7] The few convergences that can be found could be attributed to chance. With 22 constituency tests and 28 sentence level structural positions, the probability of two tests converging by accident is relatively high (Tallman 2021c).

The ambiguity here matters for linguistic theory generally. Claims about lexical integrity are not meaningfully testable, or just incoherent, if they are highly contingent on which of an open ended set of competing wordhood candidates are chosen (Tallman 2021a). We cannot discern how Chácobo data relate to the prosodic hierarchy if labeling of the relevant domains is arbitrary (Tallman 2021b). Claims about the relative autonomy of morphology and what distinguishes morphology from syntax (Anderson 2015) are likewise meaningless if they rest on arbitrary choices about where to cut the division between these domains (Tallman & Auderset 2023). We cannot felicitously compare the phonetics of bound-

[7] One could question this argument on the grounds that the smallest domain should be the "phonological word". But then the question arises as to which domain is the phonological phrase. Domains smaller than the phonological word (the "Pstem") have also been argued to be necessary for some languages (Downing & Kadenge 2020), which reintroduces the ambiguity. Such problems are discussed in detail in §4.

ary phenomena in cross-linguistic perspective (Kilbourn-Ceron & Sonderegger 2018, Seifart et al. 2021), if it is not clear what level the boundaries identify.

A question arises at this point as to how general the problem of non-convergence really is cross-linguistically. This is where the larger collaboration between more researchers begins. A methodology for reporting and coding constituency test results was developed in collaboration with linguists doing fieldwork on native languages of the Americas, some of them native speakers of these languages, at the University of Texas at Austin. The collaboration began in the context of a seminar on Morphological Typology taught by Patience Epps and Anthony C. Woodbury. In fact, many of the tests that were applied to Chácobo in Tallman (2021c) were suggested by other fieldworkers while we attempted to operationalize wordhood tests in language after language. I did not invent the variety of tests myself, rather they gradually emerged from discussing how different linguists would apply the tests in languages they specialized in.

The notion of a planar structure and test fracturing grew out of this collaboration. A planar structure is an array of structural positions that code the relative ordering of elements in a referential (nominal) or predicate (verbal) domain. The planar structure is a hypothesis space for coding constituency test results as spans over adjacent positions. The hypothesis space homogenizes morphological and syntactic representations *pro tempore*. If "words" or the word-phrase distinction are valid constituents they do not emerge from the planar structure itself, but from the patterning of constituency test results over the planar structure. The planar structure codes positions with sequential numbers and constituency test results are coded as spans over those positions.

Fracturing is the methodology employed to deal with the ambiguity of relatively abstract constituency tests or domains in their application to real empirical phenomena. When ambiguity is recognized, the researcher decomposes (fractures) the test into multiple versions. For instance, consider the case described above with non-interruptability. Rather than choosing a single "correct" interpretation of non-interruption, we fracture the non-interruption domain into a domain not interruptable by a free form and a different domain that is not interruptable by a "promiscuous" element. If linguist A discovers a version of a test not identified by linguist B, then the latter makes an attempt to apply the new version of the test to their language data as well. Thus the variables of constituenthood evolve through the reciprocal interaction of fieldworkers and become increasingly fine-grained and more comparable in the process. The research conducted in this fashion also benefits from the fact that researchers approach the issue of constituency from different intellectual traditions, further enriching the variables (see Sections 6 and 7).

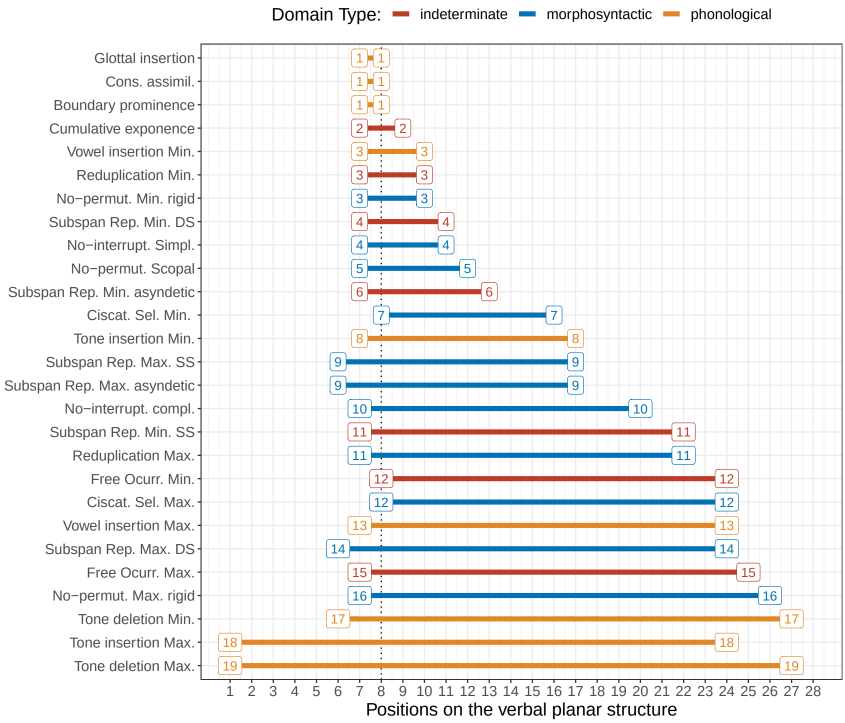
A researcher might suspect that the nonconvergences found with Chácobo would be common cross-linguistically (Bickel & Zúñiga 2017). However, application of the methodology revealed that there are apparently radical differences between languages with respect to the degree to which independent morphosyntactic and phonological principles tend to cluster. Consider the following two orthographic "words" in Chácobo and Central Alaskan Yupik. The elements in numbers are positions in the respective planar structures (see below).

(11) Chácobo (Pano):
tɨpas$_8$ *wɨni*$_{16}$ *-tsa*$_{16}$ *-kas*$_{17}$ *-i*$_{24}$ *-kiá*$_{25}$
murder -before.someone immediately:ITR:SG -want -DECL -REP
'He wanted to murder him immediately before it was too late (it is said).' (Tallman 2017: 54)

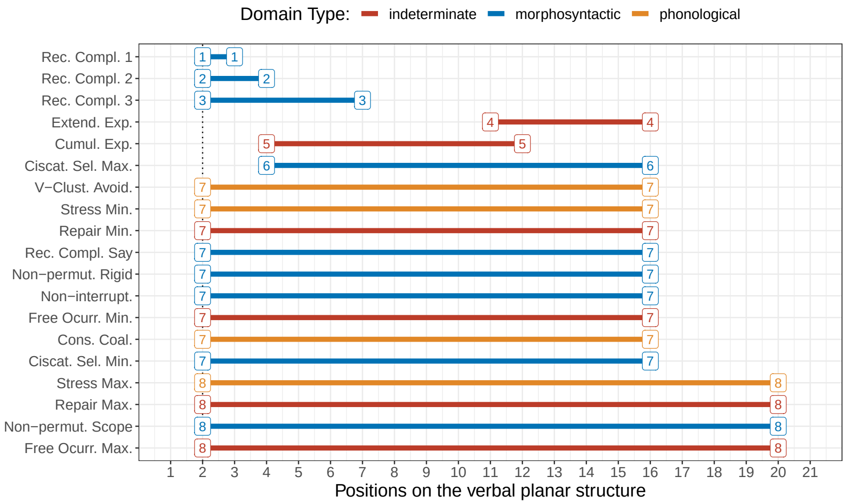
(12) Central Alaskan Yupik (Inuit-Yupik-Unangan):
quuyurni$_2$*-arte*$_3$*-llru*$_6$*-yaaqe*$_8$*-llini*$_9$*-u*$_{12}$*-q*$_{16}$
smile-suddenly-did-alas-evidentlyIND-3SG.S
'Evidently, s/he suddenly smiled, but alas.' (Woodbury 2002: 85)

In Chácobo, the relevant orthographic word is identified only by a version of the minimal free occurrence test. The orthographic word is also identified by free occurrence in Central Alaskan Yupik. However, in the Central Alaskan Yupik case, the orthographic word is identified by stress prominence, segmental allomorphy, 'say' conjunction, selection, fixedness and is furthermore a repair domain.

Planar structures were constructed for Chácobo and Central Alaskan Yupik (see Tallman 2021c and Woodbury 2024 [this volume] respectively). One way of displaying the results of constituency tests over the planar structure is by a convergence plot. A convergence plot is a strip plot that has the positions of the planar structure on the x-axis and the coded constituency tests on the y-axis. Figures 1(a) and 1(b) display convergence plots for Chácobo and Central Alaskan Yupik respectively (Auderset & Tallman 2023 for relevant terminology). A convergence between tests is where their left and right edges align on the x-axis. Convergent tests receive the name numerical label in the plots. For instance, in Figure 1(a) Glottal insertion, consonant assimilation, and boundary prominence in Chácobo all three span positions 7–8 and are given the joint label $\boxed{1}$. We can see from these plots that while both languages display misalignments, Central Alaskan Yupik has a domain of structure from position 2 to 16 (the traditional



(a) Chácobo (Pano), see Tallman (2021c) for details.



(b) Central Alaskan Yupik, see Woodbury (2024 [this volume]) for details.

Figure 1: Constituency convergence plots. See list of abbreviations at the end for full labels.

orthographic word in this language), where a number of constituency tests align. In Chácobo, there is much less convergence overall.[8]

Starting in 2017 at UT Austin, a number of researchers applied the planar-fractal method to a number of languages. The method travelled to the University of Ottawa and to the Laboratoire Dynamique du Langage (CNRS, Université de Lyon II), eventually diffusing to researchers at other institutions. The planar structure and application of the constituency tests is applied by researchers that are experts or expert native language speakers on the relevant languages. Researchers are asked to apply and critique constituency tests presented in the literature using the methodology and, where possible, reflect on how the results relate to published theoretical literature. A researcher might add a new constituency test not reported by other researchers. The other researchers in the project are then asked to apply the new test insofar as it is well formulated enough to apply without ambiguity. Researchers in the relevant project are encouraged to not just apply the methodology but critique and develop it as well. The variables for comparison are thus developed enriched through original empirical research. The idea is to pool perspectives and experiences from different researchers to enrich the variables, rather than applying them in a pre-defined top-down fashion or seeking to rally diagnostics here-and-there to ratify predefined formal categories such as "word" or "phrase."

This book presents the ongoing results of this collaborative project. The first goal was to use the methodology to help enrich descriptions of lesser described languages. Many of the chapters were written in the context of a PhD project on the documentation of the language in question. Secondly, the methodology is used to test claims about constituency and wordhood stated in the literature from a broader cross-linguistic perspective. The results suggest that there is much more cross-linguistic variation in constituency structure than would appear to be expected based on the current literature. Whether the methodology can be used to test competing hypotheses about constituency structure is partially contingent on whether those hypotheses are precise enough to be testable to begin with. In this respect, the methodology also provides a data structure for typological comparison that allows for the development of more testable hypotheses. I think the participants in this project have overall found that the methodology provides a powerful discovery procedure for the purposes of enriching linguistic description and documentation. The results have revealed that many claims

[8]Note that this figure does not present all of the tests from Chácobo, which is simplified somewhat for expositional purposes. The important point is to observe that the overall convergence pattern is different from that of Central Alaskan Yupik.

about typological regularities and variation in wordhood and constituency are oversimplified and should be revised.

3 Basic linguistic theory

Basic Linguistic Theory (BLT) seeks to provide a general framework and methodology for linguistic description and typological comparison (Dixon 1997, 2010). The framework has been the most influential in language description over the past 20 years.[9] Despite its near hegemony in descriptive linguistics, the framework is not without its critics (McGregor 2021). There is also some question as to whether all linguists interpret "Basic Linguistic Theory" in the same way (Haspelmath 2008).

In what follows I will be concerned with the notion of BLT represented in R.M.W. Dixon's authoritative statement on the approach (Dixon 2010). I will focus specifically on the approach to grammatical and phonological wordhood within BLT as articulated in Dixon & Aikhenvald (2002), Dixon (2010) and Aikhenvald et al. (2020), and refer to other authors where relevant. I focus on this approach to grammatical and phonological wordhood for two reasons. First, it is my impression that it has the status of a virtual orthodoxy within linguistic description: descriptive linguists assume that the units "phonological" and "grammatical" word are present in the language under study and describe that language in those terms, rather than investigate let alone test the claim. Secondly, the methodology for this project partially developed as a critique of the BLT framework for describing and comparing grammatical and phonological words. Thirdly, many of the assumptions of BLT are commonplace across linguistics and approaches to the relationship between morphosyntax and phonology. In what follows I hope to highlight these assumptions, pointing out which of them I think are empirically unfounded.

The BLT approach recognizes that diagnostics for wordhood do not necessarily align with one another. BLT solves this by positing that grammatical words and phonological words should be distinguished. A basic statement of the how to study words in particular languages and cross-linguistically is summarized by Dixon (2010: 10):

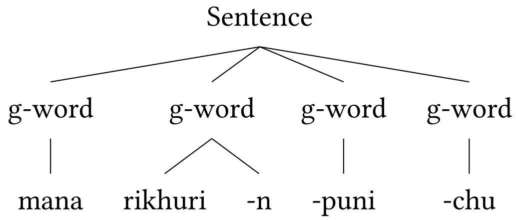
[9] I should point out that this is a very subjective impression. It is somewhat difficult to judge how influential BLT is in grammar writing because it probably tends to depend on the domain of grammar. Furthermore, analyses or assumptions can adopted in degrees rather than *in toto*. It would be hard to say that BLT has had much influence on the writing of phonology chapters in grammars over the years where the trend is to include more and more detailed phonetic information. I do not think it is too controversial though to point out that in the domain of wordhood it has become a standard.

(13) a. Recognize "phonological word", determined on entirely phonological principles.
b. Recognize "grammatical word", determined on exclusively grammatical (that is morphological and syntactic) principles.
c. Compare the two units. In some languages, grammatical word and phonological word may coincide. In other languages, grammatical and phonological word will coincide in most cases, but with a number of instances where one grammatical word may consist of more than one phonological word, and/or vice versa.

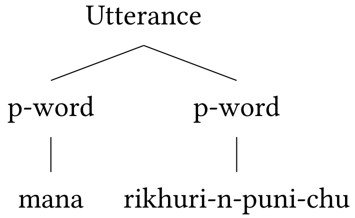
By phonological principles Dixon refers to phonological constraints (e.g. no coda consonants in a specific domain) and phonological processes (e.g. intervocalic voicing). It is not clear whether phonological principles also include so-called "post-lexical" processes or phonetic modifications related to phonological constituency generally (more on this below). Grammatical principles refer to properties holding of specific domains of structure (e.g. inability to permute elements or re-curse constituents). It is unclear how grammatical principles exclude phrase identifying processes. The identification of a distinction between grammatical and phonological words, of course, represents an important advance in linguistic description. By allowing grammatical and phonological words to misalign, it allows one to capture the generalizations that hold of these constituents while capturing some of the complexities of the relationship between phonology and morphosyntax. For example, recognizing a distinction between grammatical and phonological words allows one to capture the differences and similarities between affixes and clitics in South Bolivian Quechua (Gladys Camacho-Rios personal communication). The misalignment between g(rammatical)-words and p(honological)-words is represented with the labelled diagram below the example.

(14) g-word ⊂ p-word
South Bolivian Quechua:
mana rikhuri-n=puní=chu
NEG appear-3=certainly=NEG
'It certainly did not appear.'

(15) a.



b.



The g-words are elements or combinations of elements that can be displaced but with their internal parts in tact. The g-word *rikhuri-n* is not interruptable by a free form or clitic element and the internal parts of this constituent display little variable ordering. The clitics *=puni* and *=chu* are not part of the grammatical word because they can occur right-adjacent to a noun phrase as well (without necessarily corresponding to a difference in meaning).

However, the principles for identifying g-words (morphemes of combinations of morphemes that cannot be interrupted or split apart into pieces) do not line up consistently with phonological principles we can rally for identifying p-words. The clitics, while being independent g-words are incorporated into a pitch accent domain of the verb (projected from the verb root). The pitch accent domain is identified based on the distribution of Low-High* pitch accents on the penultimate syllable in of the relevant domain (the p-word in the domain above).[10]

BLT is not particularly clear about what phonological and grammatical principles identify "phrases." It is only stated that some sort of grammatical hierarchy exists (Dixon 2010: 33). In the Quechua case above in particular it is not clear whether the p-word should instead be regarded as a phonological phrase, for instance.

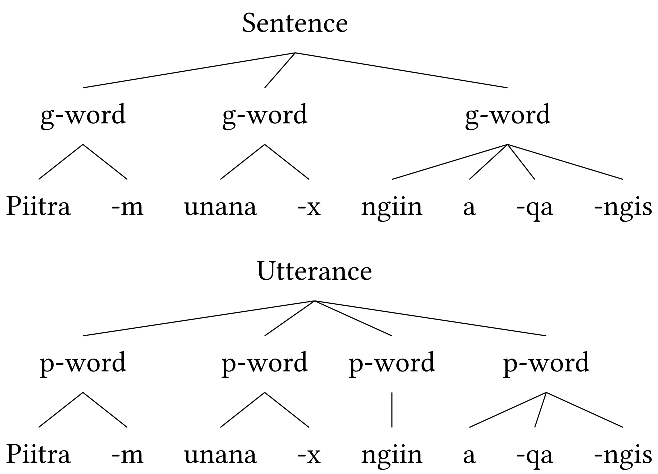
Another type of misalignment warranted by BLT is where the phonological words are smaller than morphosyntactic words. An example comes from Atkan Aleut. Woodbury (2011) refers to pronominal elements that are obligatorily left-adjacent to the verb stem as "unclitics". (Zúñiga 2014 refers to these as "anti-clitics"). They obey a principle of contiguity for g-words, but still have other

[10]This means that the high part of the tone is realized on the "stressed" syllable and the low pitch is (typically) realized on the previous syllable.

properties that Woodbury (2011) associates with p-words. A simplified depiction of the analysis of such forms presented in Woodbury (2011: 129) is presented below.

(16) p-word ⊂ g-word
Atkan Aleut:
Piitra-m *unana-x* *ngiin* *a-qa-ngis*
Peter-rel.sg cook-abs.sg for.3.pl be-pst1-3pl.NS/3.sg.S
'Peter was a cook for them.'

(17) a.
b.



Woodbury argues that the element *ngiin*, while being a separate p-word is part of the g-word of the rest of the verb. It is an unclitic, because it inverts the standard relationship definition of clitics as prosodically dependent, but grammatically independent. Woodbury does not explain why the g-word which takes in two inflected elements could not be considered a phrasal or subphrasal constituent. But, the point is that his description is broadly in line with the assumptions of BLT, despite the misalignment.

These types of misalignments (g-word ⊂ p-word and p-word ⊂ g-word) exhaust what is statable in the BLT approach without modification. The researcher identifies grammatical and phonological principles, refers to the domains of structure where these principles hold as grammatical and phonological words respectively and describes how they align or do not.

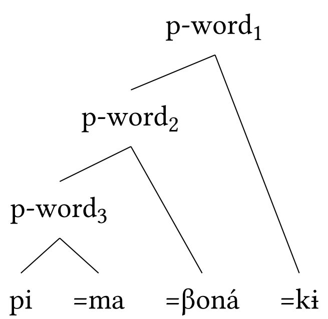
There are at least two other types of misalignments that BLT does not have the vocabulary to express. These are cases where different candidate g-words (g-domains) or different candidate p-words (p-domains) misalign with each other. These were already discussed in §1, but they are worth mentioning again.

For an example of cases where candidate p-words misalign with each other consider the example in (18).

(18) p-word$_1$ ≠ p-word$_2$ ≠ p-word$_3$ …
Chácobo (Pano):
pi=má=βoná=kɨ
eat=CAUS=going=DECL:PST
'He made him eat on the go.'

In Chácobo the constituent *pi=ma* 'causative to eat' could be regarded as a p-word on the grounds that it is a domain of obligatory minimality, without *=ma* 'causative', the verb root can lengthen (*pii=βona…* 'eat while going.') However, it would not be accurate to simply state that *=βoná* 'going' does not phonologically interact with the rest of the verb complex as the identification of *pi=ma* 'make someone eat' as the phonological word implies. The clitic *=βoná* 'going' blocks the insertion of a default high tone by having a lexical tone itself. In cases where the rest of the verb complex has no underlying high tone, the presence of a high tone on *=βoná* blocks high tone insertion. For instance, without a high tone bearing suffix *hana* 'leave' is realized with a high tone on the first syllable, but otherwise this is blocked by morpheme like *=βoná*. Therefore we could also say that *pi=ma=βona* is the phonological word. This would ignore the fact that a different phonological principle identifies the whole string *pi=ma=βoná=kɨ* as a phonological word, however. All of the aforementioned elements are in a domain of obligatory tone reduction whereby adjacent lexical high tones delete Tallman (2018, 2021c). The ambiguity of is depicted in (19).

(19)



A number of issues arise in this case. One might claim that either p-word$_1$ or p-word$_2$ are phonological phrases (or "composite groups"). the labelling issue (phonological word or phonological phrase) highlights a general problem with the BLT framework.[11] Phonological principles (e.g. phonological processes/ rules) also apply at higher levels of structure. These data highlight the fact that an adequate typology of phonological and grammatical words cannot be decontextualized from issues of constituency in general.

Examples where grammatical principles misalign and thus provide competing notions of g-words are not hard to come by either.[12] Consider the following example from Teotitlán del Valle Zapotec.

(20) g-word$_1$ ≠ g-word$_2$ ≠ g-word$_3$ ...
Teotitlán del Valle Zapotec:

r-	*œ-*	*sut*	*-nœ̄*	*-iˀny*	*=zá*	*=an*	*lǎ̰:n*
HAB-	going-	going:play	-COM	-DIM	=also	3SG.INF	3SG.INF

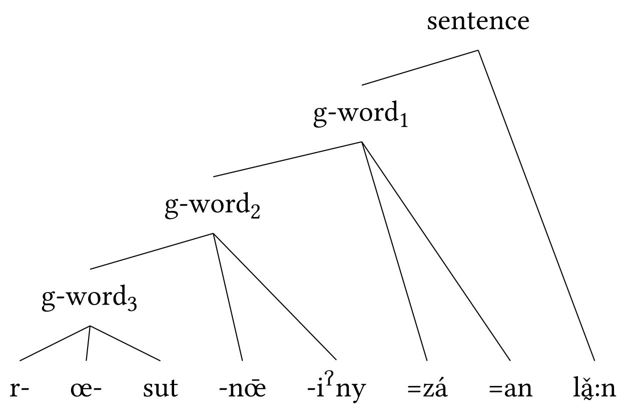
'S/he goes to play with him/her (how nice!).' (Gutiérrez & Uchihara 2024 [this volume])

The syntagm *r-œ-sut* 'going to play' is a g-word under principles of selection, minimal free occurrence and sharing under conjunction. The syntagm *r-œ-sut-nœ̄-iˀn* is a g-word under principles of non-permutability and non-interruption by a free form. The syntagm *r-œ-sut-nœ̄-iˀny=za=an* is a g-word under principles of non-interruption by a noun phrase, repetition under conjunction and maximal free occurrence (Gutiérrez & Uchihara 2024). The full picture is hard to depict in a tree diagram because a rigorous application of constituency tests gives us bracketing paradoxes in TV Zapotec. A simplified depiction of the results is provided in (21).

[11] Many current prosodic phonology analyses also posit that prosodic domains can "recurse." One might argue that (19) provides evidence that p-words are recursive in Chácobo. However, adopting recursion does not address the issue of ambiguity in label assignment, but rather exacerbates it, increasing the potential of arbitrariness of label assignment: in the case above, one could also claim that every single one of the candidate p-word domains are recursed phonological phrases, or perhaps any other layer of the prosodic hierarchy (see §4.3).

[12] Many morphosyntactic theories seem to be motivated by the fact that grammatical principles misalign, such as Baker's (1988) movement analysis and Sadock's (1991) autolexical approach to noun–incorporation. These authors do not appear to question the identification of "words", however. They seem to rely heavily on orthographic practices to parse up the boundaries between the modules that their theories presuppose.

(21)



The same issues arise in this case. What is designated g-word$_1$ or g-word$_2$ could perhaps be reanalyzed as a “phrase”, but such an analysis does not fall out of the principles described in (13).

Given the fact that p-word and g-word domains misalign, a naive linguist might wonder what the purpose is in identifying “words” at all in the description and comparison of individual languages. Entertaining such a possibility contradicts a central dogma underlying much contemporary descriptive and theoretical linguistics, however. I refer to this as the “word bisection dogma.” Dixon articulates the dogma succinctly.

(22) The word bisection dogma:
Units ‘phonological word’ and ‘grammatical word’ can without doubt, be recognized for all languages. (Dixon 2010: 7).

I use the expression “bisection”, because the abstract notion of “word” only needs to be split into two versions in this formulation. I refer to the claim as a “dogma”, because it is adopted uncritically in much language description and comparison. If a descriptive linguist claims that the principle does not apply or work for a given language, they are generally treated as ignorant or insane.

On one reading the claim in (22) is simply a tautology, and, therefore, the expression “without doubt” is warranted. I refer to this as the “fiat-based word bisection dogma.” On another reading, Dixon is making an interesting empirical claim about the structure of all (or most?) languages. I refer to this as the “empirical word bisection dogma.” On this reading the “without doubt” expression is not warranted based on our current knowledge. The fiat-based and empirical interpretations of Dixon’s claim should be kept distinct. However, many researchers seem to assume that the more substantive empirical claim follows from the fiat-based one, which is fallacious. Below, I explain the issue in more detail.

The fiat-based word bisection dogma follows from the fact that (domain-bound) grammatical and phonological principles exist at all. Once the linguist has found some domain of structure where a grammatical principle holds (e.g. "fixedness of order") one can recognize that domain as a g-word. If one finds another domain where a different grammatical principle holds (e.g. "non-interruption by a free form"), there is no problem at all if this does not line up with the domain that was already christened as a "word." When we have competing domains, the linguist simply arbitrarily designates one of the domains as a "word", discarding the other grammatical principles as irrelevant or unreliable. Another linguist (or even the same linguist) could refer to the second domain as a g-word, even if they do not line up. The same holds for phonological domains. If a stress domain and a vowel harmony domain misalign, just christen one as *the* phonological word and be done with it. One need only insist that the other domain not-so-christened is not a reliable criterion in the language in question.[13] Since there is no justificatory logic behind fiat-based designations apart from appeals to authority such an explanation will suffice.

On the tautological interpretation Dixon is simply referring to the linguist's ability to label certain domains "p-word" and/or "g-word." No claim is made about g-words or p-words having a unique interpretation from language to language or from description to description and the fact that grammatical and phonological principles might not line up to give the same results is not a problem. The linguist is free to discard certain grammatical and phonological principles as irrelevant to their identification of g-words and p-words according to the alignment of the stars, the flip of a coin, or the flippant suggestions of a more senior linguist. The misalignments described for Chácobo and Zapotec above pose no problem for the tautological fiat-based interpretation because the linguist is free to choose any of the competing p-words or g-words as constituting the "real" instance of these categories according to how they feel, or perhaps according to precedence in their area of study ("Other Uto-Aztecanists/Zapotecanists/Arawakanists etc … have defined it in this fashion and so I follow them".)

There is no problem, in principle, with the tautological word bisection dogma. It may even have expositional value in linguistic description and analysis. The expositional value of the fiat-based use of the notion of "word" is expressed most clearly by Chao in his *Grammar of Spoken Chinese*.

[13] There could be a more empirically substantive notion of a test being poorly suited to a particular language. This could be defined as cases where a test is highly ambiguous providing a number of results.

> Not every language has a kind of unit which behaves in most (not to speak of all) respects as does the unit called "word" when we talk or write *in* English about the subunits *of* English. It is therefore a matter of fiat and not a question of fact whether to apply the word "word" to a type of subunit in the Chinese sentence which has so many points in common with, and so few points divergent from, the English word "word" as to warrant the use of that term without danger of serious misunderstanding. As we shall see when we come to actual cases, we shall meet various types of word like units which can claim to be called the word, which overlap to a great extent, but which do not have quite the same scope. As usual, I shall prefer to use a familiar term, with a warning against making unwarranted inferences, in preference to using unfamiliar terms, which, though safe from being misunderstood, are often also safe from being understood. (Chao 2011: 159)

Thus, one can assign the label of "word" to a particular constituent as a matter of convenience since it could bootstrap understanding of an unfamiliar concept.[14]

But it follows as a matter of logic that one linguist's g-word and p-word will not necessarily be comparable to the next linguist's, even in the same language. There is also the danger that certain facts about the relevant language will remain poorly or imprecisely described. What would be the value in describing a potential diagnostic for g-words or p-words that does not line up with our preferred analysis (Haspelmath 2011) especially if authorities in the field *insist* that such constituents are manifested in all languages "without doubt"?

On the empirical word bisection dogma, Dixon is making a substantive claim about regulative principles or constraints underlying the distribution of grammatical and phonological properties across the languages of the world. On this interpretation, Dixon is wrong to claim that grammatical and phonological words can be identified "without doubt." For this position to hold, Dixon would have to articulate how the grammatical and phonological principles he considers relevant would be patterned were the word bisection dogma false. All substantive empirical claims depend on a description language that allows them to articulate what it would mean for them to be falsified in order to show that they are not tautologies (Mayo 2018). This is what it means to have a substantive empirical claim.

[14]As a matter of descriptive convenience it is just as likely that the notion of "word" obfuscates more than it clarifies and the purported understanding or agreement achieved is by and large an illusion. There is an important difference between a description *feeling* intelligible and having a detailed understanding of the case at hand as there is an important difference between agreement and the illusion of agreement (see Smaldino 2017, Kahneman et al. 2021 on the illusion of agreement).

However, BLT has no vocabulary or descriptive language for even articulating the relevant counterfactual.

It is not always clear when a linguist is advocating a fiat-based or an empirically contentful conception of wordhood. Haspelmath (2023) is explicit in proposing a fiat based definition (not an empirically substantive theory) of "word" for all languages. Certain passages in Dixon & Aikhenvald (2002), Dixon (2010) and Aikhenvald et al. (2020) suggest that they are pushing an empirically contentful claim about the existence of "words" in languages. For example consider the following passage:

> It is not impossible that there would be a language that lacks phonological words and/or grammatical words, but we are not at present aware of one. (Dixon & Aikhenvald 2002: 32)

However, they do not articulate what such a hypothetical language would look like. It is hard to see from their discussion and their methodology how such a situation could arise, i.e. the claim appears to be tautological (Tallman 2020). As such all claims that insinuate that grammatical and phonological words are present in all languages in BLT as it is currently formulated are unfalsifiable and, therefore, ascientific. Insisting that all languages have grammatical and/or phonological words in the absence of any clear articulation of what the falseness of such a claim would entail empirically can only reflect a metaphysical prejudice rather than a scientifically valid position.

In any case it is interesting to consider what an empirical version of the word bisection dogma could amount to.

A strong version of the empirical word bisection dogma would claim that all phonological principles converge on a single domain and all grammatical principles converge on a single domain. However, this is clearly false and is well recognized as such by everyone who has discussed the topic to my knowledge (Carnie 2000, Hildebrandt 2007, Bickel et al. 2009, Bickel & Zúñiga 2017, Haspelmath 2011, Tallman & Auderset 2023). Such a claim would be implausible on diachronic grounds alone as we would expect grammaticalizing elements to gradually integrate into word domains over time (Bybee et al. 1998, Schiering 2006).

Another rendition of the empirical word bisection dogma is that it is probabilistic. This version of the claim seems to be presupposed in the following claim by Matthews (2002: 274):

> No [wordhood] criterion is either necessary or sufficient … But they are relevant insofar as, in particular languages, they do tend to coincide.

One interpretation of this claim is that the g-domains and p-domains tend to converge around unique results more than one would expect if they were distributed according to chance alone. In this perspective the g-word and p-word are seen as regulatory principles that predict statistical clusterings of grammatical and phonological properties. We do not predict perfect coincidence between grammatical principles, nor between phonological ones, but enough to support the idea that grammar can be divided into word and phrase structure in the morphosyntactic domain (morphology versus syntax) and phonological domain (lexical versus post-lexical phonology).

In Bickel et al. (2009) this issue is engaged with, if not directly tested, in the phonological domain. Bickel et al. (2009) argue that the p-domains do not cluster around one abstract p-word domain cross-linguistically. Thus, on the interpretation that criteria should tend to cluster, it is not clear that Matthews' conjecture is correct. At least in the phonological domain the assumption seems to be falsified. As far as I know, Matthews claim about the tendency of wordhood criteria to cluster has not been tested systematically in the morphosyntactic domain. In Tallman 2021c I argue that it is not obviously true based on the application of wordhood tests in Chácobo.

This does not mean some version of the word bisection dogma as a regulative principle cannot be established when we look at the relevant phenomena cross-linguistically. This question is partly what motivated the collaborative project which resulted in this volume: is there an empirically contentful, but perhaps statistically justifiable version of the word bisection dogma that can be defended? Addressing this question requires a typological project that codes and measures the degree to which the relevant criteria align.

Insisting on a definition of the concepts by fiat may have some value in another research context (Haspelmath 2023), but it is not the concern of this volume.[15] We are concerned with describing and theorizing about patterns relevant to understanding identifiable empirical phenomena of the languages of the world, not with ratifying or rejecting some fetish in linguistics for traditional terminology.

[15]Note that Haspelmath (2023) provides a definition of a "word", which is not based on any phonological criteria. Those wishing to maintain a distinction between g-words and p-words might choose another contrasting phonological criterion to define the p-word. For instance, one could claim that the phonological word is always a minimality domain or always the stress domain. There may be some research contexts where such a universal definition is useful or even necessary. But it remains unclear why such a designation would invalidate a research program that seeks to investigate how different notions of the word, or different domains, cluster with one another cross-linguistically.

4 The prosodic hierarchy (hypothesis)

The Prosodic Hierarchy Hypothesis (PHH) is perhaps the most prominent hypothesis that is concerned with the relationship between morphosyntactic and phonological domains. The more orthodox articulations of the theory state that all languages come with a fixed number of (post-lexical) phonological layers (prosodic word, phonological phrase, utterance phrase etc.), which are projected (or mapped) from morphosyntactic constituency in a constrained fashion (Vogel 2023: 111). A corollary of this idea is that the relationship between morphosyntax and phonology is "indirect": Morphosyntactic objects are translated into phonological ones where they can be interpreted by a phonological and/or phonetic component of grammar. The mapping process eliminates details from the morphosyntax from phonology's vantage point. This information reduction constrains the types of relationships that phonology can bear with morphosyntax. That is the idea anyway. In practice, the diversity in projection and parsing rules and the flexibility with which morphosyntactic and phonological domains can be constructed by the analyst makes the PHH (and associated auxiliary hypotheses) hard (or impossible) to test.

This section provides a brief overview of the PHH and the typological studies which have sought to test it. The methodology employed in this volume was inspired by the latter studies but sought to advance from them and overcome some of their shortcomings.

To illustrate the basic idea of the PHH and indirect reference consider the following sentences from Chácobo in (23) and (24). Note that in Chácobo the ergative tone is a floating high tone.

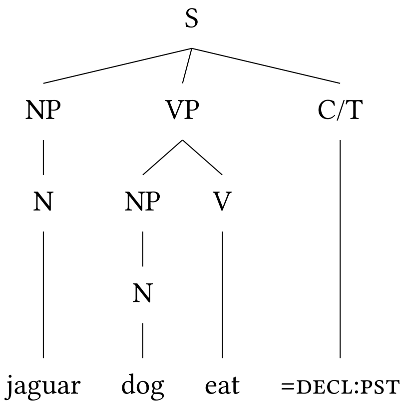
(23) *kamano=́ ina pi=kɨ*
jaguar=ERG dog eat=DECL:PST
'The jaguar ate the dog.'

(24) *ína píi kamano=́ =wa=kɨ*
dog eat jaguar=ERG =TR=DECL:PST
'The jaguar ate the dog.'

The sentences above serve to illustrate two facts about Chácobo. The displacement of the syntagm *ina pi* 'dog eat' from its position in (23) to its position in (24) suggests that the object and the verb root in Chácobo form a constituent excluding the clause-type and tense clitic *=kɨ* 'declarative past'. On the other hand comparison of the two examples shows that when *=kɨ* 'declarative past' is right-adjacent with the verb root as it is in (23) it behaves as a phonological constituent with the root, blocking the vowel lengthening manifest in (24). Assuming that the blocking of the vowel lengthening signals that *pi* and *=kɨ* are a phonological constituent in (23), we thereby arrive at an analysis where the an abstract syntactic structure motivated through constituency tests does not line up with phonological groupings based on minimality-induced processes, specifically blocking, permitting or obliging the insertion of phonological material to meet a bimoraicity requirement (Tallman 2021c).

We could posit the morphosyntactic structure for the Chácobo sentence in (23) with the translation rules in (26), resulting in the prosodic tree in (25). The structures below are simplified, only presenting constituency structures I discussed evidence for in the preceding paragraph (I assume that nouns and verbs are distinct and that Chácobo has noun and verb phrases, C/T stands for clause-type and/or tense, S stands for sentence).

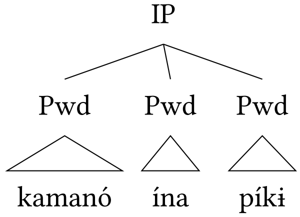
(25)



(26) Morphosyntactic to phonological constituency translation

a. Lexical (X^0) elements project a phonological word.
b. A lexical (X^0) root parses nonlexical (clitic?) elements to its right into a phonological word (Pwd) if they are not already in a Pwd of their own (or clitic elements integrate into the prosodic word to their left).
c. Translate the highest projection into an intonational phrase (IP).

(27)



We stipulate that if a Pwd is not minimally bimoraic, a root will undergo vowel lengthening. This captures the obligatory lengthening of *pi* ‘eat’ to *pii* ‘eat’ in the example in (24).

The analysis sketched above illustrates non-isomorphy between morphosyntactic and phonological domains: in the morphosyntactic analysis *pi=kɨ* is not a constituent, but in the phonological analysis it is. Or, put another way. Phonological rules of Chácobo rely on a (surface) constituent structure which is different from that which is motivated from morphosyntactic constituency tests. The analysis illustrates what is meant by indirect reference: minimality is built out of *Pwd*, which is in turn parsed from abstract notions like lexical X^0.[16] Note that the translation from morphosyntax to phonology does not make reference to part of speech categories like “noun” or morphosemantic content like PST. It only makes references to different layers of X and the distinction between lexical and functional categories. Typically lexical categories will project a phonological word but non-lexical categories will not (Selkirk 1996, 2011, Werle 2009). The mapping rule also requires a morphosyntactic analysis with some type of division into levels for a correct formulation. If we gave Chácobo a different morphosyntactic structure by, for instance, assuming that *ina pi* ‘dog eat’ was under X^0 our parsing rules would no longer make the correct predictions. Thus, articulating one’s morphosyntactic analysis is crucial for meaningful assessment of the predictions of any prosodic phonology analysis. If one does not present the evidence for X^0 or any of the presupposed constituency structures, the prosodic analysis will not make meaningful cross-linguistic predictions, nor be comparable to other prosodic analyses.

The Prosodic Hierarchy Hypothesis assumes that all languages manifest a universal prosodic hierarchy which is mapped from morphosyntactic constituency in a constrained fashion, depicted in (28).

[16]The parsing rule provided more or less gives a “relational rule”; an edge-based formulation might say that Pwd is parsed from the left edge of lexical X^0.

(28)
$$\begin{array}{ccll} \mathrm{CP} & \Rightarrow & \mathrm{IP} & \text{(Intonational phrase)} \\ | & & | & \\ \mathrm{XP} & \Rightarrow & \mathrm{PPh} & \text{(Phonological phrase)} \\ | & & | & \\ \mathrm{X}^0 & \Rightarrow & \mathrm{Pwd} & \text{(Phonological word)} \end{array}$$

Phonological processes make reference to phonological domains, not morphosyntax directly. A phonological rule that refers to morphosyntactic words or phrases is banned. This requirement will not make an empirical difference unless the mapping rules result in non-isomorphy. Phonological domains are constructed out of structures such as X^0 and XP. They do not make reference to noun phrases or verb phrases as such. X'-theory or one of its descendants, which presumes that there is phrase structure homogeneity across verbal, nominal and adjectival domains is presupposed. Indeed it is necessary for the translation process to occur. This prevents a phonological domain from being specific to a part of speech class or specific construction.

It is important to highlight what this perspective shares and what it does not share with the BLT formulation of morphosyntactic and phonological wordhood. Both the PHH and BLT assume that there is a hierarchy of constituents. Discussions of such issues generally presuppose that the identification of distinct and comparable levels cross-linguistically is somehow obvious: not much attention is given to the possibility that there might be some ambiguity in distinguishing between "word" and "phrase." The PHH also assumes the word bisection dogma: that a distinction between morphosyntactic and phonological words is sufficient for describing misalignments between candidate wordhood diagnostics. The PHH often comes coupled with a few other auxiliary positions, not explicitly articulated by BLT. For instance, BLT does not make explicit a distinction between lexical and post-lexical phonology, but this is assumed in much of the prosodic phonology research (Scheer 2010). Relatedly, in most formulations of prosodic phonology, mapping rules do not make direct reference to information like part of speech classes. But this assumption is not made explicit in BLT. One wonders, however, whether such assumptions are *implicit* in the word bisection dogma. Does the notion of a phonological word really make sense if its content and/or relationship to morphosyntax varies from construction to construction, or part of speech category to part of speech category?

The PHH shares with BLT the adoption the word bisection dogma and presents us with a set of labeling conventions for dealing with misalignments of the types $p_1 \neq p_2 \neq p_n$ and $g_1 \neq g_2 \neq g_n$. Misalignments in the morphosyntax can be handled by positing that the relevant g-domain is a phrasal, subphrasal or even a subword constituent. Despite the fact that misaligning domains can be dealt with by means of a more elaborate set of labels, there is still unresolved ambiguity with respect to which domain receives which label, a point I elaborate on below.

The PHH purports to make substantive predictions about the relationship between morphosyntactic and phonological domains. It is often implied that there is wide scale empirical support for the hypothesis and that it makes substantive predictions about language structure (Bennett & Elfner 2019), i.e. it is not just a set of arbitrary labeling conventions. Despite such triumphalist claims, it is not really accurate to discuss a single PHH. The empirical content of the hypothesis will vary drastically depending on what supporting auxiliary hypotheses are adopted and how one maps the metalanguage of the theory to language specific facts. Furthermore, the auxiliary hypotheses often weaken the predictions of the theory substantially. Below I take stock of these auxiliary hypotheses and assess their importance for the testability of (or some version of) the PHH and the general usefulness of the PHH for language comparison. The first three points are well known and widely discussed and debated in the prosodic phonology literature: (i) adding more layers (§4.1); (ii) skipping layers (§4.2); (iii) recursion (§4.3). The last two points concern issues which are less discussed, but further weaken the claims of the PHH (§4.4 and §4.5). The final point concerns the most obvious empirical prediction of the PHH about domain clustering, which current research suggests is false (Bickel et al. 2009). More generally though, I argue that PHH is not testable and therefore the idea that the PHH has broad empirical support is fallacious. The best we can do is say that there are certain versions of the PHH that have been shown to be false. Furthermore, I argue that as a typological metalanguage for language comparison, the PHH is problematic due to the ambiguity in mapping its categories and structures to actual languages. Linguists should move with caution when using concepts from the PHH for language comparison, and by extension description, as the concepts are abstract and their mapping to language particulars indeterminate. I suggest that the planar-fractal method offers a better alternative for language comparison (for now).

4.1 More layers

While the three layers displayed in (28) are assumed by most researchers, the literature attests to a wide variety of positions regarding which other layers might be relevant. In Nespor & Vogel (2007) a domain called the "clitic group" is posited to account for the behavior of combinations containing clitics between the prosodic word and the phonological phrase. The clitic group was abandoned when more sophisticated theories of clitic integration were developed in the 1990s (Booij 1996, Selkirk 1996, Peperkamp 1996, 1997). However, Vogel (2008) argues that such a constituent is still necessary, renaming it the "composite group". Downing & Kadenge (2020) adopts the "prosodic stem", a constituent lower than the prosodic word. Hildebrandt (2007) has shown that Limbu has too many domains to be able to be easily accounted for with the PHH. The possibility of adding (or removing) domains ad-hoc weakens the predictions of the PHH. At no point (except in the case of Schiering, Hildebrandt and Bickel) was the necessity of adding new domains seen as evidence against the PHH, but the possibility immunizes the theory against a specific type of counter-evidence. Actual practice in the field suggests, therefore, that the PHH does not place any constraints on the number of phonological constituents a language might have. It is perhaps true that the PHH could make some claim concerning the number of phonological layers that languages *tend* to have, but this has not been shown.

From the perspective of language comparison the possibility of adding new domains adds more ambiguity. Consider the case of adding the composite group or "kappa" to our vocabulary (Miller 2018, Vogel 2019). Now for a given p-domain in a language where the kappa was not originally introduced, we are not just faced with potential ambiguity between p-word and p-phrase, but also between p-word, p-phrase and kappa. This problem could only in principle be resolved with attention to cross-linguistically *operationalizable* morphosyntactic domains: kappa or whatever should relate to a kappa-specific morphosyntactic domain in a specific way. Otherwise the extra domain has no value for language comparison and introduces noise in language comparison. How are we to know that one linguists' kappa is not another linguist's phonological word or phonological phrase?

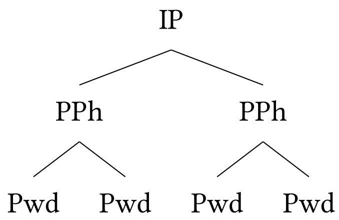
4.2 Layer skipping

The original version of the PHH posited "strict layering." An analysis that follows strict layering is one where in the parsing of elements into the prosodic hierarchy none of the layers can be skipped (Hayes 1989, Selkirk 1996, Nespor & Vogel 2007). I quote Selkirk for a more precise definition.

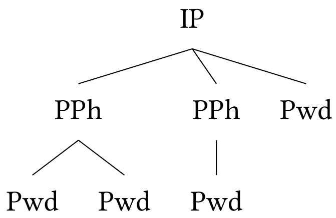
(29) The strict layer hypothesis
A constituent of category-level *n* in the prosodic hierarchy immediately dominates only a (sequence of) constituents at category-level *n*-1 in the hierarchy (Selkirk 1984: 437).

A prosodic word can only be composed of feet. A phonological phrase can only be composed of prosodic words. It cannot contain prosodic words and syllables. This hypothesis constrains the structure of phonological constituency. There are two ways of violating the strict layer hypothesis. One is through layer-skipping and the other is through recursion. I start with layer skipping. A structure without layer skipping would be as in (30a) and one with layer skipping would be as in (30b). The right-most prosodic word in this tree "skips" the phonological phrase.

(30) a.



b.



To illustrate the basic idea of layer skipping, consider the example from Chácobo below. There is a phonological domain in Chácobo where high tones are inserted if there is no underlying lexical L(ow)-H(igh) tone present.

(31) [nǒjaki ↓]
nǒya =kɨ
fly =DECL:PST
'S/he flew.'

When an underlying LH tone is present as in the example below, the high tone insertion is blocked. An H is not inserted on the first syllable as in the previous example.

(32) [nòjàjóki ↓]
noya =yǒ =ki
fly =COMPL =DECL:PST
'They all flew.'

The domain of initial H tone insertion/blocking is larger than the minimality domain that I identified as the PWd above (Tallman 2018). I thus assume it is the PPh, following the assumptions of the prosodic hierarchy.[17]

In the example in (33), the clitic *=kɨ̌* 'prior event, different subject' (not to be confused with toneless *=kɨ* 'declarative, past') blocks the insertion of the H tone as expected on *noya* 'fly' as expected.

(33) [píno nojàkɨ́ tsí honi tsájakɨ↓]

pino	*noya*	*=kɨ̌*	*tsi*	*honi*	*=* ́	*tsaya =kɨ*
humming.bird	fly	=PRIOR:DS	LNK	man	=ERG	see=DECL:PST

'When the humming bird flew the man saw it.'

In different subject dependent clauses, verb phrases can front as in the example below, where *noya* 'fly' appears before the subject *pino* 'hummingbird.' Note that in this example, the H tone is inserted on *noya* 'fly.'

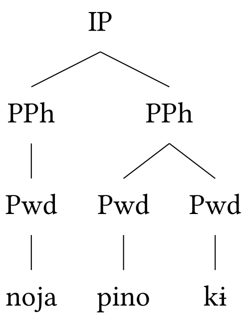
(34) [nója píno kɨ̌ tsí ɨ tsájakɨ↓]

noya	*pino*	*=kɨ*	*tsi*	*honi*	*=* ́	*tsaja*	*=kɨ*
fly	humming.bird	=PRIOR:DS	LNK	man	=ERG	see	=DECL:PST

'What the humming bird did was fly when the man saw it.'

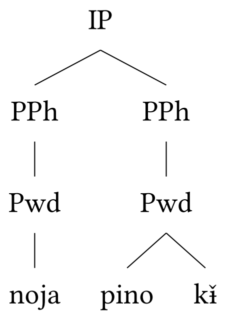
In the string *noya pino kɨ̌* two possibilities are warranted under strict layering. Either, the *=kɨ* must integrate into the Pwd projected from *pino* or it must itself project its own Pwd. The two possibilities are depicted below (excluding an analysis whereby the clitic projects its own PPh, which would not solve the problem at hand in any case).

(35)



17 But I could call it the "composite group."

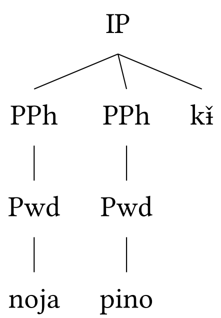
(36)



Neither analysis makes correct predictions. If we assume that *=kɨ̌* 'prior, different subject' projects its own Pwd, then it should lengthen to meet minimality requirements. Even if we allow it to integrate into an adjacent Pwd (for which there is no evidence based on vowel lengthening), its presence should block the insertion of an H tone on *pino* 'hummingbird', contrary to fact.

Our prosodic analysis can be saved from quick falsification, if we allow *=kɨ̌* to integrate post-lexically with a higher prosodic domain, say IP, depicted in the tree below. This involves "skipping" both the Pwd and the PPh layer.

(37)

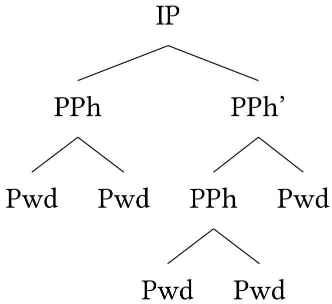


Violating strict layering makes the PHH weaker as it immunizes the theory further against potentially falsifying evidence, bringing it closer to the status of a tautology, i.e. a set of labels for annotating phonological domains and nothing else. As far as I have been able to discern the ability for clitics to integrate at various levels of the prosodic hierarchy does nothing except redescribe their phonological behavior in a stipulative fashion. Insofar as this interpretation is correct, layer skipping exonerates the PHH from making any predictions about clitic phenomena cross-linguistically. While it may be an elegant expositional device for representing language-internal and cross-linguistic differences in the behavior of clitics (Peperkamp 1996), it should be recognized as just that, not a theory that posits constraints on how much languages can vary.

4.3 Recursion

As stated above, in the original PHH, strict-layering prevents individual prosodic domains from recursing. An example of a recursive structure in prosodic phonology would be as follows. In the structure below PPh' is a recursed PPh of the lower domain.

(38)



The issue of whether recursive structures exist in phonology is somewhat controversial (Féry 2017, Tallman 2021b, Ishihara & Myrberg 2023, Kügler 2023, Bögel 2021, Cheng & Downing 2021, Ito 2021, Miller & Sande 2021). The reason seems to be related to the fact that different authors adopt different criteria for identifying recursion. Here I will limit the discussion to how the issue of recursive phonological domains is relevant for language comparison (see Miller & Sande 2021 for an important discussion about how recursion might be constrained cross-linguistically).

An important first cut in understanding recursion in phonology would be to recognize a distinction between notational and empirical recursion. The distinction is inspired by the discussions in Schiering et al. (2010) and Miller & Sande (2021).

(39)
   a. Notational recursion: A category is embedded under another category with the same label. The different instances of the label need not have the same empirical signal (i.e. they do not refer to identical empirical phenomena).
   b. Empirical recursion: A category is embedded under another category. Each layer signals the same empirical phenomenon.

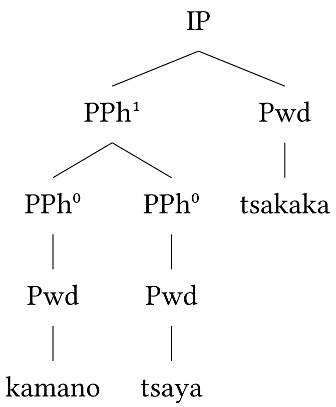
In notational recursion one label is just formally represented as embedded under another one. I can illustrate notational recursion with an example from Chácobo. In Chácobo, I associated minimality with Pwd, default H tone insertion with PPh and intonational phrasing with IP. There is an important prosodic phenomenon in Chácobo whose span of structure is in between that of the PPh and the IP. Trisyllabic nouns truncate their final syllable if they occur before the clause-type morpheme. Otherwise they occur in their “long forms”. The long form of the morpheme *kàmáno* ‘jaguar’ is illustrated in (40) and the short form in (41). Likewise the short and long forms of *tsăkaka tsăka* are provided in these examples.

(40) [tsăkà tsájakɨ kàmáno ↓]
tsăkaka tsăya =kɨ kamăno
agouti see =ANT jaguar
‘The jaguar has seen the agouti.’

(41) [kàmá tsájakɨ tsákaka ↓]
kamáno tsaya =kɨ tsákaka
jaguar see =ANT agouti
‘The agouti has seen the jaguar.’

Rather than positing a new domain for noun and adjective apocope, I can assume that the PPh recurses. The lower PPh^0 is relevant to H tone insertion and blocking and the higher PPh^1 is the domain where trisyllabic or larger nouns and adjectives truncate their final syllable.[18]

(42)



Thus truncation only occurs in PPh^1. It should be obvious, however, that this is no different empirically from just positing an extra layer. The only difference is that using notational recursion introduces labeling ambiguity (a point made *en*

[18] I could even justify this decision based on a syntactic analysis whereby both PPh^0 and PPh^1 are mapped from XPs as in Match Theory (Selkirk 2011).

passant by Féry 2017: 62 and Richards 2016: 97 without discussion of the resulting epistemic problems this ambiguity entails): once recursion is admitted there isn't a clear reason why we should not label PPh^1 as UP^0, and the original UP as UP^1, shifting the burden of recursion to another domain. For the purposes of language comparison I, therefore, cannot see any advantage in using notational recursion.

On theoretical grounds, the adoption of notational recursion weakens the prosodic hierarchy for the same reason that adding new domains does. Without further constraints, the effect of adding recursion into the categories of the prosodic hierarchy seems to mean that this theory now puts no upper bound on the number of prosodic domains it allows (Tallman 2021b). It is not clear to me what the purpose is of advocating notational recursion over just adding extra domains.

There might be examples of real empirical recursion (see Féry 2017 for a review). For instance, let's say that inside PPh^1, a super H tone with twice the distance in semitones from L tones was inserted on the first syllable of the domain. One could argue that the relevant phonetic effects have now been stacked in proportion to how embedded the domain is, but that the phonetic properties of the domain have remain unchanged. Something like this might be true for the prosodic behavior of some embedded clauses as they can display similar prosodic properties but with phonetic differences shrunk down (Vigário 2010).

4.4 Empirically contentless layers

Nespor & Vogel (2007: 11) argue that if one does not find evidence for a given layer of the prosodic hierarchy one is not necessarily warranted in assuming that the layer is not present. While the layer may not be causally related to a specific phonological process or phonetic effect, stipulating its presence may help formulate rules for other prosodic domains. An example might be positing CVV syllables in Araona (Takana). While it is not strictly necessary to state the stress rule/pitch accent rule of the language (for this all you need are vowels and consonants), positing a syllabification rule makes the statement of the stress rule simpler (Tallman & Gallinate Accepted). In this case perhaps one is warranted in positing the syllabification rule and syllables as a prosodic layer in the language. We might also find a pitch accent rule in a language which applies as PPh, which inserts a pitch accent on the leftmost prosodic word in the PPh. The prosodic word itself might not have any independent phonological processes, but assuming prosodic words are present helps in articulating the phonological phrase.

Nespor & Vogel (2007: 11-12) seem to take the idea of empirically empty layers even further, however, suggesting a strong burden of proof for positing the absence of one of the domains of the prosodic hierarchy in a given language, thus letting the PHH off the hook again, this time in terms of making any predictions regarding the minimum number of phonological layers one needs to ratify the theory.

> If … it turned out to be the case that all of the languages that appeared not to have phonological rules that refer to X^i shared some other feature as well, this would be a more convincing type of evidence that X^i may be absent in a particular category of languages characterized by this feature.

The interesting empirical question raised by this point notwithstanding, it should be noted that the epistemic consequences of allowing categories of the prosodic hierarchy to be empirically invisible makes the PHH even weaker as a theory. For a given language, cases where no phonological rule or process can be found for a p-domain predicted to exist by the PHH cannot be regarded as counter-evidence.

The suggestion that some languages may have little or no empirical phenomena which are causally related to their prosodic words has been taken up by Féry (2017: 270). Such languages are referred to as "phrase languages" (they include Hindi, Georgian, Turkish among others).

> … tonal specifications are mostly assigned at the level of Φ - phrases and ι-phrases. But contrary to intonation languages, specifications at the level of the word are sparse, absent or only weakly implemented. Phrase languages do not automatically associate pitch accents with stressed syllables, most tones are nonlexical (or 'post-lexical').

This position begs the question as to when one is ever justified in questioning the universality of a specific domain according to prosodic phonologists, since the criterion of finding something in common in such languages is at least suggested by Féry. Note that the position seems to differ from Nespor & Vogel 2007. Féry finds evidence that the languages where no p-word is present have something in common, but assumes that the p-word is there anyways.

The analytic possibility of positing empirically contentless layers potentially adds more indeterminacy for language comparison. Instead of positing that a given Pwd has little or no empirical signal the question arises as to whether the PPh should be relabeled as the Pwd. This is a general problem when the number of phonological domains is smaller than the set predicted to exist from the prosodic hierarchy (Tallman 2020). One linguist's Pwd might be another's PPh, for instance (see Michaud 2017: 321-322 for relevant commentary).

Domain labeling ambiguity arises as a consequence of a lower number of prosodic domains when we only consider the prosodic tree geometry without considering the structural relations between the prosodic tree and analogous morphosyntactic domains. A prosodic word is not (just) the domain between the foot and the phonological phrase, but also the domain which is structurally closest in some sense to the morphosyntactic word.

4.5 But what morphosyntactic structure?

The validity of using structural closeness to morphosyntactic domains to label prosodic ones, depends on those morphosyntactic domains also being consistently definable from language to language (Miller 2018). That is, in case after case, the identification of and the distinction between X^0, XP and other constituents has to be made consistently. However, in general, the prosodic phonology literature rarely discusses morphosyntactic criteria. For instance, in Féry (2017) only a single criterion is provided for morphosyntactic wordhood (coordination), and as far as I could discern no literature is cited that helps the reader discern how to parse up morphosyntactic constituents in a way that makes predictions about the morphosyntax-phonology interface operationalizable cross-linguistically.

Exacerbating the problem, the morphosyntactic literature is not obviously unified in its prescriptions for how one should go about identifying the relevant constituents or if the morphosyntactic constituents presupposed by the PHH are even valid at all. Carnie (2000), for instance, argues that the there really is no discrete distinction between X^0 and XP. The reasoning behind this is that the properties associated with (head moving) X^0 constituents and (A/A'-moving) XPs do not perfectly cluster. Similar problems have been discussed outside of the generative literature (Russell 1999, Haspelmath 2011, Bickel & Zúñiga 2017, Tallman 2021c). There are constituents that behave like X^0s according to some criteria and like XPs according to others.

We can add that part of controversy about direct versus indirect reference theories relates to what the correct morphosyntactic analysis is, as morphosyntax-phonology non-isomorphisms could be the result of an incorrect analysis of the morphosyntax (Seidl 2001). The possibility that non-isomorphisms might be the result of unmotivated analyses in the morphosyntax was also highlighted in the usage-based literature (Bybee & Scheibman 1999). Nonchalance about the labeling of *morphosyntactic* domains, not to mention how to motivate the correct constituency structure, is, therefore, not justified for linguists interested in testing and/or developing theories about the relationship between morphosyntax and phonology.

4.6 Clustering hypothesis

One prediction of the PHH is domain clustering or bundling (Bennett & Elfner 2019). This is the only claim of the prosodic hierarchy that has been tested in a typological study.

Bickel et al. (2009), Schiering et al. (2012) developed a word-domain database. This database coded phonological processes in 70 typologically diverse languages. It taxonomized the phonological processes that define p-domains into a number of types (e.g. metrical based, harmony, segmental). Each domain could be coded as being mapped over a set of structural categories (e.g. prefix-root vs. prefix-root-suffix). The relative clustering of domains could then be assessed cross-linguistically. The structure of the database allowed the researchers to assess a number of statistical relationships between phonological domains: (i) which phonological processes tend to occur in "higher" or "lower" domains than others; (ii) which phonological processes tend to cluster together in terms of span of application; (iii) whether there is an overall tendency for domains to cluster or bundle together better than one might expect.

An answer to the last question is most relevant to the claims about the prosodic hierarchy. Using multidimensional scaling Bickel et al. (2009) argue that there is no tendency for the phonological domains of their study to cluster. They argue that this result refutes the claims of the Prosodic Hierarchy Hypothesis. The idea is that if the PHH were correct, we would expect prosodic domains to cluster around a single formal category, but they do not evince any tendency to do so. In another publication taking a close look at Thai and Limbu (Schiering et al. 2010), two languages which present challenges to the PHH in that they do not have the right number of layers, the authors suggest that the reason for the observed non-clustering is that prosodic domains are "emergent." There is no set of innate formal categories constraining the distribution of phonological domains, these emerge from language history. The studies by Réné Schiering, Kristine Hildebrandt and Balthasar Bickel were the first to systematically investigate the issue of domain clustering. In certain aspects the methodology employed by these authors overcomes many of the epistemic difficulties associated with the prosodic hierarchy I discussed above. The methodology employed in the current study builds on Schiering and company's methodology in important respects. We try to overcome some of the shortcomings of their approach, and so these shortcomings are worth commenting on.

The first shortcoming is that the project focused only on "word-domains", rather than assessing the relationship of phonological domains from morph to utterance (or at least prosodic word to utterance phrase). This opens the research up to criticisms that *perhaps* some of the domain misalignments could be related to the fact that some of these domains are "phonological phrases" (or higher domains). If there is no consistent way of distinguishing between prosodic words and phonological phrases based on phonological criteria, then it becomes unclear why some of these p-word domains are not actually indicating a higher level of structure.

As far as I understand, the identification of p-domains in Schiering et al. (2012), Bickel et al. (2009) were limited to "lexical" phonological processes. This issue was not explicitly discussed in the published materials to my knowledge and thus my comments here should be taken with a grain of salt (Hildebrandt 2024 [this volume]). Lexical phonological processes are supposed to be different from post-lexical processes based on a number of properties: structure preservation, optionality, reference to morphosemantic information, categoriality, among other properties (Zsiga 2020: 201). Lexical phonological processes are also supposed to be word-internal. A phonological process is structure preserving if it involves changing one contrastive phonological unit to another. For instance, vowel tensing in English is structure preserving: the change of *grain* /gren/ to /græn/ in the context of the form /grænular/ is structure preserving because /e/ and /æ/ contrast in English. Such a process would be considered "lexical." Flapping in English, which only results in the introduction of a noncontrastive allomorphy [ɾ] is considered post-lexical. Schiering et al. (2010) only focused on lexical phonology.

A problem arises when we consider the fact that the criteria for distinguishing between lexical and post-lexical processes do not cluster together. For instance, the morphophonetics literature has shown that there are many word-internal processes which are not structure preserving (Plag 2014). Some research has also uncovered structure preserving processes that are "post-lexical" in the sense that they occur at phrase level domains (Hyman 1993). Bybee (2001: 214) points out that the distinction between lexical and post-lexical is probably graded, rather than discrete. It is not clear, therefore, that a distinction between lexical and post-lexical phonology can serve to delimit a "word domains project." We seem to be forced by the empirical phenomena to look at the whole picture without presupposing that phonological processes can be divided neatly into lexical and post-lexical categories.

On theoretical grounds, focusing only on the word domain means that the Prosodic Hierarchy Hypothesis cannot be systematically engaged with. In many current formulations of the PHH, it is *only* concerned with post-lexical processes.

Lexical phonological processes are handled by lexical phonology, where there is no expectation of domain convergence. Rather, layering and cyclicity is all that is expected in the word. Contrary to the assumptions that are made in Bickel et al. (2009), clustering of phonological processes around a single domain is not predicted for domains defined by lexical phonological processes.

Another criticism of the word domains project is that it did not explicitly engage with morphosyntactic information. This criticism is present in Miller & Sande (2021), for example. The PHH is not just a theory about the clustering of phonological domains. It also purports to be a theory which constrains the relationship between morphosyntax and phonology. Miller's criticisms suggest that one should not conduct a typological project of phonological word domains without also including morphosyntactic information. Insofar as Miller's criticisms are meant as a defense of PHH (rather than simply a critique of the word-domains project) they are somewhat weak, however, because prosodic phonology literature suffers from a general dearth of argumentation for its presupposed morphosyntactic analyses even where it posits abstract morphosyntactic structures.[19]

Another critique of the word-domains project is that it did not present an alternative theory which meaningfully constrains the distribution of p-domains cross-linguistically. The force of Bickel (2015), Schiering et al. (2012, 2010) is largely methodological. They argue that typological research should start from language specific processes rather than positing *a priori* structures. Such an approach seems necessary if we are going to hope to test competing claims about prosodic phonology. Schiering et al. (2010) also suggest that their results support an emergentist approach to phonological domains: "This leads us to conclude that the prosodic word is a language-particular category which emerges through frequent reference of phonological patterns to a given morphological construction type." (Schiering et al. 2010: 705). The argument seems to be largely based on the failure of formal theories to account for linguistic variation, rather than the development of a testable emergentist theory of prosodic domains (see Mielke 2008 for discussion). Future research should be dedicated to fleshing out an empirically contentful emergentist alternative. If this is done we will be able to actually assess how much formal innate structure is really necessary, if any (Schmidtke-Bode & Grossman 2019).

[19]It is my understanding that morphosyntactic information (g-domains) were included in the original AUTOTYP database. However, it is not obvious to me how the morphosyntactic domains related to the findings reported in published materials.

5 Typological description languages, falsifiable theories and selection bias

The previous discussion has suggested that prosodic phonology suffers from two serious problems. First, insofar as it professes to be a theory about language structure it suffers from a lack of falsifiability.

Second, insofar as it might serve a function for language comparison it is also problematic: the theory posits a repertoire of formal categories and structures, but the mapping between these and language specific facts is highly underdetermined, resulting in a lack of commensurability from description to description.

The planar-fractal method seeks to be a typological description language in the spirit of Schiering et al. (2010) and Good (2016) that addresses these issues. This means that it is a method for comparing structures from language to language. It does not seek to be a theory which constrains typological variation. But it can serve as a methodology for testing or developing such theories. It is developed in such a way that it can be used to create machine-readable databases. This will allow researchers to discover statistical trends in the relationship between morphosyntactic and phonological domains.

Some researchers find this strange because they assume all formal frameworks for describing linguistic facts should necessarily be theories about typological variation or the nature of language, or language universals or whatever. However, developing a description language for stating facts independently of a theory is necessary to assess the relative merits of competing theories and to avoid lapsing into self-sealing tautologies in theory construction. Relatedly, some have criticized generative linguistics specifically for conflating "theory" with "notation" or "metalanguage" (Dryer 2006). While it is true that the planar-fractal method makes certain assumptions about language structure and assumptions about what data are important via its notation, distinguishing between data structures and theoretical models is crucial in all the sciences. Data structures are useful because they allow us to state or even simulate explicitly what data patterns we would observe if our theories were false or true. Distinguishing data structures from our theories allows us to actually assess whether a theory is testable (Mayo 2018).

The planar-fractal method does not compete with the PHH or any other prosodic theory for status as a theory. However, as a description language for coding, testing and developing theories concerning the relationship between morphosyntax and phonology it is superior. It attempts to eliminate mapping ambiguity between language specific facts and language structures (e.g. is phonological domain *x* a p-word or a p-phrase?) and code cross-linguistic data in a machine-readable database (See Auderset et al. This Volume for the database structure). It does not posit *a priori* structures presupposed by certain theories. Rather it is designed in such a way that it could be used to test such theories and/or their auxiliary hypotheses. In this way it functions as a "comparative concept" (Haspelmath 2010, Good 2016) allowing constituency facts to be coded in a commensurate fashion from language to language.

One of the motivations for conducting a cross-linguistic study and developing a methodology such as the one used in this volume is to overcome certain methodological shortcomings of traditional linguistic analysis. One such methodological shortcoming is referred to as "methodological opportunism" or "diagnostic fishing" (Croft 2001, 2010, Haspelmath 2011). The idea behind this criticism is that, in certain cases, linguistic frameworks, theories or hypotheses are coupled with a methodology that allows (or perhaps impels) researchers to discard or ignore data that might contradict a preferred hypothesis or a preferred set of hypotheses. Croft (2001) has argued that one of the reasons that there are so many competing syntactic theories is because researchers are simply using different data to construct their analyses throwing out or dismissing as irrelevant the data used by their competitors. Haspelmath (2011) applied a similar criticism to the literature that makes use of some notion of "word." Because there is no jointly agreed upon set of wordhood criteria, criteria can be used to because they fit a preferred analysis or discarded if they do not.[20]

In general terms, biases of this kind are well-known outside of linguistics, especially in discussions about replicability and hypothesis testing (Risen & Gilovich 2006, Nosek et al. 2018, Mayo 2018). More closely inspired by the latter literature, I refer to the problem as "selection bias" (Tallman 2021a) as opposed to "methodological opportunism" or "diagnostic fishing". The solution to selection bias that I propose below is called "full reporting." Rather than every linguist pulling criteria in an "opportunistic" fashion from the literature and interpreting the criteria *just so* they fit with their preferred analysis, FULL REPORTING means applying constituency diagnostics according to a protocol, developed by a team of researchers working on different languages. The idea is that full reporting forces the linguist to be held accountable to constituency diagnostics they might not have used otherwise. With this methodology we hope to assess claims about domain clustering

[20]While the criticism seems to be directed at generative linguistics, it is not clear why the same criticism does not apply to other theory-driven endeavors in linguistics. BLT, for instance, presupposes a distinction between phonological and morphosyntactic words: why does the methodological critique of generative linguistics not extend to this approach as well (see §3)?

in a less biased fashion, because we are not as beholden to the implicit biases of individual linguists working in isolation.

6 Planar structures

A planar structure is a hypothesis space for coding the results of constituency tests or domains, phonological and morphosyntactic alike. It is a "comparative concept" in the sense that Good (2016) uses the term in his discussion of templates. A planar structure is a maximally flat structure that contains POSITIONS which are FIT OUT by ELEMENTS. The positions are ordered into a template. The planar structure is an extension of the coding methods developed by Bickel et al. (2009) and Bickel & Zúñiga (2017). Unlike the structures of the latter sources, however, it is not delimited by orthographic word boundaries as it scopes over a whole sentence. Rather it contains syntagmatically distinct positions where elements (whether "morphological" or "syntactic") are positioned on the same "plane" with a caveat: languages have a planar structure for each part of speech distinction they contain. A verbal planar structure contains positions within a presupposed verbal word, "free" adverbials, and other syntactic elements and NOUN PHRASES (nominal planar structures) all in the same template. A nominal template will have the noun root, all affixes which can combine with a noun and any syntactic noun modifiers.

In this section, I describe the planar structure by comparing it to phrase structure analyses. First, I provide a conceptual introduction to planar structures by articulating them as "flattened out" phrase structure grammars in §6.1. Then I provide a more precise formal sketch of planar structure grammars in §6.2 describing them as a species of phrase structure grammar with more rigid conditions on what constitutes an admissible non-terminal node. §6.3 discusses the TANGLING of different planar structures, referring to cases where modifiers of one domain (predication, reference) appear in another and how this is handled. Another constraint on planar structures is that they contain a BASE element which is fixed in place in the template, a condition not put on non-base elements (§6.4). planar structures analyze elements into positions and elements are analyzed into minimal morphs where possible and larger structures where necessary. The minimal morph condition is discussed in §6.5. Finally I briefly comment on a criticism of the methodology that has arisen through its presentation at various venues in §6.6.

6.1 Flattening phrase structure grammar

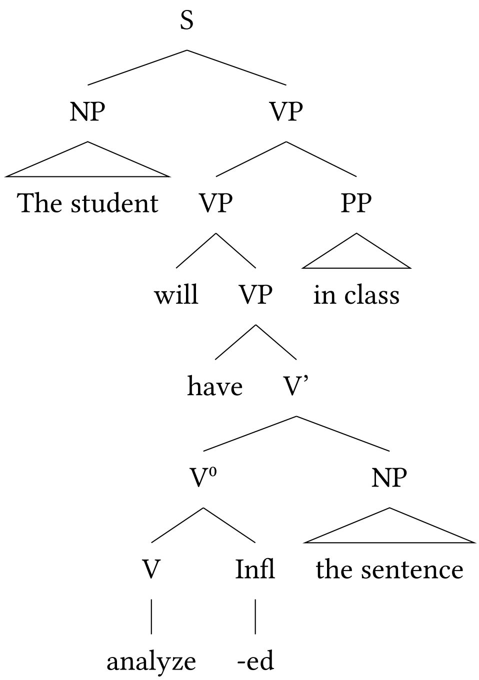
In order to explain the planar structure I will compare it with a typical phrase structure grammar. To start off I point out that a planar structure could be viewed as a phrase structure grammar which is "flattened out" until issues of recursion would make the device unworkable as a constituency test coding device. This is not done because of a commitment to the idea that sentence structure is non-hierarchical. *Rather* it is done in order to construct a template over which constituency test results can be coded in a commensurate fashion across languages. Furthermore, the formalism gives us the possibility of coding bracketing paradoxes in a given language, which are not straightforwardly supported in phrase structure grammars.[21] I will emphasize throughout that the planar structure is not meant to compete with or replace any given phrase structure-based or prosodic theory as a tool for the development of testing of linguistic hypotheses. My view is that they should complement them. The planar structure is a *cross-linguistic comparison tool* and *constituency test or domain measuring device*, not a hypothetico-deductive model.

The idea of flattening out a constituency structure should be intuitive for linguists who are familiar with competing syntactic theories where more or less hierarchical analyses can be contrasted with more or less flatter analyses (e.g. Culicover & Jackendoff 2005, Sobin 2008 for discussion). Consider the English sentence *The student will have analyzed the sentence in class.* A fairly standard constituency analysis might posit the phrase structure rules in (43a), with the corresponding constituency analysis in (43b) (see McCawley 1988: 207-261 Baker 1995 for rough equivalents in terms of the degree of hierarchical structure).

(43) a. S → NP VP
VP → VP PP
VP → will VP/V'
VP → have VP/V'
V' → V^0 NP
V^0 → V Infl

[21]In order to represent or model them, one has to posit multiple phrase structure grammars (Sadock 1991) or toss out certain test results.

b.

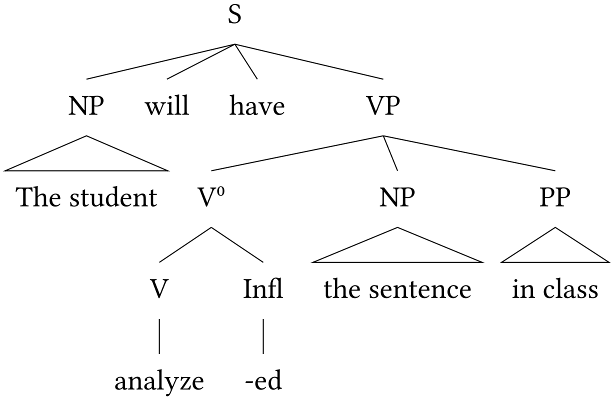


A few arguments might be rallied in favor of the layered VP structure above. For example V’-deletion (McCawley 1988: 210) and affix-hopping combined with X’-theory (Ouhalla 1999: 95–99) can be used to motivate such an analysis. *Do-so* proform replacement or perhaps considerations of scope might be rallied to support the idea that the prepositional phrase *in class* requires an additional VP-layer (Sobin 2008).

Another analysis might flatten out the structure on the grounds that the evidence for the layered VP above is weak and/or problematic for a variety of reasons (Culicover & Jackendoff 2005). We might posit a flatter structure as in (44a).

(44) a. S ⟶ NP will have VP
VP ⟶V^0 NP PP
V^0 ⟶ V Infl

b.



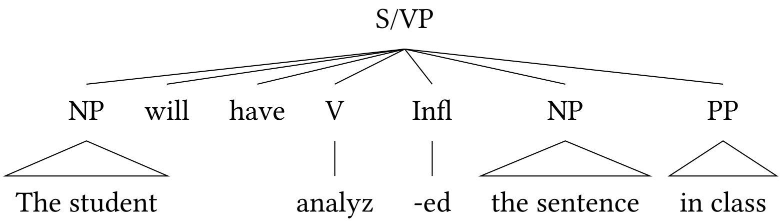
And this is as far as any linguist would go with English in terms of "flatness" (to my knowledge) if English was our primary consideration. For typological investigation though we want a representation that allows us to code constituency tests regardless of whether these support a specific constituency analysis.

It is at this point that an important conceptual difference between phrase structure grammars and planar structures arises. We are interested in phrase structure grammars only insofar as they give as position classes over which we can state test results. We are not interested in an elegant account of English grammar but one which allows unbiased comparison of constituency tests with other languages unmediated by the chimerical and abstract constituents posited in phrase structure grammars. In fact, our goal is to represent all languages *as if* they had the same degree of structural flatness so that we can assess how constituency tests might or might not support various hierarchical structures to different degrees across languages.

In order to do this we flatten the structure further as illustrated in (45) below.

(45) a. S/VP → NP will have V Infl NP PP

b.

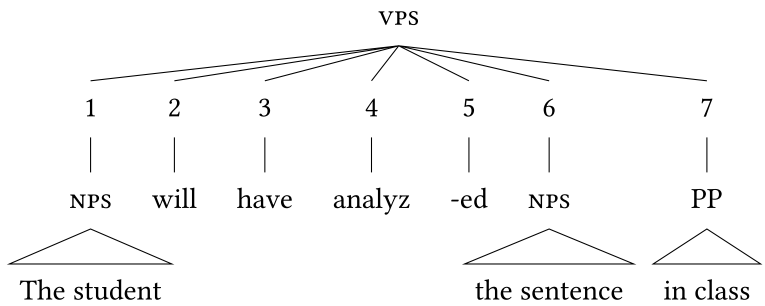


Constituency tests and constituency test fracturing are discussed in §7, but the relationship between a constituency test and a planar structure needs to be introduced to understand the next step in explaining the motivation for our representational device. Putting aside the noun phrase and prepositional phrase, the structure posited above represents nothing except the relative ordering of elements in the verbal word and/or the verb phrase with its functional projects or modifiers. To discuss constituency test results, we will refer to spans of structure identified by these tests and attempt to define them in a consistent way cross-linguistically.

Let us say we want to code the result of a do-so proform test in English. We could say that the test identifies a span of structure [V…NP][22] and a span of structure [V…PP][23] over the template defined by the phrase structure rule in (45). Such a notation will quickly get out of hand and become ambiguous with more complex structures, however.

We, therefore, take our flattened out representation and add consecutive numbers over the positions classes. As in the example in (46), where vps stands for "verbal planar structure" and nps stands for "nominal planar structure."

(46)



The relevant phrase structure rules would be as follows. The first rule giving the verbal planar structure and the other rule giving the structural positions and the elements that can fit them out.

(47) vps ⟶ 1 2 3 4 5 6 7
1 ⟶ nps
2 ⟶ will
3 ⟶ have
4 ⟶ analyze
5 ⟶ ed
6 ⟶ nps
7 ⟶ [P nps]

[22] As in *The student will have* [*analyzed the sentence*]$_i$ *in class and his teacher will have* [*done so*]$_i$ *too in his office.*

[23] As in *The student will have* [*analyzed the sentence in class*]$_i$ *and his teacher will have* [*done so*]$_i$ *too.*

We could now say that the DO-SO TEST in English identifies a 4-6 and a 4-7 span. We use a flat template in order to state the constituency tests that motivate our constituency analysis. If we report only those tests that allow us to motivate the constituency analysis we consider valid, a phrase structure grammar and the planar structure with constituency tests would be notational variants of one another. But the planar structure allows us to approach the question with more agnosticism. We can state and code the results of tests which we are unsure about (i.e. unsure if they are constituent-identifying) and we can more easily state which groupings (spans) have more or less support.

At this point the reader might wonder whether the planar-fractal method provides nothing except an awkward notational variant of constituency analyses which allow overlapping constituency structures (Sadock 1980, 1991). This impression would be legitimate if we stopped short of developing the method for cross-linguistic comparison.

For typological comparison there is an important difference between providing a phrase structure grammar which manifests a particular constituency analysis that implicitly codes some set of constituency tests and a planar structure which allows for explicit coding of those constituency test results. The former is mediated by abstract constituent categories such as V^0, VP, word, phrase etc., the latter is only mediated by a notion of verb/predicate, a notion of noun/referential expression, and (perhaps) a notion of adjective/modifier. Apart from this, the planar structure coupled with reported spans is only mediated by structural positions (which is also true of phrase structure grammars in any case).

The problem with abstract constituents for typological comparison is that they can stand in for groupings that are based on an open-ended set of constituency diagnostics and linguists can differ in terms of which of these constituency tests they think ought to be captured by the phrase structure representation. This can lead to obfuscation of empirical differences and similarities in constituents or domains across languages. A VP in one case might not mean the same thing as a VP in another. We can consider the English case and compare it with Chácobo. I stated that the VP containing an object NP and a V in Chácobo could be motivated by displacement in §4. There are no verbal proform tests that provide evidence for a verb and object constituent which excludes the subject.[24] However, in English there are a host of tests that provide evidence for the verb phrase (see the sources cited in Osborne 2018 for example). The tests that motivate a constituent in one case are different in kind and quantity than they are in the next. At this more granular perspective, debates about whether some language "has" or does not

[24]The translation equivalent *toka ... a...* 'do so' can replace a verb without an object noun phrase.

"have" an NP or VP (Austin & Bresnan 1996, Louagie 2021) miss the point that languages might still vary in terms of the degree to which the latter structures are supported and what types of constituency tests support them.

That it might be theoretically legitimate to treat the Chácobo VP and the English VP as the same in some sense would be beside the point. If we are interested in comparing language constituent structures to the finest degree of detail, we need to start out by dissecting abstract constituents down to the tests that are used to justify them. The planar structure is designed to help us do just that.

To further develop the English planar structure we would continue adding positions until any and all predicative sentences of the language could be "fit out" with planar structure positions. Thus, we would add positions, for negative marking, adverbs, verbal particles, all of the auxiliaries, fronted constituents etc. This should be kept in mind in the following structure. A complete planar structure analysis of English would require a paper of its own.

Given that the structure is built specifically to represent linear ordering among elements, a question arises as to how variably ordered elements can be represented in the structure. As with typical phrase structure grammars, we can add structural positions that allow elements to base generate in alternative positions. For instance, to represent the variable ordering of *quickly* with the verb phrase in English as in (48).

(48) a. *The student analyzed the sentence **quickly**.*
b. *The student **quickly** analyzed the sentence.*

We add the requisite positions for *quickly* in the planar structure in order to account for its ordering in relation to the elements we already have as in (49).

(49) a. S/VP ⟶ 1 2 3 4 5 6 7 8 9 10 11
b. 1 ⟶ NP
c. 2 ⟶ quickly
d. 3 ⟶ will
e. 4 ⟶ quickly
f. 5 ⟶ have
g. 6 ⟶ quickly
h. 7 ⟶ analyze
i. 8 ⟶ ed
j. 9 ⟶ NP

k. 10 → quickly
l. 11 → [P NP]

Another issue arises when we consider the fact that certain modifiers of the verb can combine with the verb complex iteratively (Vater 1978, Forker 2014). Prepositional phrases in English display this property.

(50) *The student analyzed the sentence* [*at his desk*]$_{PP}$ [*in class*]$_{PP}$ [*without thinking*]$_{PP}$ ...

To accommodate iterably combining modifiers we introduce a distinction in positions between slots and zones (Tallman 2018, 2021c).

(51) a. Slot: can fit out a single element at a time;
b. Zone: can fit out multiple elements which can surface in any order.

The last planar structure rule only has to be modified by making position 11 a zone (11_{zone} → PP), which means that the category PP can repeat itself in that position.

Planar structures do not flatten out word and phrase structure without limits. We can only flatten out the templates insofar as we do not run into self-similar embedding or recursion. A relative clause in a nominal template will be represented as a single element, rather than flattening out a whole sentential template along with the nominal elaborators. A noun phrase (or more technically a nominal planar structure) in a verbal template will typically just be represented as a single element as well. Thus, we will have planar structures for each functional domain (predicate, referential expression) or part of speech. This is why in the example in (49) NP and P are represented as elements of the verbal plane. A noun will receive its own planar structure. The prepositional phrase will be coded as a nominal planar structure plus an element that codes the relationship between the verb and the noun, i.e. a case or P in rule 11.

6.2 A formal sketch of planar structure grammars

A planar structure grammar is a coding device outfitted with the following elements:

(52) a. Planar structures (V, N, Adj, Adv ...);
b. Non-terminal elements / positions;
c. Terminal elements that occur inside positions;

d. Planar structure rules/templates;
e. Two types of rules for positions (SLOTS versus ZONES)

Each terminal planar structure has a fixed number of non-terminal elements we call positions (see Partee et al. 1990 for discussion of terminal versus nonterminal elements). Apart the initial symbol introducing the planar structure and positions of the planar structures, nonterminal elements are not allowed. All other elements associated with planar structures are terminal nodes. We call these terminal elements just "elements" for short.

The positions are of two types: slots and zones defined below. The slash / represents 'or'. The curly brackets are used for an unordered set of elements which do not have a precedence relationship with each other.

(53) a. $P_{slot} \longrightarrow a/b/c$ ....
b. $P_{zone} \longrightarrow \{a, b, c ...\}$

Only one element can fit out a slot. The rule above for slots outputs the following.

(54) a. a
b. b
c. c
d. ∅

Inside a zone multiple elements can occur and these can occur in any order. Thus the rule $P_{zone} \longrightarrow \{a, b, c ...\}$, produces the following possibilities.[25]

(55) a. a b c
b. a c b
c. b a c
d. b c a
e. c a b
f. c b a
g. a b
h. b a
i. a c

[25]Note that the sequential lettering in the example above (a,b,c) has no formal significance. The lettering was inserted at the request of the series' editors.

j. c a
k. b c
l. c b
m. a
n. b
o. c
p. ∅

If a planar structure is embedded in a zone it is understood that this planar structure can iterate (like the prepositional phrase in the example above). Thus if we have a rule as in the following:

(56) $P_{zone} \longrightarrow \Pi$

where Π is or contains a planar structure. The output is as follows:

(57)
a. Π_1
b. Π_1 Π_2
c. Π_1 Π_2 Π_3
d. …

As stated above, planar structure rules consist only of non-terminal nodes called positions with precedence relations between them.

(58)
a. VPS ⟶ 1 2 3 4 5 6 ….
b. NPS ⟶ 1 2 3 4 5 ….
c. …

Languages can vary in terms of the number of positions each planar structure has. Some languages might have a verbal planar structure with only around 20 positions (e.g. Araona) (Tallman 2024 [this volume]), while others can have around 40 (e.g. Chorote) (Carol 2024 [this volume]). Languages can further vary in terms of how many and which positions are slots or zones.

A language with more fixed orderings will typically be represented with more slots overall. A language without any fixed ordering at all would have a single zone. So-called "free word-order" languages are not represented with only zones, however. The reason is that they typically display some degree of fixed ordering inside their verbal or nominal "words", which are represented on the same plane.

6.3 Tangling of planar structures

Planar structures can be "tangled" with one another. This aspect of planar structures has not been systematically discussed across the studies, because most studies have focused only on verbal planar structures. Nevertheless, it is an important aspect of some planar structures that needs to be described to adequately compare these with phrase structure grammars. Furthermore, if the study of constituency using planar structures advances beyond comparing verbal structures, tangling will need to be dealt with more systematically in future studies.

Normal phrase structure grammars allow different types of non-terminal elements. However, in a planar structure grammar, the only types of non-terminal nodes are POSITIONS and the initial symbols of the planar structures themselves. In this sense, planar structure grammars are more rigid than normal phrase structure grammars. Once again: this rigid flatness of planar structure grammar is imposed to for cross-linguistic commensurabilty so that planar structures can be constructed as constituency test coding and measurement devices, not because a linguist who uses a planar-fractal method believes that all linguistic structures are flat.

More is needed to describe structural relations in a sentence apart from the formal properties described above. The reason for this is the well-known fact that verbal and nominal categories and modifiers can intermingle syntagmatically. When developing a planar structure we allow "tangling" between nodes if necessary in order to capture such cases (Partee et al. 1990: 442).[26] An example from English comes from the quantifier *all*, which displays a well-known property of "stranding."

(59) a. *All the students will analyze the sentences.*
b. *The students will all analyze the sentences.*

The problem with such sentences is that there is a nominal modifier interspersed with a verbal modifiers, yet nominal and verbal modifiers should be on distinct planar structures according to the planar structure formalism.

To accommodate cases of part-of-speech modifier intermingling, we add a position in the verbal planar structure for the quantifier *all*. We only allow such

[26] Partee et al. (1990: 442) define the "Nontangling Condition" for a typical constituent structure grammar as follows: "In any well-formed constituent structure tree, for any nodes *x* and *y*, if *x* precedes *y*, then all nodes dominated by *x* precede all nodes dominated by *y*." Trees for planar structure grammars can violate the non-tangling condition, whenever positions of distinct planar structures are intermingled.

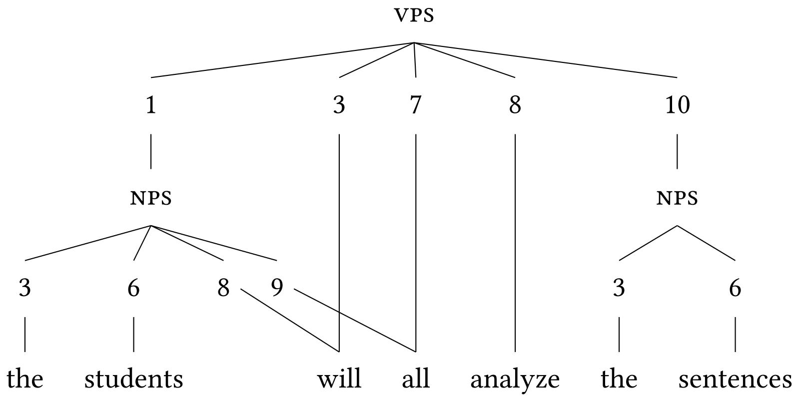
intermingling if it is necessary, otherwise elements should be placed uniquely in their own planar structure. Preliminary verbal and nominal planar structures are provided in (60) and (61). Once again, these are only partial planar structure grammars of English developed for expository purposes.

(60)
a. VPS → 1 2 3 4 5 6 7 8 9 10 11 12
b. 1_{slot} → NPS
c. 2_{slot} → quickly
d. 3_{slot} → will
e. 4_{slot} → quickly
f. 5_{slot} → have
g. 6_{slot} → quickly
h. 7_{slot} → all
i. 8_{slot} → V-ROOT
j. 9_{slot} → ed
k. 10_{slot} → NPS
l. 11_{slot} → quickly
m. 12_{zone} → [P nps]

Note that the element *all* would be represented in the nominal planar structure as follows:

(61)
a. NPS → 1 2 3 4 5 6 7 8 9 10
b. 1_{slot} → quantifier
c. 2_{slot} → of
d. 3_{slot} → the, a, all,
e. NPS's
f. 4_{slot} → one, two, three …
g. 5_{zone} → APS
h. 6_{zone} → N-ROOT
i. 7_{zone} → [who/which…
j. VPS]
k. 8_{slot} → vsp[2–6]
l. 9_{slot} → all

(62)



In a sense admitting tangled planar structures violates the constraint I placed earlier on flattening out planar structure, since in the representation above, *all* is a modifier of the noun but also in the verbal planar structure. If we are allowed to tangle planar structures in this fashion, why not completely collapse them? The reason is because this would make planar structures infinitely long and thus impractical for database construction. In order to accommodate intermingled structures while also allowing planar structures to have some practical use, we adopt the following protocol in the development of planar structures.

(63) Tangle-only-if-necessary protocol: Do not tangle planar structures unless it is necessary to account for the relative ordering of elements. Then, introduce the least amount of positions possible in order to capture the relevant precedence relations.

The protocol is followed by all descriptions in this volume. The restriction is imposed to guarantee commensurability across descriptions and to capture the relative ordering of elements, while enforcing finiteness on planar structures.[27]

6.4 Base elements and positions in planar structures

Another restriction on planar structures relates to their base elements. Base elements can be regarded as the phrase structure equivalents of “heads.” But actually defining a base element as a comparative concept turns out to not be entire trivial. I will introduce these restrictions and then explain why they are adopted. The first restriction is stated below.

[27] It is not yet clear though that all tangled elements have been appropriately represented in the nominal planar structures that are presented in this volume. Such NPSs will perhaps require revision at a later stage.

(64) Base position restriction: All planar structures have a base element. The base element is the semantic head of the planar structure (Croft 2001, 2022). The part of speech of the base element defines the type of planar structure.

For instance, a verbal planar structure must contain a verb root, and a nominal planar structure must contain a noun root. Another restriction is imposed on how base elements are fit out in a given planar structure. Of course an immediate problem arises as to whether it is really obvious which element is the semantic head in any given case. I discuss this issue below.

Before delving into this issue a second restriction has to be imposed on the distribution of base elements within planar structures.

(65) Only-one-base-position restriction: There can be no more than one position for a base element or formative that is part of a base element per planar structure.

First, note that this restriction *does not* mean that a base element cannot occupy more than one position at the same time. A base element can display multiple exponence allowing formatives split across more than one position of the planar structure if necessary. What it means is that we do not allow the same base element formative to be generated in different positions of a planar structure. Such a condition seems to be implicit in the construction of morphological templates, but in syntax it is common to think of a verb "moving" or "dislocating" to different positions of the clause, so the restriction requires more commentary. A similar interpretative warning is in order: we are not imposing this condition because we think "verb root/stems never move" or "verb roots/stems never base generate in more than one position." Rather it is a restriction imposed to adequately code the results of constituency tests in a practical fashion.[28]

I will illustrate what this means in practice with an example from Chácobo. In Chácobo a subject NP and the verb stem (verb plus affixes) can variably order. That is S-V and V-S orders are both permissible. Tallman (2018) describes cases where the V occurs before the NP S/A argument as "verb-fronting." An example of verb fronting is provided in (66). The first example displays S-V order and the second displays V-S order, where the verb and an associated motion clitic "move" to the front of the sentence.

[28]Furthermore, it is perfectly possible that a methodology could exist where the Only-one-base-position restriction is rejected. It is adopted here because when it was not imposed the reporting of constituency tests became unwieldy as one would have to fracture tests according to the position of the base element. Relaxing this condition also very naturally results in competing planar structure analyses for the same language.

(66) a. *βakɨ́ tsi o̥ʂa =kana =kɨ* ‘
child LNK sleep =going.ITR LNK =DECL:PST
‘The child slept while going (e.g. in a truck).’

b. *o̥ʂa =kana tsi βakɨ́ =kɨ*
sleep =going.ITR LNK child =DECL:PST
‘The child slept while going (e.g. in a truck).’

Using the planar fractal notation, two competing grammars emerge for the distributional facts above (at least). The first allows the verb to be generated in different positions in the planar structure depicted in (67) where V-BASE represents the verb base and NPS represents a nominal planar structure.

(67) a. VPS ⟶ 1 2 3 4 5 6 7 8 9
b. 1 ⟶ V-BASE
c. 2 ⟶ *=kana*
d. 4 ⟶ *tsi*
e. 5 ⟶ NPS
f. 6 ⟶ *tsi*
g. 7 ⟶ V-BASE
h. 8 ⟶ *=kana*
i. 9 ⟶ *=kɨ*

This planar structure requires some extra restrictions to get the distributional facts right.[29]

Another grammar might let the NPS move around in different positions and force the verb core to stay in place as in (68).

(68) a. VPS ⟶ 1 2 3 4 5 6 7
b. 1 ⟶ NPS
c. 2 ⟶ *tsi*
d. 3 ⟶ V-BASE
e. 4 ⟶ *=kana*

[29]Certain positions would be open or closed depending on which position the verbal base fit out. Position 6 would be open if position 7 was filled by V-BASE and otherwise closed.. Position 4 would be open if position 1 was filled by V-BASE and otherwise closed.. Position 8 would be open if position 7 was filled by V-BASE and otherwise closed. Position 2 would be open if position 1 is filled with V-BASE and otherwise closed.

f. 5 → *tsi*
g. 6 → NPS
h. 7 → *kɨ*

In the context of this project we would always choose the second grammar. The reason is that when we construct a verbal planar structure we do it with the goal of reporting constituency test results that include the verb. This restriction sometimes results in proliferation of positions around the verb in a way that many linguists might consider counter-intuitive. For instance, in South Bolivian Quechua there are a relatively large number of clitics which occur in a fixed order with respect to one another Rios & Tallman 2024 [this volume]. Since they modify the predicate they are all in the verbal planar structure but they can occur before or after the verb with the same restrictions of linear order with respect to each other. As a consequence of ONLY-ONE-BASE-POSITION RESTRICTION we have dedicated positions for the clitics before and after verb which recode their the linear constraints these elements have with one another.

There are two reasons for imposing the only-one-base-position restriction. The most important reason is practical and involves limiting the scope of constituency test application to make is manageable and also more in line with how constituency tests are actually used.

For each constituency test we assume that it must overlap with the base element of a planar structure. This reduces the number of constituency tests that have to be reported, but also makes the planar structure a more coherent tool for research. Defining constituency tests such that they must overlap with a specific position makes them easier to define and apply consistently.

Allowing a base element to potentially occupy more than one position complicates constituency test reporting. We would have to report different constituency test for every position we allow the verb to occupy as the spans of structure would change accordingly.

The second reason this restriction is imposed is because it restricts the number of possible planar structures that are compatible with the data. This increases comparability between the descriptions, because it reduces the number of competing planar structure analyses that a researcher could construction. The ideal is actually to have the construction of the planar structure to be completely unambiguous insofar as the relevant facts are known (see §6.6 for discussion). This is achieved through imposing protocols and constraints on the construction of planar structures.

I now return to the notion of a semantic head which the original definition makes reference to. Simplifying Croft's discussion somewhat, a semantic head combines the notions of PROFILE EQUIVALENT with the highest paradigmatic contrast. In a combination X+Y the profile equivalent is X if X+Y is a type of X (Croft 2001: 257). In a combination X+Y, X is the element with the highest paradigmatic contrast if it is in paradigmatic contrast with more elements than Y (Croft 2001: 270). In the context of the planar structure, I assume that elements that can occur in the same position are in paradigmatic contrast with each other in that position. Croft conjectures that while both profile equivalence and relative paradigmatic contrast tend to align in defining headedness at the syntactic level, in morphology, these criteria tend to misalign such that the root displays the highest paradigmatic contrast while the affix is the profile equivalent.

As the planar-fracture method starts from the premise that we should homogenize morphological/word and syntactic/phrase structure representations as much as possible in order to investigate the actual empirical motivation for the division, Croft's notion of RELATIVE PARADIGMATIC CONTRAST would appear to be more appropriate in defining the semantic head since it generalizes across syntax and morphology.

The main problem with systematically associating our verb base with a profile equivalent is because it is frequently the case in many languages that there is more than one element that can be considered the profile equivalent. This would seem to be especially true of languages that are traditionally labelled as polysynthetic as they contain many "lexically heavy" elements that are neither roots in an obvious sense nor do they necessarily project their own planar structure.

To take one example, if we consider, for instance, *do-bea-tsoa* [carry-come-go.up] 'bring something up a hill' from Araona it is not clear which of the morphemes (all classified as 'roots' by Pitman 1980) is the profile equivalent of the whole (the action is a type of carrying, a type of coming and a type of upwards motion). Nor is this issue particularly uncommon (Woodbury 2024 [this volume]).

The paradox dissolves if we move away from identifying the verb base based on the properties of elements and define the notion based on the more abstract notion of POSITION. If we associate relative paradigmatic complexity with positions, then we ask whether, when aggregating over the elements that can occur in each position, we find one position which simultaneously can function as a profile equivalent and displays a high degree of paradigmatic complexity. The verb base position is the position whose elements in the aggregate display the highest degree of paradigmatic complexity compared to other positions. The issue clearly requires more discussion, but based on the data I have observed thus far, it appears that conceptualizing the base in terms of a single position in the planar structure seems to resolve the issue of semantic head ambiguity. Another possibility would be, of course, to drop the condition that there can only be a single base, or that a base is necessary at all to define the planar structure. We have not adopted this strategy in this volume for practical reasons, but it does not mean that it is not an avenue that ought to be explored.

Developing a coding device with different formal properties and constraints might highlight different aspects of constituency structure and allow different generalizations to come to light. The main point for typological comparison though is that whatever measurement instrument is developed and used that it be applied as consistently as possible across languages.

6.5 Minimal morphs

I stated above that the planar structure breaks down elements into positions and those positions can be composed of morphs. However, the identification of morphs is known to lead ambiguities. In a recent review of the notion of "morph" in morphosyntactic analysis, Haspelmath (2020: 124) states "whether a form is minimal or can be further divided into smaller forms with their own content is not always clear." (see Blevins 2016 for important discussion).

In the planar-fractal approach, we always divide forms into their smallest parts ("minimal morphs"). This means that many of the morphs will not necessarily have semantic content, rather they could just be "recurrent partials" in the sense of Crysmann & Bonami (2016: 314). The condition is stated below:

(69) Minimal-morph condition: Analyze elements into morphs. Where ambiguity arises in terms of the number of morphs into which a form can be broken down, always chose the smallest element (or the analytic result that gives the most morphs).

There are two reasons for this condition. One is to impose consistency across the descriptions. The other relates to what the planar structure is for. It is a device for measuring (mis)alignments between constituency test results. Conflation of elements could result in conflation of positions, which could result in spurious convergences between constituency tests (i.e. a loss of precision and a loss of potentially important information). In contrast, it is hard to see how any sort of spurious misalignment between tests could arise because of overly splitting morphs. If it is truly correct that some purported combination of two or more morphs should really be regarded as one, there should be no reason to expect that a constituency test would break it into pieces.

6.6 Competing planar structures

One of the reasons for not using constituency structure or phrase structure analyses to compare languages is that, for a given language, even for the same set of facts considered, there are competing constituency structure analyses. This point should be obvious enough to anyone who has read debates in the syntax literature (Croft 2001, Culicover & Jackendoff 2005 among others). Constituency tests do not apparently point to one and only one analysis. Self-described descriptive linguists might imagine they are sheltered from this problem when they claim to be following Basic Linguistic Theory, but this is an illusion, for there can be competing analyses of what constitutes the grammatical and phonological word in this approach at the very least.

One criticism (or worry) that has arisen in the presentation of the methodology is the possibility that, even given the principles specified above, it might be possible that competing planar structure analyses are possible for a given language. That is, just as there are competing phrase structure analyses, there could be competing planar structure analyses.

This criticism has some validity in principle. But there is an important difference between our critique of Basic Linguistic Theory, the Prosodic Hierarchy Hypothesis and traditional constituency analysis as tools for comparison and the latter criticism of the planar-fractal method. In the latter cases, the ways in which ambiguities arise are easy to state (e.g. different "wordhood tests" identify different domains of structure; different phonological domains could be mapped to different levels in the prosodic hierarchy; different constituency tests could be used or discarded in the development of a constituency analysis) and there are known empirical facts lead to such ambiguities. For the planar-fractal method, the criticism amounts to a speculation that if different researchers looking at the same set of facts from a given language *somehow* develop distinct planar structures these same researchers might *somehow* arrive at different results for the relative convergence and non-convergence of constituency tests.

But this criticism (or perhaps worry) could be applied to *all* comparative concepts. Anytime a comparative concept is proposed we might upon closer empirical scrutiny find that the concept is more ambiguous than intended.[30] In fact one of the goals of empirical research is to make sure that the comparative concept allows for consistent comparison. The solution to finding that our comparative concept is more ambiguous than intended is either to impose further restrictions on the concept or to split the concept into more variables. In the context of planar

[30] A sure-fire way of never having a comparative concept scrutinized is for it to never actually be used in any typological study.

structures this would entail further tightening the protocol for building them or reporting competing analyses according to different principles. But if we simply start off with the premise that we need to develop a methodology that ensures no ambiguity could ever arise before engaging in any empirical studies, we will never engage in any empirical studies.

At a minimum someone who has such a worry about planar structures should explain how the relevant ambiguity might arise and actually provide a case study demonstrating that it exists, in fact, and matters for the comparison of constituency tests and domains.

7 Fracturing constituency tests

The constituency tests that one finds in the literature are ambiguous. For a given "constituency test" or "wordhood test" you will generally find (although not always) more than one interpretation when they are specified more precisely.

An obvious example of ambiguity in a constituency test comes from non-interruption or contiguity. The elements of words or constituents are non-interruptable or contiguous. The problem with this claim is that it is contingent on identifying an appropriate INTERRUPTING ELEMENT. Take a word like *post-dependence* in English. This prefix *post-* can be interrupted from *dependence* by the morph *in-* as in *post-independence*. We do not regard this as evidence that *post* does not form a word with *dependence* in the first example because of the status of *in-* as a prefix. To make the criterion more precise we might say that this is because *in-* is bound (cannot be a free form) and is highly selective of its particular base: *in-* cannot be a full utterance by itself and selects noun roots. A combination of elements that can be interrupted by a non-selective free form would be regarded as more than one word. Importantly, the criterion cannot be used unless we have stated something about the interrupting element.

When researchers assume the existence of endoclitics, the criterion for non-interruptability is implicitly relaxed. For instance, in European Portuguese the form *mostrar-emos* 'we will show' can be interrupted by a bound pronoun *-lho* as in *mostrar-lho-emos* 'we will show it to him' (Luís & Spencer 2004). The question arises as to why such constructions are not simply seen as a violation non-interruption: why are *mostrar* and *-hemos* not distinct words? Here the interrupting element is bound and one could claim that on these grounds it does not constitute a genuine instance of interruption (Bauer 2017 for the contrary position). In certain types of incorporating or compounding structures the criterion of non-interruption is further weakened if not dropped altogether.

We can go even further though. In Chácobo, what the domain of non-interruption is, will depend on whether our interrupting element is a free form or a combination of free forms (e.g. a noun phrase). If we use a combination of free forms (e.g. *honi* 'man' and *siri* 'old' in a noun phrase) as the interrupting element, then the causative is part of the verbal word. If we say the interrupting element ought to be fixed as a single free form, then the causative is not part of the verbal word. This is illustrated in (70) (Tallman 2021c).

(70) *tsaya =yáma =má honi siri=́ =wa =kɨ*
see =NEG =CAUS man old=ERG =TR =DECL:PST
'The old man did not show it to him.'

Thus, the constituent identified by non-interruption will depend on what we choose as an interrupting element.

One way of dealing with this issue is to choose a "correct" non-interruption test by fiat, as suggested in Haspelmath (2011, 2023). The problem with this solution is that the result is bound to be arbitrary. Such a solution also pointlessly limits the amount of variation we are can cover in our typological study of constituency. We do not know which one of these versions of the test will be the most revealing a priori – why should we engage in a research program that pretends that we do?[31] Rather we FRACTURE the test into its different interpretations and apply all of these, coding the relevant details in the database. We define domains for interruption by a free form, by a combination of free forms, or by some promiscuous element insofar as the fractures give distinct results.

Similar considerations about ambiguity apply to phonological domains as well. The most obvious problem with identifying the span of application of a phonological process arises because of VACUOUS APPLICATION of a phonological rule. Vacuous application occurs when the phonological conditions for a specific phonological rule are never met in a certain environment. If the relevant conditions

[31]Haspelmath (2010) notes that comparative concepts should be "useful" – they are not true or false. However, in the case of his word "retro–definition", which amounts to a domain that cannot be interrupted by any free form, he does not show how it might be useful for any conceivable typological study. In order for Haspelmath's recent intervention of the question of wordhood to be of value for empirical studies, he needs to show why christening one the many domains coded in our study as *the* "word", as opposed to any of the other domains, is revealing. The perspective taken in this volume is different. We assume that languages might be organized in such a way that a "word" might be definable based on a different set of diagnostics from case to case. The organization of constituency tests might show some sort of dichotomous patterning regardless of whether there is a single defining criterion across all languages. Note that this perspective is ostensibly empirical since it is not a foregone conclusion that we should find such a pattern. On the other hand, no empirical questions arise from Haspelmath's retro-definition.

are never met, one cannot tell whether the relevant phonological process and domain spans over such structural positions and their junctures or not. The solution, as with morphosyntactic domains, is to fracture. I will illustrate the issue with glottal stop insertion from Chácobo below.

In Chácobo there is one environment where glottal stop insertion is obligatory: this is between two vowels at the boundary between a prefix and a root. The process does not occur if the root begins with a consonant, however. The glottal stop insertion is shown at the prefix-root boundary in (71). The non-application of the rule is found in (72).

(71) [βáʔàtʃɨ́kɨ]
βă- atʃ -ɨ̆ =kɨ
arm- grab -ITR =DECL:PST
'S/he grabbed her/his own arm.'

(72) [βánɨ̀ʂɨ́kɨ]
βă- nɨʂ -ɨ̆ =kɨ
arm- tie -ITR =DECL:PST
'S/he tied his/her arm.'

We have evidence for the existence of the process of glottal stop insertion at the boundary between prefix and root. However, at the juncture between the root and suffixes or enclitics in Chácobo no evidence for or against the application of the glottal stop insertion rule ever arises. The reason is that vowel initial transitivity markers such as *-ɨ* only ever combine with consonant final roots. Otherwise all suffixes and enclitics in Chácobo are consonant initial.

How are we to characterize the domain of application of glottal stop insertion? Does the glottal stop insertion domain span over suffixes or not? In principle there appear to be two options. One of these is to assume only positive evidence counts. This would define the prefix-root constituent as the domain for glottal stop insertion. The other is to assume that the rule applies vacuously in all cases where there is no evidence against the application of the rule, i.e. where there are adjacent vowels spanning morph boundaries, but where no glottal stop insertion applies. I refer to the smaller (positive evidence only domain) as the MINIMAL DOMAIN. And the larger (negative evidence only domain) as the MAXIMAL DOMAIN.

The problem with leaving the issue open to interpretation is that it allows researchers to identify spurious convergences between domains. Since the maximal domain is substantially larger than the minimal domain in Chácobo, one could claim that it converges with any other domain of intermediate size between the minimal and maximal domains of glottal stop insertion. To be somewhat more formal, imagine the minimal domain spans 3-4 and the maximal domain 1-6 for glottal stop insertion. If we have a stress domain that spans 2-5, we can claim that the glottal stop and stress domains line up with one another if we leave the space between minimal and maximal domains open to interpretation rather than being more specific (see Tallman 2021c for the actual details in Chácobo). Not providing a formalization of the degrees of freedom in domain interpretation will naturally result in theories of phonological parsing being confirmationally lax: if there is ambiguity chose the interpretation that makes your theory work.

Test fractures can be divided into different types. The first type, which reoccurs throughout the database, is the MINIMAL–MAXIMAL fracture. I assume that a minimal–maximal fracture arises any time the minimal domain is by definition a subspan of the maximal. An example of this is provided with the glottal stop insertion above. This type of fracture reoccurs throughout the database and throughout the studies in the volume for a number of constituency domains.

Another type of fracture is a distinction between STRICT and LAX interpretations of a criterion. The most obvious instance where this is relevant is in the context of tests of selection. The reason is that selection is a matter of degree. An element with high selectivity, might only combine with verbs. One with lower selectivity might only combine with nouns. An element might display an intermediate status in that it can appear in non-verbal predicates, but not strictly combine with nouns, however. For instance, the assertive morpheme *rá* in Chácobo requires there to be a verbal predicate. The reportative only requires there to be a predicate, verbal or non-verbal. We can, thereby, define domains based on laxer and stricter definitions of selection.[32].

There are also fractures which relate to specific constructions of a language. The most obvious cases relate to recursion based diagnostics, or SUBSPAN REPETITION. These have to be fractured according to what appear to be very language specific subtypes (e.g. same vs. different subject clauses in Pano languages, "word-internal" complementation structures in Inuit–Yupik–Unangan languages; compounding and/or serial verb constructions in Zapotec languages). Each of these constructions can be constituent identifying in different ways, but often they are distinguished according to highly specific structural criteria. This does not mean that the different instances of subspan repetition cannot be taxonomized into different subgroups eventually (Bickel 2015). Future research might reveal that different construction types can be further broken down into codable

[32] Javier Carol (2024 [this volume]) in particular is to be credited with highlighting this point, which was not initially obvious to me (Tallman 2021c)

properties for typological investigation (Bickel 2010).[33]

A final way that tests can be fractured is BY ANALYSIS. This situation arises when interpretation of a test is contingent on whether some set of formatives is interpreted as being allomorphs of a single morpheme or diachronically related but distinct morphemes. The structure of syntagmatically defined distributional classes is contingent on such analytic decisions and tests that refer to linearization can, thereby, be affected as well. A clear example comes from the causative *-chi* in South Bolivian Quechua. Camacho-Rios (2022) splits occurrences of the morph into cases where the suffix is "lexicalized" with a verb base and cases where it is not. Muysken (1981), among others, does not adopt such an analysis, and, in fact, argues against it. These analytic differences matter for the interpretation of constituency tests since they change facts about the relative (non)permutability of elements in the Quechua verb complex. Fracturing according to analysis here implies reporting different tests depending on which of the analyses of the *-chi* morphs is adopted. Fracturing by analysis provides us with important information about analytic ambiguity in the assessment of constituency tests.

8 Domains: Morphosyntactic, phonological and indeterminate

It is outside of the scope of this introduction to provide a full review of all the constituency tests and issues in their application. In this section I list the main test/domain types that we attempted to code across all the languages of this study. These can be classified into MORPHOSYNTACTIC, PHONOLOGICAL and INDETERMINATE. The morphosyntactic tests/domains are listed in (73). The phonological tests are listed in (74). For details on how to apply the relevant tests and how they are fractured the reader should consult the chapters of this volume.

(73) Morphosyntactic tests/domain types

a. NON-PERMUTABILITY: A span wherein the elements do not display variable ordering with respect to one another.

[33]A comment at this point is necessary to avoid confusion. It has been suggested to me that somehow fracturing involves abandoning "comparative concepts." I do not think this is correct. Fracturing in the context of this research project simply means that each collaborator is responsible for developing and applying comparative concepts in the process of database development. Attention to concrete details not subsumed under a comparative concept does not entail abandonment of comparative concepts. For instance, we can code the domain which is not interruptable by a single free form in Chácobo and Hup, but note that the relevant interrupting elements are morphemes with different semantics.

b. Non-interruptability: A span that cannot be interrupted by an element of a certain type.
c. Ciscategorial selection: A span whose elements are ciscategorial selective with respect to a particular part of speech.
d. Recursion-based/Subspan repetition – maximal: For a specific construction that involves repetition of positions in the planar structure (e.g. conjunction, reduplication), the largest possible span where size is calculated as *R–L*, where R is the right edge and L is the left edge of positions filled out by elements in each of the conjoined spans of structure.

The phonological domains are divided into two overarching types. We also annotate these with the classifications provided in Bickel et al. (2007) as well as these are largely appropriate for our purposes.

(74) Phonological tests/domain types
a. Segmental: A span wherein a segmental phonological process applies.
b. Suprasegmental: A span wherein a suprasegmental process applies.

A number of coded domains do not fall straightforwardly into either the morphosyntactic or phonological categories. We refer to these as indeterminate domains they are listed in (75) below.

(75) Indeterminate domains
a. Free occurrence: A span which is a single free form.
b. Deviations from biuniqueness: A span which displays deviations from biuniqueness.
c. Recursion-based/Subspan repetition – minimal: For a specific construction that involves repetition of positions in the planar structure (e.g. conjunction, reduplication), this is the span wherein none of the elements can display wide scope over the conjoined spans of structure.

Free occurrence is sometimes described as a morphosyntactic test (Haspelmath 2011) and sometimes as a phonological one (Zingler 2020). Deviations from biuniqueness (e.g. circumfixation, domains for the cells of inflectional classes etc.) mix phonological and morphosyntactic properties in such a way that straightforward classification as morphosyntactic or phonological is problematic. Finally, conjunction of spans of structure is used as a test for constituency, but accounts differ on whether wide-scope phenomena are a product of ellipsis or not. On an ellipsis based account the relevant domain could be phonological, which is why this domain is coded as indeterminate (see Osborne 2006 for background). This is only relevant for the minimal domain, however. The maximal domain would generally be treated as morphosyntactic.

It is worth stressing that coding a domain as indeterminate reflects agnosticism at the stage of coding data, rather than a theoretical commitment.

Furthermore, I would like to emphasize that the constituency tests applied in this volume do not exhaust what one *could* code as a constituency test in this approach. There are other aspects of constituency structure that have not yet been operationalized to a point where they can be coded in a cross-linguistic study. An example of this would be constraints related to islandhood which form an important part of the insights achieved in the syntactic literature. Hopefully future research will fill in the relevant gaps. The planar-fractal method is extensible in the sense that new tests can be added as we learn more about constituency and expand the scope of the project to new domains.

9 Chapters of this volume

The chapters on this volume contribute to the description and analysis of wordhood and constituency phenomena in the languages of the Americas. We attempted to do this by applying a unified methodology, the planar-fractal method. Researchers are also encouraged to critique the method: this allows for the development a cross-linguistic database in the short term, but also for the development of ideas about how to improve or expand te coverage of the methodology in the long term.

In Chapter 2, Anthony C. Woodbury provides a description of constituency in Central Alaskan Yupik (Inuit–Yupik–Unangan, USA). Cup'ik displays a relatively high degree of convergence around the word domain, as it is understood in Inuit–Yupik–Unangan studies. Out of the studies of this volume, the evidence for wordhood based on convergence is perhaps the most impressive in this language. However, Woodbury identifies a number of word "slivers" inside the traditional word that could also be identified as "words" if other criteria were rallied. Woodbury provides a number of incisive comments on the definition of wordhood in Cup'ik. He points out that "conventionalized coherence and meaning", while specified as a wordhood diagnostic in Dixon & Aikhenvald 2002, identifies lexemic verb bases in Cup'ik. Woodbury also critiques Tallman's 2021c notion of planar structure base or core, used as a type of non-moveable anchor in the construction of a planar structure. Tallman (2021c) tried to use Croft's notion of semantic head to define this construct, but Woodbury points out that the criteria for semantic headedness give competing results in Cup'ik. This raises the question as to whether planar structures presuppose an assumption about language structure (one semantic head per part of speech domain) that does not apply in all cases.

In Chapter 3, Hiroto Uchihara provides a description of Oklahoma Cherokee (Iroquian, USA). He shows a high number of convergences around the traditional Iroquian word in this language. He provides a detailed discussion of how the domains identified in Cherokee relate to categories of the prosodic hierarchy. While previous research has reanalyzed the Iroquian "word" as a phrase, Uchihara points out that this depends on what criterion or set of criteria are rallied to support domain labeling. Based on a the relatively high number of convergences found in Cherokee, he points out that apparent cases of domain misalignment could arise from looking at an arbitrarily low number of criteria (e.g. Bickel & Zúñiga 2017). While certain languages may show a relatively high amount of domain misalignments, "emergentist" explanations still need to explain high convergences where they occur.

In Chapter 4, Miller applies the planar-fractal method to Kiowa (Tanoan, USA). She argues that the methodology provides further support (in addition to Miller & Sande 2021) for Tri-P mapping, a phase-based theory of the syntax-phonology interface. In this approach phonological domains are the output of morphosyntactic phases, defined in terms of derivations in syntax. Empirically the results suggest that for every phonological domain there is at least one converging morphosyntactic one. Miller's chapter shows that the planar-fractal method might be helpful in testing competing theories of the syntax-phonology interface since it "strips away theoretical assumptions" that can lead to noncommeasurability between linguistic analyses.

Nakamoto provides a detailed analysis of constituency in Ayautla Mazatec (Popolocan, Oto-Manguean, Mexico) in Chapter 5. Nakamoto shows a relatively low amount of convergence in phonological domains. He shows that interesting analytic issues arise with domain (mis)alignment assessment because of the presence of concatenative floating tones. This suggests more potential problems in assessing domain (mis)alignment cross-linguistically.

In Chapter 6, Sandra Auderset, Carmen Hernandez Martinez and Albert Ventayol-Boada provide a description of constituency tests applied to Duraznos Mixtec (Baja Mixteca, Oto-Manguean, Mexico). Duraznos Mixtec displays the most striking misalignments out of any of the languages in the volume. The authors show that the high degree of ambiguity in identifying the word is reflected in the literature by authors representing Mixtec languages with different degrees of synthesis orthographically. In general, the results could be regarded as evidence for Pike's contention that the morphology-syntax and word-phrase distinctions are weak or unmotivated in Mixtec languages, yet we should refrain from claiming that all Mixtec languages are the same in this regard.

In Chapter 7, Ambrocio Gutiérrez Lorenzo and Hiroto Uchihara apply the planar-fractal to the analysis of nominal and verbal domains in Teotitlán del Valle Zapotec (Zapotecan, Oto-Manguean, Mexico). They argue that there is some support for morphosyntactic words independent of phonological words based on the clustering assumption (i.e. words are domains of high clustering). Based on the clustering assumption, TDZ Zapotec would appear to be closer to isolating than is has been described in previous literature, at least morphosyntactically. Assessment of the clustering of phonological domains is less clear, however. The highest domain appears to be the one with the strongest convergences. The results suggest that a clustering assumption cannot be used to divide words from phrases: higher utterance/sentence level domains might be just as likely to show high convergences.

Eric Campbell provides a description of constituency in Zenzontepec Chatino (Chatino, Oto-Manguean, Mexico) in Chapter 8. He shows a high degree of convergence in Zenzontepec Chatino on (morpho)phonological grounds around a small span of structure, which he described as the word in previous work. The situation is reminiscent of Central Alaskan Yupik in terms of convergences, but for a smaller (isolating?) word domain. However, in Zenzontepec Chatino identifying a morphosyntactic word is more problematic. Nevertheless, a question arises in such cases as to how an emergentist approach would explain high convergences in phonological processes found in Chatino.

In Chapter 9, Minella Duzerol provides a description of the French-based creole Martinican (Martinique). According to Duzerol there are not many phonological criteria that can be used to motivate a notion of phonological word in the language, thus most of the criteria that one can rally to analyze Martinican structure are morphosyntactic. Duzerol discusses the results in light of orthographic conventions and practices in Martinican. While the results do not line up with official orthographic conventions for delineating words, Duzerol suggests they might line up more with actual writing practice.

In Chapter 10, Patience Epps provides a description of Hup (Nadahup) using the planar-fractal method. By focusing on the difference between Hup and its sister language Daw, she argues that one could characterize the Hup and/or Daw structures as isolating or synthetic depending on which criteria are prioritized.

Either both languages are isolating, Hup is polysynthetic and Daw is isolating or both languages are polysynthetic depending on which criteria are considered. Epps suggests that the key difference between Daw and Hup, the phonological integration of elements in a fixed order into a larger phonological unit in the latter but not the former, arose due to contact with Tukanoan languages. Epps discussion also reveals that non-interruption as a test is not obviously informative. There are many different non-interruptable domains depending on which element is chosen. Epps suggests a diachronic explanation for this situation.

Magdalena Lemus-Serrano provides a description of constituency in Yukuna (Arawak, Colombia) in Chapter 11. Lemus-Serrano reports extremely low levels of convergence in Yukuna overall (somewhat surprising given that Yukuna's template also requires a relatively lower number of positions compared to that of other languages). This raises questions about the applicability or relevance of categories such as morphosyntactic and phonological word for the language. The synthetic status of Yukuna is likewise unclear because it depends on which criteria are prioritized. On the other hand Lemus-Serrano argues that the results support current diachronic scenarios about the evolution of person prefixes/proclitics in Arawak.

Andrés Salanova provides a description of Mẽbêngôkre (Ge, Brazil) in Chapter 12. Salanova argues that the planar-fractal analysis provides further support for the notion of word that was adopted in his previous analysis. That the relevant constituent is a word is also supported by the fact that a number of structure preserving morphophonological processes occur within the same span. Interestingly, Salanova suggests that the language has few obvious post-lexical processes. Apart from this Salanova shows that Mẽbêngôkre displays a number of striking bracketing paradoxes that are mostly related to the possibility of incorporating postpositions into a span of structure left-adjacent to the word.

In Chapter 13, Adam Tallman describes the application of constituency tests to Araona (Takanan, Bolivia). I argue that whether we find convergences within the phonological or morphosyntactic domains depends on how certain "indeterminate" domains are classified. It is unclear whether deviations from biuniqueness, minimal subspan repetition and free occurrence domains should be classified as morphosyntactic or phonological. How to relate the results to claims about morphosyntactic and phonological structure is contingent on how we treat these indeterminate domains. Overall there is a way of interpreting the results with respect to common assumptions about wordhood in Takanan languages, but the planar-fractal method shows that such analyses are partially arbitrary. Whether Araona is isolating or (poly)synthetic depends on which of the diagnostics we assume are word identifying versus phrase identifying.

In Chapter 14, Gladys Camacho-Rios and Adam Tallman provide an analysis of Uma Piwra South Bolivian Quechua (SBQ) (Quechua, Bolivia). We find some support from wordhood diagnostics for the orthographic word in SBQ. SBQ is interesting because of the number of complex morphemes that replace spans of structure internal to the word, but without covering the root (semantic head). In the phonological domain, there are no convergences in SBQ. We contextualize the results in relation to debates about the morphology-syntax distinction in Quechua.

In Chapter 15, Javier Carol provides a description of constituency in Chorote (Matacoan, Argentina). Carol discusses his results in terms of the high degree of "transcategoriality" of elements in Chorote. Transcategoriality is relevant for the way we have formulated selection in this project. A selection domain is one which contains elements which can only combine with a single part of speech class. Carol argues that this domain is, in fact, ambiguous because it depends on whether we are concerned with "selection of a predicate" versus "selection of a verb" in its assessment. He breaks down the criteria further to capture this difference. Chorote displays cases where the nominal structure must be partially interspersed (tangled) with the verbal one because the distribution of noun phrases in Chorote depends on whether these occur with a demonstrative or not: nominal demonstratives also incorporate into the Chorote verbal structure. Overall the results for Chorote suggest a highly ambiguous situation without obvious support for the word bisection thesis.

In Chapter 16, Cristian R. Juárez provides a description of constituency tests in Mocovi (Guaycuruan, Argentina). Juarez shows that the constituency test results in Mocovi support a graded notion of word. Minimal fractures of domains overall suggest a much smaller word constituent than has been described for Guaycuruan languages, whereas maximal domains come closer to supporting a larger word constituent.

Chapter 17 provides an overview of the results of the volume. We focus on the structure of the database and the workflow for its development. We target three assumptions in linguistics that we think need to be revised in light of the results of this volume. This chapter calls for reassessment of the notion of synthesis, wordhood test, and claims about the relative reliability of tests in the linguistic literature.

Chapter 18 provides a critical and retrospective commentary on the project of comparing wordhood and constituency cross-linguistically by Kristine Hildebrandt. Hildebrant compares the methodology of the Word Domains project to the Constituency-Convergence project, commenting on areas that still require future research.

In Chapter 19, Taylor Miller further assesses the planar-fractal method in relation to a one of the current theories of syntax-phonology interaction: Tri-P mapping with Cophonologies by Phase. Taking some select examples from this volume, she argues that the model makes successful predictions concerning the patterns found in Araona and Ayautla Mazatec. She shows that a description of the data in terms of the planar-fractal method permits a relatively stream-lined assessment of how well data fit syntax-phonology interface theories, thus opening the door to more rigorous intertheoretic comparison.

Abbreviations

3	third person	IND	indicative
ABL	ablative	INF	infinitive
ABS	absolutive	INTRC	interactional
ANT	anterior	ITR	intransitivizer
ASR	assertive	LNK	linker
ASSIMIL.	assimilation	LOC	locative
AUX	auxiliary	MAX.	maximum
CAUS	causative	MIN.	minimum
CISCAT.	ciscategoriality	NEG	negative
COAL.	coalescence	NO-INTERRUPT.	non-interruptability
COM	comitative	NO-PERMUT.	non-permutability
COMPL	completive	OCCURR.	occurrence
COMPL.	complement	PL	plural
CONS.	consonant	PRIOR	prior
DECL	declarative	PST	past
DIM	diminutive	REC.	recursion-based
DS	different-subject conjunction	REL	relative
		REP	reportative
DST	distant past	SEL.	selection
ERG	ergative	SG	singular
EXP.	exponent	SS	same-subject conjunction
EXTEND.	extended		
GEN	genitive	TR	transitive
HAB	habitual	V-CLUST.	vowel cluster

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Chapter 2

Constituency in Cup'ik and the problem of holophrasis

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In Unangan-Yupik-Inuit (UYI) languages, Words are traditionally analyzed as a single Base lexeme, then zero to many Postbases (derivational suffix units), and then inflection according to word class. Since both Bases and Postbases are lexemes that may have concrete meaning, the resulting Word can be phrase-like (holophrastic) even though the languages have no compounding. We evaluate this analysis for verb-headed clauses in Cup'ik, a Central Alaskan Yupik variety, by examining and measuring constituency in the program of the present volume. This yields significant grammatical and phonological confirmation of the traditional Word unit; but the program assumes that the Verb Base will be the single, lexically-dense verb core in a clause, thus not gauging holophrasis, the grouping of multiple lexically-dense elements within a single Word or how such elements might project constituency within or beyond the traditional Word. It is argued that a more complete assay of wordhood within this program must gauge lexical and grammatical contributions to the clause element by element, regardless of Base status. In that way, the program would detect and measure holophrasis as a significant typological dimension along which UYI languages would occupy an extreme position.

1 Introduction

Polysynthetic languages and polysynthetic constructions are defined as prolifically holophrastic: a single word expresses what in more analytic languages would appear as a whole phrase (Duponceau 1819; see also Boas 1911; Fortescue 1994; and Mithun 2009, who cites Lieber 1853 as the source of the term *holophrasis*).

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Mattissen (2004, 2006, 2017), surveying languages considered polysynthetic, finds multiple elements within a putative word unit carrying lexical meaning, and encoding such categories as "event or participant classification and quantification, setting (e.g., 'in the night'), location or direction, motion, instrument (e.g., 'by hand')". The survey points to considerable diversity in the kinds of lexical meanings and categories that can be expressed morphologically and in which ones of these are selected from language to language; and even considerable diversity in how such categories are encoded: as roots alone, roots within compounds, clitics, affixes, featural ablaut/mutation, or as combinations of any of these. Even more fundamentally, holophrasis presupposes a theoretically and empirically stable notion of the WORD; and yet the word is what this volume aims to scrutinize.

Unangan-Yupik-Inuit (UYI) languages (historically termed Eskimo-Aleut languages) pose the problem interestingly: constituency diagnostics are quite agreed that Words–where capitalization signals a formulation optimized to account succinctly for a language's own patterns–are made of a single Base lexeme and zero or more Postbases (derivational suffix lexemes): so every time you encounter a new Base, you start a new Word. And since Postbases are lexemes, often quite concrete and often heading productive constructions that grammatically extend beyond the putative Word in which they occur, they give a clear impression that UYI Words are holophrastic, even though–as it happens–there is no actual Base plus Base compounding.

The purpose of this chapter is to examine and measure constituency in Cup'ik verb-headed simple clauses in terms of a comparative program that is designed for that purpose, namely that of Tallman (2021) and the chapters in the present volume. Cup'ik, spoken in Chevak, Alaska, is a variety of Central Alaskan Yupik (CAY), which in turn may serve as a typical representative of the UYI family, in particular its Yupik-Inuit (YI) branch. I will then evaluate the results by comparing them against the largely agreed-on historic framework that was just mentioned in which Cup'ik and other UYI languages have been analyzed, and on that basis evaluate and critique our comparative program. In particular I will show that the program perspicuously demonstrates the depth and breadth of evidence for the long and complex Word unit posited for the family traditionally; but that as formulated, it comes up short in that it does not fully measure the LEXICAL DENSITY of combining elements; that is, roughly, where those elements sit along a continuum from maximally content-bearing and lexical, to non-content-bearing and grammatical-only. Such a continuum is expressed by Sapir (1921: 106–126) in his scalar framing of what he calls BASIC VS. RELATIONAL CONCEPTS, and their (defeasible) tendency to align, respectively, with morphological roots vs. grammatical processes like affixation, ablaut, and so on. Relatedly Croft (2001: 244) presents a notion of PRIMARY INFORMATION BEARING UNIT within a constituent as part of a consideration of headedness that we will return to later.

Rather than measure the lexical density of combining elements, the present program requires that Cup'ik Verb Bases (roots or stems) should serve as the lexically-dense constituent anchor or VERB CORE in Verb Words, rather than Postbases (suffixes or suffix clusters), even if some Postbases should turn out to be functionally verb-like and have considerable lexical density. Because of that, it does not allow consideration for the phenomena that have led to perceptions of holophrasis, namely the grouping of multiple lexically-dense pieces into a single word and the recognition of how such elements might project constituency apart from their participation in traditionally-recognized holophrastic words. I argue, then, that a more complete assay of wordhood within this program must actually gauge constructional contributions–including lexical density–element by element, whether it is a root/stem or not. In that way, it can be possible to detect and measure the presence, degree, and impact of holophrasis.

2 Cup'ik and the Unangan-Yupik-Inuit languages

Cup'ik, as noted, belongs to the Unangan-Yupik-Inuit family, whose genetic subgrouping is as shown in (1), based on Woodbury (1984), Fortescue et al. (2010), and the discussion there:

(1) Unangan-Yupik-Inuit (UYI) language family:
- Unangan [Formerly Aleut] (Eastern and Western varieties)
- Yupik-Inuit [Formerly Eskimo]
  - Sirenik (Russia; presently dormant)
  - Yupik
    - Siberian Yupik (2 languages)
      - Central Siberian Yupik (Russia and Alaska)
      - Naukan Siberian Yupik (Russia)
    - Alaskan Yupik (2 languages)
      - Central Alaskan Yupik (CAY): Cup'ik (Chevak); Cup'ig (Nunivak Island); General Central Yupik varieties (Yukon Delta to Bristol Bay, variously known as Yup'ik, Yupiaq, Yugtun); others

        · Pacific Yupik (several varieties)
    – Inuit-Iñupiaq (Dialect continuum from Northern Alaska to Canada to Greenland; varieties known as Iñupiaq (Alaska); Inuvialuktun, Inuktitut, Inuttut (Canada); Kalaallisut (West Greenland), among others

Major sources on CAY include several grammars (Reed et al. 1977; Jacobson 1995 and Miyaoka 2012) and an outstanding dictionary (Jacobson 2012). Woodbury (1981) focuses on the Cup'ik variety in particular. All of this work continues a broader framework established and expanded in writings on Kalaallisut, especially Kleinschmidt (1851), Bergsland (1955), Fortescue (1984) and Sadock (2003). The tradition is also notably expanded in de de Reuse (1994), which focuses on Central Siberian Yupik. Despite many differences in interpretation, all this work shares a deep commitment to describing the languages on their own terms; and the agreement across these works is one of many indications of a unique and also shared typological build across the languages themselves, as I discuss in Woodbury (2017). The present chapter is based on about 20 hours of transcribed naturalistic speech and a large number of sentences from elicitation, all created over the period from 1978 to 1997 in visits to Chevak, Alaska and mostly archived at the Alaska Native Language Archive in Fairbanks, Alaska.

3 The Cup'ik word in own-terms description

In this section I outline those aspects of Cup'ik relevant for this article in a way that strives to fit the language's own patterns and that also largely conforms to the traditionally-established framework for UYI grammar. I term this OWN-TERMS DESCRIPTION, repeating the oft-repeated adage, but I do not mean to suggest that a single most optimal own-terms account always exists. Rather, I'm suggesting a stance that values internal perspicuity over extrinsic plans or frameworks (see Haspelmath 2011 for some more concrete discussion). In what follows I draw heavily on Woodbury (1981 and 2017), which give more detail. We'll consider first the architecture of (traditional) Words (inflection, derivation, and sometimes clitics); and then briefly review features that support the characterization of UYI Words as holophrastic.

3.1 Inflectional morphology

Based on inflectional and other patterns, Cup'ik has three classes of WORD: NOMINALS, VERBS, and PARTICLES (again, note the use of capitalization because these terms are in some ways parochial).

Nominal Words are a super-category consisting of common nouns, independent pronouns, demonstratives, quantifiers, participles, and others, and they are inflected for case, number, and (for common nouns) the person and number of any possessor. For example, (2) shows a noun phrase consisting of two Nominal Words, a demonstrative and a noun, both inflected for Absolutive singular, where either constituent is optional (marked by parentheses); and (3) shows several possessor-possessum constructions, where the case value of the possessor, always syntactically optional, is the Relative case while the inflection of the possessum reflects the person and number of the possessor in addition to its own number and case.[1]

(2) Demonstrative – Noun
(tau-na) *(arnaq)*
(that-ABS.SG) (woman.ABS.SG)
‘that woman; woman; that one.’

(3) Possessor – Possessum

a. *(arna-m* *tau-m)* *eni-i*
(woman-REL.SG that-REL.SG) house-ABS.SG+3SG.POSS
‘that woman’s house; her house.’

b. *(wii)* *en-ka*
(me.REL.SG) house-ABS.SG+1SG.POSS
‘my house (of mine)’

[1]Cup’ik has these phonemes: /p,t,t͡ʃ,k,q,m,m̥,n,n̥,ŋ,ŋ̊,v,f,l,ɬ,j,s,ɣ,ɣ^{w},x,x^{w},ʁ,ʁ^{w},χ,χ^{w},a,i,u,ə/ (Woodbury 1981). Cup’ik examples are cited in the standard Central Alaskan Yupik orthography (Jacobson 2012), where all symbols represent phonemes with the same IPA value except: <vv> = /f/; <ll> = /ɬ/; <gg> = /x/; <ww> = /x^{w}/; <rr> = /χ/; <u͡r> = /ʁ^{w}/; <u͡rr> = /χ^{w}/; <ng> = /ŋ/; <ḿ> = /m̥/; <ń> = /n̥/; <ńg> = /ŋ̊/; <c> = /t͡ʃ/; <y> = /j/; <g> = /ɣ/; <w> = /ɣ^{w}/; <r> = /ʁ/; <e> = /ə/; and apostrophe following a consonant symbol and preceding a vowel symbol <C’V> indicates that the consonant is phonemically geminate /C:V/. Also, voiced continuant symbols represent their voiceless counterparts in clusters with other voiceless sounds, hence <maligtellruanga> ‘s/he followed me’ represents strictly-phonemic /malixtəɬχuaŋa/, where orthographic <g> and <r> are representing the voiceless phonemes /x/ and /χ/. Furthermore, when examples are segmented morphologically, the segmentations are performed on the orthographic (and therefore phonemic level) spelling, and for that reason it will become obvious to the reader that quite extensive morphophonological rules are at play, so that a Base or Postbase we are discussing may show up with different shapes in different contexts. Some idea of these rules is outlined in §5.7.2, when we take up the segmental phonological basis for constituency; but the curious reader will find full discussions of these matters in Woodbury (1981) for Cup’ik and of very similar facts for other Central Alaskan Yupik varieties in Miyaoka (2012) and Jacobson (2012). In any case, I have chosen not to add a regularized, morphophonemic line to each example because for present purposes, it does not add much, and it’s also rather cumbersome.

c. *(taluya-m) quli-ini*
(trap-REL.SG) area.above-LOC.SG+3SG.POSS
'above the trap; above it.' (lit: At the trap's area-above)

Verb Words likewise are inflected, but for one of ten or so values for Mood, which indicates illocutionary force or type of subordination for the clause of the Verb Word in which it appears; and then for the person and number of the surface intransitive subject (S), transitive object (O), and, in most Moods, also the transitive subject (A). (4a)-(4b) show intransitive clauses consisting of a Nominal Word S in the Absolutive Case, which is always optional when recoverable; and a Verb Word in the Indicative and Appositional Moods; (5a)-(5b) shows transitive sentences with Nominal Word A in the so-called Relative Case[2] and O in the Absolutive Case, again both optional, and Indicative (5a) and Appositional Mood (5b) verbs agreeing in person and number with O, and in (5a) but not (5b) also with A because the Indicative Mood requires A-agreement while the Appositional Mood excludes it.[3]

(4) S – V

a. *(Arnaq) qavar-tu-q.*
woman.ABS.SG sleep-IND-3SG.S
'The woman/She is sleeping.'

b. *(Wangkuta) qavar-lu-ta.*
we.ABS.PL sleep-APPOS-1PL.S
'We, sleeping.'

(5) A – O – V

a. *(Arna-m) (kaugpii-t) tangrr-a-i.*
woman-REL.SG walrus-ABS.PL see-IND.3SG.A-3PL.OBJ
'The woman/She saw the walruses/them.'

b. *(Kaugpii-m) (wii) tangrr-lu-a.*
walrus-REL.SG me.ABS.SG see-APPOS-1SG.OBJ
'The walrus/It, seeing me.'

[2]RELATIVE is the traditional term for this case, although some more recent writings on Inuit varieties outside Alaska use the term ERGATIVE. Relative persists in part because it marks possessors in addition to just transitive subjects.

[3]The APPOSITIONAL Mood–with mood sign *-lu-* ~ *-na-* in all YI languages and known in the literature also as CONTEMPORATIVE, CONJUNCTIVE, or SUBORDINATIVE–indicates a clause in apposition or co-subordination with another clause, with which it normally shares a S/A subject. It can usually be glossed in English with a present participle, as I have done in (4b) and (5b).

Finally, Particle Words are Words that lack inflection. They function as adverbs, discourse particles, and interjections, e.g., *unuaqu* 'tomorrow', *cali* 'more', *ataam* 'again', *wall'u* 'or else,' and *Aren!* 'Oops!'.

As should be clear from the examples, the inflectional categories marked on Nominal Words and on Verb Words are expressed by a suffix or suffix cluster we can, as a whole, term the Nominal Inflection and Verb Inflection. While they systematically encode the category values described above, they often do so in a way that is non-biunique: for example, Absolutive Singular is *-na* for Demonstratives and otherwise nothing, as shown in (2); *-tu-* 'Indicative' in (4a) shares nothing with *-a-* 'Indicative third singular A' in (5a); whereas in (4b)-(5b) *-lu-* is a more consistent marker of the Appositional Mood. Yet nearly always, the inflectional marking is linearly distinct, as suffix or suffix cluster, from its Nominal or Verb host, which we can identify as the Nominal Base and the Verb Base. This can be expressed as rules in (6), where Inflection designates whatever suffix or suffix bundle expresses the appropriate obligatory inflectional categories, indicated in (7):

(6) Inflection rules

- Nominal Word ➔ Nominal Base + Nominal Inflection
- Verb Word ➔ Verb Base + Verb Inflection

(7) Inflectional categories

- Nominal Inflection
  - Number (Singular, Plural, Dual)
  - Case (Absolutive, Relative, Obliques)
  - Possessor Person (1,2,3,Reflexive) and Number
- Verb Inflection
  - Mood (Indicative, Interrogative, Optative, Appositional two Participial Moods (transitive and intransitive), and five or so Adverbial Moods with values like 'when in the past', 'whenever', 'while', 'if/when hypothetically', and 'although').
  - Person/number of surface S, O, A

We can also make two typological observations at this point. First, insofar as nominal inflection includes information about external possessors and verb inflection includes information about S, O, and A, the pattern is one of head-marking. But since possessor, S, O, and A NPs are also marked for case, the pattern is also one of dependent-marking. Thus, Cup'ik displays what Nichols

(1986) has termed DOUBLE-MARKING. Second, in terms of alignment, nominal case-marking in nominals is mostly ERGATIVE-ABSOLUTIVE and virtually never NOMINATIVE-ACCUSATIVE, whereas the complex and often non-biunique patterns within verb inflection show both alignments depending on mood (Woodbury 1981: 141–189).

3.2 Derivational morphology

We now take up the composition of Nominal and Verb Bases (but leave aside that of Particle Words). Nominal and Verb Bases can be simple lexemes, representable as lemmas in a lexicon: Jacobson (2012: 12)'s CAY dictionary (by its own count) lists 11,200 of them.

3.2.1 Base recursion

But more complex Nominal Bases and Verb Bases can be derived by a simple recursive process, spelled out in (8):

(8) BASE RECURSION RULE
Base ➔ Base + Postbase

POSTBASE is a term of art first arising in Reed et al. (1977) that refers to a suffixal lexeme which selects either a Nominal or a Verb Base, and from it, derives either a Nominal or a Verb Base. There are therefore four major classes of Postbase: those both selecting and deriving a Nominal Base (NN); those both selecting and deriving a Verb Base (VV); those selecting a Verb Base and deriving from it a Nominal Base (VN); and those selecting a Nominal Base and deriving from it a Verb Base (NV).[4] Of these Jacobson (2012)'s CAY dictionary lists about 540, some but not all of which are fully productive; and none of which can also function as Bases.[5] Furthermore, it is possible to keep adding Postbases to an ever growing complex Base, as long as the selectional criteria are observed. Strings of up to five Postbases are not uncommon. Examples (9) and (10), from Words occurring in Cup'ik texts, give the flavor:

[4] There also are a few further minor possibilities, including the selection of a Particle, the selection of an inflected Word (Woodbury 1996, Sadock 2017), and the derivation of a Particle Word.

[5] Even at the level of the UYI family, Bases reconstruct as Bases (or Bases plus suffixes) and Postbases as suffixes or suffix clusters, with only a tiny class of exceptions (Fortescue et al. 2010). Thus there is virtually no reanalysis (or 'grammaticalization') of Bases as Postbases or vice versa: the classes are disjunct.

(9) Woodbury (2017: 542)

ivruci-$_N$	'waterboot (N)'
ivruci-***li***-$_V$	'**make** waterboots (for)' (-*li*- NV 'make (for)')
ivruci-*li*-***ste***-$_N$	'**one who** makes waterboot (for)' (-*ste*- VN '(possessor's) one who does V (tr)'
ivruci-*li*-*ste*-***ngerr***-$_V$	'**have** someone who makes (one) waterboots' (-*ngqerr*- NV 'have')
ivruci-*li*-*ste*-*ngqer*-***sugnait****e*-$_V$	'**definitely not** have someone who makes (one) waterboots' (-*yugnaite*- VV 'definitely not')
ivruci-*li*-*ste*-*ngqer*-*sugnail*-***ngur***-$_N$	'**one that** definitely doesn't have someone who makes (his/her) waterboots' (-*ngur*- VN 'one who does V (intr.)')

(10) Woodbury (2017: 542)

quuyurni-$_V$	'be smiling'
quuyurni-***arte***-$_V$	'**suddenly** be smiling' (-*arte*- 'suddenly')
quuyurni-*arte*-***llru***-$_V$	'suddenly smile**d**' (-*llru*- VV 'did')
quuyurni-*arte*-*llru*-***yaaqe***-$_V$	'suddenly smiled, **but alas**' (-*yaaqe*- VV 'alas')
quuyurni-*arte*-*llru*-*yaaqe*-***llini***-$_V$	'**evidently** suddenly smiled, but alas' (-*llini*- VV 'evidently')

(9) demonstrates the possibility of PING-PONG RECATEGORIZATION (Mattissen 2017: 86), deriving back and forth between Nominal and Verb bases; while (10) shows the continuous elaboration of a verb base. As also can be seen, there appears to be a semantic corollary to this recursive process that we can formulate as follows:

(11) POSTBASE SCOPE RULE
A Postbase has scope over exactly the base it selects.

To the extent (11) is true (although it isn't entirely true, as we're about to see), the whole Base to the left of a given Postbase is a constituent, semantically speaking.

3.2.2 Templatic pre-inflection

A wrinkle in the story just told is that a small number of VV Postbases align in a fixed order just before the Verb Inflection, shown in (12) and illustrated in (13), which I have called the Templatic Pre-Inflection (Woodbury 1981), and which follows patterns that might largely be predicted in terms of scope (e.g., Foley & Van Valin 1984: 208–224):

(12) Order: 1 < 2 < 3 < 4 < 5 < 6 < 7 < Verb Inflection (where the elements in each slot are mutually exclusive)

1. Aspect: *-tu-* ‘always’, *-yuite-* ‘never’, *-qar-* ‘momentarily’
2. Realization1: *-yaaqe-* ‘in vain’, *-ngate-* ‘seem’, *-ksaite-* *‘not yet’*
3. Tense: *-llru-* ‘did’, *-ciqe-* ‘will’, *-ngaite-* ‘won’t’
4. Status: *-nrite-* ‘not’; *-yugnarqe-* ‘may’; *-yugnaite-* ‘definitely won’t’
5. Realization2: *-yaaqe-* ‘in vain’, *-ngate-* ‘seem’
6. Evidential: *-llini-* ‘evidently’; *-lli-* ‘perhaps’
7. Tense-Modal: *-(g)aqe-* ‘would have’, *-ki-* (requires Optative) ‘will; did (narrative reading)’; *-lqe-* (requires Indicative transitives) ‘did’)

(13) a. 3-6
*melu-**llru-llini**-u-q*
smoke-did-evidently-IND-3SG.S
‘evidently s/he smoked.’

b. *6-3
*melu-**llini-llru**-u-q

(14) 3-6-7
*pi-**llru-lli-aqe**-ka-it*
do-did-perhaps-would.have-TRPRT-3PL.A+3PL.OBJ
‘that they would have maybe told them.’

(15) 1-3-6
*liica-**tu-llru-lli**-ki-it*
teach-always-did-perhaps-TRPRT-3PL.A+3SG.OBJ
‘that they *maybe used to* teach him.’

(16) 3-4
*pi-vaka-**llru-nril**-ke-ka*
do-fully-did-not-TRPRT-1SG.A+3SG.OBJ
‘that I didn’t fully [obey] it.’

(17) a. 2-3
*naptar-c-**aaqe-llru**-u-nga*
whitefish-catch-in.vain-did-IND-1SG.S
'I caught a whitefish, but alas.', e.g., it got away

b. 3-4
*naptar-te-**llru-yaaq**-u-a*
whitefish-catch-did-in.vain-IND-1SG.S
'I did alas catch some whitefish.', e.g., a veiled offer

(13) and (17) are elicited forms that test alternative orderings; (14)-(16) are text examples that further illustrate the ordering claimed in (12). Such fixed ordering–albeit with substantial differences in detail--is found before verb inflection in all Yupik-Inuit languages (hence the term Templatic Pre-Inflection) and has been treated as a departure from the strictly binary, right-branching model specified by the Base rule (8). For example, some have argued that the ordered VV Postbases form branching constituents (Fortescue 1980 for Kalaallisut) that sometimes also include the Verb Inflection (Woodbury 1981 for Cup'ik, de Reuse 1994 for Central Siberian Yupik). It is also possible instead to leave (8) alone, but to impose the template implied by the formulation in (12) as a filter. It would seem that templatic ordering would weaken the Postbase Scope Rule (11), but not entirely: as can be seen in (12), the Realization Postbases are "wild cards" that may occur in two positions (2 and 4), with typical scopal effects as in (17a)-(17b), see Woodbury (2017: 554–555).

3.3 Enclitics

Certain particles are treated as enclitics, occurring in a mostly fixed order at the ends of Words of any class. They are sometimes treated as regular parts of Words but often marked distinctly–e.g., with clitic boundaries noted orthographically–so as to form what we can call Clitic Groups, shown in (18), where 'Enclitics' stands for a sequence of from one to four Enclitics following a specific ordering and never numbering more than four (see Woodbury 1981:292–294), and illustrated in (19), where '=' marks Enclitic boundaries:

(18) CLITIC GROUP RULE
Clitic Group ➔Word + (Enclitics)

(19) *Tayima=llu=ggur=am* *pii-nani*
elsewhere=and=it.is.said=again absent-APPOS.3.REFL.SG.S
'and it is said, again, he was absent, somewhere else.'

In (19) the host is a Particle Word *tayima* 'elsewhere' and three Enclitics appear on the first Word in the whole host phrase, as is frequent. The Clitic Group itself is based in part on the fixity of clitic order but also on its status as a superordinate domain for automatic stress rules, albeit with a few differences from those stress rules applying to the Word proper (see §5.7.1 for further discussion).

3.4 The case for holophrasis

The foregoing lets us articulate two ways that Cup'ik is holophrastic, that is, that a single word expresses what in more analytic languages would appear as a whole phrase. One is the lexemic character of both Bases and Postbases; the other is the propensity of certain VV Postbases to head phrase-like or even clause-like constituents that go beyond just the Base to which they are suffixed. These are taken up in turn in the following two subsections.

3.4.1 The complex lexemic character of bases and Postbases

Both Bases and Postbases are lexemes, that is, elements that are PRODUCTIVE grammatical and semantic formatives in larger constructions, and they are LISTEMES, that is, elements with non-compositional meaning that therefore have to be listed in the lexicon. (However, because Base formation (8) is recursive, we are really speaking here only about Bases not recursively formed as the output of (8)). Such Bases then are the productive listemes consisting of the idiomatic collocation of a root or stem, and zero or more less-than-productive suffix elements. Thus, the Nominal Base *qayaq* 'kayak' consists of a single root *qayaq* whereas *ivruciq* 'water boot', as in (9), consists of a semi-idiomatic combination of the verb Base *iver-* 'to wade' plus a suffix (also a Postbase) *–(u)ciq* 'means for V-ing'; but the meaning is not just any device for wading, but specifically a thigh-high fish-skin or seal-gut boot. Postbases likewise are productive lexemes, but consisting of one or more suffixal elements. For example, drawing again on (9), *-li-* is a NV Postbase meaning 'to make V' that consists only of the suffixal element *-li-*. That same suffixal element can also combine with another suffixal element, *-ur-* , usually having 'habitual' meaning, to form a complex Postbase *-liur-* 'to deal with N', which productively selects a Nominal base to form a Verb Base. But unlike the *-li-* suffixal element, the *-ur-* 'habitual' suffixal element is not a standalone productive Postbase; and moreover, the whole meaning of *-liur-* 'to deal with N' is somewhat semantically idiomatic and non-compositional. So *-liur-* is a productive suffixal listeme and lexeme, what we're calling a Postbase. An even more complex, but quite typical Postbase from (9) is *-yugnaite-* 'to definitely not (do) V', composed of the elements *-yug-,* which as an independent VV Postbase means 'to want V'; plus *-nar-*, not an independent Postbase but occurring within some Postbases with the meaning 'to tend to V'; and then *–(ng)ite-*, which independently is an NV Postbase meaning 'to lack N'. Although this may compose into something like 'to lack a tendency to want to V', the actual meaning, 'to definitely not (do) V', is hardly the same. In short, etymologically complex Postbases, like etymologically complex Base lexemes, are not the semantic sums of their parts.

The other part of the equation–as seen in the discussion of rule (8)– is that as lexemes, Bases and Postbases do indeed work productively and compositionally. Writing about Central Siberian Yupik, de Reuse (2009) proposes the term PRODUCTIVE NONINFLECTIONAL CONCATENATION (PNC). He argues that it is a hallmark of polysynthesis, and that it is especially elaborate in Yupik-Inuit languages, for which it offers a specific mechanism for the vaguer notion 'holophasis'.

3.4.2 The lexical density of certain Postbases

A second strand of the argument for holophrasis is establishing the lexical density of the elements within words: this is germane because holophrasis is not holophrasis if the components of Words are not word-like; and part of being word-like is having lexical density. For UYI languages, the lexical density of Nominal and Verb Base lexemes is established and can be assumed. What is worth establishing is the lexical density of Postbases. What follows is a synoptic survey of VV Postbase meanings (a far deeper and more exhaustive account is in Miyaoka 2012 for Yup'ik). It is broken into two groups: Postbases acting as heads that select Verb Base as complement; and Postbases acting as adverb-like modifiers to the Verb Bases they morphologically select (quoted from Woodbury 2017: 545):

> **VV Postbase-as-head (verb-selecting verb).** (i) causative and other transitive, complement-taking, argument-structure affecting verbs (Sec. 30.7.2 further characterizes this class, called double transitives): 'let', 'ask/tell to', 'say that', 'think that', 'wait for'; (ii) other argument structure-affecting verbs, auxiliaries, or voice markers: 'to do V-tr. (to)' (antipassive, suppresses O or makes it oblique), 'to do V in place of', 'to do V on account of' (applicative), 'for S (pl.) to do V to each other', 'tend to cause V (intr.)', 'be time (for O or S) to V or be V-ed', 'will/should V or be V-ed', 'be more V (stative) than (oblique)', 'test how V (stative) O is'; (iii) verbs of ability: 'be able to', 'be ready to', 'not any longer be able to'; 'be able to do V proficiently'; (iv) verbs of desire, propensity, purpose, or modality: 'want to', 'want O to',

‘tend to’, ‘no longer care to’, ‘be ready to’, ‘be ready at any moment to’, ‘in order to’, ‘be about to’, ‘plan to’, ‘must/should’ (v) verbs of endeavor: ‘try to’, ‘try unsuccessfully to’ (vi) verbs indicating phases of accomplishment: ‘begin to’, ‘be about to’, ‘set out to’, ‘go and V’, ‘be in a state of V-ing’, ‘to become V (stative)’, ‘to reach a state of V (stative)’; ‘stop V-ing’.

VV Postbase-as-modifier (adverb). (i) manner adverbs: ‘poorly’, ‘happily’, ‘well’, ‘easily’, ‘roughly’, ‘quickly’; (ii) adverbs of degree, speed, and intensity: ‘more and more’, ‘excessively’, ‘intensely’, ‘really’, ‘suddenly,’ ‘barely’, ‘a lot’, ‘a little’, ‘just, only’, ‘almost’; (iii) affective epithets: (Sec. 30.7.3 further characterizes this class, which usually modify verbal actants): ‘poor’, ‘darned’, ‘young’, ‘dear’; (iv) relators to other events: ‘first’, ‘also’, ‘again’, ‘never again’, ‘finally’, ‘earlier’, ‘later’; (v) aspect-related adverbs: ‘do V to O (pl)) one after another in succession’, ‘continuously’, ‘now and again’, ‘habitually’, ‘customarily’, ‘always’, ‘first’, ‘repeatedly V and un-V’; (vi) negators: ‘not’, ‘will not’, ‘not yet’, ‘don’t V!’ (vii) tense markers: ‘in the past’, ‘in the future’, ‘not in the future’; (viii) markers of propositional attitude: ‘evidently’, ‘contrary to expectation’, ‘authentically,’ ‘probably’, ‘but alas’, ‘maybe’, ‘seemingly, perhaps’ ‘probably’, ‘definitely not’; (Sec.3.2.2 discusses special ordering properties of some of v-viii).

Not all VV Postbase meanings described here are equally lexically dense, but even the sheer number of meanings suggests that at least some have very considerable lexical density. Correspondingly, the sheer number of VV Postbases makes them as a whole an open rather than a closed class (even if certain Postbases are more grammatical than lexical). It is also worth noticing the complete lack of adverbial meanings based on body part as instrument (‘by hand’), location (‘above’), setting (‘on the beach’), direction (‘toward speaker’), specific time (‘at night’) that are otherwise common in polysynthetic languages, cf. Mattissen 2017.

3.4.3 The syntactic independence of certain Postbases

In his article, de Reuse also argues that PNC–unlike derivational morphology–‘interacts with syntax’ in a way that would violate the Postbase Scope Rule (11). By ‘interacts with syntax,’ he refers to a long set of debates, the crux of which is the extent to which certain productive verb-deriving (i.e., NV and VV) Postbases–can be treated as ‘syntactic atoms’ at some level, even as they function in the morphological treatment just outlined as PNC’s (Sadock 1980, 1991, Woodbury

& Sadock 1986, Mithun 1984, Baker 1988, de Reuse 1994, Johns 2007, Compton & Pittman 2010, Fortescue 2015, Yuan 2018). We will take up this issue in more detail in §6, but consider the following example:

(20) (Woodbury 2017: 352)
[ciku-meng atauci-meng ene]-ngqer-tu-a
ice-INS.SG one-INS.SG house-have-IND-3SG.S
'I have one house made of ice.'

Here the NV Postbase *-ngqerr-* 'to have N' seems to take as its complement not just its Nominal Base host *ene-* 'house', but (at some, possibly abstract level, represented with square brackets) an NP meaning 'one house made of ice' that is expressed, in part, by the stranded modifiers *cikumeng* '(with) ice' and *ataucimeng* '(with) one'. The question then is the extent to which *-ngqerr-* 'to have N' functions as a verb, and the extent or level at which 'one house made of ice' is a constituent. Although a lot of the debate is expressed in the terms of popular cross-linguistic frameworks (Haspelmath 2011), there is widespread agreement on the 'own terms' basics of constructions such as these.

3.4.4 Conclusion

The crux of UYI specialists' own-terms analysis, even across internal interpretive divides, is that these languages have highly complex Words built, productively, from lexemic Bases; (lexemic) Postbases; inflection; and phonologically adjoined Clitics. At the same time, they recognize that these Word components bear resemblances to units treated as words in other languages insofar as the components can themselves behave as 'syntactic atoms' and can often have morphologically complex and idiomatic internal composition.

With all of that in mind, our task now is to measure UYI languages–taking Cup'ik as the case in point–in cross-linguistic comparative terms, first, for the obvious end of comparing it in a consistent way to what is becoming an impressive sample of other languages measured similarly; but second, in order to see to what extent the comparative program captures all of what has arisen in the centuries-old UYI linguistic tradition, congratulating it where it does so, but proposing revisions or expansions or clarifications where it does not do so.

4 A planar structure to diagnose constituency in the Cup'ik clause

The PLANAR STRUCTURE FOR THE VERB is provided in **Table 1.** It is based on flattening out and elaborating the generalizations from §3. In the system we are using, every planar structure is lexically anchored, so to speak, on a lexemic CORE element that is obligatorily present. For Tallman, that core or anchor must be a root or stem, relative to which the surrounding planar positions are located. Accordingly he defines the VERB CORE "as a verb root *or* as a verb stem which would no longer remain of the same category if any of its affixes were stripped of (Tallman 2021: 13). Applying the first part of this criterion to Cup'ik, then, we can consider Verb Base from §3 (before the recursive application of the Postbase rule in (8)) as the verb core in terms of which the rest of the verbal planar structure is defined. Since–as noted–lexemic Verb Bases are not necessarily unanalyzable roots, we will engage in a certain amount of sleight of hand by considering lexemic Verb Bases as the verb core in position 2 even if they aren't single simple roots, but rather consist of a root or stem, together with less-than-productive etymological VV suffixes, e.g., *eliynga-* 'to be knowledgeable' from *elite-* 'to learn' plus the restricted and only semi-productive VV suffix *-nga-* 'be in a state of having 'V-ed'.[6] Applying the second part of Tallman's criterion, 'a verb stem which would no longer remain of the same category if any of its affixes were stripped off', is more straightforward. For example, if a derived Verb Base such as *enengqerr-* 'house-to.have.N' = 'to have a house' were formed from a Noun Base (*ene-* 'house') and a NV Postbase (*-ngqerr-* 'to have N'), the whole derived Verb Base would count as a Verb Core and thus would fill just position 2 in our planar structure.

From there, VV Postbases fill position 3; positions 4-10 encode the seven template-ordered Pre-inflectional positions described in §3.2.2; positions 11-16 are for the formatives that mark the Verb Inflection, divided into Mood (11–12, where only 12 is obligatory) and person and number marking for S, O, and usually A. Finally, 17-20 are for Enclitics, which as noted follow a specific order and probably

[6]That is, in deciding what counts as an 'element' to fill planar structure positions, I'm taking Verb Bases and Postbases to be elements–fitting positions 2 and 3 respectively, even though they are often made up of smaller (but not fully compositional) pieces. This amounts to a decision to set as the threshold for planar analysis at a level somewhat above that of the smallest morphological formatives. A similar move for English might take the phrase *they are overwhelmed us* and consider *overwhelm* as the verbal core, even though it is a derived stem consisting of the prefix *over-* and the verb root *whelm.* I later call this the setting of a LEXEMIC THRESHOLD for purposes of analysis.

never number more than four at a time. The periphery surrounding 2-20 consists of zones 1 and 21, fore and aft. respectively.

The span 2-16 thus represents the traditional Verb Word, and is the orthographic word for many native speaking writers. The span 2-20 represents the traditional (Verb Word-hosted) Clitic Group. Some native speaking writers follow the orthography’s convention of attaching each clitic to the word with a hyphen, while other writers use no hyphen, in effect taking 2-20 as the domain of the orthographic word (whereas it’s not common at all to see the clitics written apart, as separate words).

On this analysis, most positions are slots because they can only be occupied by a single element at a time, not several, as spelled out explicitly for positions 4 through 20. Zones are assumed for the flanking positions 1 and 21 in order to accommodate multiple phrases and their components: this is simply a convenience in order to focus on grammar around the verb core (position 2). Internally, only position 3 is a zone since it can include sequences of zero or more Postbases whose order is strictly based on its scope over the verb. Finally, three distinct sequences seem to share a function: 11-12 for Mood; 13-16 for Person and Number of A, S, and O; and 17-20 for various mostly adverb-like enclitics.

As illustration, (21) is a biclausal phrase with two Verb Bases and therefore must be treated as involving two instances or parses of the verbal planar structure, the first (here abbreviated ‘1 {v}’) focused on the Verb Base *aper-* ‘to utter’, which thus fills position 2 as verb core; and the second (‘2 {v}’) focused on the stative Verb Base *cuka-* ‘to be fast’ so that it fills position 2 as verb core for the second parse:

(21)								
	ap	*-tu*	*-llini*	*-aq*	*-a*	*-a*	*=llu*	*=gguq*
1{v}:	2	-4	-9	-10	-12	-16	=18	=19
2{v}:	[1	-	-	-	-	-	-	-]
	utter	-always	-evidently	-would	-IND	-3SG.A+3SG.OBJ	=&	=QUOT

cuka	*-u*	*-na*	*-ku*
[21	-	-	-]
2	-7	-12	-16
be.fast	-lack	-APPOS	-3SG.OBJ

‘And, it is said, s/he would always utter it slowly.’

It cannot be emphasized enough that, although the planar structure can be applied to transcribed Cup’ik clauses, it does not constitute a perspicuous description of those clauses, much less an account of how clauses are constructed in

Table 1: Planar structure anchored on the Cup'ik verb base. (Obligatory positions are bolded.)

Pos	Type	Elements
(1)	Zone	Nonverb (If nominal, Any grammatical function/Case; otherwise particle) [OPT]
(2)	**Slot**	**Verb core: Lexemic Verb Base or minimal Verb Base [OBLIG]**
(3)	Zone	VV Postbase [OPT]
(4)	Slot	Aspect: *-tu-* 'always', *-yuite-* 'never', *-qar-* 'momentarily' [OPT]
(5)	Slot	Realization1: *-yaaqe-* 'in vain', *-ngate-* 'seem', *-ksaite-* *'not yet'* [OPT]
(6)	Slot	Tense: *-llru-* 'did', *-ciqe-* 'will', *-ngaite-* 'won't' [OPT]
(7)	Slot	Status: *-nrite-* 'not'; *-yugnarqe-* 'may'; *-yugnaite-* 'definitely won't' [OPT]
(8)	Slot	Realization2: *-yaaqe-* 'in vain', *-ngate-* 'seem' [OPT]
(9)	Slot	Evidential: *-llini-* 'evidently'; *-lli-* 'perhaps' [OPT]
(10)	Slot	Tense-Modal: *-(g)aqe-* 'would have', *-ki-* (requires Optative) 'will; did (narrative reading)'; *-lqe-* (requires Indicative transitives) 'did' [OPT]
(11)	Slot	Mood [OPT]
(12)	**Slot**	**Mood [OBLIG]**
(13)	Slot	Person+number [OPT]
(14)	Slot	Person+number [OPT]
(15)	Slot	Person+number [OPT]
(16)	**Slot**	**Person+number [OBLIG]**
(17)	Slot	Enclitic [OPT]
(18)	Slot	Enclitic [OPT]
(19)	Slot	Enclitic [OPT]
(20)	Slot	Enclitic [OPT]
(21)	Zone	Nonverb (If nominal, Any GF/case otherwise particle) [OPT]

Cup'ik. If the planar structure (or the program of which it is a part) were a grammar, it would be a finite-state grammar, inching from one position to the next, linearly, without systematically incorporating recursion (other than of the trivial X* sort of which finite-state grammars are capable). In contrast, the traditional 'own-terms' account given in §3 is equivalent to a context-free phrase-structure grammar that is recursive on many levels (even if filtered in certain ways, see §3.2.2), and captures how Postbases normally both select, and have scope over, the building Base. And yet, admittedly, even that doesn't capture certain nuances, e.g., that the two Enclitics in (21) have scope over the whole utterance and not just the Word that hosts them. Of course, as noted the planar structure has the advantage of allowing a simple kind of measurement of constituent classes (independent of their level of embedding, and across possibly distinct constituent-forming strategies), as well as simple cross-linguistic comparison. Both these feats would be challenging if some type of context-free phrase structure grammar were used as the basis for comparison.

5 Constituency diagnostics applied to the Cup'ik clause

We now apply CONSTITUENCY DIAGNOSTICS (also called constituency tests) taken, except as noted, from Tallman (2021). The main focus of this section is a description of the results of constituency diagnostics applied to Cup'ik over the planar structure in Table 1. By a constituency diagnostic we refer to some generalization over the constructions of the language that identifies a subspan in the planar structure. The following tests will be applied:

- Free occurrence
- Non-interruptability
- Repair domain
- Non-permutability
- Ciscategorial selection
- Subspan repetition/subspan selection
- Phonological domains: Prosodic
- Phonological domains: Segmental
- Biuniqueness deviation domains

Furthermore, where applicable, each test will be FRACTURED into subtests where criteria are defined more specifically, usually (but not always) with the result that one subtest can be termed MINIMAL and the other MAXIMAL, based on the length of the span it ends up identifying.

5.1 Free occurrence (2-16, 2-20)

FREE OCCURRENCE is defined as "[a] well-defined contiguous subspan of positions whose elements can be uttered as a minimal free form" (Tallman 2021: 16). This picks out the span 2-16, as shown in (22), which show that the three obligatory positions in the planar structure, 2, 12, and 16 must all three be present to constitute a minimal free form:

(22) a. *tekit-u-t*
2-12-16
arrive-IND-3PL.S
'they arrive(d)'

b. *Tekit-u
2-12

c. *(t)u-t
12-16

But if we define the free span as containing one and only one free element (i.e., a maximal minimum free form) then the span can add enclitic positions, even though enclitics cannot occur by themselves (23). In this respect they are different from Particles, which can occur as free forms (24):

(23) a. *tekit-u-t=am*
2-12-16=20
arrive-IND-3PL.S=but
'but they arrive(d)'

b. *=am
=20

(24) a. *tekit-u-t* *cali*
2-12-16 21
arrive-IND-3PL.S also
'they arrive(d) also'

b. *Cali.*
21
also
'Also, more.'

The two spans, 2-16 and 2-20 correspond, respectively, to the Word and the Clitic Group identified in §3.

5.2 (Non)-interruptability (2-16)

(Non)-interruptability is defined as "[a] well-defined contiguous subspan of positions whose elements cannot be interrupted by elements of class I", where 'class I' is some sort of 'interrupting element', whether a free form as defined by free occurrence, or some other test-definable subspan, that is to say, by some other span showing constituent properties (Tallman 2021: 16). For Cup'ik, the result is always the Verb Word (span 2-16), whether the interrupting element is a single free form or several free forms. Thus (25a) shows a well-formed span 2-16 while (25b) interposes *ukut (cuut)* 'these (people)' between the Verb Base and a semantically somewhat verb-like Postbase *-qatar-* 'going to':

(25) a. *Qanrute-qatar-a-n-ka* *u-kut* *(cuu-t)*
2-3-12-15-16 [21–] ([21–])
talk.to-gonna-IND-3PL.OBJ-1SG.A this-ABS.PL person-ABS.PL
'I'm gonna talk to them, these (people).'

b. **Qanrute uku-t (cuu-t) qatar-a-n-ka*
2 [21–] ([21–]) 3-12-15-16
Intended reading: 'Talk to these (people), I'm going to (do so) to them.'

Crucially, when enclitics are present, forming a Clitic Group, span 2-20, interruption after position 16 is optionally possible, by either one or several free forms. Then, the enclitics cease to be associated with the anchoring Verb Word for purposes of the constituency diagnostics and scope effects we are considering, and are instead associated with whatever is the last of the interrupting free Words (as in (26b), where Nominal Word(s) interrupt):

(26) a. *Qanrute-qatar-a-n-ka=am* *u-kut* *(cuu-t)*
2-3-12-15-16=20 [21–] ([21–])
talk.to-gonna-IND-3PL.OBJ-1SG.A=but this-ABS.PL person-ABS.PL
'But I'm gonna talk to them, these (people).'

b. *Qanrute-qatar-a-n-ka* *u-kut* *(cuu-t)=am*
2-3-12-15-16 [21–] ([21–])=20
talk.to-gonna-IND-3PL.OBJ-1SG.A this-ABS.PL person-ABS.PL
'But I'm gonna talk to them, these (people).'

The free form(s) *ukut* 'these' or *ukut cuut* 'these people' interrupt at the boundary between the inflection and the enclitic, in effect taking it as its own enclitic and forming a new Clitic Group with it. Thus, the Verb Word 2-16 is non-interruptable but the Clitic Group 2-20 is not non-interruptable.

There is, however, a periphrastic construction in which a Verb Base that contains one or more productive VV Postbases can be broken into two Verb Words. It might be taken as a way to interrupt the original Verb Word but it is different from what we've considered up to now in that the interrupting material isn't, by any test, a constituent in its own right. A simple example is shown in (27), based on (25a), where the interrupting material is marked off with square brackets for clarity:

(27) *Qanru[-llu-ki* *(u-kut* *(cuu-t))*
2[-12-16 ([21–]) ([21–])
talk.to[-APPOS-3PL.OBJ (this-ABS.PL (people-ABS.PL))
pi]-qatar-a-n-ka.
2]-3-12-15-16
do.so]-gonna-IND-3PL.OBJ-1SG.A
'Talking to them/these ones/these people, I'm gonna do so to them' = 'I'm gonna talk to them/these ones/these people.'

Here the Verb Base *qanru(te)-* 'to talk to' is "finished off" by getting Appositional mood inflection (since it cannot stand alone without any inflection); and the original sequence is then resumed by mounting the VV Postbase *-qatar-* 'to be going to V' on the virtually empty, prothetic, implicitly anaphoric Verb Base *pi-* 'to do V', which then hosts not only *-qatar-* but the subsequent Indicative Mood inflection. In effect then, you get two complete run-throughs of the planar structure.

Interpretation of this pattern depends crucially on whether you consider the interrupting stretch, *-lluki (ukut (cuut)) pi-*, marked in the position analysis with square brackets, as a legitimate interrupting element. It certainly is not a constituent; rather, it works to fission the 2-16 (Verb Word) span in (25a) into two distinct and grammatically connected 2-16 spans, and in that sense might be seen as strong confirmation of the 2-16 span. But it also works as evidence of a constituent break–in this case–between the Verb base *qanru(te)-* 'talk to' and the VV Postbase *-qatar-* 'to be going to V'.[7]

5.3 Repair domain (2-16; 2-20)

I define REPAIR DOMAIN as the minimal domain observed by speakers when repairing an utterance; that is, the minimal planar distance backwards that a speaker must go if they make an error somewhere along the way and wish to start again. Although it is not one of the tests in Tallman (2021), it is somewhat related to free occurrence and to (non-)interruptability in that it gives evidence of what might be considered a minimal unit of production. Likewise, because repetition is involved, it is also related to subspan repetition.

In Cup'ik oral discourse, if a pause or speech error occurs in the midst of a span 2-16, the speaker will go all the way back to the beginning of the Word and start again, as shown in the following recorded text examples, where '–' indicates self-interruption before repair:

(28) a. *elliriq-lu-ni–* *elliriq-lu-tek*
2-12-16- 2-12-16
feel.orphaned-APPOS-3.REFL.SG.S– feel.orphaned-APPOS-3.REFL.DU.S
'he, feeling orphaned– those.two, feeling orphaned'

b. *akuyut-li-a–*
2-9-12.16–
paste-maybe-IND.3SG.A.3SG.OBJ–
akuyu-qura-lli-a
2-3-9-12.16
paste-keep-maybe-IND.3SG.A.3SG.OBJ–
'maybe she pasted it– maybe she kept pasting it.'

c. *tuqu–* *tuqu-ne–* *tuqu-t-niara-llini-lu-ku*
2– 2-6– 2-3-6-9-12-16
die– die-will.soon– die-have-will.soon-evidently-APPOS-3SG.OBJ
'die– will soon die– (she) will evidently soon have it die.'

[7]See Miyaoka 2012: 938 and Woodbury 2017: 545–546 for further discussion of this construction. The problem is that *-qatar-* 'gonna' here is somewhat verb-like, having immediate scope over *pi-* 'do thusly' but–because *pi-* is essentially a pro-verb bound by *qanrute-* 'to talk to,' *-qatar-* 'gonna' also has implicit scope over *qanrute-* 'to talk to' or (with inflection) *qanrulluki* 'talking to them'. I return to the issue of VV Postbases having verb-like properties in §6.

d.	*[tekiy-ngait–*	*[tekiy-ngait]-ni-lu-ni*
	[2-6–	[2-6-]-3-12-16
	arrive-won't–	arrive-won't-say-APPOS-3.REFL.SG.S
	'won't arrive–	saying he (himself) won't arrive.'

(28a) is the simplest example, where a whole span 2-16 is uttered, but on realizing the speaker uttered singular *-ni* in position 16 when dual *-tek* was intended, he repeats the entire span verbatim, but with position 16 corrected. (28b) is also a case where a whole span 2-16 is uttered and then redone–but in that case, the repeat version adds an extra Postbase at position 3, leaving everything else the same. (28c) and (28d) show interruptions at various points within the 2-16 span, returning to repeat the position 2 verb core until a complete and satisfactory 2-16 span is reached. (28d) is of special interest because it involves a break after what might be considered an internal constituent (marked with square brackets and discussed at length in §5.6.3); nevertheless that constituent break is not sufficient to prevent cycling back to the beginning of the whole Word.

I have not knowingly encountered examples where a speaker picks up again somewhere in the middle of the span 2-16 without returning at least to position 2; nor do I find any examples of a self-interruption or self-correction beginning with only an Enclitic (positions 17-20). However, I have no very clear examples parallel to (28a)-(28d) where an Enclitic is repaired. On the strength of that negative evidence, then, we might consider span 2-20 as a weakly-supported maximal minimal repair domain and the span 2-16 as a much better-supported minimal minimal repair domain.

5.4 (Non)-permutability (2-16; 2-20)

(NON)-PERMUTABILITY is defined as "[a] well-defined contiguous subspan of positions that cannot be variably ordered with one another (if a-b, then b-a must not occur)". It then is fractured into STRICT NON-PERMUTABILITY, where the elements always occur in a fixed order; vs. FLEXIBLE NON-PERMUTABILITY WITH SCOPE, where in addition to fixed order, it is possible for elements to order variably if there are differences in scope. (Tallman 2021: 16, 24).

The account in §3 and the planar structure in Table 1 both imply strict non-permutability. The positions, as far as we have seen, occur in the order given and not other orders, as shown in (29a) and (29b).

(29) a. *im-na* *tekite-qata-llini-u-q=ggur=am*
[1–] 2-3-9-12-16=19=20
that.one-ABS.SG arrive-gonna-evidently-IND-3SG.S=it.is.said=but
'But that person evidently is going to arrive.'

b. **im-na qata-tekite-llini-u-q=ggur=am* (1-1 **3-2**-9-12-16=19=20)
im-na tekite-llini-qatar-tu-r=ggur=am* (1-1 2-9-3**-12-16=19=20)
im-na tekite-qatar-tu-llini-r=ggur=am* (1-1 2-3-12-9**-16=19=20)
im-na tekite-qata-llini-r-tu=ggur=am* (1-1 2-3-9-16-12**=19=20)
im-na tekite-qata-llini-u=ggur=am-eq* (1-1 2-3-9-12=19=20-16**)
im-na tekite-qata-llini-u-r=am=gguq* (1-1 2-3-9-12-16=20=19**)

c. *im-na=ggur=am tekite-qata-llini-u-q* (**1-1=1** 9-12-16)
im-na=gguq tekite-qata-llini-u-r=am (**1-1=1** 9-12-16=20)
im-na=am tekite-qata-llini-u-q=gguq (**1-1=1** 9-12-16=19)

By itself, (29a)-(29b) suggests strict non-permutability within the span 2-20, our maximal minimum free form (or Clitic Group); but (29c) adds a further wrinkle, showing that it is always possible to host a sentential-scope clitic like *=am* 'but' or *=gguq* 'it is said' on a different Word entirely, without any change in scopal effect; in that expanded light, as Natalie Weber (p.c.) pointed out to me, the relevant span may be only 2-16, our minimum minimal free form (or Word).

The next question however is whether either 2-20 or 2-16 shows strict non-permutability and not flexible non-permutability with scope. The formulation of the planar structure itself lacks strictness in a few places, most clearly since as we already saw in §3.2.2, positions 5 and 8 are alternative positions for (at least) two Postbases expressing categories of Realization('in vain' and 'seem', see Table 1); and moreover, the choice of position (5 vs. 8) affects their scope in keeping with the Postbase Scope Rule (11). We saw this in (17), which I repeat as (30) using the planar structure position numbers and treating the complex Verb Base *naptar-te-* (Nominal Base *naptar-* 'whitefish' + NV Postbase *-te-* 'to catch') as the unsegmented occupant of position 2:

(30) (=17)

a. *Naptarc-**aaqe-llru**-u-nga*
2-5-6-12-16
whitefish.catch-in.vain-did-IND-1SG.S
'I caught a whitefish, but alas.', e.g., it got away

b. *naptarte-**llru-yaaq**-u-a*
2-6-8-12-16
whitefish.catch-did-in.vain-IND-1SG.S
'I did alas catch some whitefish.', e.g., a veiled offer

In (30)=(17), the VV Postbase *-yaaqe-* 'in vain' turns up in position 5 in (30a) and position 8 in (30b), on either side of position 6 *-llru-* 'did'. Furthermore, ordering is free within position 3, a zone in which most VV Postbases occur, but are subject to the Postbase Scope Rule (11), so that any Postbase in position 3 will have scope over the Verb Base and any earlier position 3 Postbases (as will be discussed further below in §5.6).

In all then, we can characterize the whole span 2–20, when considered on its own, as showing flexible non-permutability with scope, but the flexibility is only due to the ordering of elements within zone position 3 and in certain positions in the span 5–8. Otherwise, the span 2-20 shows strict non-permutability. Furthermore, when we consider the mobility of clitics in a wider clausal context–as in (29c)–we find evidence that clitics (positions 17-20) are themselves permutable as long as they are hosted by a different whole Word, and we can in that context consider that only the span 2-16 shows strict non-permutability.

5.5 Ciscategorial selection (2-16; 4-16)

Ciscategorial selection is defined as "[A] well-defined contiguous subspan of positions whose elements can only semantically combine with one part of speech class" (Tallman 2021: 16). It then is fractured into minimal (all in span are ciscategorial) vs. maximal (all outside the span are transcategorial) ciscategorial selection.

As a first approximation, the Cup'ik span 2-16, the Verb Word, should seem to demonstrate minimal ciscategorial selection given that both Inflection (by rule (6)) and Postbase derivation (by rule (8)) select specific categories. In contrast Enclitics, occupying the span 17-20, can be appended not just to Verb Words but to any full Word (by rule (18)), and must therefore be regarded as transcategorial:

(31) a. Verb Word + Enclitic
tekit-u-t=llu
2-12-16=18
arrive-IND-3PL.S=&
'and they arrived.'

b. Nominal Word + Enclitic
tau-na=llu
this-ABS.SG=&
'and this.'

c. Particle Words + Enclitic
ernerpak=llu
all.day=&
'and all day ...'

In fact though, even within the span 2-16 there are exceptions to minimal ciscategorial selection: certain Postbases in position 3 turn up as both NN and VV Postbases and in that sense may be considered transcategorial because they select either Nominals or Verbs. These Postbases typically act semantically as modifiers (rather than heads) with respect to the Nominal Base or Verb Base; and with Verb Bases, they can even serve as modifiers not to the Verb Base itself, but to one of the Verb Base's core arguments (discussed in Woodbury 2017):

(32) a. *mikelngu-urluu-t*
child-poor-ABS.PL
'the poor children.'

b. *tekit-urlur-tu-t*
2-3-12-16
arrive-poor-IND-3PL.S
'they poorly arrived; the poor ones arrived.'

It also might be ventured that within positions 13-16, person and number inflection, there is some transcategoriality since there is some etymological overlap in the person marking on nouns, and that on verbs in certain moods (as seen for the plural *-t* in (32a)-(32b)); but this is sporadic, irregular, and non-biunique to a degree that it is marginal and probably not a part of synchronic grammar.

We are left to conclude that, in light of these few transcategorial position 3 Postbases, it cannot strictly be the case that 2-16 is minimally ciscategorial. But it can be considered maximally ciscategorial, since other than in position 3, it is virtually totally ciscategorial, whereas as we have seen, the Enclitic positions beyond it, 17-20, are entirely transcategorial.

One final note before leaving ciscategoriality. It can be noted that the span 4-16, taken by itself, is genuinely minimally ciscategorial since all select (lexemic or derived) Verb Bases. Granted, 4–16 is out of range of our testing program, which only looks at spans that include the verbal core. Nevertheless, if contiguous ciscategoriality is in some sense a sign of constituency, then it identifies as some sort of a constituent what earlier was termed the Pre-Inflection (span 4-10) in combination with the Verb Inflection (span 11-16). I return to the issue of possible beyond-verbal-core constituency in §6.

5.6 Subspan repetition/Subspan selection (2-3, 2-4, 2-7, 2-16)

Subspan repetition is defined as 'a well-defined contiguous subspan of positions that occurs more than once for a given construction' (Tallman 2021: 16).

Many aspects of Cup'ik morphology/syntax fit here, including syntactic coordination/subordination, e.g., examples (21) and (39), and they would straightforwardly support the span 2-16 (the traditional Verb Word, Base through Inflection).

However, I wish to limit my consideration to what might be considered as a subtest or a related test that focuses especially on the subspan selection properties of some of the hundreds of Postbases belonging to the zone position 3, specifically ones which lead to the repetition of certain alternative but interesting subspans. All involve subspans selected and scopally embedded by position 3 VV Postbases, leading to repetition insofar as the embedded material contains positions that overlap those of the embedding position 3 Postbases and any material that follows it. Specifically, there are four kinds of cases:

- Subspan selection by ordinary position 3 VV Postbases: Span 2-3
- Subspan selection by special position 3 VV Postbases: Span 2-4
- Subspan selection by special position 3 VV Postbases: Span 2-7
- Subspan selection by a special position 3 VV Postbase: 'say X': Span 2-16

By selection I mean that the position 3 VV Postbase selects a span that is grammatically a (derived) Verb Base (as defined in (8)) or Verb Word, beginning with position 2 and ending somewhere later in the planar structure; and that the selecting VV Postbase has semantic scope over the selected subspan in keeping with the Postbase Scope Rule (11). The subspan involves repetition in all but the first of these four cases because it includes positions beyond position 3. I consider each in a separate subsection.

Although these selection patterns lead to some subspan repetition, it is not repetition in which *each* instance of the repeating subspan contains a position 2 verb core; or even where one instance of the repeating subspan implies a gapped or missing verb core.[8] Rather, it is the selecting VV Postbase (from any of the four subclasses just identified) which does the selecting and seems to behave in certain respects like a verb core; but on the program being applied is prevented from being measured as a verb core because it is a suffix and not a root. Accordingly, it might be better to consider subspan selection as different test from subspan repetition, because subspan selection focuses on the embedded span alone, rather than the overlap between the embedding and the embedded span.[9] This is entirely an artifact of our method, one that becomes conspicuous as the method tries to measure Cup'ik grammar: namely, our method does not recognize the VV Postbases in question as verbal cores in their own right–if it did, then what we have to call subspan selection would be subspan repetition in the notionally intended sense. We return to this question in §6. But for our purposes, subspan selection is useful and straightforward in demonstrating a certain type of constituency.

5.6.1 Subspan selection by ordinary position 3 VV Postbases: Span 2-3

Most VV Posbases occur in position 3, a zone, defined in traditional terms as a VV Postbase applying via the Base Recursion Rule (8) to a lexemic Verb Base (occupying only position 2) or to a complex Verb Base already derived via (8). The distinguishing feature of position 3 VV Postbases is that they cannot follow a Postbase of position 4 or later and they normally obey the Postbase Scope Rule (11), having scope over the Verb Base they select:

(33) *Prime-at=ll'* *taw'* *an-te-**qata**-llini-lu-ku*
1-1=1 1 2-3-**3**-9-12-16
prime-ABS.PL=& then go.out-with-**gonna**-evidently-APPOS-3SG.OBJ
'And the Primes (basketball team) are apparently about to take it (the ball) out (into the court).'

In (33), position 3 -(*u)te*- 'V along with' selects and has scope over position 2 *an(e)*- 'go out' and -*qata(r)*- 'gonna V' selects and has scope over the 2-3 span *an-te*- 'to take out'. Then -*llini*- 'evidently' selects and has scope over the 2-3-3 span *an-te-qata(r)*- 'to be going to take out'. That is followed by the Appositional Mood, and a person/number ending. But none of (34) are well formed:

[8] That is, suppose a position 3 Postbase selects a subspan 2-7 (the case considered in §5.6.3). Then, the selected span might, say, consist of 2-3-7; and the selecting Postbase might be followed by the sequence 7-12-16. In that case the only actually repeating sequence will be 3-7, and it will not include the verb core itself.

[9] I thank Natalie Weber for a really perspicuous discussion of this difference.

(34) **an-te-llini-**qatar**-lu-ku* (2-3-9-**3**-12-16)
an-llini-te-qatar**-lu-ku* (2-9-3-**3**-12-16)
an-qata**-ut-llini-lu-ku* (2-**3**-3-10-12-16)

Although the last of these does not violate the planar structure, it apparently does not make sense for position 3 –(*u*)*te-* 'V along with' to select and have scope over the (otherwise well-formed) 2-3 span *an-qata(r)-* 'to be going to go out'.

5.6.2 Subspan selection by special position 3 VV Postbases: Span 2-4

Certain VV Postbases select a subspan from position 2 to a position after position 3. All these Postbases add a transitive subject argument and have meanings like 'cause', 'say', 'tell', 'wait for,' and more. They break down into three sets according to the span they select, to be treated, respectively, in this and the following two subsections.

The first set selects the subspan 2-4. Its members have been termed (among other things) Double Transitive (Kleinschmidt 1851), and include the following VV Postbases (Woodbury 2005):

- 'want, ask, tell (subject) to V
- 'think that (subject) might V
- *-cite-* ~ *-vkar-* (suppletive) 'let, allow, cause (subject) to V'

The examples in (35), involving *-sqe-* 'want, ask tell (subject) to V', illustrate:

(35) a. *[Kinerci-qaa]-**sqe**-vke-na-ki*
[2-4]-**3**-7-12[10]
[dry.something-just]-**tell**-not-APPOS-3PL.OBJ
'Telling (him) not to just dry them.' (Literally: 'Not telling (him) to just dry them')

b. **[Kinerci-qa-nrite]-**sqe**-llu-ki*
[2-4-7]-**3**-12-16
Intended reading: 'Telling him not to just dry them.'

[10]Strictly speaking, this is a somewhat illegal planar representation since '3' follows '4'; but it offers a simple and perspicuous way to capture the embedding and recursion of subspan selection without positing a great many more positions only to capture the workings of this (and the following) limited set of Postbases.

In these examples, brackets enclose the subspan selected by the position 3 VV Postbase *-sqe-*. In (35a), *-sqe-* selects a subspan ending in the position 4 VV Postbase *-qar-* 'just V'; but it cannot select a subspan ending with the position 7 negative VV Postbase (*-nrite-* 'not).[11]

5.6.3 Subspan selection by special position 3 VV Postbases: Span 2-7

The next set of position 3 VV Postbases is also a part of the Double Transitive class recognized by Kleinschmidt, but it has scope over the subspan 2-7 and includes these among others:

- 'think that V',
- 'say that V'

Here again, brackets mark the embedded subspan:

(36) *[qacingqa-nri]-**cuk**-lu-ki*
[2-7-]-**3**-12-16
[stay.put-not-]-think.that-APPOS-3PL.OBJ
'thinking they were not staying put.'

(37) *[atanqe-ciq]-**ni**-llru-a-teng* *ama-ni*
[2-6-]-3-6-12-16 [21–]
wait.for-will-say.that-did-CONSEQ-3SG.A.3REFL.PL.OBJ there-LOC
'because he said (he) will wait for them there.'

In (36), *-yuke-* 'to think that V' (appearing here as *-cuk-*) follows the position 7 VV Postbase *–nrite-* 'to not V'; in (37), *-ni-* 'to say that V' follows the position 6 VV Postbase *-ciqe-* 'will', which applies to the waiting event; but then starts its own recursive "cycle" that allows it to be followed by its "own" position 6 VV Postbase indicating the tense of the whole event of saying, *-llru-* 'did'.[12]

[11]The negation markers *-vke-* in (35a) and *-nrite-* in (35b) are suppletive allomorphs in complementary distribution, the former occurring when the Appositional Mood immediately follows and the latter occurring elsewhere. Both examples happen to be in the Appositional Mood, which, as noted, does not overtly index the transitive subject (A). But they are present and recoverable, because normally–including in these particular cases–the implicit A is bound by a (transitive or intransitive) subject elsewhere in the discourse.

[12]Recall also the repair example (28d), where a *-ni-* 'say' embeds a span 2–6.

5.6.4 Subspan selection by a special position 3 Postbase 'say X': Span 2-16

The position 3 VV Postbase *-a(a)r-* 'say Word (to someone)' embeds a subspan 2–16–that is, any whole Word (including any Verb Word):

(38) a. *Pik-a-qa-ar-lu-ku.*
[2-12-16-]-3-12-16
own-IND.3SG.OBJ-1SG.A-say-APPOS-3S.OBJ
'Saying to him/her, "It's mine!".'

b. *Pik-a-qa!*
2-12-16
own-IND.3SG.OBJ-1SG.A
'It's mine!' (Literally: 'I have it as a thing, I own it.')

In the traditional own-terms framework, this and similar constructions are taken as one of a few synchronic instances where a verbalizing Postbase is added to a Word to form a new complex Base (i.e., Base ⟶Word + Postbase; see e.g., de Reuse 1994, Sadock 2017). One might ask whether the subspan in this case might instead be a result of compounding or cliticization; yet with respect to the other tests presented in this section, the whole sequence from position 2 to position 3 is a derived Verb Base just like any other, and the whole resulting Verb Word (as in (38a)) shows no phonological evidence of an enclitic boundary between the internal inflection and the verbalizing Postbase.

5.6.5 Conclusion

The upshot of this discussion is that position 3 VV Postbases break down into groups according to the subspans that they select and have scope over. For our purposes these suggest constituent properties for the relevant subspans: 2-3, 2-4, 2-7, and 2-16. Complementarily, they also strongly suggest constituent properties for a constituent anchored by the position 3 VV Postbase itself, which behaves in many ways like a lexical verb in its own right, even though it is not what we are calling the verb core of the construction. We will return to this question in §6.

5.7 Phonological domains (2-16; 2-20)

Tallman (2021: 16) defines three categories of phonological domain–segmental, stress, and tone where the application of phonological or morphophonological processes may define contiguous subspans as constituents of some kind. In this section I will focus on two prominent sets of phonological phenomena, one prosodic and the other segmental.

5.7.1 Prosodic domains (2-16; 2-20)

The domains of (mostly) automatic prosodic foot and stress assignment rules in Cup’ik are ideal for our purposes since they are clear, dramatic, and well-studied. These rules define iambic feet, from left to right, beginning at the Base of any Word (therefore at position 2 for Verbs) and ending after the Inflection (position 16 for Verbs). The syllabic shape conditions and internal composition of feet will not concern us (see Woodbury 1981, 1987 for details). In (39) we have two Verb Bases, and for purposes of measurement, each can function as position 2 verb core *pissu-* ‘to hunt’ defining the first (labeled 1 {v}), and *mallussu-* ‘to hunt beached whales’ defining the second (labeled 2 {v}):

(39)

	pissu	*-tu*	*-llini*	*-lu*	*-ni*	*mallussu*	*-tu*
1{v}:	2	-4	-9	-12	-16	[21	-
2{v}:	[1	-	-	-	-]	2	-4
	hunt	-always	-evidently	-APPOS	-3SG.S	hunt.beached.whale	-always

-llini	*-lu*	*-ni*
-	-	-]
-9	-12	-16
-evidently	-APPOS	-3SG.S

‘He apparently always hunting, he apparently always hunting beached whales.’

The footing rules apply to the span 2-16 in each parse (that is, they apply to the traditionally-recognized Word), where they group light syllables into iambic binary feet, stressing and (if open) lengthening each foot-final syllable; but the foot rules stop short of footing the final syllable of the span, therefore always leaving one (first parse) or else two (second parse) final syllables unfooted, unstressed, and unlengthened. We see this in the annotated phonetic form presented in (40a), where syllables are broken with periods and feet shown with parentheses. Crucially, the footing process cannot continue, unabated, from one Word into the next; it must reset and start again with each new Word, as shown by the impossibility of (40b):

(40) a. ➔[(pi.ˈsu:.)(tu.ˈɬi:.)(ni.ˈlu:.)ni (ma.ˈɬu:.)(su.ˈtu:.)(ɬi.ˈni:.)lu.ni]

b. * ➔[(pi.ˈsu:.)(tu.ˈɬi:.)(ni.ˈlu:.)(ni.ˈma:.)(ɬu.ˈsu:.)(tu.ˈɬi:.)(ni.ˈlu:.)ni]

Iambic foot formation does, however, continue without reset through any Enclitics that may follow span 2-16; that is, through position 20. For example, if we add Enclitics *=llu* 'and' *=gguq* 'it is said' into positions 19 and 20, respectively, for each of the two 2-16 spans just considered, we get a continuation of the same foot formation pattern – shown in (41) using phonetic transcription–where iambs continue to be gathered until the penultimate syllable, leading, in the cases below, to one new foot each:

(41) a. ➔[(pi.ˈsuː.)(tu.ˈɬiː.)(ni.ˈluː.)(ni.ˈ=**ɬuː.)=xuq**]
'And, it is said, he apparently always hunting'

b. ➔[(ma.ˈɬuː.)(su.ˈtuː.)(ɬi.ˈniː.)(lu.ˈniː.)=**ɬu.=xuq**]
'And, it is said, he apparently always hunting beached whales'

Nevertheless, the feet created when Enclitics are included follow a slightly different pattern, not visible in the simple examples just shown (see Miyaoka 1985 and Woodbury 2002: 93 for the details of this). Therefore, it is best to say that 2-16 is the span for the core set of footing rules, while 2-20 is the span for a closely related by slightly adjusted further set of footing rules.

5.7.2 Segmental domains (2-16)

Extensive morphophonemic processes apply at the junctures within the span 2-16; whereas few if any of these processes apply at Enclitic junctures, positions 17-20 (Reed et al. 1977; Woodbury 1981; Miyaoka 2012). Crucially, these processes also do not apply across the juncture from position 1 to position 2, leading to virtually total morphophonological invariance for the onsets of Verb Bases. We now describe three such cases.

5.7.2.1 Syllabic structure and VVV cluster avoidance (2-16)

The phonemic representation of any Word, including the Verb Word (span 2-16), consists of one or more syllables with the shapes CV, CVC, CVV, or CVVC (where VV is any combination of the peripheral vowels /a, i, u/ but never the central vowel /ə/). Word-initially (and hence at the onset of any Verb Base), the initial syllable can have no consonant onset, hence V, VC, VV, and VVC are also allowed. These patterns are amply illustrated, and never counterexemplified, in the examples in this article. Likewise, Enclitics (span 17-20) can form syllables with no vowel onset, e.g. *=am* 'but'. Furthermore, no phonemic representation of a span 2-16, or of any Enclitic, ever ends in the central vowel /ə/, serving phonologically to (negatively) demarcate the end of the spans 2-16 on up to 2-20.

One consequence of the foregoing is that it should never be possible to find a VVV sequence within the span 2-16; and this is true. But because Verb Bases (position 2) can begin with a vowel, it should be possible to find a VVV sequence across a span 1-2; and likewise anywhere after position 16. And it is:

(42) a. *Qaill’ ma-kut qulira-t pi-aq-at**a***
1 1-1 1-1 1-1-1
how this-ABS.PL stories-ABS.PL tell-CONTIN-3PL.S
***aa**nait-aq-u-t qaa?*
2-10-12-16 21
lack.mother-would-IND-3PL.S Q
‘Why is it that whenever they tell these stories, there would be no mother?’

b. *Cuuc**i**-**a** **a**ssiiri-u-q*
1-1 2-12-16
life-ABS.SG+3SG.POSS worsen-IND-3SG.S
‘his life got worse.’

c. *teki-ca-m**i**-**u**=**a**m*
2-12-15-16=20
reach-CONSEQ-3REFL.SG.A-3SG.OBJ=but
‘but when he reached it.’

d. *qumiu-llr-a-t-ni=ll**u***
2-12-14-15-16=18
be.pregnant-CONTMP-3SG.OBJ-3PL.A-CONTMP=and
***aa**na-ita*
21-21
mother-REL.PL+3PL.POSS
‘and while their mothers were pregnant.’

In (42a)-(42b), VVV sequences arise between positions 1 and 2 between two Verb Words; in (42c) between positions 15-16 and 20, that is a Verb Word and an Enclitic; and in (42d) between positions 18 and 21, an Enclitic hosted by a Verb Word and a following Nominal Word.

Finally, we can note that many morphophonological processes operating in the Cup’ik Word (including not only the Verb Word span 2-16, but also Nominal and Particle Words) lead to the total avoidance of VVV clusters through epenthesis, hiatus, and constraints against otherwise normal intervocalic consonant loss when it would lead to a VVV cluster: for details see Woodbury 1981: 29–103; Reed et al. 1977: 18–38; and Miyaoka 2012: 195–219.

5.7.2.2 Uvular-velar consonant coalescence (2-16)

The morphophonological processes just mentioned belong to an even larger suite of processes that (a) apply only within the Cup'ik Word (meaning, for Verb Words, the span 2-16 and excluding Enclitics (17-20); (b) are partly automatic, conditioned by the segments at the end of the building Base and the beginning of each new Postbase or Inflection that follows; and (c) are partly idiosyncratic, requiring that Bases, Postbases, and Inflectional suffixes must be grouped in morphophological or morpholexical classes whose exact alternations and behavior cannot entirely be predicted by automatic morphophonological rules, but which still allow–once classes are carefully established–for powerful generalizations. There is not space to demonstrate very much of this here, but I have picked out a representative example demonstrating the three characteristics (a)-(c) just noted, a rule of UVULAR-VELAR CONSONANT COALESCENCE.

Bases and Postbases end either in a vowel or in a (non-labialized) velar or uvular continuant, usually /ɣ,ʁ/ but very rarely their voiceless counterparts. An arbitrary subgroup of /k/-initial Postbases and inflectional suffixes comprise a special class, such that when any member of that class is suffixed to a /ʁ/-final Base or Postbase, the resultant /ʁk/ cluster coalesces as /q/.[13] We will consider four suffixes from this class, each occupying a different position. The suffixes are given in IPA-based morphophonemic representation where the coalescing /k/ morphophoneme is underlined to distinguish it from suffix-initial /k/ morphophonemes with other behaviors:

- /-$\underline{\text{k}}$saitə-/ 'to not yet V' (position 5)
- /-$\underline{\text{k}}$i-/ 'will' (with Optative) (position 10)
- /-$\underline{\text{k}}$ə-/ Transitive Participle Mood (position 12)
- /-$\underline{\text{k}}$a/ 1st Person Singular Transitive Subject (position 16)

We will start by considering them in combination with two position 2 Verb Bases, shown here in morphophonemic citation form and in the Appositional Mood (for third person singular direct object), which fully preserves all segments:

- /təɣu-/ 'to take' (cf. /təɣu-lu-ku/ 'taking it')
- /atuʁ-/ 'to use' (cf. /atuʁ-lu-ku/ 'using it')

[13]It is also the case that when a /ɣk/ cluster involving this class arises, the cluster simplifies to just /k/; but for our purposes that can be left aside.

/təɣu-/ ’to take’, is vowel-final and should thus not affect the suffix initial morphophoneme /k/, whereas /atuʁ-/ ’to use’ is /ʁ/-final and thus it should show coalescence. This can be seen for the first three suffixes in (43)-(45):

(43) a. */təɣu-ksait-a-a/*
2-5-12-16
take-not.yet-IND-3SG.A+3SG.OBJ
‘s/he has not taken it yet.’

b. */atu-qsait-a-a/*
2-5-12-16
use-not.yet-IND.3SG.A+3SG.OBJ
‘s/he has not used it yet.’

(44) a. */təɣu-ki-li-u/*
2-10-12-16
take-will-OPT.3SG.A-3SG.OBJ
‘s/he should take it.’

b. */atu-qi-li-u/*
2-10-12-16
use-will-OPT.3SG.A-3SG.OBJ
‘s/he should use it.’

(45) a. */təɣu-kə-ka/*
2-12-16
take-TRPRT.3SG.OBJ-1SG.A
’that I take it.’

b. */atu-qə-ka/*
2-12-16
use-TRPRT.3SG.OBJ-1SG.A
’that I use it.’

It will be noticed that the examples in (45) also show the fourth /k̄/-coalescing suffix in position 16, the first person singular transitive subject suffix /-k̄a/. There it occurs after the final vowel of the Transitive Participle /-k̄ə-/ and for that reason undergoes no coalescence. But (46) shows that same suffix after the Indicative suffix /-aʁ-/ in (46a), where coalescence indeed occurs; meanwhile, (46b) demonstrates a context where the /ʁ/ that is part of the Indicative is present:

(46) a. */təɣu-a-qa/*
2-12-16
take-IND.3SG.OBJ-1SG.A
'I take it.'

b. */təɣu-aʁ-put/*
2-12-16
use-IND.3SG.OBJ-1PL.A
'we use it.'

(43–46) then show that certain /k/-initial formatives show coalescence throughout the 2-16 span. Meanwhile no /k/-initial position 2 Verb Base or position 17-20 Enclitics coalesce with preceding uvulars, ever; instead, uvular-/k/ sequences are preserved, as shown for a /k/-initial Verb Base in (47a) and (the only) /k/-initial Enclitic in (47b):[14]

(47) a. */nanvaq kau-lu-ku/*
1 2-12-16
lake.ABS.SG reach.into-APPOS-3SG.OBJ
'reaching into the lake.'

b. */t͡ʃa-niar-tu-q=kiq/*
2-10-12-16=19
do.what-should-IND-3S=I.wonder=REFL.
'I wonder what he should do?'

In summary then, uvular-velar consonant coalescence in Cup'ik (a) operates across formative boundaries only in the span 2-16; (b) it is a more-or-less natural phonological process; and yet (c) it is idiosyncratic in that not all /k/-initial suffixes behave this way. Citing the technical literature on Central Alaskan Yupik morphophonemics, I have claimed that these characteristics are broadly characteristic of the language and lead to the variability that you see when phonemic-level forms are segmented (see Footnote 1).

[14]It will be noted that the uvular plus /k/ sequences involve the stop /q/ and not the continuant /ʁ/, as in prior examples. This actually reflects a further Word (including Verb Word, span 2-16) privilege, namely that formative-final velars and uvulars are only continuants within 2-16 (if they appear at all), and only stops elsewhere, the situation for the /q/'s in (47a) and (47b). In fact in Nominal Bases, where the Absolutive Singular form has no overt inflectional suffix, Base-final /ʁ/ surfaces as /q/ when (notionally) Word-final but as /ʁ/ after Postbases that do not delete it: thus */nanvaq/* 'lake' in (47a) is /q/-final as an independent word but /ʁ/-final when followed by, say, the Posbase */-kaq/* 'what will be N': */nanvaʁ-kaq/* 'what will be a lake'.

5.7.3 Phonological conclusions

It is of particular interest that the span claimed for segmental processes throughout the preceding section is 2–16, and not anything smaller. Given, for example, Lexical Phonology and Morphology (Kiparsky 1985) and other frameworks that have built on its insights, one might expect levels or layers radiating out from the lexical Verb Base, where spans like 2-3 (derived Verb Bases minus the Pre-Inflection) or 2-10 (all derivation, minus inflection) might be expected to show partly different morphophonological processes. But this has not been a finding, at least so far, of Central Alaskan Yupik morphophonological research. Rather, just as with uvular-velar consonant coalescence, morphophonological processes are distributed evenly throughout the whole span 2-16. The only significant layering, then, is when Enclitics (17-20) are added. They share with the span 2-16 the propagation of left-to-right iambic footing, as shown earlier; but they are otherwise like independent words in lacking segmental morphophological processes.

5.8 Biuniqueness deviation domains (11-16; 4-12; none that includes verb core)

A biuniqueness deviation domain is defined as "a well-defined contiguous subspan of positions whose elements display deviations from biuniqueness (one meaning-one form)" (Tallman 2021: 16). All things considered, Cup'ik is remarkably biunique, given its relatively fusional morphophonology, and yet there are two spans where biuniqueness sometimes breaks down, and interestingly, they do not involve the verb core. For that reason, these domains are, strictly speaking, not germane to the testing program at hand, which only considers constituent domains that include the verb core. Nevertheless I will discuss these extra-verb core domains in any case and then suggest later, in §6, how they may inform a somewhat differently-conceived exploration of constituency using planar methods.

5.8.1 Nonbiunique marking of mood and person/number of S/A/O: Span 11-16

Verb Inflection includes marking for Mood in positions 11-12 and for the person and number of S, O, and (with most Moods) A in positions 13-16. But within this span 11-16 there often is suppletion, zero marking, cumulative exponence, or multiple exponence, depending on the Mood and person/number combinations involved. For example:

(48) a. *tangrr-ar-pe-kut*
2-12-14-16
see-IND-2SG.A-1PL.OBJ
'you (sg.) see us.'

b. *tanger-Ø-kut*
2-12-16
see-OPT.2SG.A-1PL.OBJ
'(You, sg.) see us!'

c. *tangerr-lu-ta*
2-12-16
see-APPOS-1PL.OBJ
'seeing us.'

d. *tangrr-a-i*
2-12-16
see-IND-3SG.A+3PL.OBJ
's/he sees them.'

e. *tangrr-a-g-ke-t*
2-12-13-15-16
see-IND-3DU.OBJ-3DU.OBJ-3PL.A
'they see those two.'

f. *tangrr-aq-a-ne-g-ne-ki*
2-11-12-13-14-15-16
see-CNTG-CNTG-3DU.A-3DU.A-3DU.A-3PL.OBJ
'whenever those two see them.'

In (48a)-(48b) VS. (48c) the first person plural object marker shows suppletion (*-kut* ~ *-ta*); In (48b) there is zero marking for the Optative mood and the second person singular A subject, i.e., cumulative exponence; in (48d) there also is cumulative exponence, with *-i-* marking both A and O; in (48e) the ordering of A vs. O is opposite to that in (48a), and the third person dual object is marked twice, i.e., has multiple exponence, while the third person singular A subject is marked by −*t*, which is suppletive with respect to its marking with *-a* in (48d); and in (48f), there is extreme multiple exponence, with two formatives marking the Contingent Mood and three marking the third person dual A subject.

5.8.2 Cumulative exponence and suppletion involving negation: Span 4-12

The span 4-12 includes what we have called the Pre-Inflection (4–10) and Mood marking (11–12) within the Verb Inflection. Negation, which normally occurs in position 7, fuses or forms portmanteaux or induces suppletive forms for certain elements in neighboring positions when they are adjacent. The following are examples:

(49) *-nrite-* 'not' (7) + *-lu-* 'Appositional mood' (12) ➔ *vke-na-*

a. *tegu-nrit-a-a*
   2-7-12-16
   take-not-IND+3SG.OBJ-3SG.A
   's/he doesn't take it.'

b. *tegu-lu-ku*
   2-12-16
   take-APPOS-3SG.OBJ
   'taking it.'

c. *tegu-vke-na-ku*
   2-7-12-16
   take-not-APPOS-3SG.OBJ
   'not taking it.'

(50) *−ciqe-* 'will V' (6) + *-nrite-* 'not V' (7) ➔ *+ngaite-* 'will not V' (6)

a. *an'e-ciq-u-a*
   2-6-12-16
   go.out-will-IND-1SG.S
   'I will go out.'

b. *an'e-nrite-u-a*
   2-7-12-16
   go.out-not-IND-1SG.S
   'I am not going out.'

c. *an-ngait-u-a*
   2-6-12-16
   go.out-will.not-IND-1SG.S
   'I will not go out.'

d. **an-ciqe-nrit-u-a*
   2-6-7-12-16
   go.out-will-not-IND-1SG.S

e. *ane-llru-nrit-u-a*
2-6-7-12-16
go.out-did-not-IND-1SG.S
'I did not go out.'

(51) *-tu-* 'always' (4) + *-nrite-* 'not V' (7) ➔ *-yuite-* 'never' (4)

a. *an'e-tu-u-nga*
2-4-12-16
go.out-always-IND-1SG.S
'I (always) go out.'

b. *an-yuit-u-a*
2-4-12-16
go.out-never-IND-1SG.S
'I never go out.'

c. **an-tu-nrit-u-a*
2-4-7-12-16
go.out-always-not-IND-1SG.S

In (49), the position 7 negative 'not' Postbase and the position 12 Appositional Mood suffix undergo mutual suppletion when (and only when) adjacent. In (50), the position 6 future 'will' Postbase and position 7 negative 'not' Postbase are obligatorily replaced with a suppletive portmanteau when adjacent, which, as shown in (50e) does not happen when the past-tense 'did' Postbase occupies Position 6 before negation in position 7. And in (51) the position 4 habitual 'always' Postbase and position 7 negation 'not' Postbase are obligatorily replaced with a suppletive portmanteau when adjacent.

Both sets of deviations from biuniqueness suggests "patches" of constituency. In the 11-16 case, that "patch" is clearly the Verb Inflection as a whole; and in the 4-12 cases with negation, it is the formation of something like an incipient negative auxiliary. Both are islands of "wordiness" that tend to exclude the verb core (position 2)–as well as the Postbases in zone 3. As such they are beyond the present project, which only considers spans that include the verb core. They nevertheless are potentially of interest when we take a more neutral view of constituency tests, as discussed in §6.

5.9 Summary and conclusion

Our constituency diagnostic results from this section are summarized in Table 2. In the following discussion, I make some basic generalizations over the results and compare them to the "own-terms" traditional analysis presented in §3.

Of the nine diagnostic types we can recognize, all but biuniqueness deviation support the traditional Verb Word (2–16) as a constituent, while three–free occurrence, non-permutability, and prosodic phonological domains–also support the Clitic Group (2–20). Note that both receive support among the first six, more morphosyntactically-based diagnostics; as well as among the two (morpho)phonologically-based diagnostics. It would be wrong, for example, to say that the Verb Word (2–16) is a grammatical construct only, since it is a major phonological domain; and equally wrong to say that the Clitic Group (2–20) is only a phonological construct, owing to its non-permutability with respect to a maximal fracturing.

Table 2: Constituency diagnostic results for Cup'ik ([a] = excludes verb core.)

Constituency diagnostic	Min frac	Max frac
Free occurrence	2–16	2–20
Non-interruptability	2–16	2–16
Repair domain	2-16	--
Non-permutability (Flexible/scopal within 3 and 5–9; rigid otherwise)	2–16	2–20
Ciscategorial selection	4–16[a]	2–16
Subspan repetition	2-3, 2–4, 2–7, 2–16	
Phonological domains: Prosodic	2-16	2–20
Phonological domains: Segmental	2-16	--
Biuniqueness deviation domains	4-12[a]; 11–16[a]	

Sporadically, shorter subspans are also supported, but with no clear 'winners'; and some of these are 'illegal' if we only consider constituency that includes the verb core. The (traditional) Verb Inflection is singled out as a site of biuniqueness deviation; but, somewhat surprisingly, its complement, the maximal Verb Base (2–10) is not, and that boundary is muddied further as biuniqueness deviation singles out 11–16, which groups the "own-terms" Sub-Inflection and Mood. The following summarizes:

- Span 2-3 (Verb Base without adjunction of Subinflection (4-10)), by subspan repetition.

- Span 2-4 (Verb Base including adjunction of Aspect), by subspan repetition.

- Span 2-7 (Verb Base including adjunction of Aspect, Tense and Negation), by subspan repetition.
- Spans 3 and 5–8, by non-permutability that is flexible with scope.
- Span 4–12, the combined subinflection (4–10) and Mood (11–12) spans when negation (normally position 7) is present, by biuniqueness deviation (suppletion and cumulative exponence)
- Span 11-16 (the whole Verb Inflection), by biuniqueness deviation (of all kinds)

It is also notable that, as indicated, none of these spans gets major support on purely phonological grounds. For example, the stress rules discussed in §5.7.1 cannot "see" internal divisions within the span 2-16; nor are there segmental morphophonological processes that pertain to subspans of 2-16. In general, we do get several levels of grammatical elaboration of the recursive, left-branching Verb Base (2-3, 2-4, 2–7). We also get a "patch" where early VV Postbases show scopal effects (within 3 and sporadically in 5-8 due to "wild cards" occupying positions 5 and 8 according to scope). Arguably, the true scopal domain–per the Postbase Scope Rule (11)–might be considered the span 2-4 and then, sporadically, 5-8 as noted. This is because the non-permutability of the verb core and 3-8 is scope-based. If so, then what we actually find is a cascading series of left-branching constituents, as predicted by the Base Recursion Rule (8).

But as noted, biuniqueness deviation shows us two "patches" of constituency behavior that lie beyond the verb core, 4-12 (Subinflection with Mood), and 11-16 (the Verb Inflection proper). These pose auxiliary-verb like clusters within the word distinct from the left-branching, recursive Verb Base, and may pose what may superficially be described as a 'bracketing paradox.'

People – linguists and non-linguists alike – without much acquaintance with UYI grammar and phonology are often skeptical, asking, How could the words of a language be that long? Surely these are phrases written without spaces, and not actual words. But the cumulative weight of our constituency tests–mostly drawn from among those tests typically thought of as being diagnostic of wordhood (as reviewed in Haspelmath 2011 and Tallman 2020)–offers considerable ballast to the idea, accepted by UYI-family native speakers, and by Native and non-Native specialists in UYI linguistics, that these long stretches are indeed words, without much problem at all.

6 The "verb core", and gauging holophrasis directly: theoretical and empirical issues

Let us turn attention back to our comparative program, which–as we just saw–offers strong support for the traditionally recognized Verb Word and Clitic Group. We also saw slivers of support for subspans within the Verb Word. But if, as contended, UYI languages are highly holophrastic, why only slivers? Are there some general ways to amend our program so that it more fully detects constituency within the Verb Word, or, more generally, constituency within the whole clause that might even dissect the Verb Word or reapportion its pieces, so as to offer a better basis for the holophrasis intuition?

Here my goal is to point out directions, rather than offer full solutions.

Consider this: Dixon & Aikhenvald (2002: 19–20), in characterizing the "grammatical word", cite "conventionalized coherence and meaning", specifying that "while the meaning of a word is related to the meanings of its parts, it is often not exactly inferable from them." Because of such idiosyncrasy, words should be listable in the lexicon. But clearly, the best analog to "grammatical words" in this sense is not the whole (traditional) Verb Base (span 2-10, including all but the Verb Inflection) or even for that matter the span 2-3, that is, the Verb Base minus span 4-10, what we called the Templatic Pre-Inflection, since the recursiveness of productive Verb Base formation (8) is theoretically infinite. Rather, the best analogs to grammatical words by Dixon and Aikhenvald's criterion are lexemic Verb Bases (position 2 only) and at least some VV Postbases, which, as we have seen, are productive, have conventionalized coherence and meaning, and, when internally complex and composed themselves of suffix pieces (as shown in §3.4.1), have meanings that aren't always inferable from the meanings of those suffix pieces. In other words, Dixon and Aikhenvald's criterion–especially taken together with our results in the previous section–give us exactly what we need to recognize the holophrasis we encounter in UYI languages like Cup'ik.

Consider again expressions like (36), repeated here as (52):

(52) = (36)
[qacingqa-nri-]-cuk-lu-ki
[2–7]-3-12-16
[stay.put-not-]-think.that-APPOS-3PL.OBJ
'thinking they were not staying put.'

In traditional terms, the expression is a single Verb Word 2-16. But it also includes two units with conventionalized coherence and meaning: (a) the position 2

Verb Base *qacingqa-* 'to stay put', formed semi-idiosyncratically from a root *qacig-* 'be easy, comfortable' plus *-ngqa-* 'be in a state of V'; and (b) the VV Postbase *-yuke-* (which becomes *-cuk-* here by morphophonological rules) 'to think that V', formed semi-idiosyncratically from two otherwise independently-attested VV Postbases, *-yug-* 'to want or tend to' and *-ke-* 'to consider as V'. By adding Dixon's and Aikhenvald's criterion, we neatly characterize the holophrasis of the expression.

Our criteria in §5, particularly subspan repetition (see §5.6), did get at some of this, by noting that *-yuke-* 'think that V' could, even as a position 3 VV Postbase, select a span 2-7 out of turn. But if we were considering the corresponding English gloss, we would have had no problem calling 'think(ing)' a verb core. So why can't we call *-yuke-* a verb core, especially since doing so might not only comport with Dixon and Aikhenvald's criterion, but also unlock further useful criteria?

Recall that Tallman (2021: 13) defines the verb core "as a verb root *or* as a verb stem which would no longer remain of the same category if any of its affixes were stripped of". He goes on to say, "The verb core constitutes the semantic head of the sentence insofar as the sentence is an example of a verbal predicate construction (see Croft 2001: 259; Anderson 2006: 211–27 on the concept of semantic head)." Meanwhile Croft (2001), recasting in semantic terms an already-present tension in the morphosyntactic notion of headedness (cf. e.g., Zwicky 1985), distinguishes notions of headedness based on lexical density ('primary information-bearing unit' (PIBU) in a constituent (p. 244) and PROFILE EQUIVALENT, an element within a complex expression that "profiles/describes a kind of the thing profiled/described" by the whole expression (p. 257). And Croft (2001) then defines the head as "the profile equivalent that is the primary information-bearing unit, that is, the contentful item that most closely profiles the same kind of thing that the whole constituent profiles" (p. 259). But then, when considering headedness 'in morphology', he stipulates (without argument) that within a word, "both inflection and root are profile equivalents of the whole; but the root is the PIBU" (p. 268) and that "profile equivalence is not helpful in defining morphological structure, in particular the root–affix structure of words." (p. 269)

But if we are trying to gauge wordhood, we cannot presuppose it. We cannot require the verb core to be what the grammatical tradition has, in advance, stipulated as being a single root or a stem, however well-founded that stipulation may be. Nor can we say by fiat that the PIBU works one way within words and another way across words. Rather, we should allow elements other than roots or stems to be designated as verb core for purposes of constituency measurement, especially if they show headedness in either established sense: as a (relatively) lexically dense PIBU within a given constituent; or as a profile-equivalent that may be seen as selecting or having scope over or determining a complement constituent (see Haspelmath 1992, in particular, for a defense and interesting synthesis of the long-established tradition of gauging headedness in morphology; also Woodbury 1981 for analytic program in terms of multiple or conflicting headedness notions). It even means rejecting, a priori, the notion of *primary* information-bearing unit itself, since it stacks the deck against holophrasis by presupposing a lack of multiple and perhaps equally primary information-bearing units within a given constituent. Rather, it may be better to consider or try to measure lexical density in a more general and abstract way.

So in the case of -*yuke*- 'think that' in (52), -*yuke*- evidently has some lexical density; and it also is the profile equivalent of the whole Verb Base to which it belongs, *qacingqanricuke*- 'to think O was not staying put'; for example, -*yuke*- is responsible for the transitivity of the whole expression. -*yuke*- is therefore a head in every sense.

Mechanically, allowing -*yuke*- in (52) to count as verb core (position 2) in our planar structure would require no re-working at all of the planar structure itself; as shown in (53), the part before it, *qacingqanrite*- 'to not stay put', would be relegated to the position 1 peripheral zone, and the remaining Inflection would conform to the planar structure as positions 12 and 15. It would also not preclude a planar level at which -*yuke*- counts as occupant of position 3, as originally done in (52).

(53)	*qacingqa*	*-nri*	*-cuk*	*-lu*	*-ki*
1{v}:	[2-	7]	-3	-12	-16
2{v}:	[1	-]	-2	-12	-16

stay.put-not-think.that-APPOS-3PL.OBJ

'thinking they were not staying put.'

But what it would do is present a class of cases where the span 2-16 sometimes fails to pass the constituency diagnostics that it passed in §5. That is, whenever a VV Postbase is reckoned as verb core, it will be the span 1-16 (and the span 1-20) that passes the constituency diagnostics, rather than 2-16 (and 2-20) as shown in Table 2.

Furthermore, if we consider certain VV Postbases as verb cores, we encounter many situations where their syntactic selection properties and semantic scope extends *beyond* just the Verb Bases they immediately follow. Consider:

(54)

(54)	*Uyurama*	*tengmiaq*	*tan'gurrarmun*	*ivar-cit-a-a*
	1	1	1	2-3-12-16
	my.brother.REL.SG	bird.ABS.SG	boy.DAT.SG	seek-let-IND-3SGA+3SG.OBJ

‘My brother made/let the boy look for the bird.’ (Woodbury 1985: 274)

Here, the VV Postbase *-cit-* ‘make/let’ is a dense(ish) profile-equivalent for the whole phrase that is shown because–recalling Croft's definition–“it profiles/describes a kind of the thing profiled/described by the whole expression”: it, by itself, specifies transitivity and the overall argument structure, introducing both the Relative case A that does the ‘letting’, and a complement proposition that expresses the ‘seeking’. As such, the syntactic selection and semantic scope of *-cit-* extends beyond the Verb Base *ivar-* ‘seek’, because if we consider its own argument structure, then 1b-to-2 is a subspan over which the head *-cit-* ‘let’ in position 3 has scope. That is, we can distinguish a subspan from 1b-to-2, where all internal arguments are explicit.

Moreover, there also are NV Postbases–deriving a Verb Base from a Nominal Base--with lexically dense verbal meanings like ‘have,’ ‘be,’ ‘wear,’ ‘hunt’, ‘eat’, ‘be tired of (N)’, and others (but see discussion in Mithun 1998, who points out that for some NV Postbases, there are etymologically-unrelated Verb Bases with similar senses, but that are inherently more foregrounded in the discourse than the Postbase; relatedly, Johns 2007 argues such NV Postbases are light verbs). They too may be worthy of consideration as verb core, and as such lead to an extension of syntactic selection and semantic scope beyond the Verb Word that they head. For example:

(55)	*ciku-meng*	*atauci-meng*	*ene-ngqer-tu-a*
	1a-1b	1c-1d	1e-2-12-16
	ice-INS.SG	one-INS.SG	house-have-IND-3SG.S

‘I have one house made of ice.’ (Woodbury 2017: 352)

In (55) we have taken the NV Postbase *-ngqerr-* ‘to have N’ to be the verb core (position 2): it shows a certain level of lexical density, as well as profile-equivalence not only for the Verb Base *enengqerr-* ‘to have a house’ but also for the whole phrase meaning ‘have one house made of ice’. That is, *cikumeng* ‘(with) ice’ and *ataucimeng* ‘(with) one’ appear to be ”stranded” as apparently separate words, shunted into the (accusative-functioning) Instrumental case. And yet, as semantic modifiers of the nominal head *ene-* ‘house’, they must come within the scope of *-ngqer(r)-* ‘have’. At the same time the Verb Word *enengqertua* ‘I have a house’ conforms to all the tests that have been noted for positions 2-16 in §5. This bracketing paradox has been discussed and debated extensively by Sadock (1980, 1991), Mithun (1984), Baker (1988), and many others, under the heading 'noun incorporation.' One of the issues under debate is the extent to which suffixes can count as verbs; and another is whether extended NP complements for such 'noun-incorporating' verbs–whether suffixal or not–should count as constituents even when they have one subconstituent (usually the head) inside a holophrastic word, and the remaining subconstituent(s) outside it, as in (54) and (55).[15] Since our focus is constituency whether above, below, or across the putative word-level, it is important for us not to join such debates on a priori grounds, but rather to add to our battery of constituency diagnostics ones that can measure the validity of constituents without regard to putative wordhood.

In summary, we have pointed to three areas or dimensions of consideration where our program can be adjusted so that it better detects the constituency implications of holophrasis in UYI languages and perhaps others. We can label and formulate them as follows:

Lexemic threshold. Calling on Dixon and Aikhenvald's criterion of 'conventionalized coherence and meaning', at what point do you 'not bother' with less-than-productive patterning when determining what elements (and hence positions) you will consider in formulating and applying a planar structure for the purpose of measurement? In the present analysis, for example, 'Bases' and 'Postbases' were the 'elements' and their internal composition was ignored; but would actually analyzing their component morphemes and assigning them to positions end up making Cup'ik Verb Bases and VV Postbases look more word-like? And are there languages for which such a strategy makes sense?

[15]Baker (1988) frames this as a head-to-head syntactic movement transformation, where (roughly) the lexical head (whether a word or an affix) of a subcategorized phrase subjoins to or incorporates with the head of the phrase that subcategorizes it. Sadock 1991's Incorporation Principle is the same idea, but treats the pre-incorporation constituency (heads-apart) as constrained by a Syntax module and the post-incorporation constituency (heads-together) as constrained by a Morphology module, motivating a constituency clash or bracketing paradox; see also Woodbury 1996 for an alternative formulation along similar lines. Meanwhile in the literature on Canadian Inuit varieties, Compton & Pittman (2010) go so far as to see Bases and Postbases as Words and the (traditional, span 2-16) Word as phrases with high degrees of phonological cohesion. Yuan (2018) follows Johns (2007) in seeing NV and VV Postbases as light verbs that 'get together' syntactically (or just postsyntactically) with their complements (or the heads of their complements) because they are in some sense light or relatively lexically un-dense; but Yuan also very importantly observes that not all NV Postbases select and combine with bare stems: although the fact are quite diverse across the YI languages, some NV Postbases combine with phrasal nominals (including personal pronouns and demonstratives) and some with oblique case marked words or phrases: See also Woodbury (1996) for discussion of some similar phenomena for Cup'ik.

Profile equivalence. Calling on this aspect of headedness as dissected by Croft, would it be useful to re-formulate and then re-fit an alternative planar structure in which the 'verb core' is determined not merely by what is a Base, but instead in terms of strong profile equivalence within a larger domain? This may end up making Cup'ik Verb Bases and VV Postbases look more word-like, and likewise, reveal constituency patterns that include pieces of traditional Words together with other Words external to them, as discussed in the incorporation literature.

Lexical density: And calling explicitly on this other aspect of Croft's dissection of headedness, can we perhaps motivate–in some cases at least–Tallman's and Croft's initial intuition that come what may, the verb core of a holophrastic word will contain a root rather than only an affix or affixes? Such a notion of lexical density might be reckoned relative to its contribution to the whole clause or phrase in which it occurs (Croft's PIBU); or relative to sense relationships within a lexicon as a whole, such as relations of hyponymy or extentional inclusiveness; or even relative to phrasal pragmatic prominence, as Mithun (1998) has intriguingly proposed for Central Alaskan Yupik NV and VV Postbases, arguing that they have less pragmatic saliency than comparable Verb Bases that might paraphrase them.

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Abbreviations

1	first person	abs	absolutive
2	second person	appos	apposition
a	agent	cntg	contingent mood

CONSEQ	consequential mood	POSS	possessive
CONTIN	continuative	QUOT	quotative
CONTMP	contemporative mood	REFL	reflexive
DAT	dative	S	argument of intransitive verb
DU	dual		
INS	instrumental	TRPRT	transitive participle mood
OBJ	object		
OPT	optative		

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Chapter 3

Constituency in Oklahoma Cherokee

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This chapter provides a fine-grained description of the result of constituency diagnostics applied to Oklahoma Cherokee, a Southern Iroquoian language spoken in Northeastern Oklahoma. The case of Oklahoma Cherokee is especially intriguing, due to its polysynthetic nature. As is claimed in Bickel & Zúñiga (2017) on constituency in polysynthetic languages, more than one constituent need to be posited. On the other hand, unlike what they report for other polysynthetic languages, the method employed here shows that language-internally there is a strong wordhood candidate; this also reflects the general intuitions about wordhood among speakers (see below) and linguists working on Cherokee and Iroquoian languages.

1 Introduction

This chapter provides a fine-grained description of the result of constituency diagnostics applied to Oklahoma Cherokee, a Southern Iroquoian language spoken in Northeastern Oklahoma. The chapter is divided into four sections after this introductory section. First, §2 discusses the planar structures in the verb and noun complex, followed by §3 and §4 which provide a description of each of such constituency diagnostics: phonological diagnostics in §3, and the morphosyntactic diagnostics in §4. §5 summarizes the result of application of various diagnostics to the Cherokee verb complexes and concludes with some typological and theoretical implications.

Oklahoma Cherokee, a Southern Iroquoian language spoken in North Carolina and Oklahoma, the United States, is a polysynthetic language, and as in other such languages, poses a question with regard to the definition of 'word': ideas conveyed by phrases or sentences in languages such as English, Spanish or

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Japanese can be conveyed by a 'word' in Cherokee, as illustrated in (1) and (2); in the examples the plus sign indicates that the morphemes connected with this sign are synchronically no longer analyzable:

(1) dv̌:ní:ne:giʔe:li[1]
ta-anii-nee+kiʔ-ee-l-i
CISL-3SG.A-liquid+take-DAT-PRF-MOT
'They will take it (liquid) from him.' (Feeling et al. 2003: 206)

(2) (hla) yigv:nv̂:tlo:híha
hla yi-kvv-nv́v(ʔ)+:(ʔ)tlhoo-híh-a
NEG IRR-1/2SG-leg+strap-PRS-IND
'I'm not tying up your leg.' (EJ2011)

The case of Oklahoma Cherokee is especially intriguing, due to the number of morphemes a 'word' can contain. This chapter attempts to answer questions such as how many constituents are needed, whether there are any convergences, and whether a word can be defined in such a language.

2 Planar structures

2.1 Verbal planar structure

The planar structures for the verb, noun and adjective complexes are provided in Table 1-Table 3 below. They are based on flattening out and elaborating template representations and/or phrase structure rules across morphological and syntactic domains.

First, Table 1 shows the planar structure for the verb complex. The positions 1, 18, 23 and 24 are zones, while the others are slots. Zones are where variable elements can occur in free order, while slots are where only one element can occur at a time. Prefix order is fixed, while there is some uncertainty with respect to the suffix order, especially of derivational suffixes in positions 14 – 20. This is because co-occurrence of more than one derivational suffix is relatively uncommon in natural speech, and I have no elicitation data to confirm if alternative orders

[1] In the examples, the first line shows the surface forms as pronounced by speakers and the second line shows segmented forms. The numbers in the third line, which is shown after examples in (3), correspond to the slot numbers in the table on the third page. These are followed by glosses and free translations.

are possible with or without scope differences. Most of the orders in Table 1 are motivated based on the attested data in my corpus.[2]

In position 18 within the verbal complex, dative and ambulative suffixes can co-occur without any apparent scope difference (cf. §4.4). Word order in Cherokee or in Iroquoian in general is not fixed and is mostly determined by information structure (Scancarelli 1987: §3.7; Mithun 1995). It is still unknown if clitic order is fixed or not.

The following is an example of a verb containing some of the morphemes in Table 1:

(3) nidayú:go:whtv́hdi
ni-tay-uu-koohwahth-v́ht-i
v:4-6-9-12-21-22
PART-CISL-3SG.B-see-INF-NOM
'for him to see it (looking this way).' (Pulte & Feeling 1975: 246)

Some issues that were encountered during the development of the verbal planar structure are as follows. First, 'aspectual' suffixes are found in two positions in the planar structure, 13 and 21. The (perfective) aspectual suffix in position 13 is required only when one of the derivational suffixes in positions 14 – 20 is present. Moreover, when there is more than one derivational suffix, all but the last have to have the aspectual suffix in position 13. Otherwise, the aspectual suffixes are not filled out in both positions. Secondly, Oklahoma Cherokee, as other Iroquoian languages, is rich in fusional morphology: some morphemes are portmanteau, and some morphemes manifest complex allomorphy conditioned by phonological and morphological factors (Uchihara & Barrie 2019). This sometimes makes segmentation challenging, especially in positions 2 - 21, which might result in more than one planar structure that could be posited. Non-concatenative morphological processes are also robust, including two stem alternation processes, Laryngeal Alternation and tonicity[3] , and superhigh accent that has some mor-

[2]The data in this chapter comes from my fieldnotes and recordings collected during 2011–2013 (in field) and since 2020 (with Christian Koops), as well as a set of recordings collected by Durbin Feeling and William Pulte in the late 1970s, and various interviews recorded and provided by the Cherokee Nation, including Cherokee Nation Radio Show (CNRS). In addition, some data comes from published materials by a speaker-linguist Durbin Feeling, especially Feeling (1975) and Feeling et al. (2003). The initials in the sources are abbreviations of the speakers' names.

[3]Laryngeal Alternation is triggered by certain pronominal prefixes, where the stem-initial *h* alternates with a glottal stop (Munro 1996). Tonicity is conditioned by various morphosyntactic factors and reflected in the tonal effects of a glottal stop and whether a vowel-initial pronominal prefix has a lowfall tone or not (Cook 1979: 92; Uchihara 2016: Appendix A).

Table 1: Planar structure for verb in Oklahoma Cherokee

Positions	Type	Elements
(1)	zone	NP{A, S, P}; PP; Adv
(2)	slot	Irrealis *y(i)-*; relative *c(i)-*
(3)	slot	Translocative *w(i)-*
(4)	slot	Partitive *n(i)-/ii- ~ iy-*
(5)	slot	Distributive *tee-/ti- ~ c-/too-*
(6)	slot	Cislocative *ta(y)-/ti(y)- ~ c-*
(7)	slot	Iterative *vv- ~ v́ʔ-/ii- ~ íʔ-*
(8)	slot	Negative *ka(y)-/kee-*
(9)	slot	Pronominal prefixes
(10)	slot	Middle *ata(a)-/ ali-/ at-*; reflexive *ataat-/ ata(a)-/ at-*
(11)	slot	Incorporated noun root, compounded verb root
(12)	slot	Verb root
(13)	slot	Aspectual (perfective, only to host the following derivational suffixes in positions 14 - 20)
(14)	slot	Duplicative *-iis-*
(15)	slot	Repetitive *-iiloo-*
(16)	slot	Causative (can be repeated)
(17)	slot	Completive *-o-*
(18)	zone	Dative *-e(e)-;* ambulative *-iit-*
(19)	slot	Venitive *-ii-*; andative *-ee-*
(20)	slot	Inceptive *-iit-*
(21)	slot	Aspectual (present; imperfective; perfective; punctual; infinitive)
(22)	slot	Modal (indicative *-a*; assertive *-vv́ʔi*; reportative *-ééʔi;* habitual *-óóʔi*; future imperative *-vvʔi;* participial; nominal *-i*)
(23)	zone	Clitics (interrogative, discursive)
(24)	zone	NP{A,S,P}; PP; Adv

phosyntactic functions (Uchihara 2016: Ch. 11). These are not reflected in the planar structure in Table 1.

2.2 Nominal and adjectival planar structures

Table 2 and Table 3 show the planar structures for the noun and adjective complexes. They share some positions with the verbal planar structure presented above; for instance, all of them share partitive, distributive, pronominal and middle/reflexive prefixes. However, as can be observed, the number of positions for the nominal and adjectival planar structures is significantly reduced compared to verbs. That is, like other languages spoken in North America, Oklahoma Cherokee is a heavily 'verbal' language.

Table 2: Planar structure for noun in Oklahoma Cherokee

Positions	Type	Elements
(1)	zone	NP{A,S,P}, PP, Adv
(2)	slot	Partitive *ii- ~ iy-*
(3)	slot	Distributive *ti- ~ c-*
(4)	slot	Pronominal prefixes
(5)	slot	Middle *ata(a)-/ ali-/ at-*, reflexive *ataat-/ ata(a)-/ at-*
(6)	slot	Compounded noun root
(7)	slot	Noun root
(8)	zone	-*ya* 'real', diminutive -*(uu)ca*, adjectivizer -*haaʔi*
(9)	slot	Locative
(10)	zone	Clitics (interrogative, discursive)
(11)	zone	NP{A,S,P}, PP, Adv

Again, the orders in Table 2 are justified by the attested forms in my corpus. Thus, the order of -*ya* 'real' or the diminutive –*(uu)ca* in position 8 followed by the locative in position 9 is justified by the following examples:

(4) kuwa:yő:ʔi
kuwaa-y(a)-oőʔi
n:7-8-9
mulberry-real-LOC
'Pryor (a town in Oklahoma).' (Feeling 1975)

(5) ani:ge:hyu:jő
anii-keehy(a)-uuc-oőʔi
n:4-7-8-9
3PL.A-woman-DIM-LOC
'Female (Seminary).' (CED-EJ2010)

Adjectives have been argued to constitute an independent lexical category (Lindsey & Scancarelli 1985), but Uchihara & Barrie (2019) argue that they are hard to distinguish from nouns (especially derived nominals) in many cases. The adjectival planar structure does resemble the nominal planar structure as can bee seen in Table 3, unlike in Northern Iroquoian languages where adjectives are indistinguishable from verbs (Chafe 2012). The only difference between the nominal and the adjectival planar structures is the intensifiers in zone 8, instead of the nominal suffixes in position 8 and the locative suffix in position 9 in the nominal planar structure.

Table 3: Planar structure for adjective in Oklahoma Cherokee

Positions	Type	Elements
(1)	zone	NP{A, S, P}, PP, Adv
(2)	slot	Translocative *w(i)-*
(3)	slot	Partitive *ii-* ~ *iy-*
(4)	slot	Distributive *ti-* ~ *c-*
(5)	slot	Pronominal prefixes
(6)	slot	Middle *ata(a)-/ ali-/ at-*, reflexive *ataat-/ ata(a)-/ at-*
(7)	slot	Adjective root
(8)	slot	Intensifier
(9)	zone	Clitics (interrogative, discursive)
(10)	zone	NP{A,S,P}, PP, Adv

The following is an example of an adjective containing some of the positions in Table 3.

(6) wǔ:sdî:kv̋:ʔi
w-uu–astíi-khvv̋ʔi
a:2-5-7-8
TRNSL-3SG.B-small-INT
'smallest.' (Feeling 1975: 337)

Cherokee has its own writing system, the Cherokee Syllabary devised in the early 1800s by Sequoya (Foreman 1938). When writing in syllabary, speakers usually write as one orthographic word from position 2 to 22 or 23 in the verbal planar structure, from position 2 to 9 or 10 in the nominal and 2 to 8 or 9 in the adjectival planar structures, and a space or a period is inserted between the orthographic words. This is illustrated in (7), taken from a collection of Cherokee stories collected by a speaker-linguist Durbin Feeling (Feeling et al. 2018), written in the Cherokee Syllabary. As can be seen, enclitics (in position 23 in the verbal planar structure, and positions 10 and 9 in the nominal and adjectival planar structures)[4], are written together with the preceding hosts.

(7) ᏦᏍᏓᏓᏅᏟ**Ꮓ** ᎠᏴ**Ꮓ** ᎡᏙᏓ**Ꮄ** ᏃᏊ ᎣᏥᏍᏓᏩᏛᏒ ᎩᏟ

jo:sdada:hnv̋:hli=hno ayv́=hno e:do:dá=lé nǒ:gwu o:ji:sdâ:wadv́:sv́ gi:hli

c-	*oost-*	*ataa-*	*hnvv̋hli*	*=hno*	*ayv́*	*=hno*	*ee-*	*toota*	*=lé*
v:1	-	-	-	-	1	-	1	-	
n:3-	4-	5-	7	=10	7	=10	5-	7	=10
DIST-	1DU.EXCL.A-	REFL-	brother	=and	1SG/PL	=and	1SG.B-	father	=or

noókwu	*oocii-*	*stá(ʔ)wat*	*-vv(ʔ)s*	*-vv́ʔi*	*kiihli*
1	9-	12	-21	-22	24
then	1PL.EXCL.A-	follow	-PRF	-ASR	dog

'So, my dad, my brother and I followed the dog.' (Feeling et al. 2018: 13)

3 Phonological domains

This and the following sections look at each of the diagnostics applied to the verbal complexes in Oklahoma Cherokee. In this section, I present the phonological diagnostics: Domain of H1 Spreading (§3.1), Domain of H3 Assignment (§3.2), Domain of Superhigh Assignment (§3.3), Final apocope (§3.4), Syllabification (§3.5) and h-metathesis + vowel deletion (§3.6).

3.1 Domain of H1 spreading (11–21)

H1 is a class of high tone which has been induced by a glottal stop (Uchihara 2009, 2016: Ch.7). H1 spreads leftward to the preceding mora, as long as it satisfies complex phonological conditions, such as that the preceding syllable is long and does not carry a marked tone (Uchihara 2016: §6.5). In (8), the high tone on the

[4] Here they are connected with = and boldfaced in the syllabary.

syllable *dó* spreads to the preceding mora on the syllable *we:*, forming a low-high rising tone on this vowel:

(8) à:tawě:dóʔvsga
a-thaweetó-ʔvsk-a
v:9-12-21-22
3sg.a-kiss-prs-ind
'He is kissing her.' (Feeling 1975: 58)

Figure 1 is an autosegmental representation of 8, visualizing the spreading process.

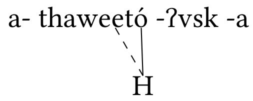

Figure 1: Autosegmental representation of *à:tawě:dóʔvsga*

Crucially, H1 which is lexically linked somewhere between positions 11 to 21 cannot spread to a syllable which belongs to the pronominal prefix in position 9 as in (9) or the reflexive/middle prefixes in position 10 as in (10), even if the other conditions for spreading are met (i.e. the preceding syllable is long and does not carry a marked tone). That is, the domain of H1 Spreading is the subspan that extends from position 11 to 21. Here, the domain of H1 Spreading is indicated by square brackets.

(9) ji:[nâ:wi:díh]a (*jǐ:nâ:wi:díha)
cii-ná(ʔ)wiit-íh-a
v:9-12-21-22
1sg>an-carry.fl-prs-ind
'I am taking him somewhere.' (Feeling 1975: 104)

(10) à:da:[sdâ:yv:hv́sg]a
Ø-ataa-stá(ʔ)yvv-hv́sk-a
v:9-12-21-22
3sg.a-refl-cook.meal-prs-ind
'He is cooking a meal.' (Feeling 1975: 7)

If the morpheme boundary (between the verb base in position 12 and the prefixes in positions 9 and 10) in fact is the conditioning factor, one would expect that the same morpheme with H1 (with a historical glottal stop) would show different realizations depending on whether the preceding morpheme is a pronominal (or reflexive/middle) prefix or part of the verb base. This prediction is born out. Compare the form *-k-íʔ-* 'eat-PRS' with a pronominal prefix *oostii-* '1DU.EXCL.A' in (11) and *-stiik-íʔ-* 'eat.LG-PRS' in (12), both of which clearly have in common the morpheme *-k-íʔ-* 'eat-PRS'. Both in (11) and (12), the preceding syllables are long and thus the phonological environment is the same. However, in (11), the element *-kíʔ-* is preceded by a pronominal prefix *oostii-* in position 9 to which H1 cannot spread. In (12), on the other hand, the element *-kíʔ-* is preceded by a stem-internal long vowel *ii* to which H1 can spread:

(11) ò:sdi:[gíʔ]a (*ò:sdǐ:gíʔ]a)
oostii-k-íʔ-a
v:9-12-21-22
1DU.EXCL.A-eat-PRS-IND
'He and I are eating it.' (DFJuly2013)

(12) à:sdǐ:[gíʔ]a
aa-stiik-íʔ-a
v:9-12-21-22
3SG.A-eat.LG-PRS-IND
'He is eating it (something long).' (Feeling 1975: 47)

We have seen above that the left-edge of H1 SPREADING is at position 11, since H1 fails to spread to the preceding pronominal prefix in position 9 or the reflexive/middle prefixes in position 10. The right-edge of the domain of H1 SPREADING is at position 21, that is the aspectual suffix: H1 in the aspect suffix can spread to the verb base, as can be seen in (12) above.

The modal suffix in position 22, which follows the aspect suffix, is outside of the domain of H1 SPREADING. This is because H1 in the modal suffix is never observed to spread to the span of positions 11 - 22. Among the modal suffixes, two suffixes, the habitual *-óʔi* ~ *-óóʔi*, and the reportative *-éʔi* ~ *-ééʔi*, have H1. However, these suffixes conspire to avoid their H1 to spread to the preceding morpheme. These suffixes have two allomorphs, one with a short vowel and another with a long vowel. The length alternation of these suffixes is conditioned by the tone of the last vowel of the verb stem (verb base in position + aspect suffixes in position) (Cook 1979: 129; Montgomery-Anderson 2008: 271). That is, the allomorph with a short vowel is selected after a high tone on the final mora of the verb stem, as in (13), while the allomorph with the long vowel is selected otherwise as in (15).

(14) shows that this verb lexically has a high tone on *i* in the imperfective suffix *-híh*, and that the high tone on the penultimate syllable is not due to spreading of the H1 of the habitual suffix *-óʔi* (in boldface).

(13) à:[dlo:hyíh]óʔi
*Ø-atlooy-híh-**óʔi***
v:9-12-21-22
3sg.a-cry-impf-hab
'He habitually cries.' (Feeling 1975: 13)

(14) à:[dlo:hyíh]a
Ø-atlooy-híh-a
v:9-12-21-22
3sg.a-cry-prs-ind
'He is crying.' (Feeling 1975: 13)

(15) à:[di:tasg]ó:ʔi
Ø-atiihtha-sk-oóʔi
v:9-12-21-22
3sg.a-drink-impf-hab
'He habitually drinks it.' (Feeling 1975: 11)

H1 of these modal suffixes have the possibility of spreading to the preceding morpheme only when the modal suffix has an allomorph with a short vowel, as in (13), but in all such instances the final vowel of the verb stem has a high tone, and thus H1 of these modal suffixes cannot spread. Thus, since H1 Spreading is never be observed in this sequence, the modal suffixes in position 22 are outside of the domain of H1 Spreading.

3.2 Domain of H3 assignment (7-21; 5-21)

Certain pre-pronominal prefixes (positions 2 - 8) in Oklahoma Cherokee assign a high tone (henceforth H3, represented with the acute accent diacritic as in H1, since their pitch levels are the same) somewhere within the initial three syllables of the verb (Lindsey 1987, Wright 1996; Uchihara 2016: Ch.10). In (16), the iterative pre-pronominal prefix *v:-* assigns H3 to the syllable *hi*; this tone is absent from the form without the pre-pronominal in (17):

(16) v:h**í**:gò:wáhta
vv-hii-koohwahth-Ø-a
v:7-9-12-21-22
ITER-2SG>AN-see-PNC-IND
'You just saw him again.' (EJ2011)

(17) hi:gò:wáhta
hii-koohwahth-Ø-a
v:9-12-21-22
2SG>AN-see-PNC-IND
'You just saw him.' (EJ2011)

H3 is not only found on the second syllable of the verb as in (16), but also on the third syllable of the verb:

(18) tla yigin**í**:gowhtǐ:ha
tlha yi-kinii-koohw(a)hth-iíh-a
v:1 2-9-12-21-22
not IRR-1DU.IN.B-see-PRS-IND
'He is not seeing you and me.' (EJ2011)

Uchihara (2016: ch.10) argues that the H3 is essentially an iambic pitch-accent rather than a floating tone, and that the difference between prefixes such as iterative *v:-* in (16) where the H3 is assigned to the second syllable on the one hand, and prefixes such as irrealis *yi-* in (18) where the H3 is assigned to the third syllable on the other, can be accounted for by considering that the latter type of prefixes are extrametrical. That is, prefixes such as the irrealis are excluded from syllable counting in the assignment of the iambic pitch accent. In the current method with the verbal planar structure in Table 1, the prefixes after position 7 (iterative) are always within the domain of H3 ASSIGNMENT, while the prefixes before that can be outside of its domain, as we will see below.

The aspectual suffixes in position 21 are also within the domain of H3 ASSIGNMENT. This is evident from the following example, where the H3 is assigned to the vowel of the aspectual suffix /i/ (and then spreads leftward by one mora). Here again the domain of H3 ASSIGNMENT is indicated by square brackets.

(19) hla yi[gv̌:hn**í**]ha
tlha yi-k-vvn-hih-a
v:1 2-9-12-21-22
not IRR-3SG.A-hit-PRS-IND
'He is not hitting him.' (Pulte & Feeling 1975: 345)

The modal suffixes in position 22 always have a high tone, either lexically or due to the boundary H tone (Lindsey 1985: 125, 168, Haag 2002: 414, Johnson 2005: 17), and thus one cannot tell if they are within the domain of H3 Assignment or not, since a high tone could be the lexical high tone or due to the H3. Thus, the discussion so far defines the minimal domain of H3 Assignment: positions 7–21.

On the other hand, the pre-pronominal prefixes in position 5 (distributive) and 6 (cislocative) may or may not be within the domain of H3 Assignment, depending on their allomorphy and whether they combine with other pre-pronominal prefixes in positions 2–5 or not.

First, the distributive prefix in position 5 has allomorphs *tee-* ~ *ti-* ~ *c-*, the distribution of which is determined by complex phonological and morphosyntactic factors (Uchihara 2016: Appendix A). With the first allomorph *tee-*, this prefix is included in the domain of H3 Assignment, and thus the H3 is assigned to the second syllable of the word:

(20) [de:hígo:whtíh]a
tee-hi-koohw(a)hth-íh-a
v:5-9-12-21-22
dist-2sg.a-see-prs-ind
'You see them.' (Pulte & Feeling 1975: 248)

On the other hand, when the allomorphs *ti-* ~ *c-* occur, this prefix is outside of the domain of H3 Assignment, and thus the H3 is assigned to the third syllable of the word, as in (21):

(21) di[jadû:g]a[5]
ti-c-at-u(ʔ)k-a
v:5-9-12-21-22
dist-2sg.b-throw-pnc-ind
'Throw it!' (Pulte & Feeling 1975: 247)

When the cislocative prefix in position 6 occurs by itself without other pre-pronominal prefixes in positions 2-5, it behaves as other prefixes in positions 2-5 in that it is outside of the domain of H3 Assignment, and thus the H3 is assigned to the second syllable of the word:

[5]The high-low tone on the penultimate syllable, instead of the expected high tone, is due to the underlying glottal stop.

(22) da[yo:j**é**:dò:l]i
tay-ooc-eet-oo(?)l-i
v:6-9-12-21-22
CISL-1PL.EXCL.A-walk.around-PRF-MOT
'They and I will come here.' (EJ2011)

When the cislocative prefix is preceded by another prefix in positions 2–5, it falls within the domain of H3 ASSIGNMENT, and the H3 is assigned to the syllable immediately after the syllable of the cislocative prefix (Uchihara 2016: 204):

(23) ni[day**ú**:go:whtv́hd]i
ni-tay-uu-koohwahth-v́ht-i
v:4-6-9-12-21-22
PART-CISL-3SG.B-see-INF-NOM
'for him to see it (looking this way).' (Pulte & Feeling 1975: 246)

The morphemes outside of this domain are never within the domain of H3 ASSIGNMENT. Thus, this defines the largest domain of H3 ASSIGNMENT: positions 5–21.

3.3 Domain of superhigh assignment (7–22; 5–22)

For another type of an accent in Cherokee, superhigh accent, the pre-pronominal in positions 2–6 are outside of its domain, as in the case of the H3 ASSIGNMENT discussed above. However, the right edge of the SUPERHIGH ASSIGNMENT is at position 22 (modal suffixes), and not position 21 as in the case of the H3 ASSIGNMENT. That is, modal suffixes are within the domain of SUPERHIGH ASSIGNMENT.

Superhigh accent is carried by a verb in a subordinate clause, by deverbal nouns, and by adjectives (Cook 1979: 92, Lindsey 1985: 125; Uchihara 2016: Ch 11.2). Although its occurrence is morphosyntactically conditioned, it manifests some properties common to 'accentual' systems: it is culminative (one per word), and its assignment is a 'default-to-opposite' footing pattern (Wright 1996: 21; Hayes 1995: 296–299; Kager 2012; Kager 1995: 384): namely, the prominence is assigned to the last non-final long vowel in the word, while the prominence is assigned to the first syllable of the word when there is no long vowel in the word.

Superhigh accent is found only on a long vowel, and is characterized by a gradual rise in pitch that rises to a point above the normal high tone register (Wright 1996: 21, Johnson 2005: 10). In (24), the penultimate syllable has the superhigh accent:

(24) [gv:jalhánv̋:hi]
k-vvcal-áhn-vvhi
v:9-12-21-22
3sg.a-fry-prf-ppl/sh
'fried.' (Feeling 1975: 127)

Extrametricality plays a role when there is no long vowel within the word. If there is no long vowel in the word, a high tone (H4 henceforth, represented with the acute accent diacritic, the same as H1 and H3 above, highlighted in boldface) is assigned to the first vowel of the phonological word, instead of a superhigh accent (Lindsey 1985: 127, Wright 1996: 21; Uchihara 2016: Ch. 11):

(25) [**á**kisdi]
a-khi-st-i
v:9-12-21-22
3sg.a-swallow-inf-nom/sh
'pill' (lit. thing to swallow) (Feeling 1975: 33)

There is a systematic exception to this generalization stated above; that is, the H4 cannot be assigned to the prefixes in positions 2–6. In (26) and (27), H4 is assigned to the second syllable rather than the expected first syllable, which belongs to the pre-pronominal prefix:

(26) ji[g**á**hliha] (*jígahliha)
ci-ka-lh-ih-a
v:2-9-12-21-22
rel-3sg.a-sleep-prs-ind/sh
'the one who is sleeping.' (DJM2012)

(27) yi[ch**á**wasa] (*yíchawasa)
yi-ca-hwa-s-a
v:2-9-12-21-22
irr-2sg.b-buy-prf-ind/sh
'If you buy it, …' (JRS2012)

The right edge of Superhigh Assignment is the modal suffixes in position 22. This is illustrated in (28), where the superhigh accent is assigned to the vowel of the habitual modal suffix in position 22.

(28) win[agíʔluhjő:ʔi]
wi-n-aki-lʔu-hc-óóʔi
v:3-4-9-12-21-22
TRNSL-PART-1SG.B-arrive-PRF-HAB/SH
'After I arrived there, …' (Pulte & Feeling 1975: 351)

The superhigh accent cannot be assigned to the enclitics in position 23, even if they have a long vowel, as can be observed in the following example. Here, the enclitic =*hééhnv* in position 23 has a long vowel, but the superhigh accent is not assigned here but rather on the vowel of the negative participle suffix -*vvna* in position 22. Thus, the minimal domain of SUPERHIGH ASSIGNMENT consists of positions 7–22.

(29) n[v:gáwò:nǐ:sgv̋:n]=hé:hn yíg
n-vv-ka-woo(ʔ)ni-:sk-vvna=hééhnv *yi-ki*
v:4-7-9-12-21-22=23 2-12
PART-ITER-3SG.A-speak-IMPF-NEG.PP/SH=because IRR-COP/SH
'If you don't speak, …' (DF2012)

The distributive pre-pronominal prefix in position 5 may or may not be within the domain of SUPERHIGH ASSIGNMENT, again depending on its allomorphy, as in the case of the H3 ASSIGNMENT discussed above. The distributive prefix has the allomorphs *tee-* ~ *ti-* ~ *c-*, the distribution of which being conditioned by complex phonological and morphosyntactic factors. When the allomorph *tee-* occurs, this prefix can carry the superhigh accent, thus it is within the domain of superhigh assignment:

(30) ji[dế:kdladiʔi]
ci-tee-k-vhtlat-iʔ-i
v:2-5-9-12-21-22
REL-DIST-3SG.A-put.out.fire-PRS-NOM/SH
'the one who is putting out fire.' (DJM2012)

On the other hand, when the allomorph *ti-* occurs, the high variant of the superhigh accent (H4) cannot be assigned to this syllable and is instead assigned to the following syllable; in other words, it is outside of the domain of SUPERHIGH ASSIGNMENT:

(31) di[jálhdohdi]
ti-ca-loht-oht-i
v:5-9-12-21-22
DIST-2SG.B-put.CMPL.into.container-INF-NOM/SH
'the one who is putting out fire.' (JRS2012)

The morphemes outside of this domain are never within the domain of SUPERHIGH ASSIGNMENT. Thus, the discussion so far defines the largest domain of SUPERHIGH ASSIGNMENT: positions 5–22.

3.4 Final apocope (2–23)

The final underlying short vowel of the domain that contains positions 2-23 is deleted, and this apocope is not applied to any other vowels within this domain (Bender & Harris 1946: 17; Feeling 1975: xii; Scancarelli 1987: 22, 46; Montgomery-Anderson 2008: 58ff., Uchihara 2013: Ch 2.3). Thus, even in an elicitation setting, speakers usually give a form without the final vowel, and only occasionally give the 'longer', 'full' forms:

(32) [jà:lsdâ:yv̋:hvsk]
c-Ø-al(i)stá(ʔ)yvv-hvsk-(a)
v:2-9-12-21-22
REL-3SG.A-have.meal-PRS-IND/SH
'the one who is having a meal.' (JRS2012)

Enclitics in position 23 are within the domain of FINAL APOCOPE (cf. Haag 1997, 1999). When an enclitic is attached, the word-final vowels (before the enclitic) are obligatory, even for speakers for whom deletion of the final vowels is the norm (Lindsey 1985: 139). (33) is a form without an enclitic and the final vowel is deleted, while (34) has an enclitic *=tv́v́* in position 23 and thus the final vowel of the verb is retained:

(33) tlá=s [yà:go:hwáht]
tlha=s y-a-koohwáhth-Ø-(a)
v:1=1 2-9-12-21-22
not=Q IRR-3SG.A-see-PCT-IND
'Didn't he see it?' (DF1972)

(34) v:, [à:go:hwáhtá=dv́:]
vv a-koohwáhth-Ø-a=tv́v́
v:1 9-12-21-22=23
yes 3SG.A-see-PCT-IND=EMPH
'Yes, he saw it.' (DF1972)

When the enclitic has a final short vowel, this final vowel of the enclitic is deleted instead. (35) is a form without an enclitic and the final vowel (as well as the onset *ʔ*) is deleted, while (36) has a clitic *=sk(o)* (interrogative), and thus the final vowel of the word is retained, but the final vowel of this clitic, *o*, is deleted instead. The presence of the underlying final vowel *o* of this clitic is evident when this clitic itself is followed by another clitic, as in (37):

(35) [hi:nâ:hlâ]
hii-ná(ʔ)hlá(-ʔ-a)
v:9-12-21-22
2SG>AN-own.AN-PRS-IND
'You own it (AN).' (JRS2013)

(36) [hi:nâ:hláʔa=sk]
hii-ná(ʔ)hlá-ʔ-a=sk(o)
v:9-12-21-22=23
2SG>AN-own.AN-PRS-IND=Q
'Do you own it (AN)?' (JRS2013)

(37) [gawó:nihá=sgò:=hv][6]
ka-woó(ʔ)n-ih-a=skò=:hvv
v:9-12-21-22=23=23
3SG.A-speak-PRS-IND=Q=CNTR
'But is he speaking?' (Pulte & Feeling 1975:294)

The left edge of this span is at position 2; when present, the final vowel of an NP in position 1 can undergo Final Apocope, as can be seen in (38). Here, the final vowel /o/ of *kááko* 'who' undergoes Final Apocope:

[6]The vowel of *=skò* is lengthened before the enclitic *=hvv* and is assigned a lowfall tone for an unknown reason.

(38) gá:g [sdalhno:hé ji:yò:sě:hv́]
káák(o) st-ali-hnoo-hé(h-a) ciiy-ooʔs-eéh-vv́ʔi
v:1 9-10-12-21-22 9-12-21-22
n:7 - -
who 2DU-MID-tell-PRS-IND 1SG>AN-say-IMPF-ASR
"'Who are you talking to?" I said to him.' (CNRS)

3.5 Syllabification (2–23)

The span that extends from position 2 to 23 is syllabified according to the following maximal syllable template (O = onset, R = Rhyme, N = nucleus, C = coda, and V = vowel), which is also subject to phonotactics constraints (see Figure 2). Such a syllable template is justified by the MAXIMAL ONSET PRINCIPLE (Selkirk 1982), CLOSED SYLLABLE SHORTENING which applies only in certain contexts, and native speaker judgments. Here the syllabification is mostly based on the judgement by speaker-linguist Durbin Feeling (see (Uchihara 2016: Ch. 3) for more detail).

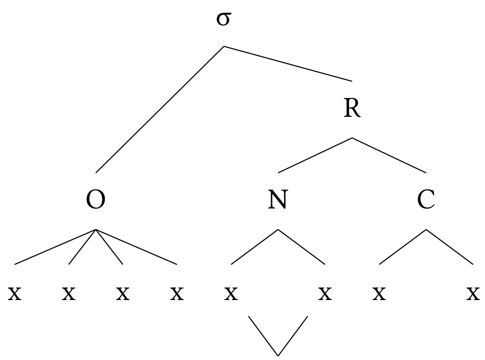

Figure 2: Maximal Syllable Template in Oklahoma Cherokee

(39) shows that syllabification is applied regardless of the morpheme boundaries within the domain of positions 2-23 . Note that the syllable boundaries (marked with dots) are placed within the base in position 12 and the aspect suffix in position 21 :

(39) [gà:.ni.gí.ʔa]
k-a:hnik-íʔ-a
v:9-12-21-22
1sg.a-start-prs-ind
'I'm starting (to walk).' (Feeling 1975: 25)

The pre-pronominal prefixes in positions 2–8 are also parsed into syllables, again confirming their status as part of the domain of syllabification:

(40) hla [ya.gwá:nh.ta]
hla y-akw-aanht-h-a
v:1 2-9-12-21-22
not irr-1sg.b-know-stat-ind
'I don't know.' (Pulte & Feeling 1975: 242)

Enclitics in position 23 also form part of the domain of syllabification, even though in most cases it is not observable since most of the clitics begin with a consonant, and form a separate syllable on their own. However, Durbin Feeling's transcription (he writes the tonal superscript after the syllable boundary in his 1975 dictionary, Pulte & Feeling 1975) below suggests that he analyzes the interrogative clitic *=s* as forming a syllable along with the preceding sequence *ha:*

(41) [gạ^{2}wo^{3}nị^{2}has^3]
ka-woó(ʔ)n-ih-a=s
v:9-12-21-22=23
3sg.a-speak-prs-ind=q
'Is he speaking?' (Pulte & Feeling 1975: 293)

Moreover, the enclitic *=éekv* 'also' is syllabified with the preceding morphemes.

(42) [ù:.nv:.ke:w.sgê:.gv́]
uun-vvkheew(i)-sk-(a)=éekv
v:9-12-21-22=23
3pl.b-forget-prs-ind=also
'They are forgetting.' (CNRS)

Syllabification does not apply across orthographic word boundaries (i.e. between position 1 and what follows, and between position 23 and 24), as the following examples show. In (43), the final *n* of the first orthographic word (which results from Final Apocope) does not constitute the onset of a syllable with the initial vowel of the following verb. Thus, the discussion so far shows that the left edge of the domain of syllabification is the position 2.

(43) jí:.sdv:n [à:.wa.du:.lí] (*jí:.sdv:.nà:.wa.du:.lí)
cíístvvn(a) akw-atuul-í(h-a)
v:1 9-12-21-22
n:7 -
crawdad 1sg.b-want-prs-ind
'I want a crawdad.' (JRS2013)

In (44), the interrogative enclitic =*s* in position 23 is not syllabified as the onset of the following vowel which belongs to another morpheme which occupies the position 24; thus, this defines that the right edge of the domain of syllabification is the position 23:

(44) gv́:n nǒ:=hv́ [aně:=s] áhan e:sgă:hn
kv́v́na noókwu=hv́v́ an-eé(h-a)=s áhani eeskaắhni
v: 1 1 9-12:21-22=23 24 24
turkey now=and 3pl.A-live:stat-nom/sh=q here nearby
'And turkeys, do they live here?' (CNRS)

3.6 h-Metathesis and vowel deletion (2–23)

The span that extends from position 2 to 23 is also the domain of a set of segmental processes, *h*-Metathesis and Vowel Deletion. These two process are motivated by the dispreference of a *CVh* sequence in Oklahoma Cherokee; when such a sequence occurs, it is remedied by deleting the vowel when *h* is followed by a plosive/affricate or by another vowel (henceforth 'Vowel Deletion') as in (45), or 'metathesizing' *V* and *h* when *h* is followed by a resonant, as in (46) (henceforth '*h*-Metathesis'; Cook 1979, Flemming 1996, Uchihara 2007, Uchihara 2013: Ch.3). Note that the *C* in the dispreferred *CVh* sequence is not also an *h*. The phonemic transcriptions are provided in // so that the behavior of *h* is more visible, which is obscured by the surface representations.

(45) [kdíha] /khtíha/
k-vht-í(h-a)
v:9-12-21-22
3sg.a-use-prs-ind
'He is using it.' (Feeling 1975: 142)

(46) [kanalu:sga] /khanalu:ska/
ka-hnaluu-sk-a
v:9-12-21-22
3sg.a-ascend-prs-ind
'He is ascending.' (Feeling 1975: 138)

Deletion is also triggered by an *s*. From this fact, we can propose that Oklahoma Cherokee has a constraint against *CVh* or *CVs* sequences, which is remedied as in (47)[7].

(47) **CVh* remedies

a. Deletion:	*C(V)hT* → *ChT*
	T(V)hV → *ThV*
	C(V)sT → *CsT*
	C(V)sV → *TsV*
b. Metathesis:	*CVhR* → *ChVR*

Vowel Deletion or *h*-Metathesis applies regardless of the morpheme boundary, as long as the target sequence is within the span of positions 2-23. This test is not fractured since the minimal domain, where these processes are known to apply, and the maximal domain, outside of which these processes never apply, coincide. (45) and (46) above illustrate cases where Vowel Deletion or *h*-Metathesis applies between the pronominal prefix in position 9 and the verb base in position 12. (48) shows that Vowel Deletion applies between the cislocative pre-pronominal prefix in position 6 and a pronominal prefix, confirming that the cislocative *t(a)-* is within the domain of this process:

(48) [tíʔgi] /thíʔki/
t(a)-hi-k-ʔ-i
v:6-9-12-21-22
cisl-2sg.a-eat-prf-mot
'You will eat it.' (JRS2012)

Similarly, the irrealis prefix *y(i)-* in position 2 can undergo Vowel Deletion:

(49) go:hű:sdi [yhi:yádu:lvʔế] kilő

koohuűsti	*y(i)-hiiy-atuul-vvh-ʔeh-a*	*khiloő*
v: 1	2-9-12-13-18:21-22	24
n: 7	-	7
something	irr-2sg>an-want-prf-dat:prs-ind	someone

'If you want something from someone.' (Montgomery-Anderson 2015)

[7]Here, *C* = any consonant, *T* = plosives and affricates, and *R* = resonants.

The following example illustrates a case where *h*-Metathesis is applied between the verb base -*asest*- in position 12 and the aspect suffix -*áhn*- in position 21.

(50) [ù:sestánv̌:ʔi] /ù:sesthánv̌:ʔi/
uu-(a)sest-áhn-vv́ʔi
v:9-12-21-22
3SG.B-include-PRF-IND
'He included him.' (Feeling 1975: 49)

h-Metathesis or Vowel Deletion never apply beyond the span of positions 2-23. On the left side, an element from position 1 cannot participate in these processes, as can be observed in (51); here, the sequence *kwa* + *h* satisfies the condition for Vowel Deletion, but it is not applied, since the sequence includes an element from position 1.

(51) jí:sgwa [hihye:lí:ʔa] (*jí:skwihye:lí:ʔa)

cíískwa	*hi-hyeel-iíʔ-a*
v:1	9-12-21-22
n:7	-
bird	2SG.A-imitate-PRS-IND

'You are imitating a bird.' (EJ2011)

On the right side, an element from position 24 cannot participate in *h*-Metathesis or Vowel Deletion, as can be observed below. Here, the sequence *ti* and *h* satisfy the structural requirement for these processes to be applied, but they are not, since the *h* belongs to an element in position 24.

(52) ő:sd [yú:lsdohdí] hawi:yá (*yú:lsdohtawi:yá)

oősta	*iy-uu-alist-oht-i*	*hawiiya*
v:1	4-9-12-21-22	24
n:-	-	7
a:7	-	-
good	PART-3SG.B-become-INF-NOM	meat

'So that the meat becomes well.' (RK2012)

4 Morphosyntactic domains

In this section, I present seven morphosyntactic (and indeterminate) diagnostics applied to the Oklahoma Cherokee verbs: deviations from biuniqueness (§4.1), ciscategorial selection (§4.2), minimum free form (§4.3), non-permutability (§4.4), non-interruption (§4.5), repeated subspan (§4.6) and nominalization (§4.7). Nominalization is a type of subspan repetition, but it is treated here separately for convenience.[8]

4.1 Deviations from biuniqueness (4–13, 4–22)

A deviation from biuniqueness refers to the lack of a one-to-one relation between forms and their meanings. Cases of (non-automatic) allomorphy, suppletion, multiple exponence etc. represent deviations from biuniqueness.

All positions within the span that extends from position 4 to 13 manifest allomorphy that is not automatic (that is, alternations due to productive phonological processes, as in the processes discussed in §3). The minimal domain of deviations from biuniqueness is therefore positions 4 to 13. For instance, the partitive prefix in position 4 shows allomorphy between *ni-* and *i(y)-* conditioned by the presence of the nominal modal suffix in position (Cook 1979: 64); the distributive prefix in position 5 alternates between *tee-* ~ *ti-* ~ *c-*, conditioned by complex phonological and morphosyntactic factors (Uchihara 2016: Appendix A); the allomorphy of the 1sg agentive prefix in position 9 between *k-* ~ *ci-* is conditioned by the following sound. In most of the cases the allomorphs are predictable from the phonological and morphological contexts, except for the 3sg agentive pronominal prefix, which shows allomorphy of *k(a)-* ~ *a-* ~ *Ø-* that is partially lexically conditioned.

However, the morphemes outside of the domain of positions 4-22 do not show any (non-automatic) allomorphy: the NPs in position 1 (that is, there is no non-automatic allomorphy at the junctures between NPs and other positions); the irrealis and the relative pre-pronominal prefixes in position 2; the translocative prefix in position 3; the enclitics in position 23; and the NPs in position 24. This defines the maximal domain of deviations from biuniqueness.

Between the minimal and maximal domain (namely positions 14 - 21), there are some positions where the morphemes show non-automatic allomorphy. Unlike in the case of the allomorphy within the minimal domain, where the distribution of the allomorphs is mostly predictable from phonological and morphological environments, in the case of the maximal domain the allomorph selection is mostly lexically conditioned. Thus, the causative suffix in position 16 shows various allomorphs *-oht-, -iʔst-, -st-*, etc., which are lexically conditioned (cf. Mithun 2000); the dative suffix in position shows allomorphs *-hééh-~ -ʔééh-*, where the conditioning factor is still unknown. Especially the aspectual suffixes in this position

[8] For the purposes of this chapter 'indeterminate' domains such as free occurrence are classified as 'morphosyntactic.'

manifest complex allomorphy, the combination of which results in no fewer than 67 inflectional classes.

4.2 Ciscategorial selection (12–22; 2–22)

Ciscategorial selection refers to a span where all of the elements are strictly modifiers or dependents with a certain part of speech, in this case verbs. A morpheme is ciscategorial if it can only occur with verbs, while it is transcategorial if it can also occur with other parts of speech. This test is fractured into minimal and maximal tests as follows:

(53) Ciscategorial selection (minimal): all the morphemes in this span are unique to verbs.

(54) Ciscategorial selection (maximal): all the morphemes outside of this span can not only occur with verbs but also with other parts of speech.

All the morphemes in the domain that extends from position 12 to 22 are ciscategorial; that is, they are unique to verbs. Thus, to the right side of the verb root in position 12, all positions up to 22 are unique to verbs, while position 23 elements (enclitics) can attach to nouns and adjectives in addition to verbs.

To the left of the verb root in position 12, not all the morphemes are ciscategorial; that is, while morphemes in positions 8 (negative), 7 (iterative), 6 (cislocative) are unique to verbs, other morphemes are transcategorial. The incorporated noun root in position 11 can occur with an adjectival root,[9] as in *a-sgù:-sdə̋:y* [3sg.a-head-hard] 'stubborn'. The reflexive prefix in position 10 can occur with nouns, as in *di:-(a)n-ada:-hnv̋:hli* [dist-3pl.a-refl-brother] '(they are) brothers'[10] as well as with verbs as in *à:-(a)da:-go:whtíha* [3sg.a-refl-see] 'he sees himself'. Pronominal prefixes in position 9 can also occur with nouns to express possessors or the copula subject as in *jì:-sgaya* [1sg.a-man] 'I'm a man' as well as with verbs as in *ji-gíʔa* [1sg.a-eat] 'I eat'. The distributive prefix in position 5 can occur with a noun as in *di:-(a)sgwagẽ́:ni* [dist-side] 'sides' as well as with verbs as in *di-chano:gî:sdi* [dist-for.you.to.sing] 'for you to sing'. The partitive prefix (position 4) can be found with a noun as in *i:-nv̋:d* [part-month] 'months' as well as with a verb as in *iy-ú:dv̀:nhdi* [part-for.him.to.do] 'for him to do it'. The translocative prefix in position 3 can occur with an adjective as in

[9] As mentioned above, adjectives are more like nouns than verbs, in contrast to Northern Iroquoian (Chafe 2012).

[10] König & Michelson (2010) argue that kinship terms like this constitute independent parts of speech in Oneida, a Northern Iroquoian language.

w-ǔ:sdǐ:kv̋:ʔi [TRNSL-small-INT] ‘smallest’, so can the relative prefix in position 2 as in *ji-ganiyè:gv̋* [REL-dangerous] ‘when he was dangerous’.

All elements outside of the span of positions 2–22 are transcategorial. This defines the MAXIMAL domain of CISCATEGORIAL SELECTION. That is, the morphemes in positions 1 (NPs), 23 (enclitics) and 24 (NPs) can attach to any parts of speech. For instance, the enclitics in position 23 can attach to any parts of speech as long as they occupy the first ‘position’ in the clause, as can be observed in the following examples; in (55) the interrogative enclitic *=sk(o)* attaches to a verb, while in (56) it attached to a noun.

(55)

jadu:lí:=sk	kanu:n
c-atuul-ií(h-a)=sk(o)	*khanuuna*
v:9-12-21-22=23	24
n:-	7
2SG.B-want-PRS-IND	bullfrog

‘Do you want a bullfrog?’ (JRS2013)

(56)

kanu:ná=sk	jadu:lí
khanuuna=sk(o)	*c-atuul-iíh-a*
v:1=1	9-12-21-22
n:7=10	-
bullfrog	2SG.B-want-PRS-IND

‘Do you want a bullfrog?’ (JRS2013)

4.3 Minimum free form (9–22; 2–23)

Tallman (2020: 18) states that free occurrence identifies a span that contains contiguous positions whose elements can be uttered as a complete utterance. This test is fractured into two:

(57) Minimum free form (minimal): the shortest span overlapping the verb core that is a complete utterance. It is felicitous to answer a question with that form (e.g. Q: *When did you go to the store?* A: *Early*).

(58) Minimum free form (maximal): the longest span overlapping the verb core that can be a single free form.

A minimal verb form in Cherokee consists of a pronominal prefix (position 9), root (position 12), aspectual suffix (position 21) and a modal suffix (position 23). Thus, the domain of the MINIMAL MINIMUM FREE FORM is the span that extends from position 9 to 22. This is illustrated in (59):

(59) galo:sga
ka-loo-sk-a
v:9-12-21-22
3sg.a-pass-prs-ind
'He is passing it.' (Feeling 1975: 102)

There are a few apparent exceptions to this generalization. First, the copula *iíki/ -ki/ keeʔs-* and *ciíy-* 'it (something long) is lying' do not take any pronominal prefix, unless they contain a fossilized 3sg agentive prefix *k-* or *c-*. Secondly, some verbs do not have any segmental exponents for the aspectual suffixes in the punctual or stative forms. In such cases I consider them to have a zero suffix; such an analysis is justified by the fact that other allomorphs of such suffixes have segmental exponents.

The span of maximal minimum free form, which is the maximal form that can stand alone and cannot be separated, covers positions 2-23. If one wishes to add elements beyond a 2–23 span, the resulting utterance will no longer be a single free form. Thus, the utterance in (60) has elements in position 1 and 24 from the verbal planar structure, each of which constitutes single free forms.

(60) hawâ: ga:nv̀:dadî:sgó:=dv́: u:gò:dí=w

hawa	*k-aanvhtat-íʔsk-óóʔi=tv́v́*	*uu-kòòti=kwúú*
v:1	9-12-21-22=23	24
a:-	-	5-7=9
okay	1sg.a-remember-impf-hab=emph	3sg.b-be.more=DT

'Of course I remember a lot.' (CNRS)

4.4 Non-permutability (2–17; 2–22)

Non-permutability, or fixed order, identifies spans where the ordering of elements is fixed (Tallman 2020: 23). Cherokee affix order is fairly rigid within the span of positions 2–17, except that the dative and the ambulative suffixes in position 18 are attested with a variable order, as shown in (61) and (62). As can be noted in the translations, there does not seem to be any scope differences. Thus, the minimal domain of non-permutability extends from position 2 to 17, where the affix order is rigid.

(61) [dà:kgi:ló:ʔe:l]ǐ:dô:ha
t-ak-vhkiiloó-ʔ-eel-iit-óo(ʔ)h-a
v:5-9-12-13-18:13-18-21-22
dist-1sg.b-wash.fl-prf-dat:prf-amb-prs-ind
'He goes around washing for me.' (PA1971)

(62) [gawó:ni:his]ĭ:dô:leha
ka-woó(ʔ)ni-:his-iit-óo(ʔ)l-eh-a
v:9-12-13-18-13-18:21-22
3sg.a-speak-prf-amb-prf-dat:prs-ind
'He is going around speaking for him.' (Feeling 1975: 319)

All elements outside of the span of 2–22 have no fixed order: this concerns the NPs in position 1 as well as enclitics in position 23. This is the maximal domain of non-permutability. First, constituent order in Cherokee is free (Scancarelli 1987: §3.7; 2015: §11.1 and references therein). Scancarelli (1987) states that "most word orders in Cherokee are variable: not just major constituent orders, but also order within constituents" (ibid.). Thus, any order of S, V and O is possible when the pronominal prefix unambiguously distinguishes the subject from the object (Scancarelli 1987: 189), as in (63) – (68), which all describe the same situation, even though many speakers prefer not to have the verb appear sentence initially as in (67) or (68).

(63) gi:hli u:sgala achu:ja

kiihli	*uu-skal-Ø-a*	*a-chuuca*
v:1	9-12-21-22	24
n:7	-	4-7
dog	3sg.b-bite-pnc-ind	3sg.a-boy

'The dog bit the boy.' (Scancarelli 1987: 189)

(64) gi:hli achu:ja u:sgala

(65) achu:ja u:sgala gi:hli

(66) achu:ja gi:hli u:sgala

(67) u:sgala gi:hli achu:ja

(68) u:sgala achu:ja gi:hli

At the same time, Scancarelli (1987: 173ff.) remarks that certain orders are not variable; for instance, determiners, numbers and genitives must precede nouns; postpositions always occur after the nouns; and the standard of comparison must follow the comparative adjective in comparative constructions; copula may not precede a predicate nominal or adjective.

Secondly, the order of enclitics in position 23, at least some of them, also seems to be free. Thus, the delimiter enclitic =*kwúú* ('only, just') and the conjunctive enclitic =*hnóó* ('and') can occur in either order.

(69) à:waksestanv́:=wú=hnó
akw-akasest-ahn-vv́ʔi=kwúú=hnóó
v:9-12-21-22=23=23
1sg.b-watch-prf-asr=dt=and
'I just looked at (it).' (CNRS)

(70) e:jí=hna=wú
ee-ci=hnóó=kwúú
n:4-7=10=10
1sg.b-mother=and=dt
'and mom (watched).' (CNRS)

More work is needed to determine the precise ordering of the enclitics.

4.5 Non-interruptability (2–22)

Non-interruptability identifies a span of positions that cannot be interrupted by some interrupting element (Tallman 2020: 20). Here I use the diagnostic of whether two positions can be interrupted by the second position enclitics. The domain which spans from position 2 to 22 cannot be interrupted with other elements, whether free or bound. Position 1 and the following morpheme can be interrupted by an enclitic as in (71), as well as the position 24 and the preceding morpheme as in (72):

(71) agv:yí̋=hé:hn di:wátvsv̋ gè:hv

a-kvvyií̋=hééhnv	*ti-akw-athv-s-vv́ʔi*	*kèès-vv̋ʔi*
v:1=1	6-9-12-21-22	7-23
a:5-7=9	-	-
3sg.a-first=because	cisl-1sg.b-grow.up-prf-asr/sh	cop-asr

'As for where I first grew up.' (CNRS)

(72) jì:wát yawḗ:lì:sá=hé:hn kilő

cii-hwahth-Ø-(a)	*y-akw-eel-i(ʔ)s-a=hééhnv*	*khiloőʔi*
v:9-12-21-22	2-9-12-21-22=23	24
n:-	-	7
1sg>an-find-pnc-ind	irr-1sg.b-think-prf-ind/sh=because	someone

'Because when I think I find someone…' (CNRS)

The enclitics in position 23 can also be interrupted by other enclitics:

(73) yáni:gà:lsdi=wú=lé
y-´-anii-ka(ʔ)l-st-i=kwúú=léé
v:27-9-12-21-22=23=23
irr-iter-3pl.a-cut.fl-inf-nom=dt=or
‘They can cut it out.’ (DC2012)

4.6 Repeated subspan (2–23; 1–24)

According to Tallman (2020: 30), the minimal repeated subspan is “the subspan of positions whose elements cannot be interpreted unless they are present in the subspan itself. The elements of the positions in the subspan cannot be elided under co-/subordination or the positions of the subspan cannot have wide scope over the repeated subspans.” Within repeated subspans, only position 1 or 24 can be elided. For instance, in (74), the NP in position 1 can be elided, but the pronominal prefixes in position 9, the aspectual suffixes in position 21 and the modal suffixes in position 22 are coreferential but none of them can be elided:

(74) gi:hli ù:dlv́:gi (gi:hli) galihwó:gi=hnv́:

kiihli	*uu-htlvv́-(ʔ)k-i*	*kiihli*	*ka-lihwoó-(ʔ)k-i=hnv́v́*
v:1	9-12-21-22	1	9-12-21-22=23
n:7	-	7	-
dog	3sg.b-be.sick-pnc-ind	dog	3sg.a-die-pnc-ind=and

‘A dog got sick and died.’ (DF1972)

The following example illustrates that the element in position 24 *sgwu* ‘also’ has scope over the two coordinated infinitive verbs, *digigo:lǐ:yê:dí* ‘to read’ and *digo:hwě:lô:dí* ‘to write’ (because the speaker is contrasting ‘speaking’ with ‘reading’ or ‘writing’, neither of which he knew how to). Thus, this confirms that the position 24 is also outside of the subspan of the minimal repeated subspan.

(75) agv:yí̋=hé:hn jijiwó:ni:hv̋, hlá yagwá:nhté di:gigo:lǐ:yê:dí
digo:hwě:lô:dí=lé: **sgwu**, hla

akvvyii̋ʔi=hééhnv	*ci-ci-woó(ʔ)ni-:h-vv´ʔi*	*hla*
v:1=1	2-9-12-21-22	1
first=because	rel-1sg.a-speak-impf-asr/sh	

y-akw-aanvht-h-ééʔi	*ti-aki-kooliiy-é(ʔ)t-i*	*ti-k-oohweel-óʔt-i=léé*
2-9-12-21-22	5-9-12-21-22	5-9-12-21-22=23
irr-1sg.b-know-stat-rep	1sg.b-read-inf-nom	3sg.a-write-inf-nom=or

skwu hla
24 24
also NEG
'When I first talked, I didn't know how to read or to write.' (EJ2012)

In the following example, the translocative prefix in position 3 has to be repeated so that each verb conveys the translocative meaning ('away'); if the second occurrence of the translocative is omitted, the second verb no longer has the 'away' meaning:

(76) kò:sd wu:dánv:liyeʔé: wu:nó:hi:lv̀:sé:
khòòstu w-uu-ata-nvvliy-eʔ-ééʔi w-uu-noohiil-vv(ʔ)s-ééʔi
v:1 3-9-10-12-21-22 3-9-12-21-22
n:7 - -
dust TRNSL-3SG.B-REFL-rub.on-PRF-REP TRNSL-3SG.B-fly-PRF-REP
'She put dust on her and she flew.' (CNRS)

Derivational suffixes such as the ambulative in position 18 cannot be elided either and need to be repeated so that each verb conveys the ambulative meaning ('here and there'):

(77) aksu:hní:dà:sdí no:lé agino:halǐ:dâ:sdí agilv̋:kwdi gè:sv́
akw-asuu-hn-iit-a(ʔ)st-i nooléé aki-noohal-iit-á(ʔ)st-i
v:9-12-13-18-21-22 1 9-12-18-21-22
1SG.B-fish-PRF-AMB-INF-NOM and 1SG.B-hunt-AMB-INF-NOM
aki-lvvkwoht-i kèès-vv́ʔi
9-12-22 12-22
1SG.B-like/SH COP-ASR
'I liked to fish and hunt.' (CNRS)

According to Tallman (2020: 30), the MAXIMAL REPEATED SUBSPAN is "the subspan of positions whose elements can occur in each of the coordinated constituents without reference to whether some of these elements can be elided or interpreted via widescope of one element over the repeated subspans". In Oklahoma Cherokee, this corresponds to the entire planar structure (positions 1–24). The following example shows that elements from position 1 to position 22 can occur in each of the coordinated constituents

(78) achű:ja gawó:niha agĕ:hyá=hno dĕ:káno:gíʔa

a-chuűca	*ka-woó(ʔ)n-ih-a*	*a-keéhya=hno*	*tee-ka-hnook-íʔ-a*
v:1	9-12-21-22	1	5-9-12-21-22
n:7	-	7=10	-
3sg.a-boy	3sg.a-speak-prs-ind	3sg.a-girl=and	dist-3sg.a-sing-prs-ind

'A boy is speaking and a woman is singing.' (Pulte & Feeling 1975: 343)

4.7 Nominalization (2–20; 1–21)

Nominalization can be considered a type of subspan repetition. When Cherokee verbs are nominalized, all the elements between slots 1 and 21 can be inherited, including an NP patient *aciíla* 'fire' as in (79) or a pronominal agent as in (80). This then is the maximal span of nominalization. Positions after 22 are excluded since all the nominalized forms have the modal suffix *-i* in position 22.[11]

(79) ajĭ:lá gő:tlvhdi

aciíla	*k-oohtlhvv-ht-i*
v:1	9-12-21-22
n:7	-
fire	3sg.a-make-inf-nom/sh

'match.' (EJ2011)

Within the span of positions 1 –21 , the subspan between positions 2 and 20 cannot be elided, thus constituting the minimal subspan. Thus, in (80), the 3sg pronominal agent *k(a)-* (position 9) in the infinitive forms of the first two verbs ('speak' and 'write') is coreferential with the 3sg pronominal agent (here with the allomorph zero) of the verb 'get ready', but they cannot be elided.

(80) gawò:ní:hisd digo:hwĕ:lô:dí yadv:nű:wstan

ka-woo(ʔ)ni-:hist-(i)	*ti-k-oohweel-óʔt-i*
v:9-12-21-22	5-9-12-21-22
3sg.a-speak-inf-nom/sh	dist-3sg.a-write-inf-nom/sh

y-Ø-atvvnvv(ʔ)wist-ahn-(a)
2-9-12-21-22
irr-3sg.a-get.ready-prf-ind/sh
'when you get ready to write your language.' (CNRS)

[11]An aspectual suffix Position 21 can also be inherited in the nominalized form when it is the imperfective suffix.

Likewise, (81) shows that the distributive prefix in position 5 cannot be elided even though it occurs in the matrix verb.

(81) de:jádě̋:hlgwaʔ dijago:lĭ:yê:dí dijo:hwě:lô:dí
tee-c-ateehlohkw-aʔ-a *ti-ca-kooliiy-éʔt-i*
v:5-9-12-21-22 5-9-12-21-22
DIST-2SG.B-learn-PRF-IND/SH DIST-2SG-B-read-INF-NOM/SH
ti-c-oohweel-óʔt-i
5-9-12-21-22
DIST-2SG-B-write-INF-NOM/SH
'when you learn to read and write.' (CNRS)

5 Conclusion

In this chapter, I have shown how 8 phonological and 13 morphosyntactic constituency diagnostics are applied to the verbal planar structure with 24 positions to see whether any convergence of diagnostics is observed, and if so, in which layers. Figure 3 provides an overview of the results of the constituency variables applied to Cherokee in terms of layers.[12] The numbers refer to the position numbers in the verbal planar structure laid out in Table 1. From this display we can see that a span from position 2 to position 22 (layer 13) and the other from position 2 to position 23 (layer 14) show high convergences.

Figure 4 displays the results in terms of edges, where the y-axis refers to the number of times a constituency result hits a specific edge, and the x-axis refers to position in the planar structure. The green columns is for the left edge and the purple columns are for the right edge. As we can observe, position 2 at the left edge and position 22 at the right edge are where more constituency results have an edge.

The following observations can be made from this result. First, as can be seen, convergences are not found except for layer 13 (positions 2–22), where three diagnostics converge, and layer 14 (positions 2-23), where five diagnostics converge, which are the best 'wordhood' candidates in Oklahoma Cherokee. That there are convergences shows that there is more structure than just word vs. sentence. What is noteworthy about this latter constituent (layer 14) – which could be the principal candidate for a 'word' in Oklahoma Cherokee – is the size of this domain: this domain contains up to 22 morpheme slots. A comparison with other

[12]The figures were created by Sandra Auderset. Four tests that were classified as morphosyntactic are labelled as "indeterminate".

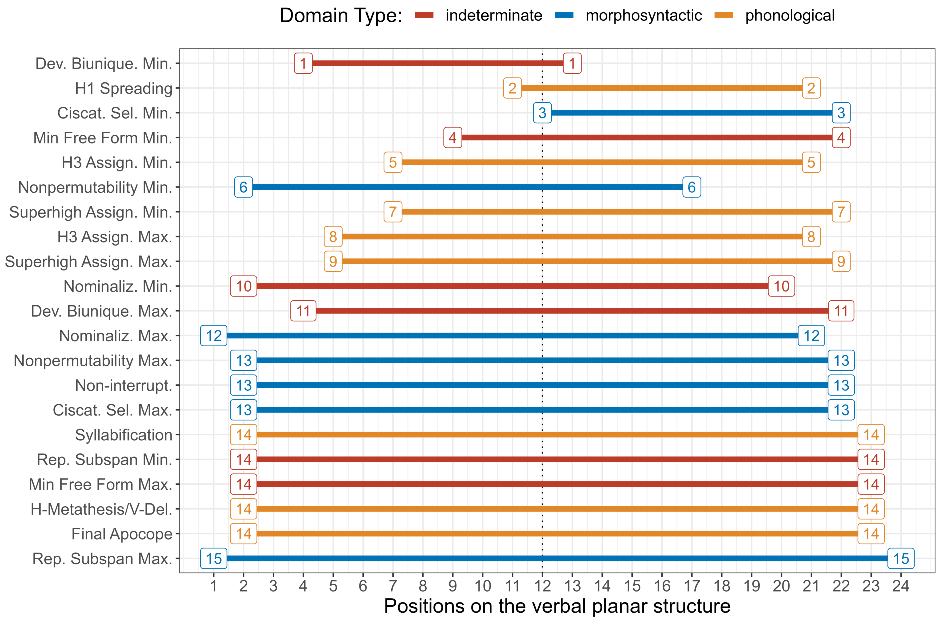

Figure 3: Constituency domains organized by converging layers in Cherokee

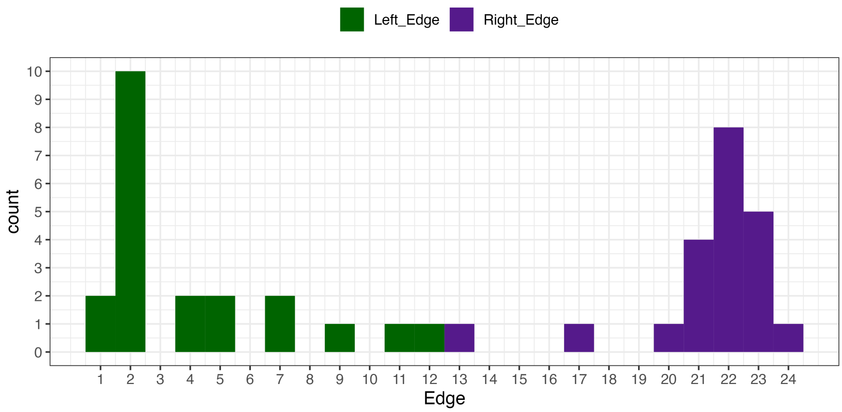

Figure 4: Constituency domain edges organized by count and type in Oklahoma Cherokee

languages in the volume confirms that the size of this domain is indeed significantly larger than average; the only language with a comparably large domain of convergences is C'upik.

Partly due to the large size of the wordhood candidate, and since this candidate can contain an incorporated noun in Northern Iroquoian,[13] some recent studies on Iroquoian languages propose that an Iroquoian word corresponds to the phonological phrase (Dyck 2009) or that the word-internal structure is a phrase rather than a head (Barrie & Mathieu 2016). The methodology employed in this chapter allows us to abstract away from arbitrary labels such as 'phrase' or 'word', but in light of such analyses, one might argue that the layer 13 (positions 2–22) is the 'word' while the layer 14 (position 2-23) is the 'phrase' in Oklahoma Cherokee, the two sole layers with any convergences, assuming that any number of convergences automatically provide word-hood candidates. However, as mentioned above, the only difference between these two layers is the incorporation of the enclitics; if anything, the group that consists of a word + enclitics should correspond to the clitic group (Nespor & Vogel 1986: Ch. 5) or the prosodic word group (Vigário 2010), rather than a phrase. Neither layer 12 nor layer 14 have any characteristics that we would expect of a phrase:[14] "a set of the form {γ, {α,β}}, where α and β are syntactic objects, be they lexical items (heads) or other phrases" (Mathieu & Barrie 2010: 10). The result obtained in this chapter indicates that the Cherokee 'word' is a 'word' after all, assuming that convergence is the correct criterion for wordhood (Matthews 2002)[15], and not a 'phrase', despite its large size.

Secondly, looking at the phonological and morphosyntactic diagnostics separately, the best phonological wordhood candidate is the span from position 2 to 23, with the convergence of three phonological diagnostics (Final Apocope; Syllabification; h-metathesis/vowel deletion), while the best morphosyntactic wordhood candidate is the span from positions 2 to 22, with the convergence of three morphosyntactic diagnostics (non-interruptibility, fixed order (maximal), ciscategorial selection (maximal)). This is shown in Figure 5 and Figure 6 below.[16] The only difference between them is that the enclitics in position 23 are incorporated in the phonological wordhood candidate while they

[13] There is not much consensus on whether compounds should be treated morphologically or syntactically as there is more of a cline in this domain (cf. Tallman 2021).

[14] Unlike Northern Iroquoian languages, Cherokee does not have productive noun incorporation.

[15] Adam Tallman suggests that an alternative is to consider that words are non-extractable or non-coordinable elements following Bruening 2018.

[16] Note that for the purposes of this chapter I assume that indeterminate domains are tests for morphosyntactic wordhood.

are not in the morphosyntactic wordhood candidate. This more or less supports the 'word bisection thesis' (Dixon 2009: 7), which states that 'phonological word' and 'grammatical word' can be recognized.

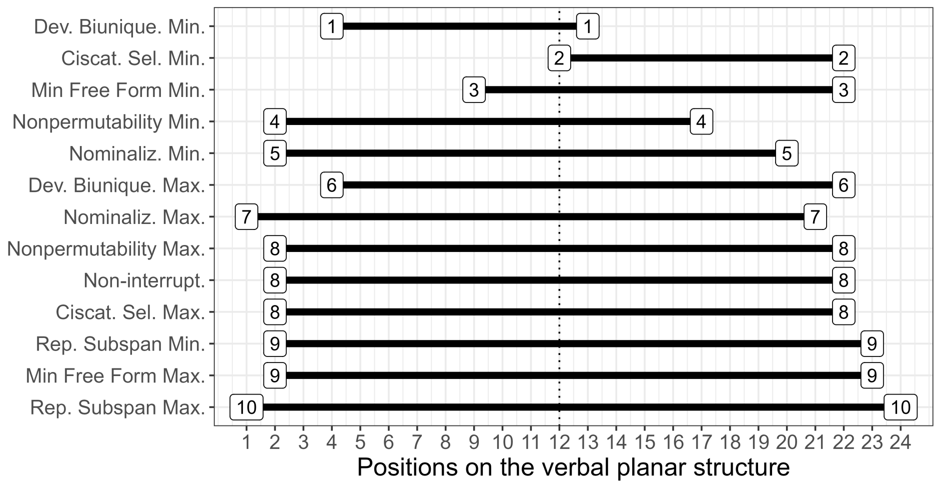

Figure 5: Morphosyntactic and indeterminate domains organized in terms of converging layers

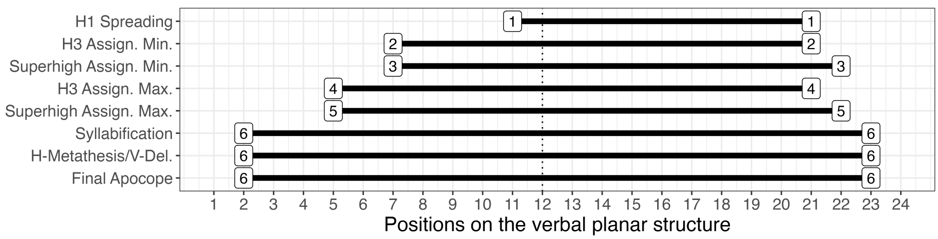

Figure 6: Phonological domains organized in terms of converging layers

As Bickel & Zúñiga (2017) claim on constituency in polysynthetic languages, more than one constituent needs to be posited and convergence is uncommon except for a couple of layers. On the other hand, unlike what they report for other polysynthetic languages, the method employed here shows that there is a strong wordhood candidate language-internally; this also reflects the general intuitions about wordhood among speakers and linguists working on Cherokee and Iroquoian languages. Future research might find that convergences such as those found in Cherokee (see Woodbury 2024 [this volume] on C'upik and Campbell

2024 [this volume] on Zenzontepec Chatino) are not so uncommon even when a larger sample of candidate diagnostics are considered. If this ends up being the case, it would demand an explanation, and such an explanation is not obviously available in current "emergentist" approaches.[17]

In sum, the only peculiarity of Cherokee wordhood is its size, but otherwise it is 'well behaved', in that the convergences are found only in two layers, each of which correspond to morphosyntactic and phonological words, respectively.

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Abbreviations

AMB	ambulative	EXCL	exclusive
AN	animate	FL	flexible
ASR	assertive	IMPF	imperfective
B	set B patientive	IND	indicative
CISL	cislocative	INF	infinitive
CMPL	completive	INT	int
CNTR	contrastive	IRR	irrealis
COP	copula	ITER	iterative
DAT	dative	LG	long
DIM	diminutive	LOC	locative
DIST	distal	MOT	motion
DT	delimiter	NOM	nominative
EMPH	emphasis	PART	partitive

[17] I thank Adam Tallman for this idea.

PP	participle	REP	reportative
PRF	perfect	SH	super high
PRS	present	STAT	stative
Q	question particle	TRNSL	translocative
REL	relative		

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Chapter 4

Constituency and Wordhood in Kiowa

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This chapter builds on previous work (Miller 2015, 2018, 2020) and investigates wordhood in Kiowa, a polysynthetic Tanoan language spoken in Oklahoma, with a focus on the verbal predicate and clause. Using the Planar-Fractal Method (Tallman 2021), five candidates for wordhood are identified using twelve diagnostics (five morphosyntactic, six phonological, and deviations from biuniqueness). The candidates are identified by the convergence of both morphosyntactic and phonological criteria, and they are largely expected given previous analysis of the prosodic structure of Kiowa (Miller 2015, 2018, 2020).

1 Introduction

The definition of the word has been a longstanding focus of debate shaping multiple areas within linguistics (e.g. Dixon & Aikhenvald 2002, Dixon 2010, Bruening 2018). Polysynthesis has been a driving catalyst of the debate since first described by Duponceau (1819). Characteristic "sentence words", or single words that encode all necessary information to be a free-standing utterance, challenge traditional understandings of the "word" in all areas of grammar (Mithun 1983, Fortescue 1994, Evans & Sasse 2002: e.g.). Thus, polysynthetic languages must play a central role in determining a definition of wordhood. Complicating matters, Haspelmath (2011) suggests the lack of uniform criteria and methods across studies precludes a viable definition of the word. Additionally, Bickel & Zúñiga (2017) argue defining the word may be beyond reach due to substantial variation across and within languages. Tallman's (2021) Planar-Fractal Method offers a set of criteria that may be applied uniformly across languages, and this volume allows us to examine many languages (including a number of polysynthetic languages) while holding the methods constant.

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This chapter investigates wordhood in Kiowa, a polysynthetic Tanoan language spoken in Oklahoma, with a focus on the verbal predicate and clause. Building on previous work (Miller 2015, 2018, 2020), I use the Planar-Fractal Method to identify five candidates for wordhood using twelve diagnostics (five morphosyntactic, six phonological, and deviations from biuniqueness). The candidates are identified by the convergence of both morphosyntactic and phonological criteria, and they are largely expected given previous analysis of the prosodic structure of Kiowa (Miller 2015, 2018, 2020).

§2 provides an overview of the Kiowa language and its speakers. A brief grammatical sketch includes the phoneme inventories (2.1.1), basic syllable structure (2.1.2), tone inventory (2.1.3), the structure of the verb complex (3.4), and syntactic information relevant to the present analysis (2.1.5). I discuss how the data in this chapter is sourced and how it is presented in §2.2. In §3, I present the flattened planar structure of the Kiowa clause. §4 introduces five morphosyntactic constituency diagnostics to be applied to the Kiowa verbal planar structure: Free Occurrence (4.1), Non-interruptability (4.2), Non-permutability (4.3), Subspan Repetition (4.4), and Ciscategorial Selection (4.5). §5 introduces the six phonological processes which will be examined with respect to the verbal planar structure. Segmental domains are considered first: Syllabification and sensitive phenomena (5.1.1), Cluster Devoicing (5.1.2), Vowel Truncation (5.1.3), and Dental-Velar Switch (5.1.4). The section concludes with an examination of Tone Lowering (5.2) and Pausing (5.3). Finally I evaluate Deviations from Biuniqueness in §6. All results are summarized and discussed in §7.

2 The language and its speakers

Kiowa is a North American language spoken in southwestern Oklahoma. Though originally classified as a linguistic isolate by Powell (1891), later work found a close relationship between Kiowa and the Tanoan languages of New Mexico and Arizona (Harrington 1910, 1928, Miller 1959, Trager & Trager 1959). Hale (1962) showed that Kiowa should be classified as a Tanoan language, an affiliation which has since been adopted in subsequent work (e.g. Watkins 1984, Harbour 2003, Adger et al. 2009, McKenzie 2012, Sutton 2014, Miller 2015, 2018, 2020).

The Kiowa Tribal Complex is located in Carnegie, Oklahoma. While tribal membership is in the thousands, local administrators and activists estimate there are approximately ten expertly fluent native speakers and fifty proficient speakers of the language (Miller 2018). The most fluent elders are over 90 years old. Efforts to bolster language use and awareness are beginning to see results thanks in large part to outreach events and teacher training through an Association for Native Americans (ANA) education grant awarded to the Kiowa tribe in 2016. Beginning at the same time, Dane Poolaw digitized and expanded upon work by Parker McKenzie, David Paddlety, Alecia Gonzales, and William Meadows, and compiled the Kiowa Language Student Glossary (Poolaw n.d.). A large-scale online dictionary project is also underway including full entries in four orthography systems, audio, story analyses, and grammatical sketches (Miller & Neely 2019). The four orthography systems will be presented and discussed in §2.2.

2.1 Grammatical sketch

This subsection provides a basic overview of relevant aspects of Kiowa grammar to be referenced in the present analysis. The phoneme inventory is presented in 2.1.1, followed by syllable structure in 2.1.2, and tone in 2.1.3. The final subsection (2.1.4) concludes with a summary of the morphophonological structure of the Kiowa verb complex, as well as the basic order of a Kiowa clause. The descriptions are intended to be very brief, as these topics are to be presented, justified, and modified when necessary in later sections.

2.1.1 Phoneme inventory

Kiowa's phoneme inventory has been established in earlier work (see Wonderly et al. 1954, Sivertsen 1956, Merrifield 1959, Watkins 1984). See Table 1 for the consonant inventory. In traditional Kiowa literature, the affricate [t͡s] is transcribed as [c], but I am adopting the IPA conventions here. The phoneme /l/ is noteworthy, as it is only realized as [l] syllable-initially. Otherwise, it is affricated as [ᵈl]. Note, also, that the phonemic status of the glottal stop is controversial. Some work has concluded that the glottal stop in Kiowa is problematic and unpredictable and therefore phonemic (Wonderly et al. 1954, Trager 1960), while other work has explained its distribution as entirely predictable and thus not phonemic (Sivertsen 1956, Merrifield 1959, Watkins 1984). The present analysis assumes the glottal stop is not a phoneme (adopting Watkins 1984's analysis, but the phonemic status of the glottal stop is not relevant to the arguments made here. It is included in Table 1 between parentheses, as this is an unresolved issue.)

Kiowa's vowel inventory may be found in Table 2. Monophthongs may be underlyingly short or long and oral or nasal. Diphthongs may be oral or nasal. Length is marked with the IPA symbol [ː], and nasality is marked with the Polish hook (e.g. ą). The Polish hook is used extensively in the existing research on Kiowa, and that usage is continued here in place of the more modern tilde in order to avoid conflict with tonal diacritics.

Table 1: Consonants (adapted from Watkins 1984)

	Labial		Dental		Alveolar		Palatal	Velar		Laryngeal
Stops										
Plain	p	b	t	d				k	g	(ʔ)
Ejective	p’		t’					k’		
Aspirated	pʰ		tʰ					kʰ		
Affricates										
Plain					t͡s					
Ejective					t͡s’					
Fricatives					s	z				h
Nasals		m		n						
Liquids				l						
Glides							j			

Table 2: Vowels (adapted from Watkins 1984)

	Monophthongs		Diphthongs	
	Front	Back	Front	Back
High	i	u		uj
Mid	e	o		oj
Low	a	ɔ	aj	ɔj

2.1.2 Syllable

The basic syllable in Kiowa consists of a vocalic nucleus, optionally preceded by one consonant (or Cj cluster), and optionally followed by one consonant from the set /p, t, m, n, l, j/ (Watkins 1984). The syllable may be schematized as (C)V(C). Thus, depending on the boundaries of syllabification, VCV sequences may be ambiguous in terms of syllabification. For example, a CVCV sequence may be syllabified as CV.CV as in the noun [mà:.jį́] ‘woman’ or as CVC.V as in the verb [bàt.ɔ̂m] ‘You make it’. This ambiguity forms the crucial test for syllabification domains in Kiowa, which will be discussed in detail in §5.1.1.

2.1.3 Tone

Pitch is contrastive in Kiowa (high, low, and falling). High tone (H) is marked with acute accent (e.g. á), low tone (L) is marked with a grave accent (e.g. à), and falling tone (HL) is marked with a circumflex (e.g. â). Only H and L are permitted on short vowels, while all three tones are permitted on long vowels or VC sequences when C is from the set /m, n, l, j/ (Watkins 1984). A minimal triplet is provided below in (1).

(1) H-L-F Minimal Triplet
t^hɔ́ː ‘hunger’
t^hɔ̀ː ‘sit, seat’
t^hɔ̂ː ‘beyond’

Tones are modified through morphologically-conditioned (e.g. compound raising and lexically-specified tone lowering morphemes) and phonologically-conditioned processes (tone lowering). The present analysis focuses entirely on phonological tone lowering, as it is not restricted to specific morphemes or morphological structures. Interested readers are directed to Watkins (1984)’s discussion of morphologically-conditioned tone processes.

2.1.4 The verb complex

This subsection introduces previous accounts of the Kiowa verb and relevant morphophonological and syntactic information for the present analysis. This information, in particular, is expanded upon and updated in Sections 3-5 within the present methodology. A linear organization of the verb complex in Kiowa is provided in 2, which combines Watkins’ Watkins (1984) and McKenzie’s McKenzie (2012) analyses. Watkins refers to the extensive verb as the most complex word class in Kiowa.[1] With up to ten slots, the verb can form an independent clause through inflection, agreement, and the incorporation of verbs, nouns, and adverbs.

(2) PRONOM - (ADV) - (N) - (V) - STEM - ASP - (NEG) - (MOD) - (HSY) - (SYNT)

Only three elements above are obligatory: a pronominal (PRONOM), the stem (STEM), and a suffix indicating aspect (ASP), which is sometimes pronounced (e.g. imperfective /-mà/), sometimes phonetically null (e.g. perfective /-∅/), and sometimes collapsed with the STEM via stem allomorphy or alternations (e.g. adding

[1]Note that Watkins does not refer to any diagnostics for wordhood and is likely referring to traditional lexical categories and what could be considered an X^0.

falling tone to indicate the imperative). Therefore, a verb complex in Kiowa may be very short as in (3) or extremely long as in (4).

(3)

hɔ́n	*∅-*	*tʰép*	*-∅*
NEG	[3SG]-	go.out	-PFV
	PRONOM-	STEM	-ASP

‘He didn’t go out.’ (Miller 2018: 44)

(4)

àn	*à-*	*bô:-*	*pòlà:jì-*	*ẹ̀:-*	*bàn*	*-mà*
HAB	[1SG]-	always-	rabbit-	hunt-	go	-IPFV
	PRONOM-	ADV-	N-	V-	STEM	-ASP

‘I am always going rabbit hunting.’ (Miller 2018: 44)[2]

Historically, the pronominal is a complex morphological element (Merrifield 1959, Watkins 1984, 1993, Adger & Harbour 2007, Miller in prep). Previous research traditionally calls the pronominal a “pronominal prefix”, but this is modified here as “prefix” is a misnomer. Watkins (1984) argues that the pronominal was composed of a tightly knit cluster of morphemes, which indicate the semantic role of the primary animate participant (agent or patient), that participant’s person and number, and the number of any third person object. Each piece of information is encoded as a sub-syllabic segment (C or V) or tone (H or L) in the form CV́VC or CV̀VC. The semantic interpretations of each segmental slot and tone are provided in (5).

(5)

C	-V	-V	-C	(L/H)
Person	-Person No.	-Object	-Object No.	(Agent/Patient)

For example, consider the pronominal in (6) below. Watkins glosses pronominals as bracketed strings containing primary role information (Agent, Patient, Object) like [A:P:OBJ], so the pronominal below is glossed as [(X/A):2PL/P:PL/OBJ]. In this case, there is an implied agent of unspecified person, a second person plural patient is the primary participant, and there is a plural object. Implied agents are not marked explicitly, so the segmental and tonal information comes from the Patient and the Object. Because the patient is second person, the first morpheme slot for Person is filled with /b/. The second slot for Person Number is then filled with /ɔ/, since the patient is plural.[3] The third slot for Object is filled

[2] The verb stem is incorrectly transcribed as [bá:] in Miller 2018. This is corrected here.

[3] /ia/ actually indicates that the number of the patient is non-dual, non-inverse, and non-singular (Watkins 1984: 118). I have abbreviated this as ‘plural’ here for clarity.

with /ia/, since the object is plural. The last morpheme slot is then filled with /d/, since a plural object is non-singular. Finally, the pronominal is marked with a high tone, since the primary animate participant is a patient.[4] The analysis is complex and abstract, but it is the best analysis of the patterns observed in Kiowa pronominals to date.

(6) b -ɔ́ -ia -d
2 -PL -PL -NONSG

Each slot is then subject to a series of phonological processes yielding a surface form that can be quite different from the underlying form. All but one process (nasalization) are productive and seen outside of pronominals in Kiowa.[5] As seen below, the underlying form is subject to four processes: Vowel Truncation, Glide Formation, Glide Deletion, and Final Devoicing.

(7) [(X/A):2PL/P:PL/OBJ] (Watkins 1984: 41—42)

/b-ɔ́-ia-d/	
biád	Vowel Truncation
bjád	Glide Formation
bád	Glide Deletion
bát	Final Devoicing
[bát]	

This decomposition is not active synchronically. Speakers are not aware of meaningful segmental morphemes, and they instead focus on the complex meanings of the pronominals. Therefore, I treat them as single elements in the present analysis.

The verb stem may consist of a simple root or a root combined with derivational or inflectional endings resulting in several different kinds of stems, including derived transitives, intransitives, and thematic stems (Watkins 1984). The verb obligatorily marks Aspect (e.g. perfective vs. imperfective) via suffixation (e.g. /-má/ 'imperfective'), stem allomorphy (e.g. imperfective stems are marked by final -n, -l, or a falling tone on the root vowel), zero allomorphs (e.g. perfective stems are sometimes marked by -∅), or a combination of the three. All other verb endings are optional but must occur in the order Aspect - Negative - Modality - Hearsay. The two modality suffixes (imperative and future) may co-occur in that

[4] Interested readers are directed to Watkins (1984) and to Miller (in prep) for a discussion of the pronominal prefixes and all of the possibilities for each of the slots.

[5] Watkins (1984) argues that the nasalization process may have been more widespread historically. Interested readers are directed to her discussion beginning on page 48.

order when modifying an imperfective stem.[6] Consider the Stem /bá:/ 'go' in (8). In (8a), the stem is inflected as perfective. Because the root ends in a long vowel, a zero allomorph attaches, and the stem appears unchanged. When imperfective in (8b), the stem ends in [n] and the suffix *-má*. In (8c)-(8e), all suffixes attach to the perfective stem from (8a).

(8) Inflections of /bá:/ 'go'

a. Stem-Aspect (Perfective)
bá: -∅
go -PFV
'went'

b. Stem-Aspect (Imperfective)
bán -mà
go -IPFV
'went'

c. Stem-Aspect-Negative
bá: -mɔ̂
go.PFV -NEG
'not go'

d. Stem-Aspect-Negative-Modality
bá: -mɔ̂: -t'ɔ̀:
go.PFV -NEG -FUT
'will not go'

e. Stem-Aspect-Negative-Modality-Hearsay
bá: -mɔ̂ -t'ɔ̀: -dê:
go.PFV -NEG -FUT -HSY
'will not go (it was said)'

Preceding the stem but following the pronominal are optionally incorporated adverbs, nouns, and verbs (9). Incorporated stems are bare (without suffixes) and are typically phonologically identical to their inflected perfective stems.[7]

[6]The negative suffix only adds to perfective stems. Additionally, of modality suffixes (imperative and future), only future may co-occur with the other suffixes in this string unless the imperative and future co-occur together (Watkins 1984).

[7]A notable exception to this is that incorporated verbs beginning in an underlying voiced obstruent or /h/ demonstrate a stem-initial ablaut rule. Interested readers are directed to Watkins (1984: 60) for a discussion of this process.

(9) Incorporated Elements (Miller 2018: 46—47)

a. Adverb

à- *kɔ̀ét-* *bá:*
[1sg]- fearfully- go.pfv
'I fearfully went.'

b. Verb

à- *dę̀:-* *hê:m* *-à*
[1sg]- sleep- die -ipfv
'I'm sleepy/I'm about to sleep.'

c. Noun

bé- *t͡sát-* *hę̀:dè*
[2sg/a:inv/obj]- door- remove.ipfv
'Open the door.'

Finally, syntactic markers indicate clausal relationships such as relative clauses, subordinating conjunctions, and switch-reference markers (Watkins 1984).[8] A complete list of Kiowa's syntactic markers is provided in (10), and (11) shows the nominal basic suffix /-dè/ used in the relativization of the first verb complex referring back to the noun [kút] 'book'.

(10) Syntactic Markers (Watkins 1984: 230–244)

Nominal	/-dè/	'basic'
	/-gɔ̀/	'inverse'
Locative	/-èm/	'here/away'
	/-òj/	'at/generally'
	/-ę̀/	'here'
Switch-Reference	/-gɔ̀/	'and/same'
	/-nɔ̀/	'and/different'
	/-t͡sè/	'when, if/same'
	/-ę̀/	'when, if/different'
	/-k'ɔ̀t/	'yet, anyway/same'
	/-ɔ̀t/	'yet, anyway/different'
Other	/-àl/	'although, even though'
	/-dò/	'because'

[8]Watkins (1984) calls these "syntactic suffixes", but this is only true of the locatives. All others are clitics. Thus, I have chosen the more neutral term "syntactic markers" here.

(11) *kút gjá- tót -dè ją́-*
book [(1SG/A):2,3SG/P:SG/OBJ]- send.PFV -NOM [(2,3SG/A):1SG/P:PL/OBJ]-
ǫ́:
give.IMP
'Give me the book that was sent.' (Miller 2018: 47)

2.1.5 Relevant syntax

Kiowa demonstrates a basic SOV word order (e.g. Watkins 1984, 1990, Harbour 2003, Adger & Harbour 2007, Adger et al. 2009, McKenzie 2012) as seen in (12), though it is subject to change due to discourse factors. For example, topics may be left-dislocated and given nouns may be right-dislocated after the verb. When two objects are present, the indirect object precedes the direct object. Kiowa is also a pro-drop language, and any argument can be left out. In fact, most Kiowa sentences consist only of a verb and its pronominal.

(12) *t͡ségùn sà:né ∅- hân*
dog snake [3SG/A:SG/OBJ]- eat.PFV
'The dog ate the snake.' (Miller 2018: 48)

Determiner Phrases consist of Quantifier - Demonstrative - Noun. Demonstratives are the only overt determiners in Kiowa (13). There are no adjectives in Kiowa. Instead, adjectival modification occurs through compounds (14) or relative clauses (recall 11).

(13) *té: új -gɔ̀ t͡sę̂: -gɔ̀*
all that -INV horse -INV
'All those horses' (adapted from McKenzie 2012: 35)

(14) *k'ją́:hį̂: + ét*
man + be.big
'big man' (Miller 2018: 48)

Relative clauses are head-internal and marked with a clause-final nominalizer that agrees in number with the head noun (/-dè/ or /-gɔ̀/). They are optionally preceded by a subordinating particle /ɔ́gɔ̀/ to provide clarity as in (15), and the relative anaphoric particle /ám/ is used when the relativized noun has been mentioned previously or the speaker assumes the addressee has it in mind (16). When both particles co-occur, the subordinating particle precedes the anaphoric particle.

(15) *{ɔ́gɔ̀ sôl bàt- tá:- ə̨̀:m -è -dè} gjà- ból- dɔ̀:*
{SUB onion [2SG/A:PL/OBJ]- cook- do -PFV -NOM/BAS} [PL]- rotten- be
'The onions that you cooked are rotten.' (Watkins 1984: 231)

(16) *{ɔ́gɔ̀ ám kút bàt- hɔ́: -gjà -dè}*
{SUB ANPH book [2SG/A:PL/OBJ]- get -PFV -NOM/BAS}
ją́- ɔ̨́:
[(2,3SG/A):1SG/P:PL/OBJ]- give.IPFV
'Give me that book that you bought.' (Watkins 1984: 231)

McKenzie (2012) shows that relative clauses are embedded using scope facts and center-embedding, which I also assume here. In a neutral order, relative clauses occur in place of the relativized noun. In questions, the relative clauses are left-dislocated (17). To indicate new information or contrast, the head itself can be left-dislocated from the relative clause as in (18). Finally, like overt DPs, the relative clause can also be right-dislocated to indicate that it is old information.

(17) *{ɔ́gɔ̀ k'ją́:hį̂: ∅- pɔ̨́:- t͡sán -dè} hɔ́ Lawton-gù ∅- bá:*
SUB man [3SG]- see- arrive.PFV -NOM Q Lawton-to [3/SG]- go.PFV
'Did the man who came to see you go to Lawton?' (Watkins 1984: 212)

(18) *Gene ∅- tɔ̨́: -tɔ́: tógúl {ɔ́gɔ̀ t͡ségùn*
Gene [3SG/A:SG/OBJ]- talk.to -IPFV boy {SUB dog
à- p'ɔ̂j -dè}.
[(2,3SG/A):3SG/P:SG/OBJ]- lose.PFV -NOM/BAS
'Gene is talking to the boy who lost his dog.' (Watkins 1984: 234)

Questions use a sentence-initial yes/no question particle [hɔ̀] as in (19). Wh-words are obligatorily fronted as in (20).

(19) *á- jój -gɔ̀ hɔ̀ bèt- kɔ́j- tɔ̨̀- hájgjá- dɔ́:*
your- child.INV -INV Q [2PL/A:PL/OBJ]- Kiowa- speak- know- be
'Do your children speak Kiowa?' (Miller 2018: 48)

(20) *hɔ̂ndé ∅- dɔ́:*
what [3SG]- be
'What is it?' (Miller 2018: 48)

2.2 Data presentation and sources

All data presented in this chapter comes from previously published sources on Kiowa or my own fieldwork on the language in 2016 and 2019. It is provided in the International Phonetic Alphabet (IPA) rather than a Kiowa orthographic system. There is no standard Kiowa orthography, though there are four systems currently in use: the Original Parker McKenzie system (OPM), two Modified McKenzie systems (MMB uses a bracket notation and MMS uses a strike-through notation), and the Gonzales Phonic System (GPS).[9]

Parker McKenzie was a Kiowa leader and linguist who devoted the majority of his life to the study of the language and the development of an orthographic system. The system is a phonetic transcription system, aiming for a one-to-one relationship between symbols and sounds much like the IPA. The system is summarized and published in McKenzie & Meadows (2001). It is praised for its phonetic accuracy in Watkins & Harbour (2010). The system has also been used extensively in various works on Kiowa (Palmer Jr. 2003, Meadows 2010, McKenzie 2010, 2012, 2015, Sutton 2014: e.g.). Though the most popular orthography amongst language learners (e.g. at University of Oklahoma) and linguists for its marking of vowel length, nasality, and tone, older native speakers tend to find it difficult to understand. Language learners also struggle with how non-English sounds are transcribed, and it is difficult to use his diacritic system on a computer without complex unicode combinations or using typesetting systems like LaTeX.

Alecia Gonzales, a Kiowa speech language pathologist, used much of Parker McKenzie's work as a guide when creating a more user-friendly orthography for pedagogical purposes (Gonzales 2001). The GPS is a transphonic system, and it is decidedly closer to English orthography. It bypasses marking tone entirely, while marking nasalization and non-English sounds with a series of digraphs and trigraphs. It is also largely written in monosyllabic or monomorphemic chunks. Though it is successfully used in the classroom, it can be confusing without certain phonemic properties listed and is not well-suited to linguistic study. Neely & Palmer Jr. (2009) offer a comparison between the GPS and OPM systems, as well as examining the larger context of language ideologies.

The final two systems are closely related to the OPM system. The Modified McKenzie Bracket and Modified McKenzie Strike-through systems update OPM to include more intuitive symbols. The MMS was largely created at University of Oklahoma by Kiowa teachers and activists involved in language classes, and it

[9] Another system of note is the Summer Institute of Linguistics (SIL) system used to publish Kiowa hymns (Gibson et al. 1962; reprinted as sleeve notes in Kotay 2005), which is still well-liked.

is the orthography used in the Kiowa Student Language Glossary (Poolaw n.d.). The MMB was adapted by the Kiowa Language & Culture Revitalization Program in an effort to turn the MMS into a more "texting-friendly" system that does not require any special or conditional formatting like a strike-through. They almost exclusively use the MMB system now in their language materials.

A side-by-side comparison of all four systems are presented in Table 3 alongside the IPA.

Table 3: Kiowa orthography comparison. The translation between systems is my own.

	'come here'	'one'	'man'
IPA	èm-ą́:	pá:gɔ̀	k'ją́:hį̂:
OPM	èm á̱	fá̱gàu	q̱á̱hî̱
MMB	èm á:]n	]bá:gàu	k'já:]nhî:]n
MMS	èm á:~~n~~	~~b~~á:gàu	k'já:~~n~~hî:~~n~~
GPS	aim ahn	pbah gaw	kxai-hehn

It is worth noting that the use of spaces to connote word boundaries varies widely between speakers of Kiowa. Using GPS, most spaces occur between monosyllables or simple morphemes. Dashes are sometimes used, though, this seems to be dependent on who is writing. Most language learners use OPM or one of the Modified McKenzie systems. Though word boundaries in those systems are considered to be more along the lines of what a linguist would assume (grouping bound morphemes together into complexes), language learners often default to spaces between syllables at first. This is likely due to language learners not yet understanding the meanings associated with each morpheme. Instead, they focus on individual syllables at a time. In my experience, native speakers who use an orthography can agree on the meaning of individual morphemes but vary in identifying where words are. This is particularly interesting for this chapter, as it raises questions about the psychological reality of any wordhood candidates for native speakers and language learners alike.

3 Planar structure

For this analysis, I adopt the Planar-Fractal Method first introduced in Tallman 2021. All morphological and syntactic information is flattened and presented as a planar structure to eliminate as many a priori assumptions about structural relationships or constituency as possible.[10] Planar structures include elements, positions, slots, and zones.

(21) Planar Structure Properties (Tallman 2021: 10–11)

a. **Element**: A formative, morpheme, affix, clitic, root, stem, phrase, clitic, or compound. Or more generally any simplex element or definable subspan of the planar structure. An element can refer to a whole paradigm of categories (e.g. associated motion) or a single morpheme (e.g. *=yó* 'completive') which may not enter into paradigmatic relations.

b. **Position**: Planar structures are made up of positions. Each position in a template has a number that is used to account for relative ordering of its elements within the planar structure. Each position is either a slot or a zone.

c. **Zone**: A type of position where more than one element can occur, and the elements are not constrained with respect to their ordering. For example, a zone with the elements a, b can output five possible strings: ∅, ab, ba, a or b.

d. **Slot**: A type of position where only one element can occur at a time. If elements are listed as potentially occupying a slot, they are mutually exclusive. For example, a slot with elements a, b can output three possible strings: ∅, a or b.

The Kiowa verbal planar structure is presented in Table 4. The structure expands upon the brief explanation of the Kiowa verb and syntactic information of the larger clause in 2.1. As mentioned before, the only required elements in a clause are the pronominal (Position 25), the verb stem (simple or derived in Position 29), and some Aspectual marking (Position 30 when a suffix). Note that overt DPs are included in their neutral pre-verbal position, but arguments are encoded via the pronominal.

Discontinuity is common in Kiowa. I have attempted to account for it as much as possible by indicating all places in the planar structure where certain elements may appear. As mentioned earlier, overt DPs and relative clauses may be right-dislocated due to new/old information or to avoid clashes with similar words. Relative clauses may also left-dislocate in questions, which is indicated in Position (1). These positions are included in the planar structure, but do not affect

[10] Interested readers are directed to Tallman 2021 for an in depth discussion of the motivation behind the Planar-Fractal Method. Such a discussion is beyond the purview of the present chapter.

Table 4: Kiowa verbal planar structure

Pos.	Type	Elements	Forms
(1)	Slot	Left-Dislocated RC	
(2)	Slot	Question Particles/WH Words	*hɔ́, hâ:têl, hɔ̂ndé, etc.*
(3)	Slot	Clause Introducers	*hétɔ́, hègɔ́*
(4)	Zone	Modal Particles	*pàhį́:, bèthêndè, mɔ́n, etc.*
(5)	Zone	Tense/Aspect Particles	*sɔ́t, mîn, àn, etc.*
(6)	Slot	Adverbs (place, manner, time)	
(7)	Slot	Noun-Locative Adverbials	
(8)	Zone	Modal Particles	*pàhį́:, bèthêndè, mɔ́n, etc.*
(9)	Zone	Tense/Aspect Particles	*sɔ́t, mîn, àn, etc.*
(10)	Slot	Negation	*hɔ́n, pòj, hę́:*
(11)	Zone	Modal Particles	*pàhį́:, bèthêndè, mɔ́n, etc.*
(12)	Zone	Tense/Aspect Particles	*sɔ́t, mîn, àn, etc.*
(13)	Slot	DP {A, S} or RC	
(14)	Slot	Noun-Locative Adverbials	
(15)	Zone	Modal Particles	*pàhį́:, bèthêndè, mɔ́n, etc.*
(16)	Zone	Tense/Aspect Particles	*sɔ́t, mîn, àn, etc.*
(17)	Slot	DP {P, i.o.} or RC	
(18)	Slot	Noun-Locative Adverbials	
(19)	Zone	Modal Particles	*pàhį́:, bèthêndè, mɔ́n, etc.*
(20)	Zone	Tense/Aspect Particles	*sɔ́t, mîn, àn, etc.*
(21)	Slot	DP {d.o.} or RC	
(22)	Slot	Noun-Locative Adverbials	
(23)	Zone	Modal Particles	*pàhį́:, bèthêndè, mɔ́n, etc.*
(24)	Zone	Tense/Aspect Particles	*sɔ́t, mîn, àn, etc.*
(25)	Slot	Pronominal	
(26)	Slot	Incorp. Adverb	
(27)	Slot	Incorp. Noun	
(28)	Slot	Incorp. Verb	
(29)	Slot	Verb Stem (Root-Deriv)	
(30)	Slot	Aspect Suffix	*-mɔ̀, -gù, -(m)ià*
(31)	Slot	Negative Suffix	*-ɔ̂: allomorphs*
(32)	Zone	Modality Suffix	*-tɔ́:, -t'ɔ́:, -î*
(33)	Slot	Hearsay Suffix	*-hêl, etc. allomorphs*
(34)	Slot	Nominalizer/Relativizer Suffix	*-dè, -gɔ̀, -nɔ̀, etc.*
(35)	Slot	Locative/Directional Suffix	*-èm, -òj, ę̀:*, etc.
(36)	Slot	Subordinate Markers	*switch-reference markers, etc.*
(37)	Slot	Adverbs (place, manner, time)	
(38)	Slot	Noun-Locative Adverbials	
(39)	Slot	Right-Dislocated DP or RC	

any diagnostics and therefore will not be discussed much further. Finally, the subordinating and anaphoric particles in relative clauses mentioned in §2.1.5 are assumed as possible initial positions within any "RC" below but are not included in the overall planar structure.

Before turning to any constituency tests, let us examine each of the positions in Table 4. The remainder of this section is divided into the following subsections: Clause-Initial Elements (3.1), Adverbials and Negation (3.2), Modal and Tense/Aspect Particles (3.3), and the Verb Complex (3.4).

3.1 Clause-initial elements

Questions are introduced with a question particle (*hɔ́*) or WH-word in Slot 2 as in (22). Questioned relative clauses are the only elements which may occur earlier in the clause, which will be discussed in §3.4.

(22) Questions

a. *hɔ́ mén- gút*
2 25- 29.30
Q [(X/A):3DU/P:PL/OBJ]- write.PFV
'Did you write to them?' (Watkins 1984: 212)

b. *hɔ̂ndé ∅- dɔ̀:*
2 25- 29
what [3SG]- be
'What is it?' (Miller 2018: 48)

Clause introducing particles (*hègɔ́* 'now, then'[11] or *hétɔ́* 'still') follow in position 3 as in (23) and (24).

(23) Clause Introducer
hègɔ́ ját dè- kò:dó- pè:tòp
3 6 25- 26- 29.30
now right.now [1SG/REFL]- very- try.IPFV
'I'm really trying right now.' (Watkins 1984: 218)

[11]The particle *hègɔ́* is commonly used as a filler word in Kiowa. It is also often truncated or reduced, sometimes only pronounced as [g] (Andrew Robert McKenzie, p.c.). For this chapter, I will focus on its non-filler use, distribution, and restrictions.

(24) Question and Clause Introducer
hɔ́ hègɔ́ gɔ́- tʰét -kjá
2 3 25- 29 -30
Q now [(1SG/A):2SG/P:INV/OBJ]- cut.open -DET/PFV
'Did you manage to get it cut open?' (Watkins 1984: 143)

3.2 Adverbials and negation

Some elements are possible in multiple positions within the clause (adverbs and noun-locative adverbials) and are included at each location they may occur. For example, adverbs are possible in pre- and post-verbal Slots 6 and 37 as in (25).

(25) a. Pre-Verbal Adverb
gį́:gɔ́: àn dé- kʰî:pòp
6 24 25- 29.30
early/morning HAB [1SG/REFL]- fly.up/IPFV
'I pop up early in the morning.' (Watkins 1984: 209)

b. Post-Verbal Adverb
jí:dè ójdè mátʰɔ̀n dɔ́- k'ɔ́:t -é kʰí:dêl
21 21 21 25- 29 -30 37
both that girl [(X/A):1PL/P:∅/OBJ]- meet -PFV yesterday
'Both those girls met us yesterday.' (Watkins 1984: 210)[12]

Noun-Locative Adverbials' neutral positions are post pre-verbal adverb (Slot 7) as in (26) or after overt Nouns (Slots 14, 18, and 22) as in (27).[13]

(26) Noun-Locative after Pre-verbal Adverb
t'á:gjàj mɔ́n-tò gjá- pʰáttɔ̀
6 7 25- 29.30
carefully hand-with [1SG/A:SG/OBJ]- smooth.IPFV
'I was carefully smoothing it with my hands.' (Watkins 1984: 210)

[12]The DP [jí:dè ójdè mátʰɔ̀n] 'both those girls' forms a single preverbal direct object DP slot 21. As DP structure is not within the scope of this chapter, I have chosen to mark each element within the DP as Slot 21. This method will be adopted throughout the rest of the chapter whenever a multi-part DP is present in the clause.

[13]Note that in (27c) the direct object - noun-locative sequence occurs within a relative clause. I have indicated the relative clause with braces.

(27) a. Noun-Locative After Overt Agent (Slot 13)
tʰàljóp *t͡sát-kjà* *ét-* *mɔ́bɔ́ttɔ̀*
13 14 25- 29.30
boy/INV door-at [3/REFL]- crowd.IPFV
'The boys were crowding at the door.' (Watkins 1984: 210)

b. Noun-Locative After Overt Patient (Slot 17)
k'ɔnkʰḭ́:-gɔ̀ *tʰǫ́:-kjà* *è-* *jî:* *-jà*
17 18 25- 29 -30
turtle-INV water-in [3INV]- disappear -IPFV
'The turtles are disappearing into the water.' (Watkins 1984: 159)

c. Noun-Locative After Overt Object (Slot 21)[14]
{k'í: *k'ɔdá:l-ɔ̂:* *∅-* *òl-* *sɔ́l* *-dè}* *gjà-*
{21 22 25- 28- 29 -36}$_{21}$ 25-
{wood wagon-on [3SG]- load- be.in -NOM/BAS} [1SG/A:SG/OBJ]-
p'éttɔ̀
29.30
take.down/IPFV
'I am unloading wood that was loaded in the wagon.'
(Watkins 1984: 230)

If two Adverbs or Noun-Locative Adverbials are present, they may co-occur in Slots 6 and 7 respectively as in (26) above. The second element tends to shift to the post-verbal Slots 37 and 38 due to discourse factors (i.e. new/old information). Noun-locatives, for example, are right-dislocated to Slot 38 in (28).

(28) Right-Dislocated Noun-Locative
kʰí:dêl *páj* *∅-* *jâj* *mɔ́sɔ́-jɔ̀*
6 21 25- 29.30 38
yesterday sun [3SG]- disappear/PFV six-at
'The sun set at six yesterday.' (Watkins 1984: 210)

Negation is marked by a pre-verbal particle (*hɔ́n* in most cases; negative imperatives are marked with *pòj* and existential negatives are marked with *hę́:*) and a negative suffix on the verb (-ɔ̂:). The negative particle occurs in Slot 10, and the negative suffix occurs in Slot 31 after the verb stem. The negative particle is typically clause-initial (29), but it is optionally preceded by Question Particles/WH-Words and/or Clause Introducers (30). In addition, adverbs and non-locatives in

[14]Note that the relative clause itself fills the direct object's Slot 21 in the matrix clause. This is indicated with a subscript outside the braces.

contrastive focus or introducing new information may occur before a negative particle (31).

(29) *hɔ́n mátʰɔ̀n ∅- t͡są́:n -ɔ̂: kʰí:dêl-gɔ̀:*
10 17 25- 29 -31 22
NEG girl [3SG]- arrive -NEG yesterday-since
'The girl hasn't come since yesterday.' (Watkins 1984: 214)

(30) Negation with Questions and Clause Introducers

a. *hɔ́ hɔ́n k'ją́:hį̂: à- bǫ́: -mɔ̂*
2 10 21 25- 29 -31
Q NEG man [2SG/A:SG/OBJ]- see -NEG
'Didn't you see the man?' (Watkins 1984: 215)

b. *hétɔ́ hɔ́n gjà- tʰáp- ɔ́m -gɔ̂:*
3 10 25- 28- 29 -31
still NEG [PL]- dry- become -NEG
'It still hasn't dried.' (Watkins 1984: 215)

(31) Preposed Adverbials and Negation
hègɔ́ kɔ́j-dɔ̀m-gjà hɔ́n mà- t͡są́:n -ɔ̂: -hèl hàótè-sàj
3 7 10 25- 29 -31 -33 37
now Kiowa-land-at NEG [2DU]- arrive -NEG -HSY several-year
'So (I hear) you haven't been in Kiowa country for several years.'
(Watkins 1984: 216)

3.3 Modal and tense/aspect particles

Modal and tense/aspect particles are the most freely ordered elements in the Kiowa clause, as they are only required to occur pre-verbally, though they do occur in the relative order with modal followed by tense/aspect particles when they co-occur.[15] There are eleven modal particles, which are listed in (32). As seen in (33), *hájáttò* translates to 'maybe' and indicates uncertainty as to whether the event will happen. While Watkins (1984) argues modal particles occur in complementary distribution, one example has been found which shows two modal particles co-occuring (34). Given this, I have indicated modal particles as a Zone, and exactly what may co-occur and in what order is left to future research.

[15] Watkins (1984) presents them as occurring in the opposite order, yet all data I have studied suggest otherwise. Therefore, I propose the order with modal particles occurring first unless future research shows otherwise.

(32) Modal Particles (Watkins 1984: 221–223)

pàhį́:	'clearly'
bèthêndè	'never, unlikely'
mɔ́n	'probably'
hájáttò	'maybe, might'
hàgjà	'maye, might'
mágjá	'was going to, might (have)'
dá	'must'
jàl	'hope'
hét	'let's, let me'
béthɔ̀:	'unknowing'
mɔ̀ɔ́jdèl	'fortunately not, if by ill fate'

(33)

hájáttò	*hɔ́n*	*ján-*	*t͡sá:-*	*ɔ́mdé*	*-t'ɔ̀:*
9	10	25-	28-	29	-32
maybe	NEG	[(1SG/A):2,3SG/P:PL/OBJ]-	go-	become	-FUT

'You might not be able to get there.' (Watkins 1984: 221)

(34)

hét	*hàgjà*	*ę̀:dè*	*kút*	*ján-*	*hájdé*	*-t'ɔ̀:*
15_1	15_2	21	21	25-	29	-32
let's	maybe	this	letter	[(1SG:A):2,3SG/P:PL/OBJ]-	learn	-FUT

'Let's see if maybe you can understand this letter.' (Watkins 1984: 222)

There are five tense/aspect particles which indicate immediate time (*sɔ́t* 'immediate/recent past', *ját* 'immediate present', *mîn* 'immediate/near future'), not-yet-achieved future events (*mí:* 'almost'), or habitual acts (*àn* 'habitual'). For example, in (35), the habitual particle *àn* indicates that the act of rabbit hunting is a repeated process.

(35)

àn	*à-*	*bô:-*	*pòlà:jì-*	*ę̀:-*	*bàn*	*-má*
24	25-	26-	27-	28-	29	-30
HAB	[1SG]-	always-	rabbit-	hunt-	go	-IPFV

'I'm always going rabbit hunting.' (Miller 2018: 44)

Just like modal particles, more than one tense/aspect particle is possible, though the first must be either *hétɔ́* 'still' or *hègɔ́* 'now, then'. The same two particles were seen earlier as clause introducers (Slot 3), and if they occur clause-initially before another tense/aspect particle it is ambiguous if they are acting as clause introducers or tense/aspect particles. They do pattern more freely as part of the tense/aspect particle zone later in the clause, though, and that is unambiguously a case of two tense/aspect particles co-occurring. Consider, for example, the following example where *hègɔ́* occurs before another tense/aspect particle indicating the continuation of an event from the past to the present as in (36).

(36) *á:*k^{h}*ḭ̀:gjà* *hègɔ́* *mîn* *gjá-* k^{h}*ḭ̂:* *-mà*
17 24_1 24_2 25- 29 -30
flowers now about.to [PL]- bloom -IPFV
'The flowers are about to bloom.' (Watkins 1984: 159)

As mentioned earlier, modal and tense/aspect particles may also co-occur and in that order. See (37) as an example.

(37) *mɔ́n* *mîn* *gɔ́-* *áttɔ̀*
4 5 25- 29.30
probably about.to [(X/A):2SG/P:∅/OBJ]- chase.IPFV
'It (a bull) is probably about to chase you.' (Watkins 1984: 221)

As they are the most freely ordered elements in the Verbal Planar Structure, the modal and tense/aspect particle zones are included in Table 4 in six possible positions prior to the verb complex. While complete data sets for each position are yet to be found (i.e. at least one modal particle, one tense/aspect particle, both a modal and tense/aspect particle), the present data are sufficient to indicate five of the six positions. The sixth position is assumed based on other patterns until data suggest otherwise. This will be discussed below.

The earliest position for both zones is after Clause Introducers (Slot 3) and before Adverbs (Slot 6) as Zones 4 and 5 as in (38) and (39) below.

(38) Modal Particle in Zone 4
hétɔ́ *mɔ́n* *ę̀:hɔ̀:* *ɔ́jhɔ̀:* *èm-* *t'ɔ́:*
3 4 6 6 25- 29.30
still probably now there [2SG]- stay
'You are probably still there now.' (Watkins 1984: 219)

(39) Tense/Aspect Particle in Zone 5
hègɔ́ *ját* *kóttè* *dè-* p^{h}*óttɔ̀*
3 5 6 25- 29.30
now right.now hard [1SG/REFL]- blow.IPFV
'I am really blowing hard.' (Watkins 1984: 218)

Both zones may also occur immediately before negation in Zones 8 and 9. For example, the modal particle *hájáttò* 'maybe' occurs in this position in (40) below.

(40) Modal Particle in Zone 8

hájáttò hɔ́n ján- t͡są́:- ɔ́mdé -t'ɔ̀:

8 10 25- 28- 29 -32

maybe NEG [(1SG/A):2,3SG/P:PL/OBJ]- go- become -FUT

'You might not be able to get there.' (Watkins 1984: 221)

The third position immediately precedes an overt Agent DP in Zones 11 and 12 as in (41) and (42).

(41) Modal Particle in Zone 11

dá-àl ám jí:dè kɔ̂l pį́:gjá gját- bɔ́:

11 13 13 21 21 25- 29.30

must-also you both some food [(X/A):1PL/P:PL/OBJ]- bring.IPFV

'You (dual) must also bring some food for us.' (Watkins 1984: 222)

(42) Tense/Aspect Particle in Zone 12

hɔ́n àn t͡sój gjà- thǫ́ -mɔ̂:

10 12 21 25- 29 -31

NEG HAB coffee [1SG/A:SG/OBJ]- drink -NEG

'I never drink coffee.' (Watkins 1984: 223)

In the fourth position, both zones (15 and 16) precede an overt Patient DP as in (43) and in (44).

(43) Modal Particle in Zone 15

béthɔ̀: ám èm- dɔ̨́ -mê:

15 17 25- 29 -33

unknowing you [2/SG]- be -HSY

'I didn't know it was you (standing behind the door).' (Watkins 1984: 223)

(44) Tense/Aspect Particle in Zone 16

àn t'ól ∅- sô: -jà

16 17 25- 29 -30

HAB snow [3SG]- descent -IPFV

'...it snows.' (adapted from Watkins 1984: 218)[16]

In the fifth position, both zones (19 and 20) precede a Direct Object DP as in (45) and (46).

[16]This clause originally appears in a subordinate clause in Watkins (1984) in the sentence 'When it gets really cold here, it snows.'

(45) Modal Particle in Zone 19
hét hàgjà ę́:dè kút ján- hájdé -t'ɔ̀
19_1 19_2 21 21 25- 29 -32
let's maybe this letter [(1SG/A):2,3SG/P:PL/OBJ]- learn -FUT
'Let's see if maybe you can understand this letter.' (Watkins 1984: 222)

(46) Tense/Aspect Particle in Zone 20
hɔ́ kôl sɔ́t kút ján- gút
2 6 20 25- 29.30
Q some just letter [(1SG/A):2SG/P:PL/OBJ]- write.PFV
'Did I recently write you a letter?'

As mentioned earlier, the sixth position for both zones (23 and 24) is assumed in the planar structure above. It is the last logically possible position for both zones prior to the verb complex (i.e. after any overt DPs and noun-locatives but before the verb complex), even though I have yet to find unambiguous evidence that either zone occurs in this location. Given clear confirmation of the other five locations within the planar structure, however, I will assume that both zones may occur in this position until data suggests otherwise.[17]

3.4 The verb complex

The verb complex, as previously discussed in §2.1, consists of a pronominal (Slot 25), the stem (Slot 29), and an aspect marker (Slot 30). Syntactic markers occur after inflections as in (2), repeated below as (47) (Watkins 1984).

(47) PRONOM - (ADV) - (N) - (V) - STEM - ASP - (NEG) - (MOD) - (HSY) - (SYNT)

These syntactic markers include nominal, locative, switch-reference, and other subordinating conjunctions (see 10 again for the full list). At closer inspection, however, it seems that it is too simplistic to treat them identically and in the same position. As expected, the nominalizing/relativizing suffix (/-dè/ 'basic' or /-gɔ̀/ 'inverse' depending on the head noun) occurs at the end of the verb complex in Slot 34 as in (48).

(48) *{pį́á:dɔ̀ è- ét -gɔ̀} dé- hɔ́: -gjà*
{21 25- 29 -34}$_{21}$ 25- 29 -30
{table.INV [3INV]- big.SG -NOM.INV} [1SG:A:INV/OBJ]- get -PFV
'I bought a big table/table that is big.' (Watkins 1984: 230)

[17]Note there is no evidence to suggest modal or tense/aspect particles can occur between a DP and a noun-locative. This is assumed not to be the case, as it is not observed in the present data.

Relative clauses may also be accompanied by locative suffixes just like the noun-locative adverbials in Slots 7, 14, 18, 22, and 38. As seen below in (49), the locative suffix /-òj/ 'at/generally' occurs immediately following the nominalizing suffix /-dé/ in Slot 34.

(49)

{hègɔ́	*mɔ́n*	*mîn*	*ę́-*	*p'ɔ́jdép*	*-dé}*
{3	4	5	25-	29	-34}$_7$
{now	probably	about.to	[(2,3sg/a):2sg/p:∅/obj]-	forget.ipfv	-nom}

-òj	*ján-*	*gút*
-7	25-	29.30
-at.generally	[(1sg/a):2sg/p:pl/obj]-	write.pfv

'You were probably about to forget me around the time I wrote you.' (Watkins 1984: 235)[18]

As with adverbials, focus and new/old information can lead to dislocation of relative clauses. In cases of contrastive focus, the contrasted relative clause moves to the left and is the first element of the clause. As seen in (50), the second person singular *ám* is left-dislocated to precede the Question Particle *hɔ́* in the second clause.

(50)

gját-	*hájgjá-*	*dɔ̀:*	*... nɔ̀*	*ám*	*hɔ́*
[(x/a):1pl/p:pl/obj]-	learn.det-	be	... and/diff	you	q
25-	28-	29	... 36	17	2

ján-	*hájgjá-*	*dɔ̀:*
[(1sg/a):2sg/p:pl/obj]-	learn.det-	be
25-	28-	29

'We know... do *you* know?' (Watkins 1984: 212)

As mentioned earlier, in questions where the questioned element is a relative clause, the full relative clause moves to the left and is the first element of the clause (17 is repeated here as 51).[19]

(51)

{ɔ́gɔ̀	*k'ją́:hį̂:*	*∅-*	*pǫ́:-*	*t͡sán*	*-dè}*	*hɔ́*	*Lawton-gù*	*∅-*	*bá:*
{sub	13	25-	28-	29.30	-34}$_{13}$	2	7	25-	29.30
{sub	man	[3sg]-	see-	arrive.pfv	-nom}	q	Lawton-to	[3/sg]-	go.pfv

'Did the man who came to see you go to Lawton?' (Watkins 1984: 212)

[18] The relative clause structure is not immediately clear in Watkins (1984)'s translation. An alternative translation is 'At the time of your probable forgetting me, I wrote you.'

[19] As mentioned earlier, the subordinating marker at the beginning is not provided a position in the planar structure. It is understood to be part of the RC, which itself fills a slot in the matrix clause.

The remaining syntactic markers are morphemes that may be used in subordination or coordination structures. There are three pairs of switch-reference markers (52) and three subordinate markers (53). Switch-reference markers in Kiowa are most often ambiguous as to whether they are being used in a subordinate or coordinate structure, but the difference does not seem to affect speaker intuitions. Watkins (1984) mentions that Kiowa linguist Parker McKenzie could not easily decide if switch-reference markers cohered to the preceding word as suffixes or clitics or if they were independent particles in the clause. She observed that he typically cliticized the switch-reference markers to the preceding word when clearly part of a subordinate clause instead of a coordinate construction (endnote 11, p. 245). McKenzie (2012, 2015) posits that switch-reference markers are pronominal heads in Kiowa, as opposed to grouping with T or C in traditional syntactic analyses. In my experience, I have found Kiowa speakers to even vary in the prosodification of switch-reference markers. Sometimes they cohere to the left, and sometimes they cohere to the following clause/pause group.

(52) Switch-Reference Markers (Watkins 1984: 236)

Same	Different	
gɔ̀	nɔ̀	'and, if' (neutral, sequential, conditional)
t͡sę̀:	ę̀:	'when, while' (simultaneous)
k'ɔ̀t	ɔ̀t	'yet, anyway' (contrary to expectation)

(53) Subordinate Morphemes

-ál	'although, even though'
né	'but'
-dò	'because' (with clause initial particle *bót*)

I will assume there is a verb-complex final position for Subordinate Markers (switch-reference and other subordinate suffixes). Research is split between a flat or compositional analysis of coordinate structures (see Wagner 2010 for an overview of the discussion). In a flat structure, the coordinating head projects to a new structure and therefore is defined by occurring outside of the clause (joining the two together with no clear head). A compositional structure is more obviously similar to subordinate constructions (a clause within a clause). Bickel (2010) argues that cross-linguistic variation blurs the line between coordination and subordination, suggesting a more continuum-like understanding of clause-linkage. For the present analysis, I remain as agnostic as possible. I adopt a flat structure and leave the coordinating switch-reference markers out of the planar structure pending future research.

4 Morphosyntactic diagnostics

This section provides an overview of the results of five morphosyntactic constituency diagnostics applied to Table 4: Free Occurrence (Minimal and Maximal), Non-interruptability (Free Simplex and Free Complex), Non-permutability (Rigid and Flexible), Subspan Repetition (Minimal and Maximal), and Ciscategorial Selection. Note that most tests are fractured into two sub-tests corresponding to different interpretations of the overarching test (cf. Tallman 2021). A contiguous subspan of planar positions is considered a candidate for wordhood if two or more diagnostics converge to identify it. Interested readers are directed to Tallman (2021) or to the introduction of this volume for more information on each test. Overall, eight subspans are identified using morphosyntactic information.

4.1 Free occurrence (25-30; 25-36)

Free Occurrence identifies a subspan of the planar structure that may be uttered as a minimal free form. That is, the subspan may form its own utterance or be a grammatical sentence-fragment answer to a question (e.g. Q: *What did the children do?* A: *Play*). This test may be fractured to two sub-tests: minimal and maximal. The Minimal Free Occurrence is the smallest subspan whose elements can be uttered as a free form. In Kiowa, the smallest possible verb complex consists of a pronominal (Positions 25), stem (Position 29), and aspectual marking (Position 30) as in (54). Incorporated elements can intervene and by definition are included in the identified subspan (Positions 25-30).

(54) *gját-* *gút* *-kjá*
25- 29 -30
[1sg/a:pl/obj]- write -pfv
'I wrote it/it was written.' (Miller 2018: 85)

Recall, however, that both the pronominal and aspectual marker can be a zero morpheme as in (55). If those were not actively present in the interpretation and agreement within the clause, one could argue it is only the verb stem itself that is required (Position 29-29). As both have semantic interpretations playing a role in the clause, and there are multiple forms of morphemes like the perfective (See §6 for further discussion), I assume that they are indeed present. Future research may suggest a better analysis, though.

(55) *∅-* *tʰép* *-∅*
25- 29 -30
[3SG]- go.out -PFV
'He went out.' (adapted from Miller 2018: 44)

The MAXIMAL FREE OCCURRENCE is the largest subspan whose elements may be uttered as a free form. Since there are additional suffixes and verb endings possible, the largest subspan that forms a minimal free form consists of the maximal verb complex. It spans from the pronominal through subordinate markers. Thus, the MINIMAL FREE OCCURRENCE in Kiowa is Positions 25-30. The MAXIMAL FREE OCCURRENCE is Positions 25-36.

4.2 Non-interruptability (29-36; 23-36)

NON-INTERRUPTABILITY identifies a subspan of the planar structure that cannot be interrupted. Again, this test may be fractured into two sub-tests: simplex and complex. NON-INTERRUPTABILITY (SIMPLEX) identifies the subspan that cannot be interrupted by any free form (e.g. any morpheme, particle, phrase, etc.). As bare stems are possible free forms, incorporated elements are ruled out. This subspan is therefore much more restricted and includes only the Verb Stem (Position 29) through the subordinate markers (Position 36).

NON-INTERRUPTABILITY (COMPLEX) identifies a subspan that cannot be interrupted by anything larger than a free form (e.g. a phrase). In Kiowa, this means examining where full DPs may occur/interrupt elements. It is also reasonable to assume Noun-Locative Adverbials form some type of adjuncted phrase themselves. Whatever that phrase is (i.e. Adverbial Phrase or a subset of DPs) is left to future research. Thus, the subspan that does not involve a full phrase intervening at any point is from the Modal and Tense/Aspect Particle zones immediately preceding the pronominal (Positions 23 and 24) through to the subordinate markers (Position 36) before any post-verbal adverbials. Thus, The NON-INTERRUPTABILITY (SIMPLEX) subspan is Positions 29-36. The NON-INTERRUPTABILITY (COMPLEX) subspan is Positions 23-36.

4.3 Non-permutability (25-31; 25-34)

NON-PERMUTABILITY identifies subspans of elements which cannot be variably ordered. This test is fractured into two sub-tests: rigid and flexible. A subspan demonstrates RIGID NON-PERMUTABILITY if its elements always occur in a fixed order with respect to one another. The majority of the verb complex is rigidly ordered in Kiowa and does not allow for any other orders from the pronominal (Position 25) to through the Hearsay suffix (Position 31). As discussed earlier, Adverbials occur in different positions to indicate differences in discourse factors like new vs. old information. Prior to the verb complex, Modal and Tense/Aspect Particles are the most freely ordered elements in the clause and thus ruled out. To the right, it is possible to reorder due to scope differences.

A subspan demonstrates Flexible Non-permutablity if its elements are rigidly ordered but may re-order with respect to one another to condition differences in scope. Relative clauses may left-dislocate and move out of the scope of Negation in Position 10. Other variable orders (e.g. adverbials) are due to non-scope discourse factors like new versus old information and are thus disregarded here. The subspan identified by this sub-test is the minimal relative clause, or the verb complex from the pronominal (Position 25) through to the nominalizer suffix (34). Thus, Rigid Non-permutability and Flexible Non-permutablity identify the subspans Positions 25-31 and Positions 25-34, respectively.

4.4 Subspan repetition (1-39)

Subspan Repetition identifies subspans of the verbal planar structure that are repeated in specific constructions (e.g. compounds, serial verbs, reduplication, coordination, subordination, etc.). In Kiowa, we may test for this in coordination and/or subordination constructions. As mentioned earlier, it is almost always ambiguous in Kiowa if a given structure is truly coordinating or subordinating (Watkins 1984). There is a difference between coordination and subordination when it comes to the placement of switch-reference markers, though, for some speakers. In a truly subordinate structure, the switch-reference marker may cliticize to the right-edge of the verb complex. Otherwise, they act as independent particles between clauses. Let us focus only on the instances where subordinate markers are attached to the complex. Specifically, consider the subordinating marker /-àl/ ‘although, even though’ which is always found verb complex-finally.

As seen below, full clauses may be repeated in the construction. In (56), negation (Position 10) and the modal particle /àn/ ‘habitual’ (in any post-negation position (i.e. Positions 11, 15, 19, or 23) are permitted. In (57) a pre-verbal adverbial is permitted in the subordinate clause (Position 6). In both cases, the second clause has been marked with braces.

(56)	*à-*	*dę̀:-*	*k’ɔ́:*	*-àl*	*{hɔ́n*	*àn*	*à-*	*dę̀:-*	*hę́:m*	*-ɔ̂:}*
	25-	28	29	-36	{10	11	25-	28-	29	-31}
	[1sg]-	sleep-	be.lying	-although	{neg	hab	[1sg]-	sleep-	die	-neg}

‘Although I lie down, I can’t fall asleep.’ (Watkins 1984: 242)

(57)

bîndè	*gjàt-*	*pɔ́:l*	*-î:*	*-t'ɔ̀:*	*-àl*	*{bòt^{h}êndè*	*à-*	*tón-*	*â:*	*-jì:*	*-t'ɔ̀:}*
6	25-	29	-30	-32	-36	{6	25-	27-	29	-30	-32}
much	[1SG/A:PL/OBJ]-	eat	-IPFV	-FUT	-although	{unlikely	[1SG]-	fat-	grow	-IPFV	-FUT}

'Even if I should eat a lot, I can't/don't get fat.' (Watkins 1984: 242)

I have yet to find an example which includes the earliest positions of the planar structure (i.e. Question Particles or Clause Introducers) in previous work or in my own corpus of Kiowa data. There is no reason, however, to think that the coordinated/subordinated clauses cannot span the entire planar structure. Unless future analysis suggests otherwise, then, I assume that the entire Kiowa verbal planar structure is the Repeated Subspan. Additionally, I have found no data showing an element can take wide-scope of a coordinated conjunct. Therefore, there is not a need to fracture this test in Kiowa at this time.

4.5 Ciscategorial selection (29-33)

Ciscategorial Selection identifies a subspan where all the elements are modifiers or dependents of a particular syntactic category (i.e. are ciscategorial). This can be fractured two ways: minimal and maximal. A subspan is Minimally Ciscategorial if all elements in the subspan are ciscategorial (only pertaining to the verb in this case). A subspan is Maximally Ciscategorial if all elements outside of this span are transcategorial (may occur with more than one category or at least in non-verbal constructions). For Kiowa, both sub-tests identify the same subspan. Since incorporated stems are bare and not restricted to verbal predicates, they are ruled out. The subspan identified is from the Verb Stem (Position 29) through the hearsay suffix (Position 33). Incorporated elements are added to modify the understanding of the verbal predicate, but they are not strictly modifiers or dependent on the verb. The same suffixes used as nominalizers to mark relative clauses are used to mark number on nouns more generally. Thus, the subspan identified by Ciscategorial Selection is Position 29-33.

5 Phonological domains

This section provides an overview of the results of the phonological domains identified in Table 4: Syllabification (Minimal and Maximal), Cluster Devoicing (Minimal and Maximal), Vowel-Truncation (Minimal and Maximal), Dental-Velar

Switch (Minimal and Maximal), Tone Lowering (Minimal and Maximal), and Pausing. As with morphosyntactic diagnostics, a contiguous subspan in Table 4 is considered a candidate for wordhood if two or more diagnostics converge to identify it. Overall, nine phonological domains are identified.

5.1 Segmental domains

Let us first consider the processes which result in changed segmental forms within a particular subspan. In Kiowa, there are seven such processes: two syllable-sensitive phenomena (Syllable-Final Devoicing and Closed Syllable Shortening), Cluster Devoicing, Glide Formation, Glide Deletion, Vowel Truncation, and the Dental-Velar Switch. In all cases, the phonological diagnostics will be fractured to form minimal and maximal subspans. A minimal subspan is that which there is positive evidence that the process in question applies. A maximal subspan is that which there is no counterevidence against the process in question applying across that subspan.

5.1.1 Syllabification and sensitive processes (29-36; 26-36)

Syllabification in Kiowa is characterized by two phonological processes: Syllable-Final Devoicing (devoicing syllable-final obstruents) and Closed-Syllable Shortening (shortening underlying long vowels in closed syllables). Miller (2018) identified the domains for syllabification within the verb complex and the larger clause. Syllabification spans the junctures between the verb stem (Position 29) and suffixes: aspect, negative, modality, and hearsay.

The data in (58) shows syllabification spanning the juncture between the verb stem /t͡sâ̰:/ 'arrive', the aspectual suffix /-n/ 'imperfective', and the imperative (modality) suffix /-ì:/. The underlying long vowel in the stem does not need to shorten because /n/ can form the onset of the syllable with the imperative suffix.

(58)	*pá:tʰà̰:-tʰɔ̀p*	*∅-*	*tʰó:gjáj*	*-t'ɔ̀:*	*-ḛ̀:*	*à-*	***t͡sâ̰:***	***-n***	***-ì:***
	7	25-	29	-32	-36	25-	29	-30	-32$_1$
	eleven-beyond	[3SG]-	pass	-FUT	-WHEN.DIFF	[1SG]-	arrive	-IPFV	-IMP
	-t'ɔ̀:								
	-32$_2$								
	-FUT								

'I'll be coming (regularly) at eleven.' (Watkins 1984: 173)

In (59), syllabification spans the juncture between the verb stem and the negative suffix. Again, the underlying long vowel of the stem need not shorten because stem-final /d/ may form the onset of the syllable with the negative suffix. Compare to the same stem when not suffixed in (60). Because syllabification must end, the underlying long vowel shortens and the final /d/ devoices and surfaces as [t].

(59) *hɔ́n* *àn* *pį́:gjá* *gjà-* ***tó:d*** ***-ɔ̂*** *(*gjà-tót-ɔ̂)*
10 11 21 25- 29 -31
NEG HAB food [3SG/A:SG/OBJ]- send -NEG
'They do not send the food.' (Miller 2018: 83)[20]

(60) *pį́gjá* *gjà-* ***tót***
21 25- 29.30
food [3SG/A:SG/OBJ]- send.PFV
'They sent the food.' (Miller 2018: 83)

Syllabification also spans the Stem-Hearsay juncture in (61) below. Just like above, the underlying long vowel surfaces unchanged and stem-final /n/ syllabifies as the onset of the syllable with the hearsay suffix /-ê/.

(61) *èm-* ***gų́:n*** ***-ê*** *(*èm-gų́n-ê)*
25- 29.30 -33
[3SG/REFL]- dance.IPFV -HSY
'I heard they were dancing.' (Miller 2018: 93)

It is impossible to determine if syllabification spans the junctures across to the nominalizer or locative suffixes in the verb complex. Because nominalizer suffixes are consonant-initial and thus have onsets (e.g. /-dè/ and /-gɔ̀/), any preceding syllable will be self-contained and thus untestable. Even though there are vowel-initial locative suffixes (e.g. /-èm/ 'here, away'), they only co-occur with a nominalized relative clause. A nominalizer suffix is always short vowel-final and thus also irrelevant for both diagnostics. Subordinate markers are the only complex-final element that *can* be tested, but I have yet to find the relevant environments to conduct the test (e.g. obstruent-final preceding morpheme before a vowel-initial subordinate marker like /-ę̀:/ 'when, different' or /-àl/ 'although'). Until there is such evidence, the subspan up to and including subordinate markers are included.

Finally, syllabification is restricted to the pronominals and blocked from spanning across the rest of the verb complex. In (62), for example, the final obstruent

[20]The stem in (59) and (60) is incorrectly transcribed as low in Miller (2018). This has been corrected here.

/d/ in the pronominal /b-ià-ia-d/ devoices to [t] rather than syllabifying as the onset of the following syllable.

(62)

bàt-	*ɔ̂m*	*(*bàd-ɔ̂m)*
25-	29.30	
[2sg/a:pl/obj]-	do.ipfv	

‘You make it.’ (Miller 2018: 82)

As for incorporated elements, Watkins includes discussions of /d/-final noun roots that devoice and also undergo Closed Syllable Shortening (e.g. /t͡sá:d/ ‘door’). I have found no evidence of any relevant alternations in my own work, though, so these are set aside. Similarly, any obstruent-final adverbs already end in a voiceless sound (e.g. /kɔ̀ét/ ‘fearfully’). Therefore, the only possible test is an incorporated verb that is consonant- or obstruent-final so that syllabification may be confirmed. I have yet to find such an example. Through other phonological diagnostics, though, we will confirm that incorporated elements form individual phonological domains.

Therefore, the Minimal Syllabification domain is Slots 29-36 (Stem to the subordinate marker). Given that there is only one possible test (an incorporated verb that is consonant- or obstruent-final), and it is left to future research to find such an example, we must conclude the Maximal Syllabification domain is Slots 26-36 (Incorporated elements through the subordinate marker). Stems tend to cross-linguistically form individual phonological words and thus are expected to form separate domains from the rest of the verb complex (see Miller 2018 and the discussion therein). Thus, I suspect future research will rule this out. Without such evidence though, I include the identified maximal subspan.

5.1.2 Cluster devoicing (29-31; 29-33)

Cluster Devoicing is an assimilation process which devoices stops after a voiceless obstruent. As seen in below, the process applies across the Stem-Aspect boundary. In (63), the initial /g/ of the perfective suffix devoices after the final [t] in ‘write.’[21]

(63)

gját-	***gút***	***-kjá*** *(*gját-gút-gjá)*
25-	29	-30
[1sg/a:pl/obj]-	write	-pfv

‘I wrote it/it was written.’ (Miller 2018: 85)

[21] The underlying form of ‘write’ is /gú:l/. It first undergoes Lateral Obstruentization (l → d) before the initial obstruent of perfective /-gjá/. Then the final /d/ devoices via Syllable-Final Devoicing thereby triggering Cluster Devoicing of the /g/ in /-gjá/.

Cluster Devoicing also applies across the Stem-Negative boundary. Watkins (1984: 177) lists the negative form for 'be lying pl.' as [kóp-kɔ̂] (cf. *k'úl* ∼ *kóp* 'be lying pl'). It is impossible to test whether the process applies across the Stem-Modality juncture, as no modality suffix begins with a voiced stop. The stative and modal hearsay form /-dê:/ provides the necessary environment to test across the Stem-Hearsay juncture (i.e. after a stative verb ending in a voiceless obstruent), but I have yet to find such an example.

There is clear evidence, however, that Cluster Devoicing is blocked from applying across the Stem-Nominalizer juncture in (64). The nominalizer suffix /-gɔ̀/ surfaces unchanged after a /t/-final verb stem. All identified locative suffixes are vowel-initial and thus irrelevant for this test. There is a potential test for subordinate markers (e.g. when /-gɔ̀/ follows a [t]). There is no such example in the current corpus, though, leaving this to future research.

(64) *{pį́:dɔ̀ è- **ét** **-gɔ̀**} dé- hɔ́: -gjá (*… è-ét-kɔ̀ …)*
{17 25- 29 -34}$_{21}$ 25- 29 -30
{table.INV [3INV]- be.big -NOM} [1SG/A:INV/OBJ]- get -PFV
'I bought a big table/table that is big.' (Watkins 1984: 230)

Cluster Devoicing does not apply prior to the stem in the verb complex. As seen in (65), the process does not apply across a pronominal's juncture. The stem /gú:l/ 'write' surfaces unchanged after [t]. Similarly, the process is blocked across an incorporated element's juncture. In (66), the final [t] of the incorporated adverb /kɔ̀ét/ 'scared' does not trigger the devoicing of /b/ in /bá:/ 'go'.

(65) ***gját-*** ***gúl*** *-tɔ̀ (*gját-kúl-tɔ̀)*
25- 29 -32
[1SG/A:PL/OBJ]- write -FUT
'I will write.' (Miller 2018: 85)

(66) *à- **kɔ̀ét-** **bá:** (*à-kɔ̀ét-pá:)*
25- 29.30
[1SG]- scared- go.PFV
'I fearfully went.' (Miller 2018: 85)

When fractured into minimal and maximal sub-tests, Cluster Devoicing identifies two subspans. The Minimal Cluster Devoicing domain is from the stem to the negative suffix (Slots 29-31). The Maximal Cluster Devoicing domain spans from the stem through the hearsay suffix where there is clear evidence that the process is blocked across to the nominalizer (Slots 29-33).

5.1.3 Vowel truncation (29-30)

In vowel hiatus, the first vowel deletes via Vowel Truncation (a vowel is considered any monophthong, diphthong, or /ia/ sequence). The process applies across the Verb Stem-Aspect juncture. In (67), the verb root forms a derived intransitive (considered together the Verb Stem here) and combines with the perfective suffix -iá. Closed-Syllable Shortening, Vowel Truncation, and Glide Formation apply and yield the surface form [tʰémgjá]. This surface form is observed in (68).[22]

(67) Derivation of /tʰê:m-gé-iá/ 'break-ITRD-PFV'

/tʰê:m-gé-iá/	
tʰémgeiá	Closed-Syllable Shortening
tʰémgiá	Vowel Truncation
tʰémgjá	Glide Formation
[tʰémgjá]	

(68)

è-	*tʰémgjá*
25-	29.30
[3SG/A:INV/OBJ]-	break.INTR.PFV

'It's broken.' (adapted from Miller 2018: 91)

Vowel Truncation does not apply, though, across any other morpheme junctures in the verbal planar structure. Instead, a gliding process (∅ → [j] / V_V) is observed across the Stem and negative, modality, and hearsay junctures. For example, a glide is inserted between vowels spanning the Stem-Negative juncture in (69). Miller (2018) first identified this gliding process. As it is restricted to these junctures and not seen elsewhere, it is excluded from the present results pending further research.

(69)

... á-	***gû:***	*-jɔ̂:*	*... (*á-gɔ̂:)*
... 25-	29	-31	...
... [3PL]-	get.well	-NEG	...

'They don't get better.' (from Watkins 1984: 216)

Since the nominalizer suffix is always consonant-initial, it is impossible to test for Vowel Truncation's application. There is clear evidence that the process is blocked from applying at the locative juncture, though. In (70), the locative suffix /-èm/ 'where' attaches to the relative clause but does not undergo Vowel Truncation when adjacent to the vowel-final nominalizer.

[22]The underlying form of the verb root is /tʰê:m/ 'break' with a falling tone, but it changes to a high tone via detransitivization.

(70) *{ɔ́:kɔ́ ∅- t^{h}ón- dɔ́: -**dé**}* ***-èm*** *à- t͡sán -gòm*
{21 25- 28 29 -34}$_{21}$ -35 25- 29 -30
{well [3sg]- dig- be -nom} -where [1sg]- arrive -distr/pfv
'I got around to places where wells had been dug.' (Watkins 1984: 180)

The process is blocked at the Stem-Subordinate marker juncture in (71). As seen below, the future and switch reference marker join together and form vowel hiatus. Vowel Truncation does not apply, and both endings surface unchanged.

(71) *gjá- t^{h}ént͡s'ò* ***tɔ̀*** ***-ę̀:*** *èm- bá:*
25- 29 -32 -36 25- 29.32
[(1sg/a):2,3sg:/p:sg/obj]- allow -fut -when.diff [2sg]- go.imp
'When I allow it, you will go.' (Miller 2018: 128)

Vowel Truncation applies within a pronominal but not across its juncture. Similarly, the process is blocked from applying across incorporated elements' junctures. Both instances can be seen in (72) below.

(72) *ę́:- ɔ́:- ǫ́:*
25- 26- 29.32
[(2,3sg/a):1sg/p:∅/obj]- temporarily- give.imp
'(You) loan it to me.' (adapted from Miller 2018)

Even when fractured, the minimal and maximal domains identify a single subspan. The Vowel Truncation domain spans from the verb stem to the aspectual marker (Slots 29-30).

5.1.4 Dental-velar switch (30-33; 26-36)

The final segmental process we will consider is the Dental-Velar Switch, an interesting process in Kiowa where dental and velar stops switch before certain front vowels (i.e. /ge/ → [de] and /di/ → [gi]). There is evidence that the process applies across the Aspect-Modality juncture and the Aspect-Hearsay juncture. In (73), the initial /d/ in the imperfective suffix switches to [g] before the imperfective [-î:] following Vowel Truncation. In (74), the /g/ in the imperfective suffix switches to [d] before the hearsay [-ê:].

(73) Derivation of /há:-dè-î:/ 'shout-ipfv-imp'
/há:-dè-î:/
há:-dî: Vowel Truncation
há:-gî: DV Switch
[há:-gî:]

(74) Derivation of /má:-dè-ê:/ 'feed-IPFV-HSY'

/má:-gè-ê:/	
má:-gê:	Vowel Truncation
má:-dê:	DV Switch
[má:-dê:]	

A combination of factors disallow testing of other morphemes and junctures. First, a phonotactic constraint bans /g/ as a coda thereby requiring that any test focus on /d/-final morphemes. Second, /i/-initial morphemes are rare in Kiowa. In order to test between the Stem-Aspect juncture, we need a /d/-final verb stem before an /i/-initial aspectual marker. No such sequence has been found in the current corpus. Additionally, there is no possible test for the negative suffix, nominalizers, or locative suffixes, as none of them begin with /i/ or /e/. While there are /e/-initial subordinate markers, it is not possible to test since there is no reason a final [g] would ever precede the subordinate marker.

Like Vowel Truncation, Dental-Velar Switch is attested within pronominals but not across their juncture. Because pronominals form their own syllabification domain, final /d/ always devoices to [t] thereby bleeding the application of Dental-Velar Switch. Additionally, there are very few /i/-initial morphemes reported in Kiowa (e.g. /îl/ 'warn,' /í:/ 'baby'). In fact, the current corpus and surveys of the literature do not include the necessary constructions to test across junctures between incorporated elements before the stem.

When fractured, the MINIMAL DENTAL-VELAR SWITCH domain identifies a subspan of the aspect, modality, and hearsay suffixes (Slots 30-33). Since there is very little that could be tested, we must say the MAXIMAL DENTAL-VELAR SWITCH domain is much larger. Though it is clear the process cannot apply from the right edge of the pronominal, there has been no counterevidence throughout the remainder of the verb complex. Thus, the domain spans from the first incorporated element through the subordinate marker (Slots 26-36).

5.2 Tone lowering (25-33; 25-36)

While there are several reported tone processes in Kiowa, most are morphologically-conditioned and thus irrelevant to the present analysis.[23] The only phonologically-conditioned tonal modification is observed in Tone Lowering (lower

[23]There is a tone raising rule found only in compounds, and there is a morphological tone lowering rule. Watkins cannot find a systematic analysis other than to lexically specify each verb root underlyingly as tone-lowering or non-tone-lowering. Interested readers are directed to Watkins (1984) for more information on these processes.

tones after a falling tone), a type of L-spreading. As seen in (75), the process is triggered by the falling tone on the pronominal and lowers the underlying high tone on both verb stems (cf. /pǫ́:/ 'look' and /ɔ́:/ 'give').[24]

(75) */kút bágî:- pǫ́:- ɔ́:/*
kút **bágî:**- **pǫ̀:**- **ɔ̀:**
21 25- 28- 29.32
book [2pl/a:(1,3sg/p):pl/obj]- look- give.imp
'(You pl.) show me the book.' (adapted from Miller 2018: 92)

The process does not occur across the verb complex's left edge, though. As seen in (76), the falling tone in /k'ją́:hį̂:/ 'man' does not lower anything in the verb complex. In fact, the same verb stem for 'look' as above appears here unchanged with its underlying high tone /pǫ́:/.

(76) */k'ją́:hį̂: ∅- pǫ́:- ą̀:/*
k'ją́:hį̂: ∅- pǫ́:- ą̀:
21 25- 28- 29.30
man [3sg]- look- come.pfv
'The man came to see (you).' (Miller 2018: 98)

An incorporated element can also trigger lowering of the remainder of the verb complex. As seen in (77), the falling tone on the incorporated noun /są̂/ 'child' lowers the incorporated verb stem and verb stem.

(77) */à- są̂- pǫ́:- ą̀:/*
à- **są̂**- **pǫ̀:**- **ą̀:**
25- 27- 28- 29.30
[1sg]- child- look- come.pfv
'I came to see the child.' (Miller 2018: 92)

Low tone spreads throughout the verb suffixes like the imperative modality suffix, the negative suffix, and the hearsay suffix. In (78), the stem's falling tone triggers the imperative suffix /-î:/ to lower. In (79), the falling tone on the incorporated noun lowers the negative suffix /-mɔ̂/. Finally, the negative suffix's falling tone triggers the hearsay suffix /-hêl/ to lower in (80).

[24]For maximal clarity, I have provided underlying forms for each example in this subsection. They are found in the first line between slashes.

(78) */hóldà bàt- ǫ̂:m -î:/*
hóldà bàt- **ǫ̂:m** **-ì:**
21 25- 29.30 -32
dress [2SG/A:PL/OBJ]- make.IPFV -IMP
'Keep on making the dress.' (adapted from Miller 2018: 92)

(79) */à- są̂- pǫ́:- ą̀: -mɔ̂:/*
à- **są̂-** **pǫ̀:-** **ą̀:** -**mɔ̀**:
25- 27- 28- 29.30 -31
[1SG]- child- look- come.PFV -NEG
'I came to see the child.' (Andrew Robert McKenzie, p.c.)

(80) */hègɔ́ kɔ́j-dɔ̀m-gjà hɔ́n mà:- t͡są̀:n -ɔ̂ -hêl háòtè-sáj/*
hègɔ́ kɔ́j-dɔ̀m-gjà hɔ́n mà:- t͡są̀:n **-ɔ̂** -**hèl** háòtè-sáj
3 7 10 25- 29 -31 -33 37
now Kiowa-land-at NEG [2DU]- arrive -NEG -HSY several-year
'You (dual) reportedly haven't been in Kiowa country for several years.' (Watkins 1984: 178)

All nominalizer suffixes and subordinate markers have an underlying low tone, so it is not possible to test for the process's application. There are occasional examples where their underlying tones change, but it is not due to Tone Lowering. Tonal modification in Kiowa is relatively understudied and other tonal processes are left to future research.

Finally, the process is blocked at the right-edge of the verb complex (e.g. an adverb or right-dislocated element) just like the left. For example, (81) two verb complexes occur next to one another. The first ends in falling tone on the negative suffix, but that does not trigger Tone Lowering across into the next verb complex.

(81) */hɔ̂ndó hɔ́n ę́:- há:d -ɔ̂ ę́:-*
hɔ̂ndó hɔ́n ę́:- há:d **-ɔ̂** **ę́:-**
2 10 25- 29 -31 25-
why/Q NEG [(2,3SG/A):1SG/P:∅/OBJ]- call.to -NEG [(2,3SG/A):1SG/P:∅/OBJ]-
bǫ́: -t͡sę̀:/
bǫ́: -t͡sę̀:
29.30 -36
see.PFV -WHEN.SAME
'Why didn't you call to me when you saw me?' (Watkins 1984: 240)

When fractured, the Minimal Tone Lowering Domain is from the pronominal through the hearsay suffix (Slots 25-33). The Maximal Tone Lowering domain continues through to the subordinate markers that cannot be tested (Slots 25-36).

5.3 Pausing (1-39)

Finally, Kiowa uses pausing to mark grammatical information between clauses much like English (e.g. to indicate a conditional statement).[25] In my fieldwork, I have found that it is a consistent diagnostic of junctures between clauses. For example, a brief pause has been indicated by the IPA pause symbol (.) in (82) below. It occurs between the first and second clause, separating the conditional statement from the rest of the sentence. Thus, the domains for grammatical pausing is the full Kiowa verbal planar structure (Positions 1-39).

(82)

ją̀n-	*pį́:-*	*ɔ̂:m*	*-ę̀:*	*(.) bàt-*
25-	27-	29.32	-36	(.) 25-
[(2,3SG/A):1SG/P:PL/OBJ]-	food-	make.IMP	-WHEN.DIFF	(.) [2SG/A:PL/OBJ]-

pô:
29.32
eat.IMP

'If I make food for you, you must eat it.' (Miller 2018: 100)

6 Deviations from biuniqueness (29-34)

The final diagnostic we will consider is Deviations from Biuniqueness. Biuniqueness is the requirement that formatives display a one-to-one relation with meaning. Kiowa deviates from biuniqueness when inflecting verb stems with aspect, negation, and when forming a relative clause (Positions 29-34). For each of the morphemes involved, there are forms that do not appear to be phonologically conditioned.

Consider, for example, the perfective suffix (Table 5), which Watkins (1984) references as the most morphologically complex of any verb inflection categories. In all cases except for intransitive stems ending in basic verb suffixes *-bé*, *-dé*, or *-gé*, the perfective has multiple forms associated with the same meaning. First,

[25] I did not test for where a speaker *could* pause within a clause. I only examined cases of clause marking and disambiguation. Where exactly speakers are comfortable including pauses not directly related to clause-marking or grammatical information is left to future work.

stems ending in /m, n, j, V:/ may either surface seemingly unchanged (a zero allomorph) or with the suffix *-é*. There is no way to predict which one surfaces. Second, /l/-final stems undergo obstruentization (/l/ → [t]) but the form may also optionally include -é. Again, there is no way to predict when this suffix surfaces and when it does not. For those stems with the basic verb suffixes, transitive stems are suffixed with -ɔ́ or -é. Intransitive stems are only suffixed with -iá(j). Finally, some vowel-final stems include no *-é* but instead end in one of series of consonants (/m, n, j, p/). This choice is not phonologically predictable. Thus, a vowel-final stem inflected for the perfective may involve a zero morpheme (i.e. no surface change), an *-é* suffix, or end with one of four consonants (/m, n, j, p/), thereby deviating from Biuniqueness clearly.

Table 5: Perfective endings (Watkins 1984: 160–164)

Stems ending in	Allomorph(s)	Examples
m, n, j, V:	∅ or -é:	t^hêm 'break.PFV' (cf. /t^hȩ̂:m/) ɔ̨́:m-é 'make-PFV' (cf. /ɔ̨́:m/)
l	t or -é	gút 'write.PFV' (cf. /gú:l/) k'ɔ́:l-é: 'bite.PFV' (cf. /k'ɔ́:l/)
-bé, -dé, -gé	-ɔ́ or -é: (TR)	hé:b-ɔ̂ 'bring in-PFV' (cf. /hé:-bé/) k'ɔ́:t-é: 'meet.PFV' (cf. /k'ɔ́:té/)
	-iá(j) (INTR)	k^hút-kjá 'get pulled off-PFV' (cf. /k^hú:l/)
V:	-C (m, n, j, p)	t^hóm 'drink.PFV' (cf. /t^hǫ́:/)

Other aspect markers show similar patterns, though not nearly as complicated. The transitive imperfective, for example, has three forms: -mɔ̀, -tɔ̀, and -gù. The first two forms could arguably be grounded in phonology. The first form -mɔ̀ occurs after /m, n, j, V:/. The second -tɔ̀ occurs after l-final obstruentization and therefore exhibits a type of stop assimliation. One could argue that /-mɔ̀/ is underlying and the default form. The third form /-gù/, however, is not predictable in any way. There is no phonological explanation for why the first consonant needs to be [g] or why the vowel is different in that form (Table 6).

The negative suffix also shows deviation from biuniqueness when attached to vowel-final stems. Though they are predictably patterned in terms of transitivity and whether or not the verb is stative/active, the only thing connecting the three endings is a falling tone. The vowels and initial consonants differ with no obvious reason (Table 7).

Table 6: Imperfective endings (Watkins 1984: 164–167)

Stems ending in	Allomorph(s)	Examples
m, n, j, V:	-mɔ̀	kʰį̂n-mɔ̀ ‘cough-IPFV’ (cf. /kʰį̂:n/)
l	-tɔ̀	ót-tɔ̀ ‘drop/fall-IPFV’ (cf. /ó:l/)
j, V: (TR)	-gù	sô:-gù ‘sew-IPFV’ (cf. /sô:/)

Table 7: Negative endings (Watkins 1984: 176–178)

Stems ending in	Allomorph(s)	Examples
m, n, l, j	-ɔ̂	tʰę́:m-ɔ̂: ‘break-NEG’ (cf. /tʰę́:m/)
V̨	-mɔ̂	ą́:-mɔ̂: ‘come-NEG’ (cf. /ą́:/)
V	-gû (TR/ACT)	kʰí:-gû: ‘carry.out-NEG’ (cf. /kʰî:/)
	-jɔ̂ (INTR/ACT)	á:-jɔ̂: ‘grow-NEG’ (cf. /á:/)
	-gɔ̂ (INTR/STAT)	dé:-gɔ̂: ‘be.standing-NEG’ (cf. /dé:/)

Finally, the nominalizing suffix – specifically the inverse suffix /-gɔ́/ – shows deviations from biuniqueness. The nominalizing suffix references the head noun in a relative clause. In Kiowa, all nouns have an inherent or implicit number when unsuffixed. They may be singular/dual or dual/plural. The inverse suffix *-gɔ́* indicates the non-inherent number. A noun that is inherently singular/dual, for example, is plural when the inverse suffix is added. A noun that is inherently dual/plural is singular when the inverse suffix is added. The inverse suffix demonstrates numerous allomorphs that are not phonologically conditioned (Table 8).

To summarize, DEVIATION FROM BIUNIQUENESS identifies the subspan from the verb stem to the nominalizer (Slots 29-34). Outside of this subspan, Kiowa is pretty consistently and transparently agglutinative and predictable.

7 Discussion

In this section, I briefly summarize the results and wordhood candidates identified by convergence of diagnostics. I then discuss the implications of these results. I focus first on the success of the Planar Fractal Method for Kiowa and then how these results are situated within the larger wordhood discussion. I conclude by outlining further questions and future directions.

Table 8: Inverse endings (Watkins 1984: 80)

Stems Ending In...	Allomorph(s)	Examples
V̨j	-mɔ́	t’ą́j/t’ą́j-mɔ̀ ‘egg’
m	-bɔ́	kóm/kǫ́:-bɔ̀ ‘friend’
n	-dɔ́	k’ɔ̂n/k’ɔ̨̂:-dɔ̀ ‘tomato’
V̀l	-dɔ́	tógúl/tógú:-dɔ́ ‘young man’
V̂l	-tɔ́	tâl/tát-tɔ̀ ‘skunk’
j	-gú	kɔ́j-/kɔ́j-gú ‘Kiowa’
i	-ój	p’í:/p’j-ój ‘female’s sister’
e	-óp	sà:né/sà:n-óp ‘snake’
elsewhere	-gɔ́	t͡sę̂:/t͡sę̂:-gɔ̀ ‘horse’

7.1 Summary

Together, morphosyntactic and phonological diagnostics converge and identify five candidates for wordhood. I have included the subspans in increasing size and which identifying diagnostics converged in (Table 9) below. Candidates 1, 2, 3, and 5 are characterized by a mix of morphosyntactic and phonological diagnostics, strengthening any proposals including them as candidates for wordhood, while Candidate 4 relies exclusively on phonological diagnostics.

Table 9: Wordhood candidates in Kiowa

Candidate	Positions	Convergence
(1) STEM-HSY	29-33	Ciscat. Select.; Cluster Devoicing (Max.)
(2) STEM-SUB	29-36	Nonint. (Simplex); Syllab (Min.)
(3) PRONOM-SUB	25-36	Free Occur. (Max.), Tone Lowering (Max.)
(4) IncorpAdv-SUB	26-36	Syllab. (Max.), D-V Switch (Max.)
(5) FULL CLAUSE	1-39	Subspan Repitition, Pausing

Candidate 1 corresponds with what most interface theories would call a phonological word (verb and inflectional suffixes). This is, in fact, one of the phonological words identified in Miller (2015, 2018, 2020). Candidate 2 adds the remainder of the verb complex to Candidate 1 (i.e. Nominalizer, Locatives, and Subordinating Markers). Though this does not correspond to a previously proposed prosodic constituent in Kiowa, it is not surprising that there may be an intermediate constituent between the phonological word and phonological phrase. Candidate 3 corresponds to the verb complex itself, which is not surprising since it is a complex V^0 and thus identified as a phonological word under some theories. In Miller (2018, 2020), however, this is identified as a phonological phrase. Candidate 4 is interesting, since it is the full verb complex without the pronominal. As it is identified by phonological criteria only, perhaps it is an artifact of the phonological separation of the pronominal clitic and the remainder of the verb. Finally, Candidate 5 consists of the entire Kiowa clause or verbal planar structure corresponding with an intonational phrase in Miller (2018, 2020).

7.2 Situating the results

In Miller 2018, I adopted a similarly structured method to the Planar-Fractal Method but focused entirely on phonological processes. Any domains that were identified by overlap (i.e. convergence of more than one process) were compared to theoretical predictions for prosodic constituents of different size. I concluded that there were three different sizes of phonological domains, and those domains correspond to the phonological word, phonological phrase, and intonational phrase. I am able to correctly predict the Kiowa domains using Tri-P Mapping (or Phase-based Prosodic Phonology) referencing cycles in the syntax to map prosodic structure (Miller 2018, 2020, Miller & Sande 2021). It is interesting that the Planar-Fractal Method 1) successfully replicated the results of this previous analysis (Candidates 1, 3, and 5 correspond to the phonological word, phrase, and intonational phrase, respectively) and 2) did so with minimal theoretical assumptions and machinery. The fact that it does so is impressive confirmation of the domains active in Kiowa and of Tri-P's analysis of the language.

These candidates correspond to prosodic constituents, though, and I hesitate to call them ”words”. If anything, I think these results suggest that the idea of the “word” is tangential to successful analysis. As mentioned earlier, it is the verb complex itself that is arguably a complex head V^0 and – by many scholars – would be called a word (see Selkirk 2011 and the discussion therein). This is not a meaningful distinction, though, without further extrapolation about the properties of this word and what that means. In this, the Planar-Fractal Method is a successful method for stripping away unnecessary assumptions and may be helpful in confirmation of theoretical proposals in the future. I would not go as far as Bickel & Zúñiga (2017) to say that a clear word definition (at least in phonology) is out of reach, though. Tri-P Mapping offers such a definition, and it is showing early success.

7.3 Remaining questions and future directions

In this section, I conclude with a list of questions to pursue in future research.

1. While previous research admits that more than one tense/aspect particle can occur, it is a novel analysis to allow modal particles to form a zone in the planar structure above. I have found only one example of two modals co-occurring, and this merits further interest. Which particles can co-occur? For both zones, is it possible for more than two to co-occur?

2. What is the difference between coordinate and subordinate structure in Kiowa, and how does that affect the prosodification of switch-reference markers?

3. What is the precise nature of the gliding process that seems to subvert Vowel Truncation?

4. What is the precise nature of the other tonal modification processes at play in the data?

5. Address the gaps in testing mentioned in the phonological analysis (i.e. those whose environments are indicated as crucial but no such example exists in the current corpus).

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Abbreviations

1	first person	MOD	modality suffix
2	second person	N	neuter
3	third person	NOM	nominative
A	agent	NONSG	non-singular
ACT	active	OBJ	object
ADV	adverbial	P	patient
ANPH	anaphoric marker	PFV	perfective
ASP	aspect suffix	PRONOM	pronominal element
BAS	basic	REFL	reflexive
DET	determiner	SAME	same referent, switch-reference
DIFF	different referent, switch-reference	STAT	stative
DISTR	distributive	STEM	stem
DU	dual	SUB	subordinator
FUT	future	SYNT	syntactic suffix
HSY	hearsay	TR	transitive
IMP	imperative	V	verb
INTR	intransitive	WHEN	when, switch-reference marker
INV	inverse		
IPFV	imperfective		
ITRD	derived intransitive	X	unspecified person

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Appendix: Complete diagnostic results

All results from the morphosyntactic and phonological constituency diagnostics throughout this analysis are summarized below:

Table 10: Diagnostic results for verbal planar structure: morphosyntactic diagnostics

	L	R	Size	Conv.	
Free Occurrence (Minimal)	25	30	6	1	The smallest possible span that can be a minimal free form
Free Occurrence (Maximal)	25	36	11	2	The largest possible span that can be a minimal free form
Non-interruptability (Simplex)	29	36	8	2	Elements in this span cannot be interrupted by any free form
Non-interruptability (Complex)	23	36	17	1	Elements in this span cannot be interrupted by anything larger than a free form
Non-permutability (Rigid)	25	31	7	1	Elements in this span cannot be permuted or variably ordered
Non-permutability (Flexible)	25	34	10	1	Elements in this span can only be permuted to change scope
Subspan Repetition	1	39	39	2	This is the smallest subspan which may be coordinated or subordinated.
Ciscategorial Selection	29	33	5	2	Elements in this span can only semantically combine with one part of speech class.

Table 11: Diagnostic results for verbal planar structure: Phonological domains

	L	R	Size	Conv.	
Syllabification (Minimal)	29	36	8	2	A span where there is positive evidence that elements of adjacent positions interact in syllabification.
Syllabification (Maximal)	26	36	11	2	The largest possible span where there is no evidence against elements of adjacent positions interact in syllabification.
Cluster Devoicing (Minimal)	29	31	3	1	A span where there is positive evidence that elements of adjacent positions interact in Cluster Devoicing.
Cluster Devoicing (Maximal)	29	33	5	2	The largest possible span where there is no evidence against the elements interacting in Cluster Devoicing.
Vowel-Truncation	29	30	2	1	The span where elements of adjacent positions interact in Vowel Truncation.
Dental-Velar Switch (Minimal)	30	33	4	1	The span where there is positive evidence that elements of adjacent positions interact in Dental-Velar Switch.
Dental-Velar Switch (Maximal)	26	36	11	2	The largest possible span where there is no evidence against the elements interacting in Dental-Velar Switch.
Tone Lowering (Minimal)	25	33	9	1	The span where there is positive evidence that elements of adjacent positions interact in Tone Lowering
Tone Lowering (Maximal)	25	36	12	2	The largest possible span where there is no evidence against the elements interacting in Tone Lowering
Pausing	1	39	39	2	The span where elements of adjacent positions interact in Pausing

Table 12: Diagnostic results for verbal planar structure: Other Diagnostics

	L	R	Size	Conv.	
Deviations from Biuniqueness	29	34	6	1	The span where forms in adjacent positions do not display a one-to-one relation with meaning, and the differences are not phonologically conditioned

Chapter 5

Constituency in Ayautla Mazatec

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This study reports the result of 30 constituency diagnostics applied to Ayautla Mazatec, a Popolocan (Otomanguean) language from Oaxaca, Mexico, following the methods laid out by Tallman (2020, 2021). This language shows a high convergence rate of morphosyntactic diagnostics, while phonological diagnostics rarely converge.

1 Introduction

This study aims at providing a comprehensive list of phonological and morphosyntactic diagnostics which define syntagmatic domains in the Ayautla Mazatec sentence with a verbal predicate, following the methods laid out by Tallman (2020, 2021). §1.1 introduces the language background, and §1.2 lays out the methodology, before examining the planar structure in Ayautla Mazatec (§2) and the constituency diagnostics (§3). §4 concludes this study.

1.1 Language background

Ayautla Mazatec (ISO 639-3: vmy; Glottocode: ayau1235) is a Lowland variety of Mazatec spoken mainly in San Bartolomé Ayautla in the northernmost part of the state of Oaxaca, Mexico, by approximately 3,000 individuals of all ages. Mazatec, along with Ngiwa (Chocholtec-Popoloca) and moribund Ixcatec, belongs to the Popolocan branch of Otomanguean linguistic family (Fernández de Miranda 1951, Gudschinsky 1958, Hamp 1958, 1960). San Martín Duraznos Mixtec (Auderset et al. 2024 [this volume]), Teotitlán del Valle Zapotec (Gutiérrez & Uchihara 2024 [this volume]) and Zenzontepec Chatino (Campbell 2024 [this volume]) are its

Shun Nakamoto. 2024. Constituency in Ayautla Mazatec. In Adam J.R. Tallman, Sandra Auderset & Hiroto Uchihara (eds.), *Constituency and convergence in the Americas*, 231–264. Berlin: Language Science Press. DOI: 10.5281/zenodo.13208548

distant relatives. Despite the genetic distance, Ayautla Mazatec shows striking similarities in its planar structures and, to some extent, the results of constituency diagnostics, with Teotitlán del Valle Zapotec and Zenzontepec Chatino. The data for this study come from my own fieldwork since 2017. Recorded textual examples from unpublished sources are indicated by a unique identifier. For the sake of illustration, however, many examples were elicited.

Phonologically, Ayautla Mazatec is a heavily tonal language—/1/ being the lowest tone and /4/ the highest—, with a boundary-sensitive phonological process of tone sandhi caused by floating /4/, transcribed as /(4)/ (Nakamoto 2020: 171–196; see also §3.12-3.14 on sandhi-related constituency diagnostics). Morphologically, inflectional exponence of person/number and aspect/mood involves extensive weak or strong suppletion of the verb roots and suppletive allomorphy of the prefixes derived from verb roots (Nakamoto 2020: 267–319). Morphosyntactically, Ayautla Mazatec is a strongly head-marking language (cf. Nichols 1986) with split intransitivity, and consistently shows the typological correlates of VO languages (cf. Dryer 2007). A root-level distinction between verbs, nouns, adjectives and positionals — mostly used as dependent components of compound verbs (cf. Cowan & Cowan 1947; Kalstrom Dolson et al. 1995: 343)—is well motivated (Nakamoto 2020: 27–63). As other Popolocan languages, Ayautla Mazatec has a relatively small number of verb roots, approximately 150 (Nakamoto 2020: 267–268; see also Pike 1948: 161; Pike 1967: 328; Krumholz et al. 1995). This paucity of verb roots is compensated by an extensive use of verb compounding and derivational prefixes that originated in verb roots.

1.2 Planar structure, constituency diagnostics and wordhood

In order to explicitly represent the linear nature of speech and to avoid *a priori* definitions of word, clitic or any other syntagmatic units of analysis, I adopt a radically flat representation of clause structure (planar structure) advocated by Tallman (2020, 2021, this volume).[1]

A planar structure is made up of **positions**, which may be a **slot** filled with an **element**—i.e. a morpheme, a compound stem, a phrase or a group of mor-

[1]For expositional reasons, however, I follow the segmentation and boundary signs used in Nakamoto (2020), where a plus sign (+) represents the compound boundary; a hyphen (-) the affix boundary; and an equal (=) the boundary of proclitics, second position clitics, enclitics and focus marker.

Spaces are written between orthographic words, which treat proclitics (with or without second position clitics) as separate words.

See §2 on proclitics, second position clitics and enclitics in Ayautla Mazatec.

phemes/stems/phrases in a paradigmatic relationship—, or a **zone**, where more than one element can occur without restrictions on their ordering.

Once the planar structure is established, language-specific **constituency tests** are mapped onto it around the **core** (root or compounded/derived stem). A constituency test is a phonological and/or morphosyntactic phenomenon which defines a syntagmatic domain, such as the domain of stress assignment, the domain of free occurrence, and so on. If a given test is ambiguous and delimits different spans according to interpretation, **test fracturing** is applied following Tallman (2021). For example, if the positive evidence and the negative evidence of a phenomenon define different domains, they are treated as two **constituency diagnostics**. Every constituency diagnostic then is well-defined, in the sense that it has a beginning position and an ending position.

According to this methodology, wordhood is not defined in accordance with some preestablished criteria (see Haspelmath 2011 for a critique on the universality of common wordhood criteria). Instead, wordhood can be understood as one of such domains on which two or more constituency diagnostics **converge**.

2 Ayautla Mazatec planar structures

In this section, first I present the planar structure of sentences with a verbal predicate (§2.1). Then I explore internally complex positions in the verbal planar structure, i.e. adverbs (§2.2) and noun complexes (§2.3), followed by a clarification about extra-clausal operations of topicalization and afterthoughts (§2.4).

Note that subordinate clauses, including relative clauses, complement clauses and adverbial clauses, will be treated in §3.6 as repeated subspans of the planar structure.

2.1 Verbal predicate

Table 1 shows the planar structure of the Ayautla Mazatec sentence with a verbal predicate, which is built around the verb root (position 19). Non-verbal predicates are outside the scope of this study (but see Nakamoto 2020: 55–57, 252).

Some constructions involve two positions. The existence of a second formative is indicated by three dots (…) after the first formative. The position for the latter is indicated in the template as “XX 2”, such as “negation + ant/post 2” of the position 13.

Morphemes that occur in certain positions are arbitrarily called “clitics”, for expositional reasons. Each class of clitics is defined as a group of bound morphemes with distributional properties in common. Morphemes in positions 6-8

Table 1: Verbal planar structure of Ayautla Mazatec

Pos.	Type	Elements	Forms
(1)	slot	connector	*ha*^{1}, *ʔba*^{1}, *ʔa*^{2}*sa*^{1}, *tu*^{1n}*ka*^{2}, etc.
(2)	zone	sentence adv., topicalization	
(3)	slot	polar Q, ‘even’, ‘only’	*tu*^{1}, *su*^{2}*ba*^{4}, *na*^{2}*se*$^{3(4)}$, *ʔa*^{2}, etc.
(4)	zone	noun complex, adverb	
(5)	slot	focus	*=*$^{3(4)}$
(6)	slot	anterior/posterior	*he*$^{2(4)}$*=*, *khe*^{24}*=(…=*^{4}*hĩ*^{4}*)*
(7)	slot	‘almost’	*me*^{2}*he*^{4}*=*
(8)	slot	negation + ant/post	*bi*^{4}*=*, *bi*^{4}*=…(*^{n}*te*^{1}*=)*, *ni*^{1}*=*
(9)	slot	temporal sequence	*=hba*^{4}, *=hba*^{4}*ni*^{23}, *=hba*^{4}*ra*^{2}, *=ra*^{2}
(10)	slot	modality, evidentiality	*=ʃu*$^{3(4)}$, *=hĩ*^{4}, *=ru*^{1}
(11)	slot	‘a little’	*=*^{1}*tɕi*^{4}
(12)	slot	past habitual, ‘always’	*=ʔĩ*$^{3(4)}$, *=*^{n}*tshɛ*^{4}
(13)	slot	negation + ant/post 2	^{n}*te*^{1}*=*
(14)	slot	adverb, pronoun (P/R)	*ʔã*^{2}, *hi*^{23}, *k*^{w}*i*^{2}, *hĩ*^{1}, *ɲã*$^{3(4)}$, *hũ*^{4}, etc.
(15)	slot	progressive	*ti*$^{2(4)}$*-*, *te*^{2}*-*, etc.
(16)	slot	aspect/mode	*b-*, *t-*, *k*^{w1}*-*, etc.
(17)	slot	associated motion	*hi*^{2}*-*, ^{n}*te*$^{2(4)}$*-*, *e*^{1}*-*, *hɛ*^{2}*ʔɛ*^{2}*-*, etc.
(18)	slot	causative, inchoative	*tsi*$^{2(4)}$*-*, *a*^{2}*-*, etc.
(19)	slot	verb root(s)	
(20)	slot	comitative	*-ko*^{13}
(21)	slot	focus	*=*$^{3(4)}$
(22)	slot	temporal sequence	*=hba*^{4}, *=hba*^{4}*ni*^{23}, *=hba*^{4}*ra*^{2}, *=ra*^{2}
(23)	slot	modality, evidentiality	*=ʃu*$^{3(4)}$, *=hĩ*^{4}, *=ru*^{1}
(24)	slot	‘a little’	*=*^{1}*tɕi*^{4}
(25)	slot	past habitual, ‘always’	*=ʔĩ*$^{3(4)}$, *=*^{n}*tshɛ*^{4}
(26)	zone	adverbial/quantifier clitics	*=h*^{n}*ku*^{23}, *=je*^{2}*he*^{2}, *=*^{n}*ka*^{2}*ɲi*$^{3(4)}$, etc.
(27)	slot	modal clitics	*=*^{4}*hĩ*^{4}, *=ɲi*^{23}, *=ni*^{4}*ɲi*^{23}
(28)	slot	pronominal clitics	*=a*^{2} ~ *=a*^{1}, *=i*, *=i*^{1}, *=a*$^{3(4)}$, *=u*^{4}, etc.
(29)	zone	noun complex, adverb	
(30)	slot	attitudinal particles	*ja*^{2}*ʔa*^{2}, *je*^{2}*he*^{2}, *tsa*^{2}*kɛ*^{24}, ^{n}*te*^{1}, etc.
(31)	zone	afterthoughts, vocative words	

and 13 are called proclitics. A group of morphemes occur in position 9–12 if any of 4 or 6-8 is occupied; if not, they occupy 22–25; these elements can be considered as Wackernagel or second position clitics (cf. Wackernagel 2020). Focus marker (position 5 or 21) is also segmented as a clitic. Morphemes in positions 26-28 are called enclitics. Inside the positions for clitics around the verb root, i.e. positions 15-18 and 20, are called affixes. Together with the clitics, "connectors" (position 1) and "attitudinal particles" (position 30) are bound morphemes too. However, given that they do not interact distributionally with the rest of the sentence, this study will pay little attention to them.

2.2 Adverbs

The adverb has the following template (Table 2). If there are "adverb 1" and "adverb 2" at the same time, they constitute only one free form. Positions 2-4, 6-8 or 11-13 are occupied if there are no other elements in the positions 4–8 of the verbal template. Note that temporal, modality/evidentiality and 'a little' clitics have a scope over the whole verbal predicate and not on the adverb.

Table 2: Planar structure for adverbs

Pos.	Type	Elements	Forms
(1)	slot	negation	*bi*^{4}*=*, *ni*^{1}*=*
(2)	slot	temporal sequence	*=hba*^{4}, *=hba*^{4}*ni*^{23}, *=hba*^{4}*ra*^{2}, *=ra*^{2}
(3)	slot	modality, evidentiality	*=ʃu*$^{3(4)}$, *=hĩ*^{4}, *=ru*^{1}
(4)	slot	'a little'	*=*^{1}*tɕi*^{4}
(5)	slot	adverb	*ʔba*^{1}*...(=*^{n}*te*^{1}*)*, *ʔba*^{1}*...(k*^{w}*ã*^{13}*)*, etc.
(6)	slot	temporal sequence	*=hba*^{4}, *=hba*^{4}*ni*^{23}, *=hba*^{4}*ra*^{2}, *=ra*^{2}
(7)	slot	modality, evidentiality	*=ʃu*$^{3(4)}$, *=hĩ*^{4}, *=ru*^{1}
(8)	slot	'a little'	*=*^{1}*tɕi*^{4}
(9)	slot	adverb 2	*=*^{n}*te*^{1}, *k*^{w}*ã*^{13}, etc.
(10)	slot	adverb type marker	*=tsa*^{2}, *=ni*^{1}, *=*^{1}
(11)	slot	temporal sequence	*=hba*^{4}, *=hba*^{4}*ni*^{23}, *=hba*^{4}*ra*^{2}, *=ra*^{2}
(12)	slot	modality, evidentiality	*=ʃu*$^{3(4)}$, *=hĩ*^{4}, *=ru*^{1}
(13)	slot	'a little'	*=*^{1}*tɕi*^{4}

2.3 Noun complex

The noun complex has the following template (Table 3). Positions 2-4, 7-9 or 16-18 of this template are occupied if there are no other elements in the positions 4–8 of the verbal template. Absolute state marker *=¹* occurs at the end of a noun complex (i) without a possessor, (ii) without a demonstrative, (iii) not in vocative function, and (iv) without a floating tone /4/ immediately before it (Nakamoto 2020: 241–250).

Table 3: Planar structure for noun complexes

Pos.	Type	Elements	Forms
(1)	slot	‘more’, ‘also’	*ⁿki²sa¹, ko¹³*
(2)	slot	temporal sequence	*=hba⁴, =hba⁴ni²³, =hba⁴ra², =ra²*
(3)	slot	modality, evidentiality	*=ʃu³⁽⁴⁾, =hĩ⁴, =ru¹*
(4)	slot	‘a little’	*=¹tɕi⁴*
(5)	slot	additive, ‘entire’	*ⁿki²-, ⁿka²-*
(6)	slot	numeral, quantifier	*hⁿku²³, ⁿkhĩ⁴*, etc.
(7)	slot	temporal sequence	*=hba⁴, =hba⁴ni²³, =hba⁴ra², =ra²*
(8)	slot	modality, evidentiality	*=ʃu³⁽⁴⁾, =hĩ⁴, =ru¹*
(9)	slot	‘a little’	*=¹tɕi⁴*
(10)	slot	noun root(s)	
(11)	slot	adjective	
(12)	slot	possesssor	*=na¹, =¹ri², =re¹, =ni¹, =na³⁽⁴⁾, =¹nu⁴*
(13)	slot	demonstrative	*=bi¹, =bju¹*
(14)	slot	relative clause	
(15)	slot	absolute state marker	*=¹*
(16)	slot	temporal sequence	*=hba⁴, =hba⁴ni²³, =hba⁴ra², =ra²*
(17)	slot	modality, evidentiality	*=ʃu³⁽⁴⁾, =hĩ⁴, =ru¹*
(18)	slot	‘a little’	*=¹tɕi⁴*

2.4 On extra-clausal operations

Within the verbal planar structure, I do not break down topicalization or left-dislocation (position 2) and afterthoughts or right-dislocation (position 31) in the planar structure, because they show no distributional interactions with the rest of the sentence. Specifically, the modality/evidentiality clitic used in the main clause appears duplicated in a topicalized constituent—as illustrated by the first instance of reported information *=ʃu*$^{3(4)}$ in (1)—or an afterthought, without altering the definition of the second position of the verbal predicate clause which begins with *su*^{2}*ba*^{4}.[2]

(1) ***'hⁿku***$^{\mathbf{23}}$***ʃu***$^{\mathbf{3}}$ ***ja***$^{\mathbf{2}}$***ni***$^{\mathbf{4}}$***'tɕa***$^{\mathbf{21}}$ *su*^{2}*'ba*^{4} *'ɕi*^{1}*re*^{13}*ʃu*^{3} *'kʷã*^{24}

	hⁿku^{23}	***=ʃu***$^{\mathbf{3(4)}}$	*ja*$^{3(4)}$*+ni*^{2}*tɕa*^{2}	*=*^{1}	*su*^{2}*ba*^{4}	*ɕi*^{1}	*=re*^{1}	*=*$^{3(4)}$
v:	2[			]	3	4[	]	5
n:	6	8	10	15	-	10	12	-
	TOP[one	=REP	tree+ocote	=ABS.ST]	only	[piece	=POSS3]	=FOC

=ʃu$^{\mathbf{3(4)}}$	*kʷ-*	*ã*^{24}
10	16	19
-	-	-
=REP	PFV-	PFV:become

‘an ocote tree reportedly fell apart into mere pieces.’ (Sánchez Díaz & Nakamoto 2020: 139, English by SN)

3 Constituency diagnostics

In this section I will describe the following 14 tests and 30 constituency diagnostics I have so far identified for Ayautla Mazatec. Tests 1-6 are treated generally as morphosyntactic tests, while tests 8-14 are phonological tests. Pause (test 7) is sometimes considered a morphosyntactic test (cf. Haspelmath 2011) and sometimes a phonological test (cf. Dixon & Aikhenvald 2002, Gerdts & Werle 2014). The syntagmatic spans identified by the diagnostic appear in parentheses. If test fracturing applies, the smaller span appears first.

1. Free occurrence, or minimum free form (19-19, 15-28)
2. Deviation from biuniqueness (15-19, 15-28)
3. Ciscategorial selection (15-19, 15-28)
4. Non-interruptability (15-28, 6-28)
5. Fixed order or non-permutability (15-20, 13-21)

[2] In interlinearized examples, the first line corresponds to the surface (or post-sandhi) form, the second line to the underlying (or pre-sandhi) form, the third to the verbal planar structure and the fourth and the fifth, if necessary, to the nominal and adverbial planar structure. The lines for planar structures are indicated with ‘v:’, ‘n:’ and ‘adv:’, respectively. The last two lines correspond to morpheme-by-morpheme gloss and free translation with a unique identifier for textual examples.

6. Subspan repetition (15-19, 15-19, 3-20, 6-28, 3-29, 2-29)
7. Pauses and fillers (15-28)
8. Stress assignment (19-20, 15-20)
9. *ɛ.j constraint (19-19, 13-25)
10. *3.(2)4 constraint (19-19, 15-21)
11. Syllable-internal segmental interactions (16-19, 16-28)
12. Disyllabic sandhi-blocking tone sequences (15-19, 15-21)
13. Obligatory sandhi (15-28)
14. Possible sandhi (15-28, 2-31)

In the following subsections, I will describe each one of these constituency tests.

3.1 Free occurrence (19-19, 15-28)

Being a minimum free form, that is, possibly constituting an utterance (and not two), has been an oft-cited criterion of wordhood (cf. Haspelmath 2011: 39). The minimal and the maximal extension of a free form in Ayautla Mazatec verbal predicates delimit different spans, thus providing two constituency diagnostics.

On the one hand, the MINIMAL MINIMUM FREE FORM consists only of the verb root (position 19) if the verb is a non-derived stative verb in third person form, such as (2).

(2) *ja$^{2'}$ʔa^{23}*
ja^{2}ʔa^{23}
v: 19
carry:3
'he has, holds, carries.'

On the other hand, MAXIMAL MINIMUM FREE FORM includes the maximal range of elements which can occur as a single free-standing form, which spans from 15 to 28, as illustrated in (3).

(3) *te^{4}'hbja^{231}*
  te^{2}- *b-* *hi^{23}* *=a^{1}*
  v: 15 16 19 28
  PROG:1- HAB- go:1 =1SG
  'I am going.'

Before position 15 for progressive prefix, position 14 is occupied by adverbs and independent pronouns which can be free-standing forms. After position 28 for pronominal enclitics, position 29 for noun complexes and/or adverb also consists of one or more free standing forms. Therefore, the maximal definition of this test is 15-28.

3.2 Deviation from biuniqueness (15-19, 15-28)

Deviation from biuniqueness (or one-to-one correspondence between form and function) has often been referred to as a characteristic of words but not phrases (cf. Haspelmath 2011: 54). Ayautla Mazatec shows many cases of non-automatic allomorphy, i.e. many-to-one correspondences between form and function (cf. Pike 1948: 132).

Specifically, progressive (position 15; Nakamoto 2020: 50–52), aspect/mode (position 16; Nakamoto 2020: 39–50, 288-306), associated motion (position 17; Nakamoto 2020: 52–53), voice (position 18; Nakamoto 2020: 29–30), verb root (position 19; Nakamoto 2020: 270–288) and bound pronouns (position 28; Nakamoto 2020: 236–239) show allomorphy not conditioned by phonology. Some allomorphies in these positions are illustrated in the following pair of examples. In (4), the progressive *ti$^{2(4)}$- ~ te^{2}-*, the andative *hi^{4}- ~ ʔi^{2}-*, the causative *tsi$^{2(4)}$k- ~ ni^{2}k-* and the verb root *i^{2}se$^{3(4)}$ ~ i^{2}se^{4}* show different allomorphs conditioned by the agent person, in addition to the habitual *b- ~ m-* conditioned phonologically as well as lexically.[3]

(4) a. *ti^{2}hbi^{4}tsi^{2}ki^{2}se^{2}'thẽ^{41}*
  ti$^{2(4)}$- *b-* *hi^{4}-* *tsi$^{2(4)}$k-* *i^{2}se$^{3(4)}$+thẽ^{1}*
  v: 15 16 17 18 19
  PROG:3- HAB- ANDT:3- CAUS:3- rise:3
  'he is going there to raise (something)'

[3]The allomorphs listed above are not at all exhaustive. See corresponding sections in Nakamoto (2020) cited above.

b. *te^{2}ʔmi^{2}ni^{2}ki^{2}se^{4}'thẽ^{13}*

	te^{2}-	*m-*	*ʔi^{2}-*	*ni^{2}k-*	*i^{2}se^{4}+thẽ^{1}*	*=i^{3}*
v:	15	16	17	18	19	28
	PROG:2-	HAB-	ANDT:2-	CAUS:2-	rise:2	=2SG

'you are going there to raise (something)'

Given the discontinuity of positions which show deviation from biuniqueness, this test can be fractured into two constituency diagnostics. The minimal interpretation of this test includes the positions 15-19, where all positions show deviation from biuniqueness (**minimal deviation from biuniqueness**). The maximal interpretation of this test includes the positions 15-28, which covers all positions outside which deviation from biuniqueness is known not to be observed (**maximal deviation from biuniqueness**).

3.3 Ciscategorial selection (15-19, 15-28)

Whether a given morpheme occurs exclusively with certain lexical categories or not has been a major criterion for distinguishing clitics from affixes (cf. Haspelmath 2011: 45). In Ayautla Mazatec verbal predicates, progressive (position 15), aspect/mode (position 16), associated motion (position 17), voice (position 18), verb roots (position 19)—root-level distinction of lexical categories is clear in this language—, adverbial/quantifier clitic (position 26) and bound pronouns (position 28) are limited to verbal predicates.[4] For example, in (5), independent pronouns *k^{w}i^{2}* 'PRONOM3' and *ʔã^{2}* 'PRONOM1SG' as well as comitative *ko^{13}* are used in non-verbal predicates.

(5) *ma^{2}'sẽ^{2} ta^{12} bi^{4} ^{n}te^{1}* ***ko^{13} 'k^{w}i^{2}*** *he$^{2(4)}$ tu^{1}* ***'ʔã^{2}***

ma^{2}sẽ^{2}	*ta^{12}*	*bi^{4}=*	*^{n}te^{1}*	*ko^{13}=*	*k^{w}i^{2}*	*he^{2}=*	*tu^{1}*	*ʔã^{2}*
half	but	NEG=	anymore	with=	PRONOM3	already=	only	PRONOM1SG

'some (lit. half) but not with them anymore, now it's only me'
(180624-002 08:56)

As with the previous test, ciscategorial selection can be interpreted in different manners. On the one hand, all elements in positions 15-19 occur exclusively in verbal predicates (**minimal ciscategorial selection**). On the other hand, no position outside 15-28 shows word-class selectivity (**maximal ciscategorial selection**).

[4]Although a similar set of bound pronouns is used to indicate the possessor of some bodypart and kinship terms, it has unpredictable differences between the one used for predicates the one used for possession. I excluded comitative (position 20) from this list, because it can be used as preposition in noun complexes.

3.4 Non-interruptability (15-28, 6-28)

Another common definition of word is that of the uninterruptible string of morphemes (cf. Haspelmath 2011: 44). However, following previous critiques (cf. Haspelmath 2011, Tallman 2021), I provide two constituency diagnostics, namely, NON-INTERRUPTIBLE BY A SINGLE FREE FORM and NON-INTERRUPTIBLE BY COMPLEX FREE FORM(S) or MORE THAN ONE FREE FORM, which give different results in Ayautla Mazatec.

The maximum span of non-interruptible elements by a single free form begins at the progressive (position 15). Immediately before it (position 14), a non-focused adverb (6a) or an emphatic pronoun in P/R function (6b)—both of which are free forms—can occur.

(6) a. *bi^{4}ʃu^{3} ʔba^{1} tsɛ̃^{2}ˈʔɛ̃^{3} kʷe^{1}ˈʔe^{4}ri^{2}*

	bi^{4}=	*=ʃu$^{3(4)}$*	*ʔba^{1}*	*tsɛ̃^{2}ʔɛ̃$^{3(4)}$*	*kʷ-*	*e^{1}ʔe^{4}*	*=ri^{2}*
v:	8	10	14[	]	16-	19	=28
adv:	-	-	5	9	-	-	-
	NEG=	=REP	[so	do:3]	POT-	POT:beat	=3/2SG

'he won't beat you like that.'

b. *bi^{4}ʃu^{3} ˈhi^{23} kʷe^{1}ˈʔe^{4}ri^{2}*

	bi^{4}=	*=ʃu$^{3(4)}$*	*hi^{23}*	*kʷ-*	*e^{1}ʔe^{4}*	*=ri^{2}*
v:	8	10	14	16-	19	=28
	NEG=	=REP	PRONOM2SG	POT-	POT:beat	=3/2SG

'he won't beat you.'

If position 14 is filled with two free forms, or complex free form, like (7a, 7b), the result is ungrammatical.

(7) a. *bi^{4}ʃu^{3} ʔba^{1} tsɛ̃^{2}ˈʔɛ̃^{3} ˈhi^{23} kʷe^{1}ˈʔe^{4}ri^{2}

	bi^{4}=	*=ʃu$^{3(4)}$*	*ʔba^{1}*	*tsɛ̃^{2}ˈʔɛ̃$^{3(4)}$*	*hi^{23}*	*kʷ-*	*e^{1}ʔe^{4}*	*=ri^{2}*
v:	8	10	14[	-]	14	16	19	28
adv:	-	-	5	9	-	-	-	-
	NEG=	=REP	[so	do:3]	PRONOM2SG	POT-	POT:beat	=3/2SG

intended: 'he won't beat you like that.'

b. *bi^{4}ʃu^{3} ˈhi^{23} ʔba^{1} tsɛ̃^{2}ˈʔɛ̃^{3} kʷe^{1}ˈʔe^{4}ri^{2}

	bi^{4}=	*=ʃu$^{3(4)}$*	*hi^{23}*	*ʔba^{1}*	*tsɛ̃^{2}ˈʔɛ̃$^{3(4)}$*	*kʷ-*	*e^{1}ʔe^{4}*	*=ri^{2}*
v:	8	10	14	14[	-]	16	19	28
adv:	-	-	-	5	9	-	-	-
	NEG=	=REP	PRONOM2SG	[so	do:3]	POT-	POT:beat	=3/2SG

intended: 'he won't beat you like that.'

On the other hand, the maximum span non-interruptible by more than one free form covers positions 6-28, delimited by two zones which may have noun complexes and adverbs (positions 4, 29), possibly filled with complex free forms.

In sum, non-interruptability by a free form spans from position 15 to position 28, while non-interruptability by more than one free forms covers positions 6-28.

3.5 Fixed order or non-permutability (15-20, 13-21)

Fixed order or non-permutability of morphemes has typically been considered characteristic within a word but not a phrase (cf. Dixon & Aikhenvald 2002: 19–20). However, the ambiguity of this test is notorious, since strict ordering of syntactic elements and variable ordering of affixes have also been reported. In this study, following the critique by Tallman (2021: §5.4), I divide the non-permutability test in two versions. One is STRICT NON-PERMUTABILITY, which entails a span of positions whose elements always occur in a fixed order. The other is NON-PERMUTABILITY WITHOUT SCOPAL DIFFERENCE, which, in addition to the previous one, includes positions with variably ordered elements, where this variable ordering corresponds to a difference in scope.

Strict non-permutability defines positions 15-20 as its span, since morphemes in these positions 15-20 in this order. Just outside progressive (position 15), there is a position for adverbs and independent pronouns (position 14). Adverbs in this position have scope over the predicate, while adverbs in position 2 have scope over the whole sentence. For that reason, some adverbs cannot occur in one of the two positions. For example, *ʔba^{1} tsɛ̃^{2}ʔɛ̃^{3}* ‘that way’ can occur in position 14 (8a) but cannot in position 2 (8b).

(8) a. *bi^{4}* ***ʔba^{1} tsɛ̃^{2}'ʔɛ̃^{3}*** *e^{2}'hɲu^{4}na^{1}*

bi^{4}=	*ʔba^{1} tsɛ̃^{2}ʔɛ̃$^{3(4)}$*	*e^{2}hɲu^{4}*	*=na^{1}*
v: 8	14	16:19	28
NEG=	that.way	PFV:deceive:3	=3/1SG

‘he didn’t deceived me that way.’

b. ***ʔba^{1} tsɛ̃^{2}'ʔɛ̃^{3}** bi^{4} e^{2}'hɲu^{4}na^{1}

ʔba^{1} tsɛ̃^{2}ʔɛ̃$^{3(4)}$	*bi^{4}=*	*e^{2}hɲu^{4}*	*=na^{1}*
v: 2	8	16:19	28
that.way	NEG=	PFV:deceive:3	=3/1SG

intended: ‘that way he didn’t deceived me.’

Just before the preverbal adverb or independent pronoun (position 14) is for the second part of the bipartite proclitic *bi^{4}…^{n}te^{1}* ‘not…anymore’ (position 13), which is exclusive to this position.[5] Therefore, 13 is included in the less strict definition of non-permutability.

After the comitative (position 20), the focus marker (position 21) can also occur in another place (position 5). This difference too corresponds to different focalized constituents. Therefore, 21 is included in the broader interpretation of non-permutability.

Outside these positions (13-21) are Wackernagel clitics (positions 9-12 and 22-25), which occur in different positions within the clause, but do not involve differences in scope. Therefore, all these positions involve permutable elements.

In sum, strict non-permutability defines 15-20 as its span, while non-permutability without scopal difference defines 13-21.

3.6 Subspan repetition (15-19, 15-19, 3-20, 6-28, 3-29, 2-29)

Some constructions specify a span of positions which can be repeated and thus can be employed as constituency tests of SUBSPAN REPETITION (cf. Tallman 2021). So far I have identified total reduplication, verbal parallelism (both at §3.6.1), grammatical nominalization with absolute state marker *=*^{1} (§3.6.2), and coordination (§3.6.3) as distinct subspan repetition constructions.

3.6.1 Total reduplication (15-19) and verbal parallelism (15-19)

The smallest subspan repetition constructions in Ayautla Mazatec are TOTAL REDUPLICATION and VERBAL PARALLELISM, which specify positions 15-19.

Total reduplication in Ayautla Mazatec, illustrated in (9) below, repeats a subspan of the verbal predicate, regardless of phonological conditions such as the syllable structure and the number of syllables. This process indicates the exhaustivity of the action expressed by the verb and therefore it is limited to dynamic verbs. In (9a), position 14 is excluded from the repeated subspan. In (9b), position 20 is excluded from the repeated subspan.

(9) a. *he*^{2} *ˈk*^{w}*i*^{2} *bo*^{2}*ʔo*^{2ˈ}*ja*^{4} *bo*^{2}*ʔo*^{2ˈ}*ja*^{4}*ʔĩ*^{3}

	he$^{2(4)}$*=*	*k*^{w}*i*^{2}	*b-*	*o*^{2}*ʔo*^{2}*+ja*^{4}	*b-*
v:	6	14	$_{\text{redup1}}$[16	19]	$_{\text{redup2}}$[16
	already=	PRONOM3	$_{\text{redup1}}$[HAB-	hit+POS:inside]	$_{\text{redup2}}$[HAB-

[5] Probably the second morpheme of this construction *^{n}te*^{1} comes from the same morpheme used as a sentence-final attitudinal particle *^{n}te*^{1} 'thus'. However, I consider this construction undecomposable, therefore I do not consider *^{n}te*^{1} as a permutable morpheme.

o^{2}ʔo^{2}+ja^{4} *=ʔĩ$^{3(4)}$*
19] 25
hit+POS:inside] =PST.HAB
'he already used to beat and beat him.'

b. *pa^{23}'la^{1} te^{2}khe^{2}'ʔ^{n}ki^{3} te^{2}khe^{2}ʔ^{n}ki^{2}'ko^{4}ʔĩ^{3}ɲa^{32}*
pa^{23}la^{1} *te^{2}-* *khe^{2}+ʔ^{n}ki^{3}* *te^{2}-* *khe^{2}+ʔ^{n}ki$^{3(4)}$*
v: 4 $_{\text{redup1}}$[15 16:19] $_{\text{redup2}}$[15 16:19]
spade $_{\text{redup1}}$[PROG- HAB:pull:1+dig] $_{\text{redup2}}$[PROG- HAB:pull:1+dig]
-ko^{13} *=ʔĩ$^{3(4)}$* *=ɲi$^{3(4)}$* *=a^{2}*
20 25 27 28
-COM =PST.HAB =ASR =1SG
'I used to be digging and digging with a spade.'

Verbal parallelism construction also repeats from progressive (position 15) to verb root (position 19). However, unlike total reduplication, each repeated subspan has a different positional root, which is part of the position 19 for verb roots. This construction expresses the distributivity of an action, therefore is only available for dynamic verbs. In (10), subspan 15-19 is repeated each followed by *+tsha$^{3(4)}$* 'sideways' and *+ni^{2}ɲa^{2}* 'quadrupedal'. Note that combinations of the positional roots show considerable flexibility, reflecting each speaker's expressivity.

(10) *'h^{n}ku^{23} ku^{1n}tu^{1}tɕu^{1}'tsĩ^{3} he^{2} ti^{2}thu^{4}'tsha^{3} ti^{2}thu^{4}ni^{2}ɲa^{2}'ko^{13}*
h^{n}ku^{23} *ku^{1n}tu^{1}tɕu^{1}tsĩ^{3}* *he$^{2(4)}$=* *ti$^{2(4)}$-*
v: 4[ ] 6 $_{\text{vpar1}}$[15
n: 6 10 - -
one bottle already= $_{\text{vpar1}}$[PROG-
thu^{4}+tsha$^{3(4)}$ *ti$^{2(4)}$-*
16:19] $_{\text{vpar2}}$[15
- -
HAB:come.out+POS:sideways] $_{\text{vpar2}}$[PROG-
thu^{4}+ni^{2}ɲa^{2} *-ko^{13}*
16:19] 20
- -
HAB:come.out+POS:quadrupedal] -COM
'he is already staggering with a bottle.'

3.6.2 Nominalization (3-20, 3-29)

Grammatical NOMINALIZATION in Ayautla Mazatec[6] targets predicates and derives noun- or adverb-like constituents which mean events, participants or circumstantial situations. Syntactically, nominalization may function as arguments or adjuncts in positions 4 or 29, in addition as the optative form in a main clause by insubordination, which is in complementary distribution to imperative (cf. Nakamoto 2020: 248, 47-50).

Within the planar structure, nominalization is indicated at two positions: (i) the complementizer/adverbial subordinator ^{n}*ka*^{2} ~ *:*^{2} or the relativizer *ɕi*^{2} ~ *:*^{2} at the beginning, and (ii) absolute state marker *=*^{1} (cf. §2.3) at the end.[7] In the example (11) below, nominalization ^{n}*ka*^{2} *tu*^{1} *tɕa*$^{2'n}$*tu*^{41} *ki*^{2}*tsi*^{2}*ka*$^{2'}$*ʔbi*^{3} $^{'}$*tõ*^{241} 'that only Antonio distributed money' begins, except for the nominalizer (subordinator here) itself, at position 3 for focus introducer *tu*^{1} 'only'.

(11) *tsa*$^{2'}$*be*^{24}*ʃu*^{3} ^{n}*tsʔja*^{32} ^{n}*ka*^{2} ***tu***$^{\mathbf{1}}$ *tɕa*$^{2'n}$*tu*^{41} *ki*^{2}*tsi*^{2}*ka*$^{2'}$*ʔbi*^{3} $^{'}$*tõ*^{241}

	tsa^{2}-	*be*^{24}	*=ʃu*$^{3(4)}$	^{n}*tsʔe*$^{3(4)}$	*=a*^{2}	^{n}*ka*^{2}	*tu*^{1}	*tɕa*$^{3(4)}$+^{n}*tu*^{4}	*=*^{1}
v:	16	19	23	29[-	-]	29[1	3	4[-	-]
n:	-	-	-	10	12	-	-	10	15
	PFV-	see:3	REP	[brother:SAP	=2SG]	SUB	only	[Antonio	=ABS.ST]

ki^{2}-	*tsi*^{2}*k*-	*a*^{2}*ʔbi*$^{3(4)}$	*tõ*^{24}	*=*^{1}
16	18	19	29[-	-]]
-	-	-	10	15
PFV-	CAUS-	be.distributed	[money	=ABS.ST]

'my brother saw that only Antonio distributed money.'

Due to the distributional ambiguity of absolute state marker, however, nominalization test is fractured into minimal and maximal interpretations, corresponding to positions 3-20 and 3-29, respectively.

MINIMAL NOMINALIZATION ends at the final position where the absolute state marker is unambiguously observed at the clause (and not the noun complex) level. For example, in (12), the nominalization ^{n}*ka*^{2} *tõ*^{241}*ʃu*^{2} *ki*^{4}*ski*^{2}*ne*^{2} 'that it ate money' ends with a verb root (position 19) followed by an absolute state marker *=*^{1}. Similarly, in (13), the nominalization ^{n}*ka*^{2} *ka*^{2}*hbi*^{2}*ko*^{13} 'when he took it' ends

[6]Abstract noun formation by *k*^{w}*ha*^{1}- also targets some verb forms in habitual (or neutral) aspect with corresponding segmental prefix. However, given its limited productivity, I do not discuss here the abstract noun formation.

[7]Nominalization with ^{n}*ka*^{2} and absolute state *=*^{1} is not exclusive to verbs; numerals can be nominalized too (Nakamoto 2020: 329–330).

with a comitative *-ko*^{13} (position 20) followed by an absolute state marker *=*^{1}. The syllable with the absolute state marker in question is emphasized in boldface.

(12) *ta*^{12} *ˈkʷi*^{2}*ʃu*^{2} *ˈkʷha*^{41} *ⁿka*^{2} *ˈtõ*^{241}*ʃu*^{2} *ki*^{4}*ski*^{2}*ˈ**ne***^{21}

	ta^{12}	*kʷi*^{2}	*=ʃu*$^{3(4)}$	*kʷha*^{1}	*ⁿka*^{2}	*tõ*^{24}	*=*^{1}	*=ʃu*$^{3(4)}$	*ki*^{2}*s-*
v:	1	-	-	-	-[1	4[-	-]	10	16
n:	-	10	-	10	10(NMLZ)[-	10	15	-	-
	but	PRONOM3	=REP	matter	[SUB	[money	=ABS.ST]	=REP	PFV-

	ki^{2}*ne*^{2}	***=*^{1}**
v:	19]	-
n:	-]	15
	eat:3]	**=ABS.ST**

‘but the matter is that it [the donkey] ate money.’ (180816-002 00:55)

(13) *ha*^{1} *ka*^{2}*ˈʔbja*^{231} *ⁿka*^{2} *ka*^{2}*hbi*^{2}*ˈ**ko***^{131}

	ha^{1}	*ka*^{2}*-*	*ʔbe*^{23}	*=a*^{1}	*ⁿka*^{2}	*ka*^{2}*b-*	*hi*^{2}	*-ko*^{13}	***=*^{1}**
v:	1	16	19	28	29[1	16	19	20	-]
n:	-	-	-	-	10(NMLZ)[-	-	-	-]	15
	well	PST-	see:1	=1SG	[[SUB	PST-	go:3	-COM]	**=ABS.ST**]

‘I saw (him) when he took it.’ (Nakamoto 2020: 249)

In contrast, absolute state marker *=*^{1} does not occur in the subsequent positions until the post-verbal noun complex (position 29). On the one hand, focus marker *=*$^{3(4)}$ (position 21) has a floating tone /4/, which blocks the occurrence of absolute state marker (Nakamoto 2020: 248–250). On the other hand, absolute state marker *=*^{1} does not cooccur with second position clitics and enclitics (positions 22-28), as illustrated by (14). The syllable on which the absolute state marker would occur is indicated in boldface.

(14) *ni*^{2}*ˈʃthĩ*^{23} *ⁿka*^{2} *kʷhe*^{1n}*ti*^{2}*ˈ**bɛ***^{4}

	ni^{2}*ʃthĩ*^{23}	*ⁿka*^{2}	*kʷ-*	*he*^{1n}*ti*^{2}*ba*^{4}	*=i*
v:	-	NMLZ[1	16	19	28]
n:	10	14[-	-	-	-]
	day	[SUB	POT-	come	=2SG]

‘the day you will come.’ (Nakamoto 2020: 245)

This cooccurrence restriction between the absolute state marker *=*^{1} and the clitics (positions 22-27) plausibly has a historical explanation. Given the broader distribution of the absolute state marker *=*^{1} in nouns, it is safe to attribute its origin to the nominal morphosyntax. Within noun complexes, however, this morpheme does not occur if the noun is possessed, while the possessor is indicated by the nearly identical dependent pronouns used in verbal predicates. I suggest that this parallelism between the nominal template and the verbal template plays a role in blocking the absolute state marker after clitics in the verbal planar structure.

Maximal nominalization includes the post-verbal noun phrase (position 29), which is the last position where the absolute state marker *=*^{1} is found. However, it is indeterminate as to whether the absolute state marker in this position is due to the nominalization, the noun phrase, or both. For example, in (15), the end of the nominalization *^{n}ka^{2} he^{2} ^{n}ti^{2}ba^{4} ɕi^{2}h^{n}ku^{231}* ‘that the other already came back’ coincides with the end of the noun phrase *ɕi^{2}h^{n}ku^{231}* ‘the other’ within it. Note that the final absolute state marker *=*^{1} is inside the inner bracket if it occurs at the noun phrase level, and outside the inner bracket if it occurs at the clause level.

(15) *ʔba^{1} ka^{2}ʔ^{n}ta^{2} bi^{4}ʃu^{3} tsa^{2}'be^{24} ^{n}ka^{2} he^{2} ^{n}ti^{2}'ba^{4} ɕi^{2}'**h^{n}ku^{231}***

	ʔba^{1}	*ka^{2}ʔ^{n}ta^{2}*	*bi^{4}=*	*=ʃu$^{3(4)}$*	*tsa^{2}-*	*be^{24}*	*^{n}ka^{2}*	*he$^{2(4)}$=*	*^{n}ti^{2}ba^{4}*
v:	1	4	8	10	16	19	29[1	6	16:19
n:	-	-	-	-	-	-	10[-	-	-
	and	even	NEG=	=REP	PFV-	know:3	[SUB	already=	PFV:come:3

ɕi^{2}h^{n}ku^{23}	*=**^{1}***
29[-	-]]
10	15]
[the.other	=**ABS.ST**]]

‘and he didn’t even notice when the other already came back.’
(Sánchez Díaz & Nakamoto 2020: 132, English by SN)

Absolute state marker *=*^{1} does not occur after the attitudinal particles (position 30), such as *ja^{2}ʔa^{2}* ‘well’ in example (16). I suggest that this is because the attitudinal particle (position 30) is found outside the nominalization.

(16) *^{n}ka^{1}tʔa^{2} tu^{1} ti^{2}ma^{4n}ka^{2}tsa^{4}'^{n}ka:^{32} tsu^{2}'ʔba^{2}ʔĩ^{2} ja^{4}**ʔa^{2}***

	^{n}ka^{1}tʔa^{2}	*tu^{1}*	*ti$^{2(4)}$-*	*m-*	*a^{2n}ka^{2}tsa^{4n}ka^{2}*	*=$^{3(4)}$*	*=:^{2}*	*tsu^{2}ʔba^{2}*
v:	1	3	15	16	19	21	29[1	16:19
	because	only	PROG-	HAB-	run:3	=FOC	[SUB	HAB:wander:3

=ʔĩ$^{3(4)}$	*ja^{2}ʔa^{2}*
25]	30
=PST.HAB]	well

‘because he only ran when he used to go around.’ (180629-002 1:02)

In sum, minimal nominalization includes positions 3-20 and maximal nominalization 3-29.

3.6.3 Coordination (6-28, 2-29)

Coordination is also fractured into minimal and maximal interpretation. Minimal coordination includes all positions which cannot be elided, or if elided, the semantic scope changes. In (17), *ʃthe*^{3} ‘garbage’ is the only omitted or optional element in the second coordinated constituent. Thus, positions 6-28 correspond to the minimal interpretation of coordination test.

(17) *tsa*$^{2'}$*ʔbja*^{231} ^{n}*ka*^{2} *he*^{2} *ki*^{4}*ka*$^{2'}$*kɛ*^{3} *ˈʃthe*^{3} *ʔba*^{1} *he*^{2} *ki*^{4}*ka*^{2}*te*$^{2'}$*tɕe*^{2}

	tsa^{2}-	*ʔbe*^{23}	=*a*^{1}	^{n}*ka*^{2}	*he*$^{2(4)}$=	*ki*^{2}*k*-	*a*^{2}*ka*$^{3(4)}$	=*i*	*ʃthe*$^{3(4)}$	*ʔba*^{1}
v:	16	19	28	1	[6	16	19	28	29]	1
	PFV-	know	=1SG	SUB	[already=	PFV-	burn:2	=2SG	garbage]	and

he$^{2(4)}$=	*ki*^{2}*k*-	*a*^{2}*te*^{2}*tɕa*^{2}	=*i*
[6	16	19	28]
[already=	PFV-	sweep:2	=2SG]

‘I know that you already burned the garbage and swept it.’

Maximal coordination, on the other hand, includes an entire sentence except for the conjunction itself (position 1), the attitudinal particles (position 30) and afterthoughts (position 31), i.e. positions 2-29.

3.6.4 Summary of subspan repetition

In sum, both total reduplication and verbal parallelism define positions 15-19 as their repeated subspans; nominalization specifies positions 3-20 minimally and 3-29 maximally; and coordination test covers positions 6-28 minimally, and 2-29 maximally.

3.7 Pauses and fillers (15-28)

Pausability, or possibility of having a pause, is defined here as the contiguous positions containing the verb core not interrupted by any pausable juncture.

Although this test is difficult to elicit—a speaker of a language may divide a string of speech and pronounce syllable by syllable, even if it has extralinguistic function, such as the clarification of pronunciation—, this test has been used as a constituency diagnostic (cf. Gerdts & Werle 2014: 609).

In this study, I identify pausable junctures from the transcribed instances of filler *hu*^{1}*ni*^{2} ‘er’ in naturally occurred speech. Specifically, I have observed that pauses with a filler *hu*^{1}*ni*^{2} may occur after a conjunction (position 1, example 18a), a proclitic such as negation *bi*^{4}= (position 8, example 18b), a second position clitic in pre-predicate position such as *=hba*^{4}*ni*^{23} 'at once' (position 9, example 18a) or reported information *=ʃu*$^{3(4)}$ (position 10, example 18c), an independent pronoun in patient-like or recipient-like function (position 14, example 18d), or between a person/number enclitic (position 28) and a following noun phrase (position 29), as in (18e). However, in a sample of 13 short texts with 129 transcribed instances of *hu*^{1}*ni*^{2} 'er', none intrudes on the positions 15-28.

(18) a. *ʔba*^{1}*,* ***hu*^{1}*ni*^{2}***, tu*^{1} *khja*^{2}*ˈʔa*^{43}*ʃu*^{3} *ˈh*^{n}*ku*^{23}*hba*^{4}*ni*^{23}*,* ***hu*^{1}*ni*^{2}***, ki*^{4}*tsi*^{2}*ˈ*^{n}*ka*^{4}*. ˈh*^{n}*ku*^{2}*hba*^{4}*ni*^{23}*ʃu*^{3} *ha*^{2}*ˈne*^{4}

	ʔba^{1}*,*	*hu*^{1}*ni*^{2}*,*	*tu*^{1}	*khja*^{2}*ʔa*^{4}	*=*$^{3(4)}$	*=ʃu*$^{3(4)}$	*h*^{n}*ku*^{23}	*=hba*^{4}*ni*^{23}	*hu*^{1}*ni*^{2}	*ki*^{4}*-*
v:	1	-	3	4	5	10	4	9	-	16
	and	FILL	only	when	=FOC	=REP	one	=at.once	FILL	PFV-

tsi^{2n}*ka*^{4}	*h*^{n}*ku*^{2}	*=hba*^{4}*ni*^{23}	*=ʃu*$^{3(4)}$	*ha*^{2}*ne*^{4}
19	4	9	10	16:19
burst	one	=at.once	=REP	PFV:sound

'and, er, suddenly one (thunderclap) at once, er, bursted, one roared at once.' (Sánchez Díaz & Nakamoto 2020: 138, English by SN)

b. *bi*^{4}*,* ***hu*^{1}*ni*^{2}***, bi*^{4} *ˈtsha*^{21}*nu*^{42} ^{n}*tsu*^{1}*ˈʔba*^{32}

	bi^{4}*=*	*hu*^{1}*ni*^{2}	*bi*^{4}*=*	*tsha*^{2}	*=*^{1}*nu*^{42}	^{n}*tsu*^{1}*ʔba*$^{3(4)}$	*=a*^{2}
v:	8	-	8	16:19	28	29[	]
n:	-	-	-	-	-	10	12
	NEG=	FILL	NEG=	HAB:give:1	=1SG/2PL	[mouth	=1SG]

'I don't, er, I don't give you my words (lit. my mouth).' (180624-002 15:44)

c. *ʔba*^{1} *he*^{2}*ʃu*^{3}*,* ***hu*^{1}*ni*^{2}***, ʔba*^{1} *he*^{2}*ʃu*^{3} *kjo*^{1} *tse*^{2}*kʔe*^{4}*ˈ*^{n}*tu*^{2n}*ka*^{2}*ni*^{3} ^{n}*te*^{1}

	ʔba^{1}	*he*$^{2(4)}$*=*	*=ʃu*$^{3(4)}$	*hu*^{1}*ni*^{2}	*ʔba*^{1}	*he*$^{2(4)}$*=*	*=ʃu*$^{3(4)}$	*kjo*^{1}	*tse*^{2}*k-*	*ʔe*^{4n}*tu*^{2}
v:	1	6	10	-	1	6	10	14	16	19
	and	already=	=REP	FILL	and	already=	=REP	there	PFV-	sit:PL

=^{n}*ka*^{2}*ɲi*$^{3(4)}$	^{n}*te*^{1}
26	30
=again	thus

'and already, er, and they already established themselves there again.' (180811-001-e2 04:08)

d. *ha*^{1} *ˈk*^{w}*i*^{2}*ru*^{1} *nɛ*^{1}*ʔɛ*^{2}*ni*^{1}*ˈsti*^{23}*na*^{1} *ʔba*^{1} *ni*^{1}*ˈma*^{13} *thi*^{2}*ˈʔmi*^{4}*re*^{1} *tsa*^{2} *ˈk*^{w}*i*^{2}*,* ***hu*^{1}*ni*^{2}***, ki*^{2}*sʔe*^{2}*ˈne:*^{41} *pre*^{2}*si*^{2}*den*^{23}*ˈte*^{1}

	ha^{1}	*k*^{w}*i*^{2}	*=ru*^{1}	*nɛ*^{1}*ʔɛ*^{2}*+ni*^{1}*sti*^{23}	*=na*^{1}	*ʔba*^{1}	*ni*^{1}*ma*^{1}
v:	1	4[	]	4[	]	4	4
n:	-	10	17	10	12	-	-
	well	[PRONOM3	=ASSM]	[man+child	=POSS1SG]	like.that	much

=$^{3(4)}$ thi^{2}- m- ʔĩ^{4} =re^{1} tsa^{2} kʷi^{2} hu^{1}ni^{2} ki^{2}- s-
5 15 16 19 28 1 14 - 16 18
- - - - - - - - - -
=FOC PROG- HAB- be.told =3/3 if PRONOM3 FILL PFV- IMPERS-
ʔe^{2}ne^{4} =:^{1} pre^{2}si^{2}den^{23}te^{1}
19 28 29
- - -
impose =3/3 president
'well, I assume that they are telling it to my husband if they had given him, er, the *cargo* of president.' (180630-001 16:32)

e. *…ʔba^{1} ^{n}ka^{2}, ^{n}ka^{2} si^{1}'khĩ^{2}re^{1},* ***hu^{1}ni^{2}****, ɕi^{2} he^{2} he^{2}'sun^{41}*
ʔba^{1} ^{n}ka^{2} ^{n}ka^{2} si^{1}+khĩ^{2} =re^{1} hu^{1}ni^{2} ɕi^{2} he$^{2(4)}$= he^{2}sun^{4}
v: 1 1 1 16:19 28 - 29[1 6 16:19
n: - - - - - - 10 - -
and SUB SUB POT:make:3+far =3/3 FILL [REL already= PFV:die:PL
=^{1}
-]
15
=ABS.ST]
'… and (he said) that, that it would keep him away from, er, those who already died.' (180816-002 04:43)

In addition, during my participant observation as an Ayautla Mazatec learner, I have noticed that many Ayautla Mazatec speakers find difficult to follow my utterances if I have any interruption in positions 15-28. Therefore, I infer that a pause in these positions yields infelicitous utterances which require additional task of processing. Hence, the impossibility of having a pause defines a domain which consists of positions 15-28.

3.8 Stress assignment (19-20, 15-20)

Stress in Ayautla Mazatec is phonetically semi-long with an increased intensity, and is obligatory, culminative and predictably assigned on the right edge (or the end) of the stress domain. In order to determine the left edge (or the beginning) of stress domain, however, test fracturing is applied. According to the positive evidence, all stressable positions from the verb root onward are included (MINIMAL STRESS ASSIGNMENT). According to the negative evidence, all unstressed positions from the stressed syllable backward until the first unstressed position are included (MAXIMAL STRESS ASSIGNMENT).

Minimal stress assignment includes positions 19-20, which are verb roots or contiguous to verb roots and have the possibility to bear stress. In (19a), the final syllable of position 19 is stressed. In (19b), position 20 is stressed instead of the final syllable of position 19. Elements after position 20 do not shift the stress, as partially illustrated in (19c).

(19) a. *ba*^{2}*ˈsẽ*^{4}

	b-	*a*^{2}*sẽ*^{4}
v:	16	19
	HAB-	stand:3

‘he stands.’

b. *ba*^{2}*se*^{2}*ˈko*^{13}

	b-	*a*^{2}*sẽ*^{4}	*-ko*^{13}
v:	16	19	20
	HAB-	stand:3	-COM

‘he helps (lit. stands with)’

c. *^{n}ku*^{1} *ha*^{1} *ba*^{2}*se*^{2}*ˈko*^{13}*hĩ*^{4}*ni*^{23}*re*^{1} *je*^{2}*he*^{2}

	^{n}ku^{1}	*ha*^{1}	*b-*	*a*^{2}*sẽ*^{4}	*-ko*^{13}	*=hĩ*^{4}	*=ɲi*^{23}	*=re*^{1}	*je*^{2}*he*^{2}
v:	1	1	16	19	20	23	27	28	30
	you.know	well	HAB-	stand:3	-COM	=INFR	=ASR	=3/3	anyway

‘well, you know, he should help them anyway.’ (181118-002 38:55)

Maximal stress assignment covers positions 15-20, where the stress is found only in 19-20, i.e. the domain of minimal stress assignment. Outside this domain, independent pronouns (position 14) have their own stress, as illustrated in (20).

(20) *bi*^{4} *ˈkʷi*^{2} *ni*^{2}*ˈkʷɛ*^{13}

	bi^{4}*=*	*kʷi*^{2}	*ni*^{2}	*-ko*^{13}	*=i*
v:	8	14	16:19	20	=28
	NEG=	PRONOM3	HAB:do:2	-COM	=2SG

‘don’t touch it.’

Aside from the phonetic correlates of duration and intensity, the stressed syllable has several phonotactic traits as its phonological correlates. Specifically, the stressed syllable tends to have more phonological contrasts. When a lexical root is found in unstressed syllables by suffixation or compounding, it tends to undergo denasalization (Nakamoto 2020: 110–111), deaspiration (Nakamoto 2020: 111–113), monosyllabification of disyllabic roots (Nakamoto 2020: 113–114) and tone neutralization (Nakamoto 2020: 154–161). In this study, however, I do not treat these phonotactic traits as separate constituency tests. These neutralization processes are morphophonological in nature and the same phonotactic traits in stressed syllables may be found outside the minimal stress assignment domain, thus they cannot provide well-defined constituency diagnostics.

In summary, the domains of stress assignment can be positively defined as positions 19-20 and negatively as positions 15-20.

3.9 *ɛ.j constraint (19-19, 13-25)

*ɛ.j, or constraint against a sequence of /ɛ/ and /j/ at the syllable boundary, is remedied by alternating (or dissimilating) underlying /ɛ/ to /a/ when such a sequence occurs as a result of morpheme concatenation, i.e. ɛ > a / _ j. It is the only segmental constraint across the syllable boundary I have so far identified in Ayautla Mazatec (Nakamoto 2020: 97–98). Minimal *ɛ.j defines the position 19 as a domain within which this alternation takes place (21).

(21) *ʔba*^{2n}***tha***$^{4'}$*ja*^{2}
b- *ʔa*^{2n}*thɛ*^{4}*+ja*^{2}
v: 16 19
hab- change:3+pos:inside
'it (state, situation) changes.'

Maximal *ɛ.j can be defined by skipping over the junctures where this alternation cannot take place until one finds its initial and final positions. For example, between the third and the fourth syllables of (22a), or between the sixth and the seventh syllables of (22b). This domain includes positions 13-25. Note that no morpheme ends with /ɛ/ or begins with /j/ between positions 13-15 or 20-25.

(22) a. ^{n}*kɛ*$^{2'}$*ʔɛ*^{1n}***tshɛ***^{4} *ja*$^{2'}$*khã*^{4}
^{n}*kɛ*^{2}*ʔɛ*^{1} *=*^{n}*tshɛ*^{4} *j-* *a*^{2}*khã*^{4}
v: 4 12 16 19
here =always pfv- break
'he always broke it here.'

b. *ki*^{2}*tsi*^{2}*tɕi*^{2}*kũ*^{2}*tɛ̃*^{2}***ʔɛ̃***^{23}*je*^{2}*he*^{2}*na*^{1}
ki^{2}*-* *tsi*^{2}*+tɕi*^{2}*kũ*^{2}*+tɛ̃*^{2}*ʔɛ̃*^{23} *=je*^{2}*he*^{2} *=na*^{1}
v: 16 19 26 28
pfv- do:3+sacred+word(?) =all.inan =3/1sg
'he blessed all of them for me.'

Therefore, *ɛ.j defines 19 and 13-25 as its minimal and maximal interpretations.

3.10 *3.(2)4 constraint (19-19, 15-21)

Nakamoto (2020: 154–161) described that lexical tones except /1/ and /2/ tend to neutralize in pretonic syllables. Among such instances, neutralization of /3/ before /24/ and /4/ takes place obligatorily within certain domain, i.e. ***3.(2)4**. According to positive evidence, MINIMAL *3.(2)4 is obligatorily found in compound verbs (position 19). For example, in (23), the underlying /3/ neutralized obligatorily with /2/ before /4/. The syllable which undergoes neutralization is emphasized in boldface.

(23) *ba²**ne²**'sũ⁴*
b- a²ne³⁽⁴⁾+sũ⁴
v: 16 19
HAB- wash:3+POS:above
'he washes (the surface of).'

MAXIMAL *3.(2)4 can be established in positions 15-21 where negative evidence of *3.24 and *3.4 is available. In (24), the underlying sequence of /3/ in position 14 followed by /4/ does not undergo neutralization. In (25), the underlying sequence of /3/ followed by /4/ in position 22 does not undergo neutralization.

(24) *bi⁴ '**ɲa³** ja⁴'tʔa²na³*
bi⁴= ɲa³⁽⁴⁾ j- a⁴+tʔa² =na³⁽⁴⁾
v: 8 14 16 19 28
NEG= PRONOM1INCL PFV- lay:3+POS:stuck =3INCL
'he didn't registered us.'

(25) *ba²'**ne³**hba⁴ni²³*
b- a²ne³⁽⁴⁾ =hba⁴ni²³
v: 16 19 =22
HAB- wash:3 =at.once
'he washes at once.'

Therefore, *3.(2)4 constraint defines position 19-19 as its minimal interpretation and positions 15-21 as its maximal interpretation.

3.11 Syllable-internal segmental interactions (16-19, 16-28)

Given that every free form in Ayautla Mazatec begins with a consonant and ends with a vowel (cf. Nakamoto 2020: 83–85), the existence of SYLLABLE-INTERNAL

SEGMENTAL INTERACTIONS suggests some grade of fusion between morphemes.[8] Specifically, aspect/mode (position 16), associated motion (position 17), voice (position 18) and verb root (position 19) have consonant-initial morphemes, while associated motion (position 17), voice (position 18), verb roots (position 19) and pronominal enclitics (position 28) include vowel-initial morphemes. Example (26) illustrates some syllable-internal segmental interactions around the verb root: habitual prefix is syllabified with andative; causative prefix is syllabified with verb root; and verb root is syllabified with pronominal enclitic.

(26) *hbi^{2}tsi^{2}kʔo$^{4'}$ja^{231}*

	b-	*hi^{2}-*	*tsi$^{2(4)}$k-*	*ʔo^{23}+ja^{23}*	*=a^{1}*
v:	16	17	18	19	28
	HAB-	ANDT:1-	CAUS-	go.out:1+POS:inside	=1SG

‘I put out, switch off.’

MINIMAL SYLLABLE-INTERNAL SEGMENTAL INTERACTIONS can thus be defined as 16-19, the span in which all elements are known to show syllable-internal segmental interactions, while MAXIMAL SYLLABLE-INTERNAL SEGMENTAL INTERACTIONS covers 16-28, outside which syllable-internal segmental interactions are not found.

3.12 Disyllabic sandhi-blocking tone sequences (15-19, 15-21)

Tone sandhi in Ayautla Mazatec is a phonological process which consists of a progressive association of floating /4/ across syllables (= tone bearing units), /4/ being the highest tone and /1/ the lowest. As a result of tone sandhi, the syllables with underlying /1/, /13/, /2/ or /23/ are generally substituted by /4/. However, the applicability, the obligatoriness, and the output of tone sandhi are subject to tonal and prosodic conditions of the syllable receiving the floating /4/ (Nakamoto 2020: 171–196).

Among several phonological and non-phonological conditions which block the application of tone sandhi (Nakamoto 2020: 184–191), DISYLLABIC SANDHI-BLOCKING TONE SEQUENCES constitute one of the tonal and prosodic conditions (the other being ‘1possible sandhi”, see §3.14). If the syllable which receives the floating /4/ is the first syllable of a /1.24/, /1.4/, /2.24/ or /2.4/ sequence within the

[8] The situation is different with tonal morphemes, because the stem or the host to such tonal morphemes always has its own tone(s) and thus is pronounceable. Therefore, the fusion between the stem or host and the tonal morpheme is a phenomenon local to each juncture.

positions 15-19, the application of sandhi is blocked.[9] For example, in (27a) and (27b), the second syllable of the example is part of the underlying /2.4/ sequence and tone sandhi fails to apply, while in (27c), tone sandhi does apply to the second syllable which is not part of a /2.4/ sequence.

(27) a. *he² ti²tsi⁴ˈthe²*
he²⁽⁴⁾= *ti²⁽⁴⁾-* *tsi⁴-* *the²*
v: 6 15 16:18 19
already= PROG:3- HAB:CAUS:3- cough
'he is already clearing his throat.'

b. *he² ti⁴tsi⁴ˈthe²

c. *he² ti⁴ma²ˈhɲu⁴*
he²⁽⁴⁾= *ti²⁽⁴⁾-* *m-* *a²-hɲu⁴*
v: 6 15 16 19
already= PROG:3- HAB- INCH-night
'it is already getting dark.'

In contrast, such underlying sequences fail to block tone sandhi if one of the two syllables is found outside the positions 15-21. For example, the second and the third syllables in (28a), in positions 14 and 16, have an underlying /1.4/ sequence, but it does not block tone sandhi. The same is true in (28b), where the underlying /1.4/ sequence in positions 19 and 22 cannot block the application of tone sandhi.

(28) a. *bi⁴ʔĩ² ˈhĩ⁴¹ tsu⁴ˈja²ni²³*
bi⁴= *=ʔĩ³⁽⁴⁾* *hĩ¹* *tsu⁴+ja²* *=ɲi²³*
v: 8 12 14 16:19 27
NEG= =PST.HAB PRONOM1INCL HAB:say:3+POS:inside =ASR
'he did not used to explain it to us.'

b. *skhe²ˈɕi⁴¹hba⁴ni²³*
s- *khe³⁽⁴⁾+ɕi¹* *=hba⁴ni²³*
v: 16 19 22
POT- pull+piece(?) =at.once
'he blows his nose at once.'

Therefore, minimal disyllabic sandhi-blocking tone sequences spans 15-19, while maximal disyllabic sandhi-blocking tone sequences covers 15-21.

[9] Similar blocking conditions have been reported for other Mazatec varieties with tone sandhi, such as Soyaltepec (Pike 1956: 63–64) and Chiquihuitlán (Nakamoto 2018).

3.13 Obligatory sandhi (15-28)

Tone sandhi in Ayautla Mazatec, or progressive association of a floating /4/, is obligatory within the positions 15-28 and is optional outside this domain. OBLIGATORY SANDHI is illustrated in (29). Sandhi from progressive (position 15) to habitual and inchoative (positions 16 and 18) as well as sandhi from verb root (position 19) to pronominal clitic (28) are obligatory. If sandhi does not apply in any of these positions, the result is ungrammatical (29b, 29c, 29d), where the syllables with underapplication of sandhi are highlighted.

(29) a. *ti*^{2}*ma*^{4}*ni*$^{2'}$*hɲa*^{2}*na*^{42}

	ti$^{2(4)}$-	*m*-	*a*^{2}-	*ni*^{2}*hɲa*$^{3(4)}$	=*na*^{1}
v:	15	16	18	19	28
	PROG:3-	HAB-	INCH-	be.sleepy	=3/1SG

'I'm getting sleepy.'

b. *ti^{2}**ma**^{2}ni$^{2'}$hɲa^{2}na^{42}

c. *ti^{2}ma^{4}ni$^{2'}$hɲa^{3}**na**^{1}

d. *ti^{2}**ma**^{2}ni$^{2'}$hɲa^{3}**na**^{1}

However, tone sandhi from position 14 or to position 29 is optional, as illustrated in the following examples. In (30a), tone sandhi from the second morpheme (position 14) may or may not apply; if applied, the underlying tone /3/ alternates with /2/ (cf. Nakamoto 2020: 142–143). We can observe the same in (30b) with the first floating /4/ associated with the third morpheme (position 23). So far I have not been able to identify what else conditions the application of sandhi outside the domain of obligatory sandhi in Ayautla Mazatec.

(30) a. *bi*^{4} *'ɲa*^{3} ***su***^{1}*'ba*^{1}*na*^{3}

~ *bi*^{4} *'ɲa*^{2} ***su***^{4}*'ba*^{1}*na*^{3}

	bi^{4}=	*ɲa*$^{3(4)}$	*su*^{1}*ba*^{1}	=*na*$^{3(4)}$
v:	8	14	16:19	28
	NEG=	PRONOM1INCL	POT:catch	=3/1INCL

'he won't catch us.'

b. *ja*^{2}*te*$^{2'}$*ɲa*^{23}*ʃu*^{3} ***thju***^{1}*na*$^{2'}$*ɲa*^{2}*re*^{42}

~ *ja*^{2}*te*$^{2'}$*ɲa*^{23}*ʃu*^{2} ***thju***^{4}*na*$^{2'}$*ɲa*^{2}*re*^{42}

	j-	*a*^{2}*te*^{2}*ɲa*^{23}	=*ʃu*$^{3(4)}$	*thju*^{1}*na*^{3}*ɲa*$^{3(4)}$	=*re*^{1}
v:	16	19	23	29[	]
n:	-	-	-	10	12
	PFV-	sell:3	=REP	[dog	=POSS3]

'(reportedly) he sold his dog.' (Nakamoto 2020: 179)

Therefore, the obligatoriness of sandhi defines 15-28 as its domain.

3.14 Possible sandhi (15-28, 2-31)

In addition to the disyllabic sandhi-blocking tone sequences (§3.12), the other prosodic condition which impedes the application of tone sandhi is that of POSSIBLE SANDHI domain. Nakamoto (2020: 176–177) reported that tone sandhi in Ayautla Mazatec is blocked across the boundary of coordination and verbal parallelism construction. For example, in (31a), tone sandhi is blocked between asyndetically coordinated verbs, i.e. $k^{w}ʔi^{3(4)}$ 'he will drink' and $ski^{1n}ta^{2}ˈja^{4}$ 'he will cry', as well as $se^{3(4)}$ 'he will sing' and ste^{1} 'he will dance'; in (31b), tone sandhi is blocked between two verb forms in a verbal parallelism construction (cf. §3.6.1), i.e. $thu^{2}tsha^{3(4)}$ and $thu^{2}ni^{2}ɲa^{2}$. In both cases, the rest of phonological conditions (tone and stress) for tone sandhi to be realized are satisfied (cf. Nakamoto 2020: 180–184); the syllable which would receive a floating tone /4/ is highlighted.

(31) a. $ˈk^{w}ʔi^{3}$, $\mathbf{ski^{1}}{}^{n}ta^{2}ˈja^{4}$, $ˈse^{3}$, $ˈ\mathbf{ste^{1}}$, $k^{w}ha^{1}hɲa^{2}ˈhbe^{4}$
$k^{w}ʔi^{3(4)}$ $ski^{1n}ta^{2}ja^{4}$ $se^{3(4)}$ ste^{1}
v: [16:19] [16:19] [16:19] [16:19]
[pot:drink] [pot:cry] [pot:sing] [pot:dance]
$k^{w}ha^{1}hɲa^{2}$+hbe^{4}
[16:19]
[pot:lie.down+pos:asleep]
'he will drink, cry, sing, dance and sleep.' (Nakamoto 2020: 176)

b. $thu^{2}ˈtsha^{3}$ $\mathbf{thu^{2}}ni^{2}ˈɲa^{2}$
thu^{2}+$tsha^{3(4)}$
v: $_{\text{vpar1}}$[16:19]
$_{\text{vpar1}}$[hab:come.out+pos:sideways]
thu^{2}+$ni^{2}ɲa^{2}$
$_{\text{vpar2}}$[16:19]
$_{\text{vpar2}}$[hab:come.out+pos:quadrupedal]
'he staggers.' (Nakamoto 2020: 177)

This fact can be interpreted as follows: tone sandhi cannot extend over two planar structures. However, Ayautla Mazatec has additional prosodic restrictions as to its application: within the verbal planar structure, even though the rest of phonological conditions (i.e. tone and stress) are met, connectors (position 1), focus introducers (polar question, 'even', 'only'; position 3) and adverbs (positions 4, 14, 29) do not undergo sandhi. For example, in (32), even though tu^{1} 'only' satisfies the rest of tonal and stress-related conditions, it never undergoes tone sandhi.

(32) *he*^{2} *ti*^{2}*ma*^{4}ˈ*ba*^{2}*ʔĩ*^{2}*na*^{42}, *nɛ*^{1}*ʔɛ*^{3}, ˈ*ɲa*^{4} ˈ***tu***^{1} *k*^{w}*hɛ*^{2}ˈ*ʔɛ*^{1}*ni*^{23}

	he$^{2(4)}$=	*ti*$^{2(4)}$-	*m*-	*a*^{4}-*ba*^{2}	=*ʔĩ*$^{3(4)}$	=*na*^{1}	*nɛ*^{1}*ʔɛ*$^{3(4)}$	*ɲa*$^{4(4)}$	*tu*^{1}
v:	6	15	16	19	25	28	31	4	4
	already=	PROG-	HAB-	INCH-sad	=PST.HAB	=3/1SG	sir	where	only

k^{w}*hɛ*^{2}*ʔɛ*^{1}	=*ni*^{23}
16:19	27
be.from	=ASR

'I was already worrying, sir, where the hell do you come from?'
(Sánchez Díaz & Nakamoto 2020: 141, English by SN)

Since the positions without restrictions on applying tone sandhi are discontinuous, the possible sandhi test is fractured into maximal and minimal interpretations: MINIMAL POSSIBLE SANDHI spans positions 15-28—where no position includes morphemes which block tone sandhi not by underlying tone or stress—, while MAXIMAL POSSIBLE SANDHI spans positions 2-31 where all positions without such prosodic restrictions are included.

4 Summary and discussions

Figure 1 summarizes the constituency diagnostics in Ayautla Mazatec described in this study, sorted by domain size. Looking at the domains, the span 15-28 ("Layer 9" in the Figure) has the highest number of convergences of 7, followed by 15-19 ("4") with 5 convergences, followed by 19 ("1") with 3 convergences, and 15-20 ("5"), 15-21 ("6") as well as 6-28 ("11") with 2 convergences.

Looking at the individual positions, progressive (position 15) is the initial position for 16 diagnostics. As for the final position, the bound pronouns (position 28) has the highest convergence rate with 10 diagnostics, followed by the verb root (position 19) with 9 diagnostics.

A closer look at individual diagnostics reveals that the convergences are mainly observed among morphosyntactic diagnostics (see also figures 2 and 3 below for convergence of morphosyntactic and phonological domains, respectively). For example, out of the 5 diagnostics which converge at the span 15-19, 4 are morphosyntactic diagnostics while only one of them is phonological; in the same vein, 4 out of the 7 diagnostics at the span 15-28 are morphosyntactic diagnostics while two are phonological and the other concerns the pause. Therefore, at least based on morphosyntactic criteria, we can recognize two strong candidates

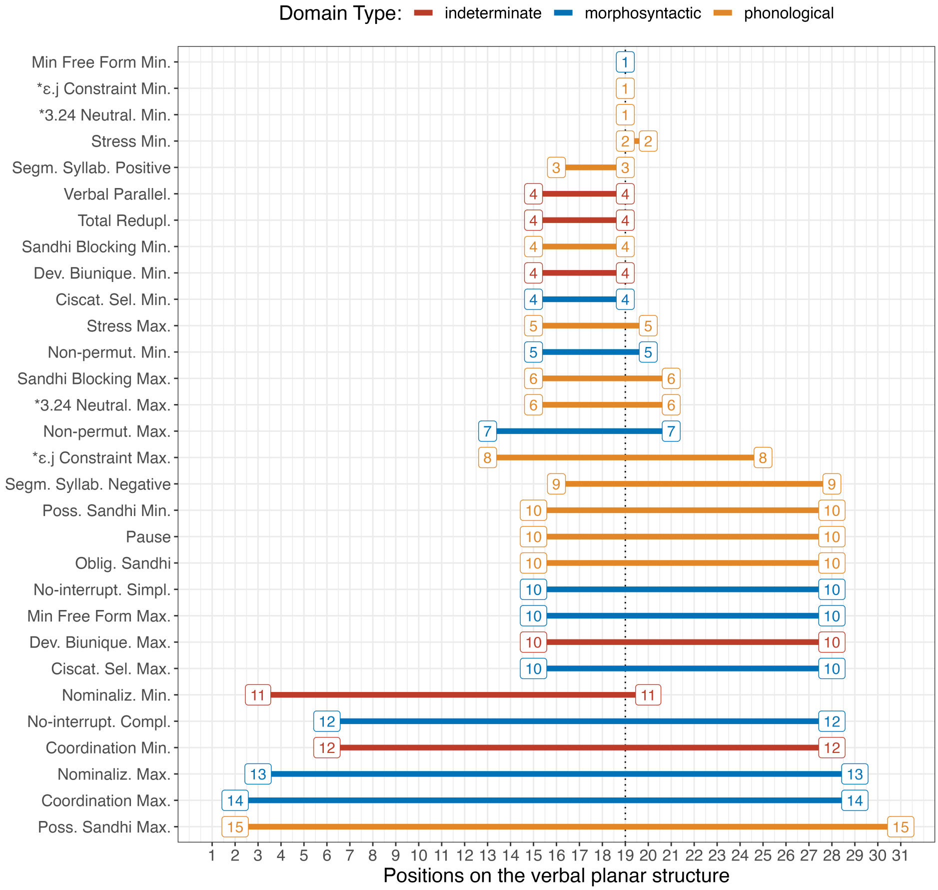

Figure 1: Convergence of domains

for words or phrases. Contrasting these candidates with my working concept of affix-clitic distinction, the span 15-19 differs from it in excluding the comitative (position 20).[10]

However, phonological diagnostics (cf. Figure 3) tend not to converge with other phonological diagnostics in Ayautla Mazatec. Out of 13 diagnostics, we have convergences of at most two phonological constituency diagnostics, namely, minimal *ɛ.j constraint and that of minimal *3.(2)4 constraints at position 19; maximal *3.(2)4 constraint and maximal sandhi-blocking tone sequences at positions

[10]I included comitative in my working concept of word, because it is inside the stress assignment domain (see §3.8).

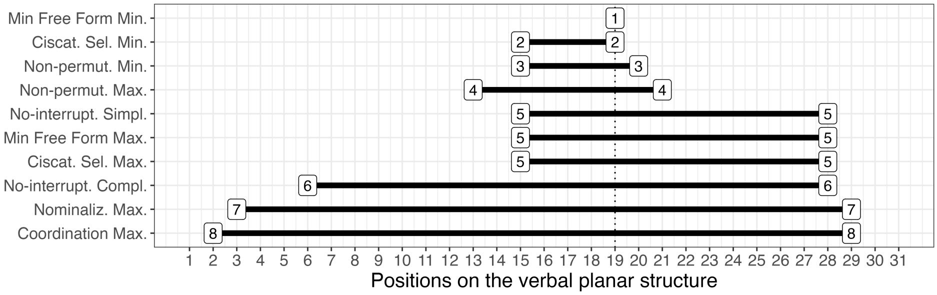

Figure 2: Convergence of morphosyntactic domains

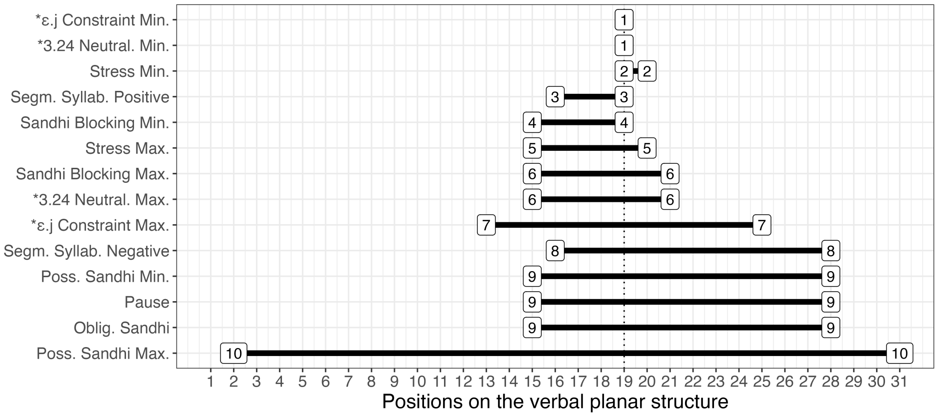

Figure 3: Convergence of phonological domains

15-21; and obligatory sandhi and minimal possible sandhi at positions 15-28. It is partly due to my analytical decision of not treating the correlates of stress as separate constituency diagnostics (see §3.8). It is also partly due to the fact that some positions do not have adequate phonological context for a given diagnostic. For example, the focus marker $=^{3(4)}$ (positions 5, 21) consists of tones and cannot provide any positive evidence for segmental processes; comitative *-ko*^{13} is the only morpheme in position 20 and is not amenable to some tonal tests.[11]

[11] A reviewer suggested ignoring positions for tonal morphemes, which would correspond to focus marker (positions 5 and 21), some of the aspect/mode markers (position 16) and some of the person/number markers (position 28), as well as absolute state marker in noun complexes (position 15). However, tones in Ayautla Mazatec are basically concatenated in linear order, such as /1/ + /3/ + /1/ > /131/ and /3/ + /1/ + /3/ > /313/ (cf. Nakamoto 2020: 196–207). Therefore, it is important to represent the linear order of these morphemes.

Diachronically, these variations of prosodic constituents in one or two positions, namely, between positions 15 and 16 and between positions 19 and 20, seems to be accounted for by recent grammaticalizations. Both progressive (position 15) and comitative (position 20) have their etymologies identifiable outside the verb complex, namely, posture verbs and preposition 'with', respectively. A possible interpretation is to see from aspect/mood (position 16) to verb root(s) (position 19) as a historically stable and more established constituent, and to see the prosodically indeterminate status of progressive (position 15) and comitative (position 20) as a result of their recent grammaticalization on the way to cohere with the inner constituent.

Synchronically, however, Ayautla Mazatec situation supports the position of Schiering et al. (2010: 704) who state that 'prosodic domains are conceived of as language-particular, intrinsic and highly specific properties of individual phonological rules or constraints'. Therefore, as same as in Tibeto-Burman language Limbu studied in Schiering et al. (2010), we cannot accommodate Ayautla Mazatec prosodic constituents into some allegedly universal hierarchy of phonological stem, word or phrase.

In conclusion, Ayautla Mazatec verbal predicates show six domains where two or more constituency diagnostics converge. The convergences are mainly observed among morphosyntactic diagnostics, and phonological domains tend not to converge in this language. This result supports the non-universality of prosodic domains suggested by Schiering et al. (2010) and, due to the lack of a strong candidate for a phonological word, is against the word bisection thesis advocated by Dixon & Aikhenvald (2002).

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Ayautla Mazatec speakers, especially Josefina Sánchez; Hiroto Uchihara, Adam J. R. Tallman, Sandra Auderset, Naonori Nagaya, and an anonymous reviewer for their comments; Sandra Auderset for her help in plotting constituency diagnostics; errors and shortcomings are exclusively mine.

Abbreviations

ABS.ST	absolute state	COM	comitative
ANDT	andative	FILL	filler
ASR	assertive	FOC	focus
ASSM	assumed	HAB	habitual

IMPERS	impersonal	POT	potential
INAN	inanimate	PROG	progressive
INCH	inchoative	PRONOM	pronominal element
INCL	inclusive	PST	past
INFR	inferred	REL	relative
NMLZ	nominalizer	REP	reportative
PFV	perfective	SAP	speech act participant
POS	positional	SUB	subordinator
POSS	possessive	TOP	topic

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Chapter 6

Constituency in Tù'un Ntá'ví (Mixtec) of San Martín Duraznos

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In this chapter we report the results of 27 constituency diagnostics applied to verbal predicate constructions in San Martín Duraznos Mixtec. We show that there are remarkably few convergences between diagnostics. We also discuss issues issues we encountered in establishing the verbal planar structure as they relate to competing analyses of morphemes.

1 Introduction

In this chapter we provide the first description of constituency in verbal predicate constructions in San Martín Duraznos (SMD) Mixtec. We follow the methodology layed out in Tallman (2020, 2021).

Constituency in Mixtec languages has previously been discussed by Macaulay (1993, 1996) for Chalcatongo Mixtec. Specifically, Macaulay focuses on describing the ordering of constituents in the language and offers a template for the positions of arguments, topic and focus constituents, and phrasal clitics. In fact, discussions on clitics in Chalcatongo Mixtec and the closely related variety of San Miguel El Grande have featured prominently in the literature on the morphology-syntax division (cf. Pike 1944, Pike 1945, Macaulay 1987, among others).

Pike (1945) argues that there is no global morphology-syntax distinction in San Miguel El Grande Mixtec. This claim is based on the observation that many bound forms can be synchronically analyzed as phonological reductions of full words. Furthermore, he notes that there is distributional overlap between bound

Sandra Auderset, Carmen Hernández Martínez & Albert Ventayol-Boada. 2024. Constituency in Tù'un Ntá'ví (Mixtec) of San Martín Duraznos. In Adam J.R. Tallman, Sandra Auderset & Hiroto Uchihara (eds.), *Constituency and convergence in the Americas*, 265–304. Berlin: Language Science Press. DOI: 10.5281/zenodo.13208550

forms that are not reductions and bound forms in general, so that all bound forms could be analyzed as underlyingly derived from full words. Macaulay (1987) argues against such an analysis, claiming that it misses important distributional, semantic, and phonological differences between morphemes and syntactic constructions attested in Chalcatongo Mixtec. Rather, she posits that a distinction between affixes, clitics, and words is motivated and that clitics can be classified into the two types proposed by Zwicky (1977): 'simple clitics' and 'special clitics/phrasal affixes'. A separate study on 'clitics' in SMD, however, found no support for this classification, but rather showed that there are more classes of morphemes and constructions (Auderset et al. 2021).

As for SMD Mixtec, there is no earlier descriptive work other than word lists collected by Josserand (1983) and Padgett (2017). This chapter is based on our ongoing collaborative documentation project and, thus, represents what we currently know about the language.

1.1 The language and its speakers

SMD is the Tù'un Ntá'ví variety spoken in the community of San Martín Duraznos in Oaxaca (Mexico) and various diaspora communities located in the US, mainly along California's Central Coast. The Tù'un Ntá'ví (or Tù'un Sàvì) languages are part of the Mixtecan branch in the Otomanguean language family (Longacre 1957, Kaufman 1988). Across Mixtec, there is a high degree of diversification, and there is no agreement on how many varieties there are and where the boundaries among them lie (Josserand 1983, Campbell 2017). They tend to form dialect continua across the vast area they occupy, which covers most of western Oaxaca, parts of eastern Guerrero and some neighboring areas in Puebla. Varieties are often divided into three geographic areas: Mixteca Alta, Mixteca Baja, and Mixteca de la Costa. However, these do not reflect linguistic groupings. Linguistically, the most comprehensive study that analyzes variation across Mixtec was carried out by Josserand (1983). She surveyed 188 lexical items from 120 villages where Mixtec is spoken and, based on their phoneme inventories and isoglosses of sound changes, she proposed 12 major dialectal clusters. SMD belongs to the Southern Baja subgroup in her proposal.

The analysis presented here is based on approximately seven hours of naturalistic speech, along with many elicited sentences and native speaker judgements by one of the co-authors. Most of the naturalistic speech was recorded in San Martín Duraznos, but some recordings were made in Ventura County, California, where a sizeable diaspora community has settled. The data will be archived with

ELAR (Auderset & Hernández Martínez 2022). The primary contact language is Spanish, although English is also used among speakers in the diaspora.

In what follows, we first present the verbal planar structure in §2 and elaborate on some difficulties and unresolved issues. We include a brief overview of important grammatical features of the language. We then discuss each diagnostic in turn, by providing a definition, justifying fractures, and presenting the domains identified with illustrative examples. We start with phonological domains in §3, then discuss indeterminate domains in §4, and finally address morphosyntactic diagnostics in §5. We summarize our findings and discuss their implications in §6.

2 The planar structure of the verbal complex

Table 3 presents the verbal planar structure of SMD. This is a maximally flat representation of all the elements that can occur in a clause with a verbal predicate. Note that the internal structure of other types of phrases, such as noun phrases (NPs) or prepositional phrases (PPs), is not represented.

Before discussing some problematic cases we encountered in establishing the planar structure, we introduce a few core grammatical elements of the verbal predicate clause and provide some background on the practical orthography.

2.1 Relevant grammatical features and background on the orthography

All examples in this chapter are provided in the practical orthography developed with the community. The orthography is largely phonemic and makes use of digraphs and trigraphs, with diacritics reserved for tone. SMD has a split into post-alveolar and alveolo-palatal consonants, so far unattested in other Mixtec varieties. This means that there are two series of fricatives and affricates: <sh, ch, nch> = [ʃ, tʃ, ^{n}dʒ], but <x, tx, ntx> = [ɕ, tɕ, ^{n}dʑ]. The glottal stop is represented as an apostrophe or saltillo. Nasalization of vowels is indicated by an <n> following the nasalized vowel. There are no final consonants and nasalization is contrastive only on final vowels, so <an#> is always [ã]. Long vowels are represented by doubling the vowel. There are three tonemes: high, which is marked with an acute accent; low, which is marked with a grave accent; and mid, which is unmarked. Every vowel is marked for tone (i.e. we do not posit toneless elements). Finally, in the practical orthography we use hyphens to visually separate certain bound elements like pronouns, as in *ve'-un* [house-2SG.NHON] 'your (SG) house'. These hyphens do not indicate the type of morphological boundary.

SMD, like other Mixtec languages, is verb initial – that is, in a basic declarative clause the verb comes first, followed by the actor argument and then the undergoer (VS and VAO). It is obligatory for the S/A-argument to be present, either as an NP or a pronoun, to form a complete declarative clause, unless the verb is impersonal. SMD has two series of pronouns, which we will refer to as dependent and independent. Dependent pronouns are all mono-moraic and cannot appear as free forms, hence the term 'dependent'. For first and second persons, they are restricted to S/A arguments, while no such restriction exists for third persons. Independent monomorphemic pronouns only exist for some first and second persons and are all bimoraic. The other independent pronouns, including all of the third persons, are combinations of the topicalizer *míí* and the corresponding dependent pronoun (cf. Table 1 covering first and second person). After the verb, independent pronouns can only be used as P arguments, although they can appear preverbally in focus position or as emphatic pronouns representing any grammatical role.

Table 1: First and second person pronouns

Gloss	Dependent	Independent
1SG	*ì*	*yì'ì*
1PL.INCL	*ò*	*míí-ó*
1PL.EXCL	*ntì*	*ntì'ì*
2SG.NHON	*un*	*yò'ò*
2SG.HON	*ní*	*míí-ní*
2PL	*ntò*	*ntó'ó*

Verbs are obligatorily marked for aspect-mood, either with a tonal marker, a segmental marker, or a combination of both. Otomanguean languages are famous for their intricate systems of verbal inflectional classes including complex interactions of segmental and tonal marking. We will briefly outline the most important points here, since the SMD inflectional class system has not been previously described (apart from an overview provided in Auderset & Hernández Martínez 2019). SMD exhibits a somewhat simpler system than that of other Otomanguean languages, such as Chichimec (Palancar & Avelino 2019) and Cuicatec (Feist & Palancar 2016). Nevertheless, tonal inflection plays an important role in the verbal system and there are multiple inflectional classes.

Whereas the completive form is always marked with a preverbal element *ì* or *nì*, the incompletive and potential forms are often only marked by tone, the former showing a characteristic high tone on the first mora. We have identified 9 segmental and 7 tonal patterns, but not all combinations of segmental and tonal patterns are attested. The roughly 380 verbal paradigms analyzed so far fall into 28 classes.

Table 2: Verbs (position 17) showing tonal inflection of different inflectional classes

INCMPL	CMPL	POT	Gloss	Class
káchí	*ìkachi*	*kachi*	'say'	INCMPL high
xú'ní	*ìxu'ní*	*ku'ní*	'squeeze'	INCMPL high with stem alternation
íin	*ìxòo*	*koo*	'live, stay'	INCMPL high with suppletion
núná	*ìnùnà*	*nùnà*	'be open'	INCMPL with both morae high
kaì	*ìkàì*	*kàì*	'burn'	INCMPL mid
kuà'àn	*ìxà'àn*	*kù'ùn*	'go'	segmental alternation only

We now discuss problematic cases that arose in establishing the planar structure: the additive *va*, adverbials, and the form *tiki* ~ *ti*. We then briefly reference the other positions, starting with positions before the verb core and then after. We also comment on how cognate forms are classified in descriptions of other Mixtec varieties, and on how these positions are represented in the practical orthography.

2.2 Issues in establishing the planar structure

The first issue in establishing the planar structure concerns the element *va*, which is glossed here as 'additive'.[1] It is very frequent in naturalistic speech and can appear multiple times in a clause, cf. (1b) and (1c). With verbs, it seems to indicate that the action has happened before or is a consequence of what was done before, as in (1a). With nouns, it appears as a linker in listings and otherwise indicates that there is more of something cf. (1c). With other adverbials, it also seems to mean 'more' e.g., in (1b). This element is a bound form – in other words, it can never appear by itself and is phonologically left-leaning. The difficulty in analyzing this element lies in assessing what it modifies in any given position it can appear in. This is especially pertinent when *va* appears after an adverbial, as it is often unclear whether *va* in these cases modifies the verb core or the adverb

[1]In San Martin Peras Mixtec, the label given to the cognate element is 'sequential' and that might be just as appropriate for SMD.

Table 3: Verbal planar structure of SMD

Pos.	Type	Elements	Forms
(1)	slot	connectors, question marker	*an, ta, távà, chii*, etc.
(2)	slot	question words	*nishi, ntxáa*, etc.
(3)	slot	focus (S/A/P, OBL, etc.)	
(4)	slot	realis negation	*kòó*
(5)	zone	adverbials	*xàà, sa'a, và'a, vitxi*, etc.
(6)	slot	additive	*va*
(7)	slot	intensifier	*kuà'à, tóntó*
(8)	slot	intensifier; again	*ntxìvà'a, yáá; tiki ~ ti*
(9)	slot	intensifier; again	*tiki ~ ti; ntxìvà'a, yáá*
(10)	slot	additive	*va*
(11)	slot	modals	*nì, ná*
(12)	slot	completive; potential negation	*ì; u/o ~ i*
(13)	slot	causative 'do'	*sá*
(14)	slot	POT; CMPL class markers	*ku; xì*
(15)	slot	iterative	*nta ~ nti*
(16)	slot	transitivizer 'put'	*chi*
(17)	slot	**verb core**	
(18)	slot	additive	*va*
(19)	slot	reciprocal	*ta'an*
(20)	slot	temporal adv.	*tuun, kîì*
(21)	slot	intensifier	*tóntó, kuà'à*
(22)	slot	intensifier; again	*ntxìvà'a, yáá; tiki ~ ti*
(23)	slot	intensifier; again	*tiki ~ ti; ntxìvà'a, yáá*
(24)	slot	additive	*va*
(25)	slot	inside/being	*ini*
(26)	slot	S/A	
(27)	slot	P	
(28)	zone	OBL, PP, LOC, adv.	
(29)	slot	discourse markers	*ní, ví*

(which in turn modifies the verb core). Since a detailed study of the semantics of *va* lies outside the scope of this chapter, our analysis is preliminary. In the current study, we assume the following: (i) when *va* appears directly after the verb core, it modifies the verb and this position is thus included in the planar structure (at 18); (ii) when *va* appears after one or more adverbials, it modifies the verb and these positions are thus also included in the verbal planar structure (at 6, 10, and 24); and (iii) in all other cases, *va* does not modify the verb, thus these appearances are excluded from the planar structure.

(1) a. *tatùun xàà xínì-va míí-ntí ña kò'va*
like already INCMPL.know-ADD TOP-1PL.EXCL CLF.THING amount
chikàà-ntì
POT.put(invisible)-1PL.EXCL
'so we already know what amount to put in' SMD-0020-Huauzontle

b. *sáàn na kuntxati-ó iin rátó lo'o-va ini kasun*
SO MOD POT.wait-1PL.INCL one moment little-ADD inside POT.toast
kueé và'a-va
slowly good-ADD
'so we will wait a little moment longer so that it gets well toasted slowly' SMD-0020-Huauzontle

c. *taa ñà xàà ntóvà kíí sévóyá-va*
and CLF.THING already INCMPL.sprout COP onion-ADD
tùyá'à-va xàà ntóvà ntxi'i-va
CLF.WOOD.chile-ADD already INCMPL.sprout POT.finish-ADD
tú-kán
CLF.WOOD-DEM.PROX
'and what is already sprouting here is onion and the chile plant here has already sprouted' SMD-0009-Jardin

The next issue we address concerns intensifiers and adverbials, which can appear before and after the verb core, but exhibit peculiar behavior with respect to ordering. SMD has a variety of intensifiers (we have identified six so far), some of which can combine with verbs. They are all translated as 'a lot, very much', but it is likely that there are slight semantic differences among them that we are not yet aware of. They can be grouped into two positions based on co-occurrence restrictions: if there is more than one intensifier, *kuà'à* and *tóntó*[2] have to appear

[2]This is clearly a loan from Spanish that has taken on a new function. It could be derived either from *tonto* 'dumb, foolish', which has also been borrowed as an intransitive verb 'to be stupid', or possibly from *tanto* 'so much', which is closer in meaning.

before either *yáá* or *ntxìvà'a*, as illustrated in (2). This leads us to add two slots to the verbal template.

(2) a. *chíntxeé ta'an tóntó ntxìvà'a-na*
INCMPL.help RECP INTENS INTENS-3PL.HUM
'they really help each other a lot' elicited

b. * *chíntxeé ta'an ntxìvà'a tóntó-na* elicited

c. *itxààn sáchuun kuà'à yáá kì'vi-ì*
tomorrow POT.do.work INTENS INTENS sister[F]-1SG
'tomorrow my sister is going to work a lot' elicited

d. * *itxààn sáchuun yáá kuà'à kì'vi-ì* elicited

When an intensifier and the adverb *tiki* 'again' combine, they exhibit variable ordering, but only if no other intensifiers or slots after the verb are present. If there are other elements present, the variable ordering is blocked, as in (3). Whether the elements appear before or after the verb has no effect on this constraint, cf. (4). This suggests that in longer constructions, fixed mini-constituents have formed, perhaps based on frequency of usage.

(3) a. *chíntxeé ta'an ntxìvà'a tiki-na*
INCMPL.help RECP INTENS INTENS-3PL.HUM
'they again help each other a lot' elicited

b. * *chíntxeé ta'an tiki ntxìvà'a-na* elicited

c. *chíntxeé ta'an tóntó ntxìvà'a tiki-na*
INCMPL.help RECP INTENS INTENS again-3PL.HUM
'they again help each other a lot' elicited

d. * *chíntxeé ta'an tiki tóntó ntxìvà'a-na* elicited

(4) a. *itxààn sáchuun tiki yáá kì'vi-ì*
tomorrow POT.do.work again INTENS sister[F]-1SG
'tomorrow my sister is going to work a lot again' elicited

b. *itxààn sáchuun yáá tiki kì'vi-ì* elicited

c. *itxààn yáá tiki sáchuun kì'vi-ì* elicited

d. *itxààn tiki yáá sáchuun kì'vi-ì* elicited

To adequately represent this in the planar structure, we set up three positions that are slots but can contain either an intensifier or an adverbial depending on the construction. These positions have to be repeated before the verb, since these elements can also appear before the verb core, as mentioned above. The constraint on the ordering cannot be represented in the planar structure, but that is true for other co-occurrence constraints as well.

The third and final issue concerns the ordering of the already introduced additive *va* and *tiki* ~ *ti* 'again'. Based on examples like the one provided in (5), we had first analyzed them as variably ordering with respect to each other. However, it is more straightforward to analyze this as fixed ordering with *va* appearing in different slots, one directly after the verb and one after *tiki* ~ *ti*, since these slots are necessary anyway to account for other constructions. The same reasoning is applied to cases in which *va* and *tiki* appear before the verb core.

(5) a. *kusi tiki va-ó*
POT.sleep again ADD-1PL.INCL
'We (incl.) will go to sleep again.' all elicited
b. *kusi-va tiki-ó*
c. *kusi-va-ti-ó*
d. * *kusi-ti-va-ó*
e. * *kusi-va-ó tiki*

2.3 Elaboration on the verbal planar structure and its positions

We now turn to the positions preceding the verb core. Position 16 contains the no longer productive element *chi*. Historically, it is derived from the verb *chi'i* 'sow', which in the past had a more general meaning 'put' (still present in other varieties of Mixtec). This more general meaning seems to be still present in most verbs formed with *chi*. Otherwise, it is difficult to pinpoint the exact function of *chi*. It combines with intransitive and transitive verbs, but also with nouns and adverbials. The result is always transitive, so we gloss this element as a transitivizer.

In position 15, we find the iterative marker *nta* ~ *nti*. The allomorphy is neither phonologically nor semantically conditioned and often either allomorph can be used with the same verb base with no difference in meaning. This marker can co-occur with the transitivizer *chi*.

In position 14 we find the mutually exclusive potential and completive markers *ku* and *xì*. The latter always co-occurs with the completive marker *ì* or *nì*. These markers are only present with certain inflectional classes of verbs (hence the term 'class markers'). Other verb classes exhibit different marking for these categories.

The elements in positions 16 through 14 (or, rather, the elements in other Mixtec languages that are cognate with these) are usually described as derivational prefixes and are written together with the verb core in descriptions of other Mixtec varieties (e.g., Macaulay 1996, Hollenbach & Erickson 2013). In the practical orthography of SMD we also opted to write these elements together with the verb.

Position 13 contains the productive causative marker *sá*, derived from the verb *sá'a* 'do, make'.

In position 12 we find the potential negation *i* and *o* ~ *u* and the general completive marker *ì*. These two elements can never co-occur, so it would also be possible to represent them in two adjacent slots (in either order). However, no evidence could ever be provided for favoring one order over the other; therefore we represent them together in one slot, since we have evidence for both of them that they are positioned between the modal markers and the causative. The potential negation can be marked either by *i* or *u*~ *o* – these two markers are completely interchangeable for every verb. We have not yet determined the rules of the allomorphy for *u*~ *o*. We hypothesize that historically the allomorphy was phonologically conditioned, such that verb cores with back vowels would have been marked with *o* and the rest with *u*. However, now we find exceptions to this rule, probably due to the lexicalization of certain combinations.

Position 11 consists of the elements *ná* and *nì*. We currently have only a limited understanding of their exact semantics and functions and we hope to investigate this issue more closely in the future. The element *ná* combines with the potential form of verbs and often appears in contexts of events that have not yet taken place but are desired to occur. This analysis fits well with what has been found for cognate forms in other Mixtec varieties, which have been described as marking deontic modality (Macaulay 1996: 76–78). It is thus quite probable that *ná* also has this function in SMD. The element *nì*, on the other hand, combines with the realis form of verbs, and it only occurs in completive contexts alternating with *ì*. Comparison with other Mixtec varieties is not as instructive in this case, because the completive is either marked with tone alone (e.g., San Martin Peras Mixtec), or only displays a marker *ni* (e.g., Chalcatongo Mixtec, cf. Macaulay 1996: 74–75). We take *ì* to be the basic, unmarked form, since it is more frequent and the one given in elicitation. We suspect that *nì* might mark deontic modality of past events, and so diachronically it might represent a combination of *ná* and *ì*. In the practical orthography, the modals are written as separate words; in Macaulay (1996)'s grammar they are written as a prefix (with a hyphen).

Positions 10 through 6 are fit out by the additive, the intensifiers, and the repetitive discussed above. Position 5 contains a zone with various adverbials, such as temporal ones like *vitxi* 'now, today' and *itxààn* 'tomorrow'; aspectual ones such as *xàà* 'already'; and adverbials expressing manner like *sa'a* 'like that', *và'a* 'good, well', among others. They can variably order with one another with no difference in meaning or scope.

Directly preceding this zone is the realis negation marker *kòó* in position 4. The focus position in 3 can contain an NP expressing an argument, but also non-arguments of any kind, e.g., prepositional phrases. In position 2 we find content question words, such as *nishi* 'how', *ntxáa* 'where', *yoo* 'who', etc. The first position contains conjunctions and connectors of various types, as well as the polar question marker *an*. This concludes the discussion of the positions before the verb core; we now move on to the positions after the verb core that have not been discussed.

Between the additive (in 18) and the intensifier (in 21) discussed above, there are two additional slots: one for the reciprocal marker *ta'an* in position 19, and one for *tuun* 'always, habitually' in position 20. We suspect that other adverbial expressions might be able to appear in the latter position, but we have not been able to find specific examples.[3]

After positions 21 through 24, we find *ini* which can be translated as 'inner core, being (of a person)'. This element is often obligatory with verbs denoting mental or emotional states or processes, such as *ntiku'un ini* 'remember', *kutátxí ini* 'be sad', or *koto ini* 'look at somebody from askance'.

In positions 26 and 27 we find the arguments of the verb, expressed either as full noun phrases or as pronouns. Both are unmarked, but the S/A argument must come first, before the P argument. Furthermore, independent pronouns can only occur as P arguments after the verb.

After the arguments, position 28 contains a zone with optional prepositional phrases, locatives, oblique arguments, adverbials, etc. These can variably with one another, thus the designation as a zone. The last position 29 contains discourse markers such as *ví* 'certain' and *ní* 'affirmative'.[4] To sum up, the verbal planar structure of SMD consists of 29 positions, 16 before the verb core and 12 after it.

It is instructive at this point to compare the planar structure for SMD with Macaulay (1996) proposed template for Chalcatongo Mixtec, the only other Mixtec variety for which constituency has been investigated. It should be noted, however, that this variety is spoken in the Mixteca Alta region and is not closely related to SMD. The template (based on hierarchical bracketing) includes a total of 12 positions, 7 before the verb and 4 after. We summarize her proposal

[3]For example, the semantically similar *taki* 'always' cannot appear in this position.

[4]Further research is needed to clarify the exact function of each of these markers. So the labels given here are preliminary.

below, combining the "basic sentence structure" with the "relative ordering of inflectional prefixes" (Macaulay 1996: 79, 146):

(6) $_{\text{TP}}$[[topic] $_{\text{S'}}$[[[neg.foc][foc]] neg=$_{\text{S}}$[$_{\text{V'}}$[(adv) (temp-comp-pl-)v (adv)] =add/res=pro (xp*)]]]

The examples below show different elements of Macaulay's template for Chalcatongo Mixtec. The examples in (7a) and (7b) show the preverbal positions of topic and focus, whereas (7c) and (7d) show the ordering of negation markers, adverbs, and the temporal and additive markers.

(7) a. *roʔo tú=kúʔu=ro*
2sg neg=be.sick=2sg
'As for you, you aren't sick.' (Macaulay 1996: 106)

b. *pero niasu xí̋ xʷấ tandaʔá=∅ či tándaʔá=∅ xí̋ péðrú*
but neg.foc with Juan marry=3sg because marry=3sg with Pedro
'But it isn't Juan who she's marrying, she's marrying Pedro.'
(Macaulay 1996: 123)

c. *sókó tú=šã̀ã̀ kű̃ñű̃=∅*
well neg=much deep=3sg
'The well is not very deep.' (Macaulay 1996: 120)

d. *ni-žéé=ka=rí takú ásu róʔó*
compl-eat=add=1sg taco than 2sg
'I ate more tacos than you did.' (Macaulay 1996: 141)

Her template is similar to ours in that there are more preverbal positions than postverbal ones. The positions of the focus marker and the realis negative marker also correspond quite closely to our findings. It is also similar in that it recognizes that certain elements can appear either before and after verb, although she simply groups them together as adverbs. Chalcatongo Mixtec also has an additive marker, but it is represented only once in Macaulay's template. It would be interesting to know whether its single occurrence in the template is due to differences between the markers or due to differences in the methodology of establishing templatic structures.

3 Phonological domains

In this section we discuss the diagnostics that identify phonological domains. Unlike what has been reported for other varieties of Mixtec (cf. Hunter & Pike 1969, Daly 1973, Macaulay 1996, Hollenbach 2003, among many others) and other Otomanguean languages (cf. Campbell 2024, Gutiérrez & Uchihara 2024, Nakamoto 2024 [this volume]), SMD exhibits few tonal processes and few general phonological rules.

We identify three phonological processes that apply to the verb complex, of which two concern segments and one concerns tone. These are: vowel overwriting, bimoraicity, and tone sandhi of dependent pronouns. The first two must be fractured into a minimal and maximal domain to render consistent spans, resulting in a total of five diagnostics. Throughout this section we also provide IPA transcriptions for the examples. These are given in square brackets underneath the orthographic representation. For tone representation we chose numbers rather than bars for better readability. The low tone is represented by 1, the mid tone by 3, and the high tone by 5.

3.1 Bimoraicity constraint (12-18, 1-27; 17, 1-28)

Mixtec varieties are known for their preference for bimoraic "prosodic words" (cf. Pike 1948, Penner 2019 on Ixtayutla Mixtec, and Uchihara & Mendoza Ruíz 2022 on Alcozauca Mixtec, among others). This means that free forms have a strong tendency to be bimoraic – that is, to have two vowels.[5] This is also the case in SMD, where lexical free forms minimally have the structure CVCV (e.g., *titi* 'paper'), CVV (e.g., *nùù* 'face'), CVʔV (e.g., *tù'un* 'word, language'), or VCV (e.g., *àsì* 'tasty').

There are two ways this general observations can be applied as a constituency diagnostic. It is important to note that the verb base, like any other lexical item, cannot be monomoraic, but rather has to be (at least) bimoraic. First, we can look at the smallest and largest spans that contains only monomoraic forms (excluding the verb base). These could be equated with larger "prosodic words", given that these spans contain only one bimoaric element, the verb base. Second, we can look at the smallest and largest span overlapping the verb base that contains bimoraic forms. These could be interpreted as the verb phrase since these spans contain multiple bimoraic forms.

We start with the span overlapping the verb base that contains only monomoraic elements (apart from the verb base which cannot be monomoraic). Here we discuss both the minimal domain (i.e. the smallest span) and the maximal domain (i.e. the largest span). As outlined above, wordhood in Mixtec is often associated with bimoraicity and thus the minimal span should correspond to what is termed

[5] Long vowels count as bimoraic, i.e. as two vowels.

a "phonological/prosodic word" in other descriptions (Uchihara & Mendoza Ruíz 2022, Penner 2019).

In SMD, the minimal monomoraicity diagnostic identifies the span from 12 through 18. Apart from the verb base, this span includes all the elements usually classified as prefixes and written together with the verb, as well as the additive marker *va* when it appears directly after the verb core. The additive marker in position 10 cannot be included in this span, because – as mentioned in §2 – it is left-leaning and thus cannot appear in this position without a preceding bimoraic element. Despite being monomoraic in form, the modals in position (11) must be excluded as well, because they cannot appear without a preceding clause linker (e.g., a subordinator or conjunction). Note also that this minimal domain excludes pronouns, so it can only be applied with imperatives and impersonal verbs, since all other verbs require at least one argument to be present to form a complete utterance (see §4.1 for more details). An example is provided in 8.

(8) *ì-tàan-va*
[i¹-tãː¹³-βa³]
12-17-18
CMPL-quake-ADD
'It quaked (after having quaked before).' elicited

The maximal interpretation of the monomoraicity diagnostic identifies the whole verbal planar structure to the exclusion of the last position in 28, which only contains bimoraic elements. An example is provided in (9) with a polar question and both A and P arguments realized as dependent pronouns.

(9) *An ì-tàshì-ùn-ña?*
[ã³ i¹-ta¹ʃi¹-ũ¹-ɲa³]
1 12-17-26-27
Q CMPL-crush-2SG.NHON-3.THING
'Did you crush it?' elicited

Next we will turn to the span overlapping the verb base in which all positions are filled with bimoraic elements. This diagnostic also has to be fractured into a minimal and maximal domain. The minimal domain is just the verb base in position 17 since, as mentioned above, it is always at least bimoraic. The maximal span covers the whole planar structure apart from the last slot (position 29) which contains monomoraic discourse markers - that is, the span runs from position 1 through 28.

Note that the maximal spans from both interpretations are almost identical. This, together with the fact that the minimal and maximal domains identify spans of vastly different sizes (1 and 7 vs. 27 and 28 positions), suggests that bimoraicity might not be an informative diagnostic for constituency in SMD.

3.2 Vowel overwriting after glottal stop (17-26; 6-29)

This diagnostic is based on a phonological process in which final vowels are replaced or overwritten by the initial vowel of the following element. More precisely, when an element of the structure $CV_iʔV_i$ is followed by a vowel-initial monomoraic pronoun, the final vowel of that element is replaced with that of the pronoun. Whether or not the nasality of the overwritten vowel is preserved depends on the pronoun (cf. Table 4). The rule is formalized below:[6]

(10) $(X)CV_iʔV_i{+}V_j \rightarrow (X)CV_iʔV_j$

Table 4: Vowel-initial dependent pronouns

Pronoun	Gloss	Nasality
ì	1SG	preserves nasality of base
ò	1PL.INCL	does not preserve nasality of base
un	2SG.NHON	always nasal
àn	3SG.F	always nasal
an	3SG.THING	always nasal

Instead of making reference to final vowels, this process could alternatively be described as targeting rearticulated vowels around the glottal stop. Tonal processes targeting this same domain are attested in Huajuapan Mixtec (Pike & Cowan 1967).[7] There are two reasons we do not adopt the rearticulation analysis. First, while in most cases the vowels around the glottal stop are identical, this is not always the case and with non-identical vowels it is difficult to imagine that we are dealing with rearticulation. Second, the descriptive facts remain the same whether we refer to the domain as "final vowel" or "rearticulated vowel".

Examples (11a) and (11b) show the rule applying to a noun and a verb, respectively. (11c shows that the process also applies when the vowels are non-identical

[6]X = additional syllable in trisyllabic words, either V or CV, e.g., *àsì'í* 'wife' or *txìya'à* 'gallon (container)'.

[7]We thank Taylor Miller for pointing us to this alternative analysis.

(with a different pronoun to make the process more visible). In examples (11d) and (11e), we see that the rule does not apply when the glottal stop is followed by a consonant.

(11) a. *yé'é* + *ì* ➔ *yé'-ì*
[ʒe^{5}ʔe^{5}] + [i^{1}] ➔ [ʒe^{5}ʔi^{1}]
door + 1sg ➔ 'my door'

b. *ìnù'ùn* + *ì* ➔ *ìnù'-ìn*
[i^{1}nu^{1}ʔũ^{1}] + [i^{1}] ➔ [i^{1}nu^{1}ʔĩ^{1}]
cmpl.go.home + 1sg ➔ 'I went home'

c. *ntxè'ì* + *un* ➔ *ntxè'-ùn*
[^{n}dʑe^{1}ʔi^{1}] + [ũ] ➔ [^{n}dʑe^{1}ʔũ^{1}]
clay + 2sg ➔ 'your (sg.) clay'

d. *ko'nto* + *ì* ➔ *ko'nto-ì*
[ko^{3}ʔ^{n}do^{3}] + [i^{1}] ➔ [ko^{3}ʔ^{n}do^{3}i^{1}]
bone + 1sg ➔ 'my bone'

e. *xá'ntxá* + *ì* ➔ *xá'ntxá-ì*
[ɕa^{5}ʔ^{n}dʑa^{5}] + [i^{1}] ➔ [ɕa^{5}ʔ^{n}dʑa^{5}i^{1}]
incmpl.cut + 1sg ➔ 'I'm cutting (sth.)'

There is one exception to this process: the back vowel [o] at the end of the base will overwrite [u] of a monomoraic element. Examples (12a) and (12b) illustrate the different vowel overwriting for back vowels with a noun and a verb base, respectively.

(12) a. *kò'ò[ko^{1}ʔo^{1}] + un [ũ] ➔kò'-òn [ko^{1}ʔ-õ^{1}]*
plate + 2sg.nhon ➔ 'your plate'

b. *ntó'o[^{n}do^{5}ʔo^{3}] + un [ũ] ➔ntó'-ón [^{n}do^{5}ʔ-õ^{5}]*
incmpl.suffer + 2sg.nhon ➔ 'you are suffering'

Vowel overwriting is observed with vowel-initial dependent pronouns (cf. Table 4) in position 26 following a CVʔV base, and with elements in position 22, such as the intensifier *ntxìvà'a* (cf. example 13b). Thus, the span from 17-26 provides positive evidence for this process, i.e. the minimal span.

Negative evidence, however, can only be found for slots/zones that contain elements of the relevant structure. Slots 13-16 can never provide any evidence for or against vowel overwriting: the elements found there do not contain a glottal stop, nor are any of the immediately following elements vowel-initial. Therefore we fractured the test so as to also include a maximal domain, to identify the span in which there is no negative evidence for vowel overwriting. This identifies a much larger span, ranging from position 6 through 28. Negative evidence can be found in position 5, with the adverbial *sa'a* 'like this/that' never taking part in this process (cf. (13c), and after position 29 at the clause boundary.

(13) a. *ta sáàn ì-sùvá'-ì ì-sísínì-va-ì*
[ta^{3} sãː^{51} i^{1}-su^{1}βa^{5}ʔ-i^{1} i^{1}-si^{5}si^{5}ni^{1}-βa^{3}-i^{1}]
1 5 11-17-26 11-17-18-26
and then cmpl-prepare-1sg cmpl-have.breakfast-add-1sg
'And then I prepared breakfast.' SMD-0009-Jardin

b. *lo'o ntxìvà'-ì ì-xì'ì nánà-ì tátà-ì*
[lo^{3}ʔo^{3} ^{n}dʑi^{1}βa^{1}ʔ-i^{1} i^{1}-ɕi^{1}ʔi^{1} na^{5}na^{1}-i^{1} ta^{5}ta^{1}-i^{1}]
17 22-26 12-17 26
be.small intens-1sg cmpl-die mother-1sg father-1sg
'I was very little when my mother and father died.' SMD-0059-Padres

c. *ta sa'a sa'a ì-nto'-án*
[ta^{3} sa^{3}ʔa^{3} sa^{3}ʔa^{3} i^{1}-^{n}do^{3}ʔ-ã^{5}]
1 5 5 12-17-26
and like.that like.that cmpl-happen-3sg.f
'And like that like that it happened to her.' SMD-0047-Cena

In other varieties, this process applies to a wider range of bases, e.g., in Alcozauca Mixtec (Uchihara & Mendoza Ruíz 2022). In SMD, there is also a more general process of vowel overwriting, but it follows different rules. In connected speech, the first person plural inclusive marker *ò* often overwrites a final [a] or [u] of the preceding element. However, when asked to repeat the forms, speakers will undo this overwriting, e.g., *kaxá'an-v-ó* [eat-add-1pl.incl] 'we will eat', which is repeated back as *kaxá'an-va-ó*. This never happens with the pronoun overwriting process described above. In fact, examples like **ì-sùvá'a-ì*, repeated from (13a) but with the final vowel restored, are deemed ungrammatical. Because the more general process is largely dependent on register and speech tempo, we do not discuss it further.

3.3 Tonal processes (17-27)

This diagnostic concerns the tonal changes triggered by the tone of adjacent elements and it excludes the tonal marking of inflection, which is discussed in §4.2. In SMD, tonal processes are quite rare, and in verbal predicate constructions they appear to be limited to dependent pronouns.

Dependent pronouns show interactions with their host with regard to their tonal realizations, i.e., they exhibit tone sandhi. These interactions fall into four groups and are summarized in Table 5. It is important to underscore that the tone sandhi processes identified are only observed with dependent pronouns and do not operate elsewhere in the language. Dependent pronouns in Group 1 do not exhibit tone sandhi and thus will not be discussed further. Group 2 consists of only one pronoun – 'second person non-honorific' *un* – which copies the tone of the preceding element. Groups 3 and 4 show alternations in similar contexts, but with different realizations. A detailed investigation and description of the sandhi patterns lies outside the scope of this chapter. Our observations so far indicate that the tone realizations are not only sensitive to the phonological characteristics of the preceding element, but also to its word class.

Table 5: Dependent pronouns and their tone realizations

Group	Generalization	Pronouns
1	no tone changes	1sg *ì*, 2sg.hon *ní*
2	tone copying	2sg.nhon *un*
3	L alternating with H	1pl.incl *ò*, 3sg.f *àn~ñà*, 3.anim *rì*, 3.wood *dùn*
4	L alternating with M	1pl.excl *ntì*, 3sg.m *rà*, 3pl *nà*

The tone sandhi diagnostic is applied so that it identifies the span overlapping the verb core, which contains the elements triggering tone sandhi on dependent pronouns. Given that dependent pronouns can never appear before the core – except in focused NPs, which are not discussed in this chapter – the left-most element they can interact with is the verb core. Examples (14a) and (14b) show that the verb core indeed triggers tone sandhi on the dependent pronoun *un* 'secon person singular non-honorific'.

(14) a. *ta* *sa'a* *káchí-ún*
[ta^3 sa^{3}ʔa^3 ka^{5}tʃi^5-ũ^5]
1 5 17-26
and like.that incmpl.say-2sg.nhon
'And that's how you say it.' SMD-0047-Cena

b. *vitxi* *ì-kixà-ùn* *yó'o*
[βi^{3}tɕi^3 i^1-ki^{3}ɕa^1-ũ^1 ʒo^{5}ʔo^3]
5 12-17-26 28
now cmpl-arrive-2sg.nhon dem.prox
'Now you arrived here (...).' SMD-0047-Cena

Tone sandhi can also be observed with elements in positions 21 to 25, illustrated by the tone realization of *un* in examples (15a) and (15b). Elements in positions after the pronouns do not influence the tone realizations of pronouns. In examples (15a) and (15c) the tone realization of the dependent pronoun *un* is the same regardless of the tone of the element following it.

(15) a. *su* *ì-kuntàà* *ini-un* *guerítá*
[su^3 i^1-ku^{3n}da:^{11} i^{3}ni^3-ũ^3 we^{3}ɾi^{5}ta^5]
1 12-17 25-26 27
but cmpl-understand inside-2sg.nhon white.person
'But you understood *güerita* (light-skinned girl).' SMD-0047-Cena

b. *ta* *sáàn* *nì* *ì-sàma* *ntxìvà'-ùn*
[ta^3 sã:^{51} ni^1 i^1-sa^{1}ma^3 ^{n}dʑi^{1}βa^{1}ʔ-ũ^1]
1 5 11 12-17 22-26
and then mod cmpl-change intens-2sg.nhon
'And so you've changed a lot.' elicited

c. *su* *ì-kuntàà* *ini-un* *shìtà*
[su^3 i^1-ku^{3n}da:^{11} i^{3}ni^3-ũ^3 ʃi^{1}ta^1]
1 12-17 25-26 27
but cmpl-understand inside-2sg.nhon tortilla
'But you understood *shìtà* (tortilla).' elicited

Dependent pronouns used as P-arguments also exhibit tone sandhi, as illustrated in examples (16a) and (16b).

(16) a. *ta* *sáàn* *jààn* *chikàà-ò-ña*
[ta^3 sã:^{51} hã:^{11} tʃi^{3}ka:^{11}-o^1-ɲa^3]
1 5 3 17-26-27
and then dem.dist pot.put(invisible)-1pl.incl-3.thing
'and so we'll put it in' SMD-0020-Huauzontle

b. *ta* *sááni* *chikàà-na-ñà*
[ta³ sãː⁵⁵ni³ tʃi³kaː¹¹-na³-ɲa¹
1 5 17-26-27
and also POT.put(invisible)-3PL.HUM-3.THING
kuchúun-na-ñà *jí'in-ña*
ku³tʃũː⁵³-na³-ɲa¹ hi⁵ʔĩ³-ɲa³]
17-26-27 28
POT.use-3PL.HUM-3.THING with-3.THING
'And also they put it in and use it with that.' SMD-0008-Hierbas

This diagnostic thus identifies a span from position 17 through 27.

3.4 Spans identified by phonological domains

Table 6 summarizes all the phonological diagnostics and their results. None of the spans converge, but two of them start at the verb core and two of them end at the P-argument slot. Given how much importance is ascribed to the bimoraic minimality constraint to identify prosodic/phonological words in Mixtec, we would have expected that it correlates much more with the other phonological domains. The absence of such convergences might indicate that bimoraicity does not play an important role for phonological constituency in SMD.

Table 6: Phonological diagnostics and their results

Diagnostic	Fracture	Left Edge	Right Edge	Size	Section
Bimoraicity	min	12	18	7	3.1
Bimoraicity	max	1	27	27	3.1
Vowel overwriting	min	17	26	10	3.2
Vowel overwriting	max	4	28	24	3.2
Tone sandhi	-	17	27	11	3.3

4 Indeterminate domains

In this section, we discuss the spans identified by diagnostics that could either be interpreted as phonological or morphosyntactic, depending on the theoretical background and morphemic analysis. They involve two diagnostics: free occurrence and deviations from biuniqueness.

4.1 Free occurrence (17; 14-27; 11-27)

Free occurrence is defined as the ability of an element to stand alone as a complete utterance. There are two interpretations of this diagnostic: we can look for the smallest (minimal) and largest (maximal) span that fulfills this criterion.

In the minimal interpretation, this diagnostic identifies the shortest span overlapping the verb core that can be single free forms. In SMD, imperatives and impersonal verbs can be used on their own as a single free form. They are marked for aspect-mood by tone but appear without any further segmental marking or person indexing (cf. examples (17a) of an impersonal verb and (17b) of an imperative). The diagnostic thus identifies just the verb core in position 17.[8]

(17) a. *táan*
17
INCMPL.quake
'There's an earthquake (lit: [it] is quaking).' elicited

b. *kà'àn*
17
POT.speak
'Speak!' elicited

In the maximal interpretation, this diagnostic identifies the longest span overlapping the verb core that can be a single free form. In SMD, the application of this test results in two different spans, depending on the interpretation of the causative formative *sá*. In the following, we will illustrate the issue and present the competing results.

The causative marker *sá* in position 13 is clearly related to the verb *sá'a* 'do, make'. There are two possible analyses here: i) the causative can be analyzed as a shortened form of *sá'a*, given that forms of the structure CVʔV regularly contract to CV(V) in connected speech;[9] or ii) the causative marker *sá* is a separate element that is only diachronically related to the verb *sá'a*. There is evidence for either interpretation and it is not clear *a priori* which interpretation is the correct one.

If the causative marker *sá* is taken to be a shortened form of the verb *sá'a* – a free form – and thus the same element, then the left edge of the construction is at position 14, i.e. right after the causative. If the causative marker *sá* is taken

[8]Note that a (non-imperative, non-impersonal) declarative verb cannot stand on its own as a complete utterance, but minimally appears with an S/A argument.

[9]Macaulay (1987) calls this "fast speech reduction".

to be a separate element from the verb *sá'a*, then the left edge of the span is at position 11. All positions after that and before the verb core have elements that are not free forms.

The right edge of the span is not affected by this issue and is in either case at position 27, i.e. it ends with dependent patient pronouns. Note that the full span can only be realized if no elements in positions 19 and 22 are present, since these are free forms. However, none of these forms is obligatory. In addition, due to an asymmetry in local versus non-local arguments, this only applies to third person patients, since first and second person patients have to be expressed by an independent (free) pronoun. Some examples of *long* free forms (indicated with square brackets) from naturalistic speech are provided in examples (18a) to (18c).

(18) a. *ta ikán [sá-ntxitxà-ntò-an]*
1 5 13-17-26-27
and there CAUS-melt-2PL-3.THING
'And then they dissolve it (…)' SMD-0033-Espiritus

b. *kuíì-rì chii saa [ì-kintxaa-va-ì-rì]*
17-26 1 5 12-17-18-26-27
green-3 because like.that CMPL-take.away-ADD-1SG-3
'They are green because I just cut them.' SMD-0062-Juana

c. *sa'a-va koo-rà ta xàà [na*
5-24 17-26 1 5 11
like.that-ADD POT.stay-3SG.M and already MOD
chikàà-ì-ra] …
17-26-27
put(invisible)-1PL.INCL-3SG.M
'It [the dried chili] will stay like this and then when I add it [to the pot] (I will add a bit more water to it)' SMD-0020-Huauzontle

4.2 Deviations from biuniqueness (17; 13-17; 15-17; 12-23)

In this section, we discuss instances of deviations from biuniqueness, i.e. cases in which there a deviation from a one-to-one form-meaning correspondence. Such deviations have been associated with morphological structure or word-internal structure. In SMD, we find two types of deviations from biuniqueness: one form that codes multiple meanings (one-to-many), and multiple forms that express the same meaning (many-to-one). The latter is more commonly found in the verbal planar structure of SMD than the former. This diagnostic can be applied in two ways, a minimal fracture, identifying the smallest span overlapping the verb core that exhibits deviations from biuniqueness, and a maximal fracture, which identifies the largest span that can show deviations.

As mentioned in §2, SMD verbs fall into inflectional classes. The aspect-mood exponents of these inflectional constitute many-to-one deviations. While the completive form is always marked with a preverbal element *ì* or *nì*, the incompletive and potential forms are often only marked by tone, the former showing a characteristic high tone on the first mora. The minimal interpretation of this diagnostic identifies the shortest span where tonal inflection can be observed. This consists of just the verb core in position 17 (cf. Table 7).

Table 7: Verbs (position 17) showing tonal inflection of different inflectional classes

INCMPL	CMPL	POT	Gloss	Class
tívi	*ìtìvi*	*tìvi*	'wake up'	INCMPL high
xú'ní	*ìxu'ní*	*ku'ní*	'squeeze'	INCMPL high with stem alternation
íin	*ìxòo*	*koo*	'live, stay'	INCMPL high with suppletion
núná	*ìnùnà*	*nùnà*	'be open'	INCMPL with both morae high
kaì	*ìkàì*	*kàì*	'burn'	INCMPL mid
kuà'àn	*ìxà'àn*	*kù'ùn*	'go'	segmental alternation only

There is also a maximal interpretation of this diagnostic, which identifies the largest contiguous span overlapping the verb base that exhibits tonal inflection. In addition to the verb core, tonal inflection can also occur on the transitivizer marker *chi* and the iterative marker *nti/nta*, but not on the inflectional class markers *ku* and *xì*, nor on the causative marker *sá* (see Table 8 for examples). However, there are other positions that exhibit many-to-one relations. The maximal span of this diagnostic is, therefore, larger than that identified by tonal inflection.

The maximal domain identified by the many-to-one deviation ranges from position 12 to 23. The potential negation has three allomorphs: whether a verb takes *u* or *o* is lexically determined, but all verbs can alternatively take *i*, without any difference in meaning. After the verb base, this type of deviation from biuniqueness can be found in the adverbial *tiki~ti* in position 23. Examples (19a) to (19c) show such a span with three different forms, but with the same meaning.

[10]Examples are given with morpheme segmentation for convenience. Abbreviations: invis. = invisible; there are several 'put'-verbs depending on whether the object is being placed inside of a container and thus becomes invisible, or remains visible after relocating it.

Table 8: Causative, iterative, and derived verbs showing tonal inflection[10]

INCMPL	CMPL	POT	Meaning	Morphemes
chí-ntoo	*ì-chi-ntoo*	*chi-ntoo*	‘put down,	CAUS-be
16-17	12-16-17	16-17	stack’	
ntá-koto	*ì-nta-koto*	*nta-koto*	‘mend’	ITER-take.care
15-17	12-15-17	15-17		
ntá-chi-kàà	*ì-nta-chi-kàà*	*nta-chi-kàà*	‘put again’	ITER-CAUS-put(invis.)
15-16-17	12-15-16-17	15-16-17		
sá-keta	*ì-sá-keta*	*sá-keta*	‘finish sth.’	CAUS-put
13-17	12-13-17	13-17		
naní	*ì-xì-naní*	*ku-naní*	‘be called,	
17	12-14-17	14-17	be named’	

(19) a. *u-ka’ntxa-ti-un* *shìnì ntá’-ùn*
12-17-23-26 27
NEG.POT-cut-again-2SG.NHON head hand-2SG.NHON
‘Don’t cut your finger again!’ elicited

b. *i-ka’ntxa-ti-un* *shìnì ntá’-ùn*
12-17-23-26 27
NEG.POT-cut-again-2SG.NHON head hand-2SG.NHON
‘Don’t cut your finger again!’ elicited

c. *i-ka’ntxa* *tiki-un* *shìnì ntá’-ùn*
12-17 23-26 27
NEG.POT-cut again-2SG.NHON head hand-2SG.NHON
‘Don’t cut your finger again!’ elicited

The spans identified in this way do not coincide with those identified by the one-to-many deviations, which means that this diagnostic has to be fractured by type of deviation from biuniqueness and then further into a minimal and maximal domain for each.

The smallest span overlapping the verb core that exhibits one form with multiple meanings (one-to-many) is just the core in position 17. There is a small class of verbs that have the same form in the incompletive and potential, as illustrated in Table 9 and examples (20a) and (20b). The largest span that can exhibit this type of deviation from biuniqueness runs from the causative marker *sá* in position 13 to the verb core in position 17, cf. examples (20c) and (20d).

(20) a. *ta nishi sá'a-ntó ntoo-ntò vitxi*
1 2 17-26 17-26 28
and how INCMPL.do-2PL POT.live-2PL today
'And how do you (pl.) manage (lit.: do it) to live today?'
SMD-0059-Padres

b. *kòó xínì-ì nishi sá'a-ra káa*
4 17-26 2 17-26
NEG.REAL INCMPL.know-1SG how POT.do-3SG.M DEM
'I don't know how he is going to do it.' SMD-0062-Juana

c. *míí-ní mámà sánto'o-ní míí-ní*
3 13.17-26 27
TOP-2SG.HON mother CAUS.suffer-2SG.HON TOP-2SG.HON
'You (pl.), mother, you're making yourself suffer.' SMD-0059-Padres

d. *kòó kúnì-ì sánto'o-ní*
4 17-26 13.17-26
NEG.REAL INCMPL.want-1SG CAUS.suffer-2SG.HON
'I don't want you (pol.) to suffer.' elicited

Table 9: Verbs with identical forms in the potential and incompletive (one form – multiple meanings)

INCMPL	CMPL	POT	Gloss
sá'a	*ìsá'a*	*sá'a*	'do, make'
nù'ùn	*ìnù'ùn*	*nù'ùn*	'leave, go home'
xàà	*ìxàà*	*xàà*	'rot, decompose'
sá-nta-kàà	*ì-sá-nta-kàà*	*sá-nta-kàà*	'spread out'
13-15-17	12-13-15-17	13-15-17	

4.3 Spans identified by indeterminate domains

In Table 10, we summarize the results of the diagnostics that could be interpreted as phonological or morphosyntactic. There is one convergence that concerns the verb core: the minimal free form and the minimal domain showing one-to-many correspondences both target this span. Otherwise, there are no convergences, but note that the right edge is in many cases at the verb core. For deviations of biuniqueness, this fits well with the idea that Mixtec languages are prefixing, i.e. the verbal "word" includes a few prefixes and the core, but everything after would be syntactical.

Table 10: Indeterminate diagnostics and their results

Diagnostic	Fracture	LeftEdge	RightEdge	Size	Section
Free occurence	min	17	17	1	4.1
Free occurence	max – *sá* = *sá'a*	14	27	14	4.1
Free occurence	max – *sá* ≠ *sá'a*	11	27	17	4.1
Dev. biunique.	min – one-to-many	17	17	1	4.2
Dev. biunique.	max – one-to-many	13	17	5	4.2
Dev. biunique.	min – many-to-one	15	17	3	4.2
Dev. biunique.	max – many-to-one	12	23	12	4.2

5 Morphosyntactic domains

In this section, we discuss the spans identified by morphosyntactic diagnostics. We have identified five types of diagnostics.

5.1 Non-interruptability (14-20; 11-20; 3-25)

Non-interruptability identifies the span overlapping the core that cannot be interrupted by a free form (as defined in §4.1). In SMD, as in many other languages, this diagnostic identifies differing spans if the interrupting element is taken to be one single free form or a complex free form, such as a noun phrase.

The result of the non-interruptability diagnostic with a single free form depends on the interpretation of the causative element *sá* as either a form of the verb *sá'a* or as a separate formative (cf. the discussion in §4.1). If the causative is taken to be a form of the verb *sá'a* it constitutes a free form and the left edge of the span is right before it at position 14. If taken to be a separate element and thus a bound form, the leftmost boundary occurs at position 11. This is because the intensifiers/adverbials in 9 can stand on their own, for (when answering a question, and the following additive marker in position 10 can never appear without them. The reduction of bimoraic forms in connected speech is a well-known phenomenon in Mixtec languages (Pike 1945, Macaulay 1987, Uchihara & Mendoza Ruíz 2022).[11]

[11]It is often referred to as "fast speech reduction" but the opposition we find has more to do with connected speech (as it occurrs in conversations and narratives) versus forms spoken in isolation or carefully (as is common in elicitation) and we see the difference in speech tempo as emerging from that.

The other elements in positions 14 through 15 are all bound. The rightward boundary of the span is in both interpretations at position 20, since the reciprocal marker *ta'an* cannot be used as a free form without a verb core.

The non-interruptability diagnostic with a complex free form with internal structure (e.g., a noun phrase) identifies a large span covering most of the verbal planar structure. The left edge is at position 3, because whole NPs can be focused. On the other side, the span ends at position 25, before the argument slots, which can be fit out by complex NPs.

5.2 Non-permutability (5-19)

The non-permutability diagnostic targets the span overlapping the core that contains elements that cannot be variably ordered. As with other diagnostics, it has more than one interpretation. It can be taken to include only elements that appear in one position exclusively or it can be taken to also include elements that can variably order and produce differences in scope. Since the latter is (so far) not attested in SMD, this diagnostic does not have to be fractured. Non-permutability thus identifies the span overlapping the core containing only positions whose elements cannot be variably ordered (while meaning remains the same).

The elements in slots 6 through 16, which appear before the verb, cannot variably order and are fixed in their position. The adverbials in position 5, however, can appear in either order with no difference in meaning. This is illustrated in the examples (21a) and (21b) with *sa'a* 'like this' and *xàà* 'already'. The adverbials in position 5 thus mark the leftward boundary of this span.

(21) a. *taa ikán xàà sa'a-va ntáa míí iti-nà*
1 3 5 17 26
and DEM.PROX already like.that-ADD be TOP cornfield-3PL.HUM
ikán

DEM.PROX
'... And here, their cornfield is already like this here.' SMD-0057-Tierra

b. *taa ikán sa'a xàà-va ntáa mii iti-nà*
1 3 5 17 26
and DEM.PROX already like.that-ADD be TOP cornfield-3PL.HUM
ikán

DEM.PROX
'...And here, their cornfield is already like this here.' elicited

Of the elements after the verb base, most can also appear before it, i.e. they can variably order with it. This does not apply to the reciprocal *ta'an* in position 19, which constitutes the rightward boundary of this span. The reciprocal cannot variably order with other elements after the verb base either. Examples which illustrate this point are provided in (22) (partially repeated from §2).

(22) a. *chíntxeé ta'an tóntó ntxìvà'a-na*
INCMPL.help RECP INTENS INTENS-3PL.HUM
'They really help each other a lot.' elicited

b. * *chíntxeé tóntó ta'an ntxìvà'a-na* elicited

c. * *chíntxeé tóntó ntxìvà'a ta'an-na* elicited

d. * *ta'an chíntxeé tóntó ntxìvà'a-na* elicited

5.3 Ciscategorial selection (16-17; 17; 4-23)

An element which is Ciscategorial is one that exclusively combines with bases of a specific part of speech. In this chapter we are concerned with selectivity in relation to verbs. We ask what the span is that contains only ciscategorial elements or what the largest span is that contains ciscategorial elements on its left and right edges, the difference resulting in a minimal/maximal test fracture. The minimal interpretation of this diagnostic identifies the span overlapping the core in which all elements are ciscategorial with the core, i.e. they only combine with verbs. In SMD, this the minimal domain only identifies the verb core in position 17, because the elements in positions immediately before and after are both transcategorial. The additive, as explained in §2, also combines with nouns. The transitivizer *chi* in position 16 seems to also combine with nouns, cf. Table 11. However, one can observe that the tone patterns in the resulting verb form are not the same as in the base form with both noun bases: When *chi* combines with a verb base, the tones remain the same, but when it combines with noun bases, the tones of the bases all are raised one level. One possible analysis is that *chi* does not combine with noun bases in these cases, but with tonally derived verbs. This would make it ciscategorial, rather than transcategorial.[12] Such tonal derivations do occur in other parts of the grammar of SMD, for example in the derivation of adjectives from nouns with high tone (e.g., *ìshí* 'hairy' from *ishì* 'hair'). However, the phenomenon is not sufficiently well studied to resolve the matter in this chapter. We thus fracture the minimal domain further, into a fracture in which we consider *chi* ciscategorial and one in which we consider it transcategorial. In the former

[12]We would like to thank Eric W. Campbell for pointing this out to us.

interpretation, the minimal span ends at position 16, since the iterative marker *nta/nti* combines with adjectives and verbs without a change in the tone pattern of the base. In the latter interpretation, the span consists of only the verb core in position 17.

Table 11: Examples of *chi* combining with different bases

Form	Gloss	Base	Word class of base
chiñú'ún	worship sb.	*ñu'un* 'fire'	noun
chíko'vá	measure sth.	*kò'va* 'size, amount'	noun
chíkanii	stop sth.	*kanii* 'hit'	verb

The maximal ciscategorial selection diagnostic identifies the largest span overlapping the core that can contain elements ciscategorial with verbs. The left edge of this span is at position 4, since many elements that can appear in the focus slot are transcategorial. The last ciscategorial element on the right edge is the adverbial *tiki* 'again' in position 23. All elements after that are transcategorial. The element *ini*, for example, can also be used with nouns as a preposition 'inside/in'. The dependent pronouns that appear in position 26 can also be used as possessors with nouns.

5.4 Subspan repetition (12-15, 12-26; 7-25, 4-28, 2-29, 1-29)

In this section we discuss subspan repetition, i.e. constructions in which the verb core and possibly other elements of the verbal planar structure are repeated. For each construction or construction type, we identify which elements can have scope over both conjuncts (or, more technically, repeated subspans) and which cannot. The minimal interpretation of this diagnostic identifies the smallest span overlapping the verb core that contains elements that cannot have wide scope. We have only found wide scope so far with dependent pronouns in position 26, temporal modifiers such as *vitxi* 'now, today' and *xìna'á* 'long ago' in position 5, content questions in position 2 and at least some of the connectors in position 1. In the maximal interpretation, we consider the largest span of structure that can be conjoined, ignoring the possibility of wide-scope. The maximal spans identified by this diagnostic are different for each of the constructions we discuss. This test thus has to be fractured into 8 diagnostics (4 constructions with 1 minimal and 1 maximal domain each).

We start with a construction in which a verb is immediately followed by another verb without overt marking of the linkage. We refer to this construction as asyndetic verb-verb linkage (AVVL). Macaulay (1996: 154–155) discusses this construction in the context of sentential complements. This fits well with our data: we have only observed this type of subspan repetition with the second verb being used as an argument of the first verb. While juxtaposition of clauses is often associated with parataxis, in languages like Mixtec (and most other Otomanguean languages) which lack non-finite verb forms, this association of juxtaposition with parataxis is less obvious. We have not systematically investigated prosody or morphosyntactic restrictions of the repeated subspan, but it is quite possible that such a study would reveal that they are 'subordinated' according to at least some criteria (cf. Palancar 2012 for a detailed study on Otomi).

The largest span that can be repeated in asyndetic linkage includes the verb up to the S/A-argument in position 26. The P-argument in position 27 cannot be repeated in AVVL and thus constitutes the right edge of this diagnostic. This is not surprising given that the second verb functions as the P-argument of the first, so this position is already occupied, cf. (23. The left edge is at position 13, because the potential negation can be repeated in the complement clause, as illustrated in (23b. Elements before the potential negation cannot be repeated. Thus the maximal span in AVVL runs from position 12 to 26.

(23) a. *távà* *na* *kua'nu* *kîì-àn* *[chii* *xàà*
1 11 17 20-26 1 5
so.that MOD POT.grow soon-3.THING because already
kúnì-ì *[kaxi-ì-ñà]]*
17-26 17-26-27
INCMPL.want-1SG POT.eat-1SG-3.THING
'So that it grows soon because I want to eat it already.'
SMD-0009-Jardin

b. *[ntúta'a-ntó* *[ukuná-nto* *ve'e]]*
17-26 12.17-26 27
INCMPL.should-2PL NEG.POT.open-2PL house
'You (pl.) should not open your house.' elicited

Of the elements included in the maximal AVVL span, only the S/A arguments in position 26 can have wide scope, as illustrated in examples (24a) and (24b). The minimal domain is thus only one position smaller than the maximal one.

(24) a. *ntúta'a-ntó* *kuná-nto* *ve'e*
17-26 17-26 27
INCMPL.should-2PL POT.open-2PL house
'You (pl.) have to open your house.' SMD-0048-Mayordomia

b.	*ntúta'an*	*kuná-nto*	*ve'e*
	17	17-26	27
	INCMPL.should	POT.open-2SG	house

'You (pl.) have to open your house.' elicited

The second type of subspan repetition that we report concerns syndetic linkage with conjunctions in position 1. We first briefly discuss *ña* 'that', because there are some additional considerations to take into account. The comparable marker *xa*[13] in Chalcatongo Mixtec is described as a subordinator optionally marking sentential complements in purpose, result and relative clauses (Macaulay 1996: 153–160). Based on a preliminary survey of our corpus, *ña* appears to cover the same functions in SMD. Unlike Chalcatongo *xa*, however, in SMD there are several elements of the form *ña* with different functions and probably different historical origins (see Ventayol-Boada 2021 for an analysis of the origins of third person pronouns and relativizers in SMD). In Table 12, we provide an overview of our current analysis, in which we identify two historical sources for five different *ña* elements, which can be considered synchronically distinct. In this section, we are only concerned with *ña* as a marker of clause linkage, which we gloss as complementizer for lack of a better label.

Given that *ña* is highly generalized and as a linker and seems to have no semantic content, we think it's most reasonable to see it as a shortened form of *ña'a* 'thing', which has a very general meaning itself. Note also that the two historical sources have different tone patterns (mid-low for 'woman' and low-mid for 'thing'), which might help separate the *ña* elements from each other. While we cannot provide a detailed analysis of the tonal realizations of these elements yet, we do observe that the *ña*-marking subordinate clauses always seems to have low tone – confirming that *ñà'a* 'thing' is a probable source.

Further complications arise because *ña* is also used to modify nouns[14], and it can at times be difficult to tell whether in a given context it introduces a subordinate clause or is modifying a noun. One such example is provided in (25), where the clause introduced by *ña* could be interpreted as modifying the verb core or the NP 'twenty years' (e.g., 'It has been twenty years in which I didn't travel at all.'). We exclude such examples from the discussion here.

[13]This form is not cognate with *ña*. For details on the distribution of the two forms in other Mixtec varieties see Hollenbach & Erickson (1995)

[14]Whether these constructions should be referred to as relative clauses or nominalizations is an open question outside the scope of this chapter.

Table 12: Current analysis of *ña* elements and their sources

Element	Probable source
3sg.f dependent pronoun, allomorph of *àn*	*ña'à* 'woman'
clf.3sg 'classifier' for female beings	*ña'à* 'woman'
3sg.thing dependent pronoun, allomorph of *àn*	*ñà'a* 'thing'
clf.thing 'classifier' for things and abstract nouns	*ñà'a* 'thing'
compl marker for subordinate clauses	*ñà'a* 'thing'

(25) *ì-xinu oko kuià [ñà kòó xa'a-va-ì níí]*
12-17 28 1 4 17-18-26 28
cmpl-run twenty year compl neg.real pot.travel-add-1sg completely
'It has been twenty years that I didn't travel at all.' SMD-0059-Padres

The maximal span that can be repeated in *ña*-linkage is different from that of asyndetic linkage, resulting in a test fracture. It runs from position 4 to 28, illustrated in examples (26a) and (26b). Content question markers, focused constituents and discourse markers cannot appear in ña-linkage. The minimal span excludes S/A-pronouns and temporal adverbials in position 5, since these have wide scope. The additive in position 24, however, can only appear there if preceded by an adverbial. The left edge of the minimal span is thus at position 7.

(26) a. *ta xàà kivi [ñà chikà-ò kò'ò]*
1 5 17 1 17-26 27
and already incmpl.be.able compl pot.put(invisible)-1pl.incl plate
ta xàà kaxá'an-v-ó
1 5 17-18-26
and already pot.eat-add-1pl.incl
'And already we are able to set out the dishes and eat.'
SMD-0005-ArrozAmarillo

b. *ìchikàà ini-nà [ñà kòó kúnì míí-nà*
12-16.17 25-26 1 4 17 26
cmpl.put(invisible) inside-3pl compl neg.real incmpl.want top-3pl
kà'àn-va-na]
17-18-26
pot.speak-add-3pl
'They insist on not wanting to speak it.' SMD-0049-Medicinas

SMD also has other types of clause linkage markers in the same position, such as *távà* 'so that, in order to', *chii* 'because', *soo/suu* 'but', *ñàkán* 'so, for that reason', etc. A detailed study of each one of these markers lies outside the scope of this study and we thus treat them all together under the label of linkage with conjunctions.

The maximal span identified in this construction differs from that of asyndetic and *ña*-linkage. It includes all positions except the first position (other connectors cannot co-occur with conjunctions) and the last position, which contains discourse markers. The span thus runs from position 2 to 28, illustrated in examples 27a and 27b. We thus need a further test fracture to account for this. Within this span, the leftmost element that can have wide scope are temporal adverbials in position 5. The additive following them in position 10, however, cannot appear without them, which means that the left edge of the minimal span is at position 7. The right edge is at position 29, since S/A-arguments cannot have wide scope in this construction.

(27) a. *kù'ùn-nti* *ka'anxa-nti* *ntoo* *tíempo vitxi [chi*
17-26 17-26 28 1
POT.go-1PL.EXCL POT.cut-1PL.EXCL INCMPL.be time now because
tava-ǹa *ḿośo* *ví]*
17-26 27 29
POT.take.out-3PL worker DM
'We will go cut sugar cane around that time because they get the workers then.' SMD-0053-Carretera

b. *(...)* *[chi* *kaxi-v-ó* *ñà* *yó'o] [tí*
1 17-18-26 27 1 5
because POT.eat-ADD-1PL.INCL CLF.THING here if good
và'a *xáxí-ò-ñà] [su*
1726-27 1 1
INCMPL.eat-1PL.INCL-3SG.THING but if
[tí *kuntasí-ti-ó]*
17-23-26 5
POT.be.closed-again-1PL.INCL then
sáàn *kuìta-va-n]*
17-18-27
POT.throw.away-ADD-3SG.THING
'(We remove all the feathers from the chicken's head) because we eat this [part of the chicken's head] here, if we like to eat it, but if it puts us off, we will throw it away.' SMD-0046-Pollo

Clauses can be coordinated with the general connector *ta* 'and' and with the disjunctive marker *an* 'or'. The maximal interpretation of this diagnostic identifies the whole planar structure, i.e. positions 1 to 29. This is a different span than identified by any of the other constructions, which means we have to fracture this diagnostic further. Two examples of large coordinated spans are provided in (28a) and (28b). As mentioned above, only few elements in SMD can have wide scope. The minimal diagnostic with coordination thus identifies the same span as linkage with conjunctions described above – that is the span from position 7 through 29.

(28) a. *[ta kòó kuntaa ini-rà ní] [ta ukivi*
1 4 17 25-26 29 1 12.17
and NEG.REAL understand inside-3SG.M DM and NEG.POT.can
ka'an-rà ní]
17-26 29
POT.speak-3SG.M DM
'He doesn't understand and he doesn't want to speak.' elicited

b. *[ntxáa kù'ù-àn] [ta ñama ntxikokò-àn ñuu]?*
2 17-26 1 2 17-26 28
where POT.go-3SG.F and when POT.return-3SG.F village
'Where is she going and when will she come back to the village?' elicited

We note that all the minimal spans apart from AVVL are identical. This is due to the already mentioned scarcity of forms that can have wide scope. We will consider all the minimal spans as one diagnostic. The reason for this is that they are not independent from each other, since for each subspan repetition construction which has a maximal domain that includes all wide-scope elements, the minimal domain will give the same result. In a sense, it does not tell us anything specific related to the construction. Further research and comparison with other languages is needed to investigate how cases like this one are best treated in the planar-fractal method.

5.5 Spans identified by morphosyntactic domains

We summarize all the morphosyntactic diagnostics and their results in Table 13. Four of the minimal domains converge, but this is because they only identify the verb core, which is rather uninformative. None of the larger spans converge. However, two of the maximal subspan repetition diagnostics differ by only one position at the left edge. Furthermore, we can see that many of the spans end at the verb core. This is not surprising given that at least some of those diagnostics (like ciscategorial selection and tonal inflection) are targeting "words" (rather than "phrases").

Table 13: Morphosyntactic diagnostics and their results

Diagnostic	Fracture	MinMax	Left Edge	Right Edge	Size
Non-interrupt.	simplex, *sá* = *sá'a*	min	14	20	7
Non-interrupt.	simplex, *sá* ≠ *sá'a*	min	11	20	10
Non-interrupt.	complex	max	3	25	23
Non-permut.		max	5	19	15
Ciscat. Selection	*chi*=ciscat.	min	16	17	2
Ciscat. Selection	*chi*=transcat.	min	17	17	1
Ciscat. Selection		max	4	23	20
Subspan Rep.	asyndetic	min	12	25	14
Subspan Rep.	asyndetic	max	12	26	15
Subspan Rep.	syndetic	min	7	25	19
Subspan Rep.	*ña*-link.	max	4	28	25
Subspan Rep.	conj.	max	2	29	28
Subspan Rep.	coordination	max	1	29	29

6 Summary and discussion

We summarize all the diagnostics and results in Figure 1, arranged by span size and colored by module. The span with the highest convergence level with 4 diagnostics is the verb core in position 17. However, no phonological diagnostic targets this span, only morphosyntactic and indeterminate ones. In our view it is not particularly informative for a minimal diagnostic to target the verb core, since this has to be included by definition.

The only other convergence is found with the span 15-17, identified by the maximal tonal inflection diagnostic and the minimal many-to-one deviations diagnostic.

The almost complete absence of convergences in SMD is remarkable but perhaps not completely unexpected, and it lends further support to the view argued in Pike (1945) that there is no sharp distinction between morphology and syntax (or between words and phrases) in Mixtec languages. We do identify convergences on edges: four diagnostics have their left edge at position 12, and four

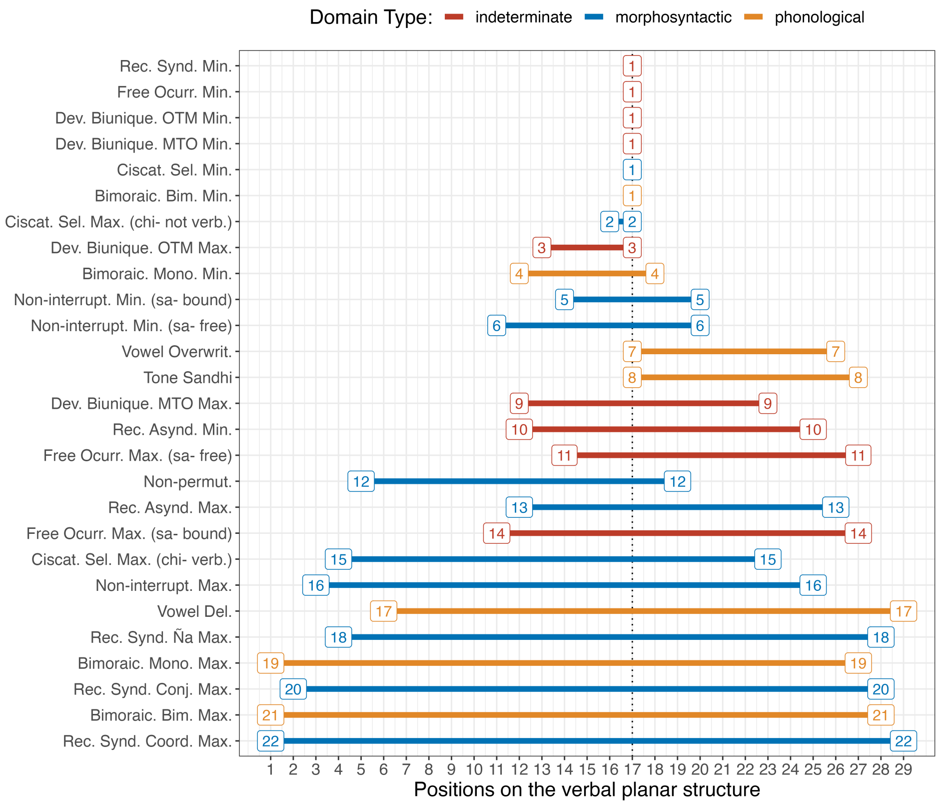

Figure 1: Constituency diagnostics and their results

have their right edge at position 27. This span could be argued to correspond roughly to what traditional analyses would call a "phonological word", containing only the verb core with its "affixes" and "clitics". In fact, it corresponds to the orthographic word including hyphens in the practical orthography of SMD as it is currently being used. However, it is not a well motivated level, since no single test, let alone multiple tests, targets this span.

Our results also help explain the different orthographic representations found in materials on Mixtec languages. Some, like Hollenbach & Erickson (2013), tend to write each morpheme separately, while others like Macaulay (1996) write many morphemes together as in one orthographic word, but separated by hyphens. In the practical orthography for SMD, our orthographic word excluding morphemes added with hyphens goes from position 12 to 17, while the orthographic word including hyphenated forms covers maximally from 12 to 27, as mentioned above. None of these spans are identical to any identified by a diagnostic, but the shorter one roughly corresponds to the minimal bimoraicity constraint (although we write the additive in 18 with a hyphen), and the longer roughly corresponds to maximal free occurence (even though the monomoraic modals in 11 are represented as separate "words").

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Abbreviations

ADD	additive
ANIM	animals
CLF	classifier
CMPL	completive
COP	copula
DEM	demonstrative
DM	discourse marker
EXCL	exclusive
F	feminine
HON	honorific
HUM	human
INCMPL	incompletive
INTENS	intensifier
ITER	iterative
M	masculine
MOD	modality suffix
NHON	non-honorific
PROX	proximal
Q	question particle
REAL	realis
RECP	reciprocal
THING	things, abstract concepts
TOP	topic
WOOD	wooden things

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Chapter 7

Words as emergent constituents in Teotitlán del Valle Zapotec

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This chapter reports the results of the application of 21 constituency tests to the verbal complex and 18 tests to the nominal complex in Teotitlán del Valle Zapotec (TdVZ). These tests are both morphosyntactic and phonological. Assuming "words" are identified as domains of structure where constituency diagnostics converge (e.g. Matthews 2002), our goal is to assess what type of word constituents, if any, are motivated in TdVZ. In contrast to recent work emphasizing the ubiquity of wordhood domain divergence (Haspelmath 2011; Bickel & Zúñiga 2017; Tallman 2020), we argue that the data of TdVZ provide support for at least one type of word constituent in this language. A novel method for estimating the chance probability of constituency diagnostic convergence supports the main thesis of this chapter.

1 Introduction

Linguists do not agree with each other with respect to whether speaker intuitions or some set of established wordhood criteria should be used to discern word boundaries (Sapir 1921: 33-34; Aronoff & Fudeman 2005: 36; Mithun 2014: 74 *vs.* Bloomfield 1914). In fact, there is no joint set of necessary and sufficient linguistic criteria for identifying words (Haspelmath 2011) and speakers do not always have consistent intuitions regarding word boundaries. For instance, the following example illustrates that the definition of the 'words' based on the speaker intuition (1a) can be quite different from that based on one of the traditional linguistic criteria (1b) of 'grammatical word' assumed in much of the literature on Zapotec (Broadwell 2000, Munro 2004, Beam de Azcona & Cruz Santiago 2022). This will be discussed in detail in this chapter on Teotitlán del Valle Zapotec.

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(1) a. [speaker intuition]
(kēdˈgwǽːˈʒlyāˀdízyán) $_{\text{Word}}$ (ˈllwâˀ)$_{\text{Word}}$

b. [wordhood criteria]
(kēdˈgwǽː)$_{\text{W}}$(ˈʒlyāˀ)$_{\text{W}}$(dí)$_{\text{W}}$(zī)$_{\text{W}}$(án)$_{\text{W}}$ (ˈllwâˀ)$_{\text{W}}$
kēd=gw-ǽː *ʒlyāˀ=di=zī=an* *llwâˀ*
NEG=COMPL-go in.vain=NEG=only=3SG.INF Oaxaca
'S/he did not go only in vain to Oaxaca.'

Notably, speaker intuitions do not always associate the word boundary with a stress domain: orthographic practices of speakers vary in terms of how synthetic they represent the language. On the other hand, linguistic wordhood criteria tends to see this language as much less synthetic because of the high degree of promiscuity of bound morphemes ("clitics"), which are regarded as syntactically placed.

In order to resolve divergences, linguists have proposed a distinction between a phonological and a morphosyntactic word(s) (for instance Dixon & Aikhenvald 2002). However, as Matthews (2002) comments: "there are divergences within these two domains. It seems that no criterion is either necessary or sufficient, but they are relevant insofar as, in particular languages, they tend to coincide" (Matthews 2002: 274). Also, Haspelmath (2011) remarks that "in order to show that a fuzzy concept of word is theoretically significant, one would have to demonstrate that grammatical units are not randomly distributed over the continuum between fully bound and fully independent units, but that they cluster significantly".

In this chapter we assess whether a word constituent can be motivated in TdVZ based on the notion of convergence beyond chance stated in the introduction of this book. We apply 21 constituency tests to the verbal complex and 18 tests to the nominal complex to TdVZ. These tests are both morphosyntactic and phonological. Our goal is to assess what type of (word) constituents, if any, are motivated in this language.

We argue that the data of TdVZ provide support for at least one type of word constituent in this language, in contrast to recent work emphasizing the ubiquity of wordhood domain divergence (Schiering et al. 2010; Haspelmath 2011; Bickel & Zúñiga 2017; Tallman 2020). This study thus suggests that the high degree of misalignments found in Bickel & Zúñiga (2017) may result from the consideration of an arbitrarily low number of diagnostics (they only consider 6). Furthermore, the misalignments found in Chácobo (Tallman 2021) may be something peculiar to this language and not necessarily general. The upshot of our results is that they show that languages vary in terms of the degree to which wordhood diagnostics cluster, even within the same language in different domains, in this specific case, verbal *vs* nominal.

After this introduction, the following section summarizes some features of Zapotec, the third section then provides an overview of the verbal template in TdVZ. The fourth part of this chapter provides an overview of divergences and convergences motivated by constituency diagnostics. In both categories (verbal (§4) and nominal (§5)), we show that in the morphosyntactic domain divergences are just as common as convergences. Methodological, theoretical and typological implications are discussed in §6.

2 Teotitlán del Valle Zapotec

Teotitlán del Valle Zapotec (ISO 639-3: [zab]) is a Central Valley Zapotec variety that belongs to the Zapotecan language family spoken in the Mexican state of Oaxaca. The Zapotecan language family in turn is one branch of the Otomanguean language stock. Zenzontepec Chatino (Campbell 2024 [this volume]), Mazatec (Nakamoto 2024 [this volume]), and Duraznos Mixtec (Auderset et al. 2024 [this volume]) also belong to this language stock. This section gives an overview of the basics of phonology (§2.1) and morphosyntax (§2.2) of TdVZ.

2.1 Phonology

TdVZ has six vowels (*i, æ,*[1] *a, o, u, ɨ*), of which *ɨ* is marginal. Vowel length is mostly predictable from the position of prominence and the consonant that follows: in prominent syllables the vowel is usually long when followed by a lenis consonant or no consonant, and otherwise the vowel is short; this is due to the requirement that demands that a prominent syllable be at least bimoraic. However, this is not always the case since all loanwords and some native words have a long vowel even though the prominent vowel is followed by a fortis consonant (e.g. *llú:py* 'Guadalupe', *ʧú:k* 'kiss', *gá:ti* 'not yet'). For this reason, we consider vowel length in TdVZ to be marginally contrastive, and thus we mark vowel length with a colon (:) even when it is predictable, as in *ru:* 'cough'.

TdVZ also contrasts three phonation types, modal (*a*), creaky (*a̰*) and glottalized (*aˀ*); the contrast is justified by a triplet contrasting only in the phonation types, such as *ru:* 'cough', *ṵ:* 'carry', and *ruˀ* 'mouth'. As in other Otomanguean

[1]In TdVZ /æ/ is realized as [e] in certain phonological contexts (Uchihara & Gutiérrez 2020a). Given that the distribution of these allophones depends on complex phonological factors, i.e., height of the adjacent consonant, syllable structure and accent, we will represent both allophones throughout this chapter.

languages, TdVZ is tonal; five contrastive tonal patterns are found on one syllable: low (*a*), mid (*ā*), high (*á*), falling (*â*) and rising (*ǎ*).

TdVZ has 24 native consonants (*b, p, d, t, g, k, gw* [gʷ], *kw* [kʷ], *m* [mː], *n, nn* [nː], *r, z, s, ʒ, ʃ, j* [x], *l, ll* [lː], *ts, ʤ, ʧ, y* [j], *w*), most of which come in pairs of lenis and fortis consonants, such as *d* vs. *t* and *n* vs. *nn* (as in other Zapotec languages: cf. Nellis & Hollenbach 1980). Fortis obstruents are voiceless, never fricated if they are stops, and relatively long. Lenis obstruents are often voiced, variably fricated, and relatively short. Duration is the main difference between lenis and fortis sonorants.

2.2 Morphosyntax

The basic morphosyntactic characteristics of Teotitlán del Valle Zapotec are as follows. The basic word order is VSO, and this language exhibits most of the predicted correlations cited by Dryer (1992) for VO languages. As in other Zapotecan languages (cf. Lee 1999), TdVZ is a head marking language and no case markings appear on NPs. Below we discuss in detail the morphosyntax of verbs, and then we discuss the nouns.

In Teotitlán del Valle Zapotec, a verb stem may be morphologically simple (*-aːw* 'eat') or complex. A morphologically complex verb stem may consist of a root plus the diminitive and the comitative suffix (*-ak-nǣː* [be.done-COMIT] 'help') or a verb root plus another lexical root. A verb root can be compounded with a noun root (*-nnyab-dḭ̂ːʤ* [ask.for-word] 'ask (a question)'), adjective root (*-ak-nall* [occur/be.done-cold] 'feel cold'), or a numeral (*-ka-tap* [sound-four] 'be at four o'clock').

A verb stem obligatorily takes a tense/aspect/modal (TAM) prefix, as in (2–4), and some verbs exhibit one of the voice prefixes, the causative *u-* or the "restorative" *a-*,[2] as shown in (5–6). These prefixes, however, are generally glossed as part of the TAM prefix throughout this work since in many cases they are lexicalized.

(2) ˈryaːb
r-yaːb
HAB-fall.down
'(S/he) falls down.'

[2]The main function of "restorative", at least in Teotitlán Zapotec, is to encode middle voice rather than the restorative function proposed by Smith-Stark (2002). However, since this terminology is widely used among Zapotecanists, we adhere to 'restorative'.

(3) ˈbya:b
b-ya:b
COMPL-fall.down
'(S/he) fell down.'

(4) riˈʤiˀ
ri-ʤiˀ
HAB-get.clogged
'(It) gets jammed.'[3]

(5) raˈʤiˀ
r-a-ʤiˀ
HAB-REST-get.clogged
'(It) gets clogged.'[4]

(6) ruˈʧiˀ
r-u-ʧiˀ
HAB-CAUS-cover
'(S/he) covers.'

When the subject is not expressed as a full NP, a pronominal enclitic encoding this grammatical role (and 3rd person object in some cases) occurs after the verb stems.

(7) ˈrya:ban
r-ya:b=an
HAB-fall.down=3SG.INF
'S/he falls down.'

(8) ˈryā:bdān
r-ya:b=dān
HAB-fall.down=3PL.FOR
'They fall down.'

A verb may optionally take proclitics and adverbial enclitics. Here, we consider that clitics in TdVZ are morphemes that are phonologically defective and must join with another syntactic terminal element to form a prosodic word (Sapir 1930: 71), following the traditional analysis of Zapotec. In addition to this, clitics in TdVZ, especially enclitics, can occur in various positions within the clause.

[3]Agent is assumed, such as when a road gets clogged/jammed with people or cars.
[4]Agent is not assumed, such as when a nose gets clogged with mucus.

Proclitics occur before the TAM prefix while enclitics come between the stem and the pronominal enclitics. This is illustrated in (9):

(9) niˈra:wzátū
ni=r-a:w=zá=tū
SUB=HAB-eat=also=2PL.INF
'What y'all also eat.'

Uninflected nouns may be morphologically simple (*ˈgæt* 'tortilla') or complex. A morphologically complex noun may consist of a fossilized prefix plus root (*bi-ˈzi:n* 'mouse') or of compounded roots (*kye-ˈyuˀ* [head.of-building] 'roof'). Nouns may take a plural marker *d´=* (*d=bénny* [PL=person] 'people')[5] and the diminutive suffix (*bækw-æˀn* [dog-DIM] '(a) nice/little dog').

Nouns can be inflected for a possessor. Alienable nouns take the possessive prefix *ʃ-*, which may provoke fortification of the root (*ˈʃ-kæt* [POSS-tortilla] 'tortilla of'), and pronominal enclitics when the possessor is not expressed as a full NP (*ˈʃ-kæt=an* [POSS-tortilla=3SG.INF] 'her/his tortilla'). Inalienable nouns do not require the prefix *ʃ-*. In addition, when the noun is possessed by a 1PL possessor, the noun takes proclitic *dū=* as well as the 1PL pronominal enclitic *=un* (INCL) or *=ūn* (EXCL) (*dū=ˈʃ-kæ̂t=un* [1PL=POSS-tortilla=1PL.INCL] 'our tortilla').

3 Data presentation and concepts: planar structure(s) and constituency tests

In this section we briefly lay out various concepts related to the methodology followed. These have been broadly discussed and defined in the introduction of this book. Thus, here we only highlight specific notions for our chapter.

3.1 Planar structure(s)

A planar structure is a templatic structure that represents all elements of some (verbal or nominal) domain regardless of constituency structure, motivated or not. Thus syntactic, and morphological elements will be displayed on the same level in this structure. Planar structures are built out of a number of parts: elements, positions, slots, and zones.

Positions are organized into a template that captures their linear order. Variable ordering of elements is captured, in the first place by placing the elements

[5]Various elements in TdVZ occur together with a floating high tone that triggers Tone Sandhi (§4.2.6, §5.2.6). This floating tone is represented with an acute accent throughout this work.

in zones, and in the second place by allowing elements to occur in more than one position in the planar structure if it is necessary. A more detailed exposition of the distinction between slots and zones can be found in the introduction of this book.

Tables 1 and 2 present the planar structure of the TdVZ verbal predicate construction and the nominal construction. These will be referred to throughout the rest of this chapter. A detailed defense of the relative ordering and identification of positions in the TdVZ verb and nominal complex is found in Gutiérrez & Uchihara (n.d.).

We define the verb base as the stem minus the tense/aspect/mood (TAM) prefix. As mentioned above, the TAM prefix is segmented in such way that it usually contains the fossilized causative (*u-*) or restorative (*a-*) vowel morphemes. This means that the position of these fossilized prefixes is not represented in the template. In the same vein, the (possibly) fossilized prefix in certain nouns will not be segmented either. The verb and noun base constitute the semantic head of the phrase insofar as the phrase they head is an example of a verbal or nominal construction. It is also important to highlight that adverbial clitics in the preverbal positions 6–8 will only occur if they have the right host (e.g. the negative marker) and otherwise they do not occur. Also, the second morpheme in monoclausal negation (=*di*) in position 18 does not occur without the negative proclitic *kēd=* in position 5.

3.2 Constituency tests

Following Tallman (2021), we assume that a constituency test is a generalization within or across constructions that targets or crucially refers to some subspan of a planar structure. The constituency tests considered are shown below. These are applied to both verbal (§4) and nominal (§5) domains.

(10) Morphosyntactic and indeterminate diagnostics

- Minimum free form
- Non-interruptability
- Subspan repetition in serialization
- Nonpermutability
- Deviations from biuniqueness
- Ciscategorial selection

Table 1: Planar structure for verb in Teotitlán del Valle Zapotec

Position	Type	Elements
(1)	slot	subordinators
(2)	slot	np (a/s, o), adv
(3)	slot	focus marker (=*ēn*)
(4)	slot	adv *á*= ‘already’
(5)	slot	clausal negator: *kēd*=
(6)	slot	adverbial enclitics of frequency and manner: =*pkā*, =*kā*, =*zī*
(7)	slot	adverbial enclitic of equality: =*zá*
(8)	slot	adverbial enclitic of comparison: =*rú*
(9)	slot	indefinite, interrogative pronouns *tū*=, *ʃī*=, *kālí*=; plural imperative *gūl*=
(10)	slot	tense/aspect/mood
(11)	slot	motion: andative *e*-, venitive *ēd*-
(12)	slot	verb base
(13)	slot	second element in a compound: nominal, adjectival root
(14)	slot	comitative -*nǽ:*
(15)	slot	diminutive: -*æˀny*/-*iˀny*
(16)	slot	manner adverbs: *ʒlyāˀ* ‘in vain’, *ʤí:* ‘quietly’
(17)	slot	intensifiers *tæ̰:*, *dâ̰:n*
(18)	slot	negation: =*di*
(19)	slot	adverbial enclitics of frequency and manner: =*pkā*, =*kā*, =*zī*
(20)	slot	adverbial enclitic of equality: =*zá*
(21)	slot	adverbial enclitic of comparison: =*rú*
(22)	slot	reciprocal *saˀ*
(23)	slot	pronominal enclitic; NP (a/s)
(24)	slot	pronominal enclitic; NP (p)
(25)	slot	pronominal enclitic; NP (r)
(26)	slot	adverb (lexical)
(27)	slot	subordinate clause
(28)	slot	discursive enclitics

Table 2: Planar structure for noun in Teotitlán del Valle Zapotec

Position	Types	Elements
(1)	slot	prepositions: *ʃtḛ̂:n* 'of'; *nez* 'by'
(2)	zone	quantifiers (QR): *zyē:n* 'various', *tubruˀ* 'some', INDEF *te=* etc; relational nouns: *low* 'face of', *kwæˀ* 'side of' etc.
(3)	slot	adverbial enclitics of frequency and manner: *=pkā, =kā, =zī*
(4)	slot	adverbial enclitic of equality: *=zá*
(5)	slot	adverbial enclitic of comparison: *=rú*
(6)	slot	plural *d´=;* 1PL *dū=*; *dā=* 'Mr.'; *tyú=* 'uncle'
(7)	slot	possessive: *ʃ-*
(8)	slot	noun base
(9)	slot	second element of a compound
(10)	slot	adjective(s) (up to three)
(11)	slot	diminutive: *-æˀny/-iˀny*
(12)	slot	intensifiers: *dḁ̂:n*; *tæ̰:*
(13)	slot	adverbial enclitics of frequency and manner: *=pkā, =kā, =zī*
(14)	slot	adverbial enclitic of equality: *=zá*
(15)	slot	adverbial enclitic of comparison: *=rú*
(16)	slot	demonstratives: *=kī* DEM.TEMP, *=kán* DEM.MED, *=rǽ* DEM.PROX *=rǣ* DEM.DIST
(17)	slot	prepositional phrase, pronominal enclitic, NP Possessor
(18)	slot	relative clause
(19)	slot	demonstrative: *=kī* DEM.TEMP *=kán* DEM.MED, *=rǽ* DEM.PROX, *=rǣ* DEM.DIST
(20)	slot	focus marker *=ēn*

(11) Phonological diagnostics
- Glottal Dissimilation
- Accentuation
- Syllabification
- Rising Tone Levelling
- Mid Tone Spreading
- Tone Sandhi
- Final Glottalization

An oft-neglected aspect of constituency and wordhood tests is that they can provide ambiguous results (Tallman 2020, 2021). The definition and results of constituency test often depends on what type of elements or constructions are being considered. Thus, wordhood or constituency tests, stated abstractly, can often be ambiguous with respect to which string they identify (see Osborne 2018 as well on this issue). Test fracturing refers to the practice of adding special conditions on constituency tests such that they provide discrete results. In doing so, a constituency test is fractured into more than one result. In the following section, we report all the tests and their respective fracturing to avoid being opportunistic.

4 Verbal domain

In this section we discuss the 21 tests applied to the verbal domain. We first discuss six morphosyntactic tests (fractured into ten). We then focus on the seven which are phonological (fractured into eleven).

4.1 Morphosyntactic diagnostics

4.1.1 Minimum free form (10-12, 4-22)

There are at least two ways of applying the minimum free form test depending on what constraints we impose on adding and subtracting bound elements on the positions flanking obligatory elements in a sentence. The ambiguity in test application is illustrated by the fact that the test can be fractured into at least two distinct interpretations depending on whether we consider the smallest possible span that is a single free form or the largest possible span that is a single free form. The distinction of interpretations is listed below.

(12) Free occurrence (minimum): The free form that contains elements from positions with the shortest distance from each other with respect to positions in the planar structure.

(13) Free occurrence (maximal): The free form that contains elements from positions with the largest distance from each other with respect to positions in the planar structure.

The smallest possible span that is contiguous on its edges with a minimal free form consists of just the verb and a TAM prefix,[6] positions 10–12. This is shown by a complete utterance below. Neither the verb base, as shown in (15), nor the TAM prefix can occur as free forms (by themselves).

(14) biˈʒuː
bi-ʒuː
v:10-12
COMPL-tremble
'(It) trembled.'

(15) *ˈʒuː[7]
ʒuː
v:12
'tremble'
Intended reading: '(It) tremble(s).'

The maximal free occurrence span is from 4–22, as shown below. This span contains all those elements with the largest distance from one another and that cannot stand as a single free form. Note that the right edge of this span (position 23) corresponds to the position of the subject of the sentence; since this element can be a nominal (which can stand as a free form), it is not included within this span.

(16) ákēdrú bakáˈnæːdí ˈsaˀdán

á=kēd==rú	*ba-kánæː=di*	*saˀ=dán*
v:4=5==8	10-12-14	22=23
already=NEG==more	COMPL-fight=NEG	RECP=3PL.INF

'They didn't fight with each other anymore.'

[6] In some stative and potential forms, the TAM prefix is zero, e.g *ø-zu:* 'STAT-stand' or *ø-dâ:* 'POT-pour'. However, in such cases we consider that there is still a zero prefix, rather than that there is no TAM prefix.

[7] Without the prefix, *ʒu:* means 'earthquake'; thus, it is grammatical, but not as a verb.

4.1.2 (Non-)interruptability (10-15, 4-22)

(Non-)interruptability identifies a span of positions that cannot be interrupted by some interrupting element. Traditionally the test has been articulated such that the interrupting element is a word (Bloomfield 1933), but this definition is obviously circular to the extent that non-interruptability is supposed to form the basis for identifying words at the onset (Mugdan 1993: 2552). One solution is to fix the definition of interrupting element based on some testable criterion. Haspelmath (2011) proposes that the interrupting element should be a free form. However, this choice is arbitrary and fails to capture the fact that interruptability (or conversely "contiguity") is a matter of degree (Croft 2001: 190-191; Tallman 2018: 117-120). An approach that can be used to capture and report more fine-grained details in linguistic structure is to fracture (non-)interruptability into a number of subtests depending on the criterial wordhood properties of the interrupting element. For TdVZ, we apply two interruptability tests to the verbal domain.

(17) Non-interruption1: A span that cannot be interrupted by an element that can occur in more than one position in the planar structure (e.g. second position clitic, a free function word or indefinite pronouns).

(18) Non-interruption2: A span that cannot be interrupted by any free form (e.g. a noun phrase or interjection).

The non-interruption1 test identifies the span 10–15. This span is shown in (19). Determining the precise span which cannot be interrupted by an element that can occur in more than one position in the planar structure is achieved by intending to place a second position clitic right after the minimum free form (position 10–12) as shown below, in this case with the adverbial enclitic of equality, *=zá*, in position 20. As noted, this is not possible when the comitative *-nǣ* in position 14 or the diminutive *-iˀny* morpheme in position 15 occurs.

(19) resutˈněˀnzán ˈlǎ̰ːn
*r-e-sut-nǣː-iˀny=**zá**=an* *lǎ̰ːn*
v:10-11-12-14-15=20=23 24
HAB-AND-AND:play-COM-DIM=**also**=3SG.INF 3SG.INF
'He also goes to play with him/her (how nice!).'

(20) *resutzáˈněˀnyan ˈlǎ̰ːn
*r-e-sut=**zá**-nǣː-iˀny=an* *lǎ̰ːn*
v:10-11-12=20-14-15=23 24
HAB-AND-AND:play=**also**-COM-DIM=3SG.INF 3SG.INF
Intended reading: 'He also goes to play with him/her (how nice!).'

On the other hand, the non-interruption2 test identifies the span 4–22. That is, the only slot where an NP may occur is either in position 2 or 23. In (22)–(23), we show that when an NP is placed between any elements within this span, the construction is ungrammatical. This span cannot be interrupted by an interjection either. Position 3 is not included within this span since the occurrence of a morpheme in this position (i.e., the focus marker) requires the occurrence of the NP in position 2.

(21) ákēdrú reˈllēˀwdí ˈ**Jwá:yn** ˈla:dy
á=kēd==rú *r-e-llēˀw=di* *Jwá:ny* *la:dy*
v:4=5==8 10-11-12=18 23 24
already=NEG==more HAB-AND-rinse=NEG Juan clothes
'Juan doesn't go to/and rinse the clothes anymore.'

(22) *kēdˈ **Jwá:yn** reˈllēˀwdi ˈla:dy
kēd= *Jwá:ny* *r-e-llēˀw=di* *la:dy*
v:5= 23 10-11-12=18 24
NEG= Juan HAB-AND-rinse=NEG clothes
Intended reading: 'Juan doesn't go to/and rinse the clothes.'

(23) *kēdreˈllēˀw ˈ**Jwá:yn**di ˈla:dy
kēd=r-e-llēˀw *Jwá:ny=di* *la:dy*
v:5=10-11-12 23=18 24
NEG=HAB-AND-rinse Juan=NEG clothes
Intended reading: 'Juan doesn't go to/and rinse the clothes.'

4.1.3 Subspan repetition in serialization (10-12, 10-23)

Subspan repetition in serialization refers to subspans of the verbal planar structure that are repeated because they cannot be interpreted unless they are present in the subspan itself. For TdVZ we consider the two most prototypical serialization constructions (Gutiérrez 2014): typical and motion serialization. The latter differs from the former in that the second verb in the construction gets more modifying morphemes (i.e., the second verb has a broader expansion). Therefore, in this section we are not only looking at one type of serialization but two. For each type we fracture the constituency test as follows.

(24) Minimal repeated subspan: the subspan of positions whose elements cannot be interpreted unless they are present in the subspan itself.

(25) Maximal (repeated) subspan: the subspan of positions whose elements can occur in each of the coordinated constituents without reference to whether some of these elements can be elided or interpreted via wide scope of one element over the repeated subspans.

Typical Serialization occurs with a verb that indicates an effect on the subject followed by a verb that introduces the cause of the effect, as in (26). The minimum span in typical serialization occurs in the same span identified by the minimum free form (minimal) test (§4.1.1): positions 10–12. In (27), note that the verb base (position 12) cannot occur by itself in this construction; thus, the TAM prefix of the first verb does not have scope over the second.[8]

(26) kēdtūbíˈʤî:bydi guˈnnā: ˈlû:y

kēd=	*tū=*	*bi-*	*ʤi:by*	*=di*	*gu-*	*nnā:*	*lu:y*
v:5=	9=	10-	12	=18	10-	12	24
NEG=	INDF.PRON=	COMPL-	be.afraid=	NEG	COMPL-	witness	2SG.INF

‘Nobody was afraid of you.’ #Wide scope: ‘nobody was afraid, nobody saw you.’

(27) *kēdtūbíˈʤî:bydi ˈnnā: ˈlû:y

kēd=	*tū=*	*bi-*	*ʤi:by*	*=di*	*nnā:*	*lu:y*
v:5=	9=	10-	12	=18	12	24
NEG=	INDF.PRON=	COMPL-	be.afraid	=NEG	witness	2SG.INF

Intended reading: ‘Nobody was afraid of you.’

The verbs in typical serialization share the subject, which must be encoded on each verb. Thus, the maximal span that must be repeated in these constructions is 10–23, as shown in the example below.

(28) riˈʤi:by ˈYá:n riˈnnyă:n ˈmwǽ:s

ri-	*ʤi:by*	*Yá:n*	*ri-*	*nnyā:*	*=an*	*mwǽ:s*
v:10-	12	23	10-	12	=23	24
HAB-	be.afraid	Ana	HAB-	witness	=3SG.INF	teacher

‘Ana is afraid of the teacher.’

Serial verb construction (SVC) whose first verb in the construction is the verb *-æ:* ‘go’ or *-ǣ̰:d* ‘come’ differs from typical serialization since the second verb

[8] In fact, in typical serialization none of the modifying elements for one verb can have wide scope over the serialized (repeated) spans. In (26), the indefinite pronoun only has scope on the first verb of the construction.

in the construction can be modified by second position clitics (in Typical Serialization this triggers ungrammaticality). Therefore, we assume they are different constructions. In motion serialization, the minimum and maximum repeated subspan is the same as in typical serialization. That is, the minimal span is 10–12 while the maximum is 10–23, as shown in the example below. Given that both types of serialization cover the same spans, these are included only once in table and the figures that summarize the convergences in the verbal domain.

(29) ˈrǽːpkādán reˈtīːʒpkādán ˈʃʧāˀ
r- æː =pkā =dán r- æ- tiːʒ =pkā =dán ʃʧāˀ
v:10- 12 =19 =23 10- 11- 12 =19 =23 24
hab- go =always =3pl.inf hab- and- and:pay =always =3pl.inf light
'They always go to/and pay the electricity (bill).'

4.1.4 (Non-)permutability (10-15)

In TdVZ the constituency test of (non-)permutability identifies a span of positions whose elements cannot be permuted. That is, the ordering of elements is 'fixed' in this span. This test identifies the span 10–15, as in (30). This is the same span identified by the non-interruptability test (§4.1.2). This test is not fractured in TdVZ since variable affix ordering has not been attested in this language, as shown in (31).

(30) resutˈněˀnyan ˈlǎ̰ːn
r- e- sut -nǣː -iˀny =an lǎ̰ːn
v:10- 11- 12 -14 -15 =23 24
hab- and- and:play **-com** **-dim** =3sg.inf 3sg.inf
'He goes to play with him/her (it is nice).'

(31) *resutæˀnǣːn lǎ̰ːn
r- e- sut -iˀny -nǣː =an lǎ̰ːn
v:10- 11- 12 -15 -14 =23 24
hab- and- and:play **-dim** **-com** =3sg.inf 3sg.inf
Intended reading: 'He goes to play with him/her (it is nice).'

Thus, besides not being permutable, elements from position 10–15 cannot occur in a different position in the template. However, elements outside this span may occur in different positions in the template. Although the elements outside of this span can occur in a different position in the template, they cannot occur in a random order; that is, these elements follow a strict sequence (wherever they occur), as shown in the example below where *ˈʒlyāˀ* always precede *=zī* whether they occur post or preverbally.

(32) baˈllēˀw ˈ**ʒlyáˀzī** ˈYá:n ˈla:dy

ba-	*llēˀw*	*ʒlyāˀ*	*=zī*	*Yá:n*	*la:dy*
v:10-	12	16	=19	23	24
COMPL-	rinse	in.vain	=only	Ana	clothes

‘In vain Ana rinsed the clothes.’

(33) ˈ**ʒlyāˀzī** báˈllēˀw ˈYá:n ˈla:dy

ʒlyāˀ	*=zī*	*ba-*	*llēˀw*	*Yá:n*	*la:dy*
v:2	=6	10-	12	23	24
in.vain	=only	COMPL-	rinse	Ana	clothes

‘In vain Ana rinsed the clothes.’

4.1.5 Deviations from biuniqueness (10-13)

In Teotitlán Zapotec, all morphemes between the positions 10 – 13 manifest non-automatic allomorphy; that is, where the alternation is not due to phonological processes or phonologically conditioned. This defines the span of deviations from biuniqueness. This test is not further fractured since morphemes outside of this span do not show any non-automatic allomorphy.

Table 3: Non-automatic allomorphy across habitual, completive and potential forms

gloss	HAB	COMPL	POT
‘get lost’	ri-ˈdyuˀn	bi-ˈdyuˀn	∅-ˈdyûˀn
‘live’	ri-ˈbā:yn	gu-ˈbā:yn	∅-ˈbá:yn
‘shake off’	ri-ˈbi:by	gu-ˈbi:by	ˈkwí:by

First, the completive and potential prefixes that occur in position 10 manifest allomorphy, which has motivated verbal classification in Zapotecan linguistics (Kaufman 1989; Smith-Stark 2002; Campbell 2011; Pérez Báez & Kaufman 2016; Beam de Azcona 2019; among others). Such allomorphy is illustrated below. As seen below, the completive prefix can either be *bi-* or *gu-*, and the potential prefix can either be zero and or fortition of the stem-initial consonant, as illustrated in Table 3, both with a tonal effect on the stem. The distribution of such allomorphs cannot be predicted by the phonological environments.

Secondly, the motion prefixes in the position 11, namely andative *e-* and the venitive *ḛ̄d-* display suppletion conditioned by the agent persons. Compare the forms in (34) without the agent person and (35) with the 1st person plural agent, which has the suppletive allomorph *yóp-* for the venitive:

(34) rēdˈtá:w
r- *ḛ̄d-* *ta:w*
v:10- 11- 12
HAB- VEN- eat
'Comes to eat.'

(35) ryópˈtṵ̂:n
r- *yóp-* *tâ̰:w* *=un*
v:10- 11- 12 -23
HAB- VEN:1PL- eat:1PL =1PL.INCL
'We come to eat.'

The verb base in position 12 also displays suppletive allomorphy according to the agent persons or tense/aspect/mood. Thus, in the 1st person forms the agentive verbs undergo stem alternation (Uchihara & Gutiérrez 2020b). For instance, the verb 'come' undergoes suppletion according to the agent persons:

(36) ˈrǣ̰:d
r- *ǣ̰:d*
v:10- 12
HAB- come
'(S/he) comes.'

(37) ˈrǣllá
r- *ǣ̌ll* *=a*
v:10- 12 =23
HAB- come:1SG =1SG
'I come.'

(38) ˈryópún
r- *yóp* *=un*
v:10- 12 =23
HAB- come:1PL =1PL.INCL
'We come.'

Some verbs undergo suppletion, weak or strong, according to tense/aspect/mood categories. Thus, the verb *akw* 'put on shirt' undergoes suppletion in the completive aspect:

(39) ˈrakw
r- *akw*
v:10- 12
HAB- put.on.shirt
'puts on shirt'

(40) ˈgut
gu- *Vt*
v:10- 12
COMPL- COMPL:put.on.shirt
'put on shirt'

A noun root in position 13 can also undergo alternation (mostly tonal) according to the agent person. Thus, in (42), the incorporated noun root *dya:g* 'ear' undergoes tonal alternation, in addition to the tonal alternation of the verb base -*kwa̰:* 'throw':

(41) rukwaˈdya:g
ru- *kwa̰:* *+dya:g*
v:10- 12 +13
HAB- throw +ear
'listens'

(42) rukwáˈdyā:gá
ru- *kwâ̰:* *+dyǎ:g* *=a*
v:10- 12 +13 =23
HAB throw:1SG +ear:1SG =1SG
'I listen.'

Morphemes in the positions outside of the span 10–13 do not show non-automatic allomorphy; they do manifest alternations, but all of such cases are phonologically conditioned.

4.1.6 Ciscategorial selection (10-12, 4-14)

All of the morphemes in positions 10–12 are unique to the verbs; it is ungrammatical to attach the tense/aspect/modal prefix or the motion prefix to any parts of speech other than verbs. Thus, this defines the minimal span of ciscategorial selection.

In addition, the morphemes in positions 4 (*á*= 'already') and 14 (-*nǣ:* comitative) are also unique to verbs, although there are morphemes within this span that are not unique to verbs, such as adverbial enclitics in positions 6–8 (as can be seen in the nominal planar structure in Table 2) and the incorporated noun root in position 13. This is illustrated in the following examples. In (43), the adverbial clitic =*zī* ‘only’ in position 6 occurs with a noun. In (44), the compounded noun root in position 9 in the nominal planar structure (Table 2) corresponds to the incorporated noun root in position 13 in the verbal planar structure.

(43) ʃkǣtzī Jwá:yn

ʃ-	*gæt*	*=zī*	*Jwá:ny*
n:7-	8	=13	17
POSS-	tortilla	=only	Juan

‘Only / just Juan’s tortilla(s)’

(44) bællˈyu:

bæll	*+yu:*
n:8	+9
snake	+soil

‘worm’

Thus, the span 4–14 defines the maximal domain of ciscategorial selection; in other words, no morpheme outside of this domain is unique to verbs.

4.2 Phonological diagnostics

This section reviews the phonological constituents that could be supported by processes that change the segmental forms of elements in the subspan.

4.2.1 Glottal dissimilation (3-15)

TdVZ has a glottal dissimilation rule such that a glottalized syllable is deglottalized when followed by another glottalized syllable (CVˀCVˀ > CVCVˀ). A similar process is reported for the Miahuatec variety of Zapotec (Hernández Luna 2021). Glottal Dissimilation is illustrated in the following example, where the glottalized vowel in the verb root -*taˀw* loses its glottalization before the diminutive suffix -*æˀn* which also has a glottalized vowel.

(45) rutaˈwǣˀnānbā

ru-	*taˀw*	*-æˀny*	*=ān*	*=bā*
v:10-	12	-15	=23	=28
HAB-	sell	-DIM	=3SG.FOR	=then

‘So s/he sells (it is good!).’

It is not the case that Glottal Dissimilation is always observed between any sequences of two adjacent syllables with glottalized vowels. Thus, between the verb root *gāˀ* 'lay' in position 12 and the compounded noun root *kwæˀ* in the example below no Glottal Dissimilation is observed.

(46) ragāˀˈkwǽˀn

ra-	*gāˀ*	*-kwæˀ*	*=ān*
v:10-	12	-13	=23
HAB-	lay	-side	=3SG.INF

'S/he lays on his/her side.'

The other positions between the span of positions 3–15 do not have any morphemes with a glottalized vowel to see if this process is applied or not.[9]

A morpheme in position 16, *ʒlyāˀ*, has a glottalized vowel but it does not undergo Glottal Dissimilation as shown in the following example; here, the glottalized vowel in the verb base in position 12 and *ʒlyāˀ* in position 16 are adjacent, but Glottal Dissimilation is not observed. Thus, position 16 is outside of the domain of Glottal Dissimilation.

(47) baˈtaˀw ˈʒlyāˀ ˈtæ̰ːn ˈgûˀn

ba-	***taˀw***	***ʒlyāˀ***	*tæ̰:*	*=an*	*gûˀn*
v:10-	12	16	17	=23	24
COMPL-	sell	in.vain	INTENS	=3SG.INF	bull

'S/he sold the bull very in vain.'

Before the verb base, a morpheme with a glottalized vowel is not attested between positions 3 to 11. However, some morphemes with a glottalized vowel are attested in position 2, and such morphemes do not undergo Glottal Dissimilation, as shown in the following example. Here, the syllables *ˈlâˀ* in position 2 and *ˈdǽˀ* in position 12 are adjacent but glottalization is kept in both syllables. Taken together, the domain of Glottal Dissimilation is 3–15; that is, Glottal Dissimilation may (but not always) apply within this domain, but it is never applied outside of this domain.[10]

[9]This means that in the verbal domain Glottal Dissimilation is observed only between the verb base in position 12 and the diminutive suffix in position 14, which make it seem like a process specific to the diminutive suffix. However, as we will see in §5.2.1, this process applies between the other morphemes in the nominal domain, and we consider that this process is general enough to be included as a phonological diagnostic.

[10]Since positions immediately preceding and following the verb base in position 12, namely positions 11 and 13, do not have any morpheme with a glottalized vowel, we cannot know if any of these positions constitute the minimal domain of Glottal Dissimilation.

(48) ˈlâˀ ˈdǽˀ nnaˀˈdʒi:

lâˀ	*∅-*	*dǽˀ*	*nnaˀdʒi*
v:2	10-	12	26
leucaena	POT-	be.picked	today

'Leucaena (*guaje*) will be picked today.'

4.2.2 Accentuation (10-15, 3-15)

In the verbal domain, the accent (or prominence) is assigned to the last syllable of the span 10–15, which is the minimal domain of Accentuation.[11] The syllables to which the morphemes in these positions belong to may bear an accent. First, when the prefix and the root form one single syllable, as in (49), all of which are in the position 10–12, the prominence is assigned to this single syllable of the root.

(49) ˈgâ̰:

∅´-	*ga̰*
v:10-	12
POT-	get.stretched

'(It) will get stretched.'

When the prefix (in the position 10) constitutes its own syllable and the root another (position 12), the prominence is still assigned to the root syllable, as shown below.

(50) riˈza:

ri-	*za:*
v:10-	12
HAB-	walk

'(S/he) walks.'

[11] The prominent syllable in TdVZ is the position of more phonological contrasts, and segmental and suprasegmental contrasts are neutralized in the non-prominent syllables (Smith-Stark 2003: 25, 32; Chávez-Peón 2015). Segmentally, the marginal contrast between *e* and *æ* is generally neutralized to *e* in many non-prominent syllables. Vowel duration contrast is also neutralized to a short vowel in non-prominent positions. All the prefixes and clitics have a short vowel; a long vowel is shortened when it loses its prominence due to suffixation or compounding. Also, in non-prominent positions, the contrast between modal and creaky vowels is often neutralized to a modal vowel. Thus, all the prefixes have a modal vowel, and enclitics can only contrast modal and non-modal phonation types, while a prominent syllable can contrast modal, creaky and glottalized vowels, as mentioned above. Lastly, only level tones can occur on non-prominent syllables typically. Thus, no prefix or clitic has a contour tone. In non-prominent syllables, a rising and a falling tone neutralizes with a high tone (along with the neutralization of the vowel duration and phonation contrasts).

In compounds (within the positions 10–13), the prominence is assigned to the last root of the compound, as in the following: the preceding syllables (the verb base in position 12) are not assigned prominence.

(51) rinnyabˈdḭ̂:ʤ

ri-	*nnya̰:b*	*+dḭ:ʤ*
v:10-	12	+13
HAB-	ask.for	+word

‘(S/he) asks (a question).’

When the verb base and a suffix in the positions 14 (comitative) and 15 (diminutive) constitute independent syllables, the prominence is assigned to the syllable of the suffix while the root preceding these suffixes do not have prominence, as shown in the following examples.

(52) rusēdˈnǣ:

ru-	*sæ̰:d*	*-nǣ:*
v:10-	12	-14
HAB-	practice	-COM

‘(S/he) studies with.’

(53) rigiˈtæˀn

ri-	*git*	*-æˀny*
v:10-	12	-15
HAB-	play	-DIM

‘(S/he) plays (nicely).’

The morphemes outside of this domain are not within the domain of Accentuation that includes the verb base in position 12. Thus, in (54) the prominence is assigned to the syllable of the comitative suffix in the position 12, and not to the syllable of the adverbial enclitic =*pká* in position 19.

(54) rowˈnǣ:pkán ˈlā̰:n

r-	*a:w*	*-nǣ:*	*=pká*	*=(a)n*	*lā̰:n*
v:10-	12	-14	=19	=23	24
HAB-	eat	-COM	=always	=3SG.INF	3SG.FOR

‘He always eats with him.’

Outside of the minimal span of Accentuation, namely 10–15, morphemes may or may not have their own prominence. When they do not have their own prominence, they never bear prominence, unlike the morphemes in positions 10–15 which can bear prominence. Thus, in the preverbal positions, the morphemes in position 2 have their own prominence, while others do not.[12] For instance, in the following example, the interrogative *ʃá=* in position 9 does not have its own prominence, and this morpheme never bears prominence.

(55) ʃábaˈkḭ:nyan ˈbæll?

ʃá=	*ba-*	*kḭ:ny*	*=an*	*bæll*
v:9=	10-	12	=23	24
how=	COMPL-	consume	=3SG.INF	fish

‘How/in which way did s/he eat (the) fish?’

In the postverbal positions, the morphemes in positions 16, 17, 22, 26, and 27 have their own prominence, while the morphemes in positions 23–25 may have their own prominence. For instance, in the following example, the morpheme *ʒlyáˀ* ‘in vain’ in position 16 has its own prominence, followed by morphemes in positions 19 (*=zī*) and 23 (*=an*) which do not have their own prominence, again followed by the 2SG pronoun *lu:y* which has its own prominence.

(56) gunniˈnǣ:ˈʒlyāˀzyán ˈlu:y

gu-	*nnḭ:*	*-nǣ:*	*ʒlyāˀ*	*=zī*	*=an*	*lu:y*
v:10-	12	-14	16	=19	=23	24
COMPL-	say	-COM	in.vain	=only	=3SG.INF	2SG.INF

‘S/he spoke with you in vain.’

The maximal domain of accentuation can thus be defined as the span of positions 3–15; there is only one prominence within this span, and outside of this span there *can* be morphemes with their own prominence.

4.2.3 Syllabification (10-12, 1-28)

In TdVZ, a canonical syllable structure is CV(:)(C). The onset is obligatory except for very few native words (*i:z* ‘year’) and more recent versions of loanwords (*á:n* ‘Ana’); in older loans, onset is inserted when the source form has no onset: *gú:r* ‘hour’, *yá:n* ‘Ana’. Unlike other Central Zapotec varieties (Chávez-Peón 2010: 13-16), onset clusters are not common in Teotitlán Zapotec and mostly restricted to the sequences of a consonant + *y* (ˈ*gyæ:* ‘flower’), a nasal + a lenis consonant

[12]Unless the adverbial enclitics attach to the negative proclitic, in which case they optionally acquire accent, as in *kēd=* NEG + *=pká* ‘always’ ⟶ *ˈkē:dpká*. This is possibly due to the requirement that the combination of a proclitic and the adverbial clitic constitute a prosodic word.

(*nga*ˀ ‘purple/blue’, *ndo̰:w* ‘amarillo dish’) or a sibilant + a consonant (ˈ*ʃtyé:ʒy* ‘garlic’, ˈ*stú:y* ‘another/ once more’). Any consonant may occur in the coda position, and coda clusters are uncommon except for a consonant + *y* sequences (ˈ*jālly* ‘twenty’).

Segments are resyllabified in the sequence of a motion prefix (position 11) + the base, as in (57), and of a (TAM) prefix (position 10) + the base (position 12), as in (58); this (positions 10–12) defines the minimal span of syllabification. The syllable boundary is indicated with a dot in this subsection.

(57) rē.ˈdyṵ́:n
r- *ēd-* *yṵ̄:n*
v:10- 11- 12
HAB- VEN- cry
‘comes to cry’

(58) ˈra:w
r- *a:w*
v:10- 12
HAB- eat
‘eat’

The morphemes beyond this span may or may not participate in syllabification. Thus, syllabification is applied in the sequence a base + (diminutive) suffix (position 15) as in (59). However, positions between the base (position 12) and diminutive (position 15), namely the positions 13 (compounded root) or 14 (comitative), do not contain any morpheme that begins with a vowel. Thus, we cannot tell if syllabification applies or not between the verb base in position 12 and these positions.

(59) gu.zu.ˈtæˀn
gu- *zut* *-æˀny*
v:10- 12 -15
COMPL- COMPL:play DIM
‘(S/he) played nicely.’

Segments are also syllabified in the sequences of the verb base + certain enclitics after position 19. The following is an example with a base (position 12) ending with a consonant and a pronominal enclitic (position 23) beginning with a vowel; here, the final consonant of the root *d* is syllabified as the onset of the following syllable:

(60) ˈbǣ̰:.dán
b- *ǣ̰:d* *=án*
v:10- 12 =23
COMPL- come =3SG.INF
'S/he came.'

However, when the positions 23 or 24 is occupied by a noun phrase, resyllabification does not take place, as in the following example. Here, the final consonant *d* of the first word is not resyllabified as the onset consonant of the syllable *Á:n*. This different behavior of a bound vs free morpheme that occupy the same position in the planar structure is a recurrent issue in TdVZ (cf. §5.2.4, §5.2.5). This could be resolved by fracturing the test according to whether these positions are occupied by a noun phrase or a bound morpheme, but this is not done in this chapter for the sake of space.

(61) ˈbǣ̰:d ˈÁ:n
b- *ǣ̰:d* *á:n*
v:10- 12 23
COMPL- come Ana
'Ana came.'

The following is an example with a stem ending with a vowel and a final clitic (position 28) which consists solely in a consonant; here, the final clitic *=ʃ* is syllabified as the coda of the syllable of the host.

(62) *ˈræ:ʃ*
r- *æ:* *=ʃ*
v:10- 12 =28
HAB- go =then
'(S/he) goes, then.'

On the other hand, not all enclitics appear to be within the domain of syllabification. Thus, adverbial enclitics (position 19) which begin with a consonant cluster (*=pkā* 'always'; *=ʒgá* 'first') do not resyllabify with the preceding V-final root, either.

(63) ˈrǣ:.pkā
r- *æ:* *=pkā*
v:10- 12 =19
HAB- go =always
'(S/he) always goes.'

Thus, any morphemes within the whole span of 1–28 *may* participate in syllabification, but not all the positions contain morphemes which would allow us to judge if syllabification is applied or not. Therefore, we cannot know whether syllabification is applied. The first morpheme has to end in a consonant and the second morpheme has to begin with a vowel (or a glide) to see if syllabification is applied (or if the morpheme only consists in a consonant or begins with a consonant cluster, we could see if syllabification applies or not, as we saw above). Since the verb stem that minimally consists of the tense/aspect/modal prefix in position 10 and the verb base in position 12 always begins with a consonant, we cannot tell if syllabification applies between the morphemes in positions before 10. On the other hand, after the verb base in position 12, only positions 15, 23, and 24 may contain a morpheme beginning with a vowel, and we have seen above that syllabification may apply between these positions. Thus, the maximal domain of syllabification is the span of positions 1–28.

4.2.4 Rising tone levelling (10-24)

Rising Tone Levelling is a tonal process in which a rising tone (which we analyze as a sequence of a mid tone and a high tone) is split into a mid tone on one syllable and a high tone (or a falling tone, when this syllable is prominent lexically has a low tone) on the next syllable with a low or mid tone, as it is illustrated in Figure 1 (a similar process is reported in the Miahuatec variety of Zapotec; Hernández Luna 2021).

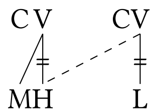

Figure 1: Rising Tone Levelling

In order for Rising Tone Levelling to apply, a few structural requirements have to be met. First, the first syllable has to have a lexical rising tone. Secondly, the rising tone needs to be in a syllable which is syllabified as an open syllable; if the following morpheme begins with a consonant, Rising Tone Levelling does not take place. Since positions immediately preceding and following the verb base in position 12, namely positions 11 and 13, do not contain any elements that meet these structural requirements, we cannot identify the minimal span of this test, and thus we do not fracture this test.

The span whose positions contain elements that display positive evidence for Rising Tone Levelling covers positions 10 to 24. Rising Tone Levelling is observed between the tense/aspect/modal prefix in position 10 and the verb base in position 12 as in the following. Here, the rising tone on the potential prefix splits into a mid tone (which is indistinguishable with a low tone in an atonic position) and a high tone on the following syllable:

(64) gūˈtǽˀ
gŭ- tǣˀ
v:10- 12
POT- gather
'will gather'

If the verb base has a rising tone, it can undergo Rising Tone Levelling when the following morpheme belongs to position 15 (diminutive) or positions 23 and 24, only if they are occupied by pronominal enclitics and not independent NPs. This is illustrated in the following examples. First, in (65) we show the application of Rising Tone Levelling between the verb base in position 12 and the diminutive suffix in position 15.

(65) gudīˈbǽ̂ˀnan
gu- dĭ:b -æˀny =an
v:10- 12 -15 =23
COMPL- COMPL:sew -DIM =3SG.INF
'S/he sewed (how nice!).'

The following example illustrates the application of Rising Tone Levelling between the verb base in position 12 and a pronominal enclitic in position 23:

(66) riˈgī:bú
ri- gĭ:b =u
v:10- 12 =23
HAB- sew =2SG.INF
'S/he sews.'

When position 23 or 24 is occupied by an independent NP, Rising Tone Levelling is not applied, even if other structural requirements are met. This is illustrated in the following example. Here, the first syllable has a rising tone, and the morpheme *i:z* begins with a vowel, but the process is not applied. Again, this different behavior could be captured by fracturing the test.

(67) ˈgǎk ˈi:z *gāk í:z
g´- *ak* *i:z*
v:10- 12 23
POT- become year
'will be a (new) year'

Outside of the 10–24 span, Rising Tone Levelling is not observed, because such positions do not contain any morpheme that satisfies the structure requirement for this process to apply. Thus, in the preverbal position, no morpheme with a rising tone is attested except for position 2. Even when position 2 is occupied by a morpheme that has a rising tone, such as *mǎ:yn* 'animal', the verb stem (that is, the minimal combination of a tense/aspect/modal prefix in position 10 and the verb base in position 12) always begins with a consonant. Thus, we cannot tell if Rising Tone Levelling would be applied or not. In the postverbal position, only positions 23 or 24 may have a morpheme which begins with a vowel, and in such cases Rising Tone Levelling is not applied, as we saw above.

4.2.5 Mid tone spreading (11-14, 1-28)

Mid Tone Spreading is a tone spreading process where a mid tone spreads to the preceding syllable when its lexical tone is low, cf. Figure 2.

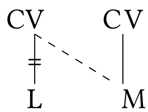

Figure 2: Mid Tone Spreading

This process can be illustrated by the following examples. The verb bases of the forms in the following are a minimal pair in terms of low vs. mid tone, *-zæ̰:by* 'get hanged' and *-zǣ̰:by* 'sink'. This tonal contrast is neutralized when the 3SG formal enclitic *=ān*, with a mid tone, follows and then its mid tone spreads to the root:

(68) a. riˈzǣ̰:byān
ri- *zæ̰:by* *=ān*
v:10- 12 =23
HAB- get.hanged =3SG.FOR
'He hangs (off/on a tree).'

b. riˈzǣ̰ːbyān
ri- *zǣ̰ːby* *=ān*
v:10- 12 =23
HAB- sink =3SG.FOR
'He sinks'.

In order for this process to be applied, we need a sequence of low tone on one syllable and a mid tone on the next. Mid Tone Spreading is known to apply between the andative prefix in position 11 and the verb base in position 12 as in (69); between the verb base and the compounded root in position 13 as in (70), and between the verb base and the comitative suffix in position 14 as in (71). This defines the minimal domain of Mid Tone Spreading (positions 11–14), which is the shortest span which includes positions, all of which manifest positive evidence.

(69) rēˈgāʃ
r- *e-* *gaʃ*
v:10- 11- 12
HAB- AND- pull.out
'goes to pull out.'

(70) r-yēpyˈʃʧāˀ
r- *yepy* *+ʃʧāˀ*
v:10- 12 +13
HAB- go.up +light
'has a chill.'

(71) rusǣdˈnǣː
ru- *sæ̰ːd* *-nǣ*
v:10- 12 -14
HAB- study -COM
'(S/he) studies with.'

Outside of this domain, in the whole span of positions 1–28, Mid Tone Spreading may apply, but positive evidence is not always available, since not all the positions have a morpheme that would satisfy the structural requirement for this process to apply. Mid Tone Spreading applies in the sequences of a subordinator in position 1 + a base (position 12) as in (72), of a base + an adverbial clitic in position 18 as in (73), of a base + a pronominal clitic in position 23 as in (74), and of a base + a discursive clitic in position 28, as in (75).

(72) ʧīˈrǣ̰:d
ʧī= r- ǣ̰:d
v:1= 10- 12
when= HAB- come
'When (s/he) comes.'

(73) riˈzǣ̰:byzī
ri- zæ̰:by =zī
v:10- 12 =19
HAB- get.hanged =only
'(It) just gets hanged (without motives).'

(74) rā:wān
r- a:w =ān
v:10- 12 =23
HAB- eat =3SG.FOR
'S/he (formal) eats.'

(75) baˈllṵ̄:bbā
ba- llṵ:b =bā
v:10- 12 =28
IMP- sweep =then
'(Go ahead and) sweep, then.'

On the other hand, Mid Tone Spreading is not observed between independent phonological words. First, when positions 23 or 24 are occupied by an independent NP, instead of a pronominal enclitic, Mid Tone Spreading is not applied between the verb base, as shown below:

(76) riˈgats ˈbēnny *rigāts bēnny
ri- gats bēnny
v:10- 12 23
HAB- be.buried person
'People are buried.'

Similarly, Mid Tone Spreading is not observed between the verb base in position 12 and a free function word in position 16, which have their own prominence (that is, they constitute their own prosodic words).

(77) guˈdo:w ˈʒlyā̰ˀ ˈbæ̂kw

gu- *do:w* *ʒlyāˀ* *bækw*

v:10- 12 16 23

COMPL- COMPL:eat in.vain dog

'(The) dog ate in vain.'

Again, this difference between free vs bound forms could be captured by fracturing the test.

4.2.6 Tone sandhi (11-19, 1-28)

Tone Sandhi is a process whereby a mid tone (and one class of high tone which is derived from a mid tone) assigns a falling or high tone to the following syllable which lexically has a low or mid tone, cf. Figure 3. This is because the mid tone in Teotitlán Zapotec is always associated with a floating high tone, since historically it comes from a rising tone (as in Quiaviní Zapotec, cf. Uchihara 2016).

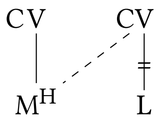

Figure 3: Tone Sandhi

The minimal pair in the following illustrates this process; in (78a), the verb base *-zæ̰:by* 'get hanged' has a low tone and does not trigger any tone change on the following vowel of the 2SG.INF enclitic, *=u*. In (78b), on the other hand, the verb root *-zǣ:by* 'fall into' has a mid tone, and thus the following vowel of the 2SG.INF enclitic is assigned a high tone.

(78) a. riˈzæ̰:byu

ri- *zæ̰:by* *=u*

v:10- 12 =23

HAB- get.hung =2SG.INF

'you hang (from somewhere/something)'

b. riˈzǣ̰:byú

ri- *zǣ̰:by* *=u*

v:10- 12 =23

HAB- sink =2SG.INF

'you sink (into a hole)'

In the preverbal position, Tone Sandhi applies between the motion prefix in position 11 and the verb base in position 12, as in (79). In the postverbal position, Tone Sandhi is known to apply between the verb base and the compounded root in position 13 as in (80); comitative in position 14 as in (81); diminutive in position 15 as in (82); manner adverbs in position 16 as well as adverbs of frequency and manner in position 19 as in (83); intensifiers in position 17 as in (84), and the negative enclitic =*di* in position 18 as in (85). This domain (positions 11- 19) defines the smallest span of Tone Sandhi.

(79) rēdˈgáty
r- ēd- gaty
v:10- 11- 12
HAB- VEN- VEN:die
'comes to die'

(80) ribē̱ˈlâ:
ri- bǣ̱: +la:
v:10- 12 +13
HAB- take.out +name
'names in (an)other way'

(81) rusyāˈnǽ:
ru- syā: -nǣ:
v:10- 12 -14
HAB- clean -COM
'cleans with'

(82) gúˈnǣˀn
g-´ ṳ̄:n -æˀny
v:10- 12 -15
POT- cry -DIM
'will cry (a little)'

(83) baˈʃūll ˈʒlyáˀzyán ˈbe:dy
ba- ʃūll ʒlyāˀ =zī =an be:dy
v:10- 12 16 =19 23 24
COMPL- peel in.vain =only =3SG.INF chicken
'He plucked the chicken in vain.'

(84) baˈʒṵ̄ːʒ tæ̰̂ː
ba- *ʒṵ̄ːʒ* *tæ̰ː*
v:10- 12 17
COMPL- fray INTENS
'frayed/scratched (something) a lot'

(85) kēdbǽ̰ːddí
kēd= *b-* *ǣ̰ːd* *=di*
v:5= 10- 12 -18
NEG= COMPL- come =NEG
'did not come'

Outside the span of 11–19, Tone Sandhi may apply anywhere within the whole verbal plan structure, namely positions 1–28. The example in (78b) above illustrates the application of Tone Sandhi between the verb base in position 12 and a pronominal enclitic in the position 23.

If the sequence is found between independent spans, Tone Sandhi is not observed. In the following example, the final syllable of the first utterance ends in a mid tone (*pān*), which would assign a high tone to the following syllable. However, no tone change is observed in the following syllable with a low tone, *zit*, since these syllables belong to different planar structures.

(86) ˈzitˈtæ̰ː ˈměːdy ˈgūpān, ˈzitˈtæ̰ː ˈměːdy ˈgūpān
zit *tæ̰ː* *měːdy* *gu-(ā)p=ān* *zit* *tæ̰ː* *měːdy*
v:2 10-12=23 2
much INTENS money COMPL-have=3SG.FOR much INTENS money
gu-(ā)p=ān
10-12=23
COMPL-have=3SG.FOR
'He had a lot of money, he had a lot of money!'

4.2.7 Final glottalization (1-28)

Finally, Final Glottalization is a process whereby vowel-final atonic syllables with low or high tone are glottalized at the final position of the whole span (1 - 28); elsewhere, the glottalization is not found. A similar process is reported for Southern Zapotec (Beam de Azcona 2004; Hernández Luna 2021). In (87), the # represents the juncture of the positions 28 and 1.

(87) Final Glottalization

a. =V$_{\text{(with low or high tone)}}$ ⟶ =Vˀ /_]#

b. =V /elsewhere

The following examples illustrate Final Glottalization. In (88), the last syllable which the 1SG enclitic =*a* belongs to is at the final position and thus is accompanied by a glottalization. In (89), on the other hand, the same 1SG enclitic is within the whole span and thus Final Glottalization is not applied:

(88) ˈnisrú riˈkā:záˀ

nis	*=rú*	*ri-*	*kǎ:z*	*=a*
v:2	=8	10-	12	=23
water	=more	HAB-	want:1SG	=1SG

‘I want more water.’

(89) riˈkā:zá ˈgâ: ˈkyæ̰:

ri-	*kǎ:z*	*=a*	*ø-́*	*ga:*	*kyæ̰̂:*
v:10-	12	=23	27	–	
HAB-	want:1SG	=1SG	POT-	trim	head.of:1SG

‘I want to get a haircut.’

4.3 Coincidence and convergence in the verbal domain

In this section, we examine all the tests applied to the verbal domain. Below we show a summary of the convergence of these tests.

Table 4: Tests and convergence in the verbal domain in TdVZ

Test	Left	Right	Size	Conv.	
Syllabification (minimal)	10	12	3	4	The shortest span of positions that contains morphemes that are known to undergo resyllabification.
Serialization 1 (minimal)	10	12	3	4	The smallest span that must be repeated in typical serialization.
Minimum free form (minimal)	10	12	3	4	The smallest possible span that is contiguous on its edges with a minimal free form.

Ciscategorial selection (minimal)	10	12	3	4	The contiguous span that contains elements that are unique to verbs.
Deviation from biuniqueness	10	13	4	1	A span where non-automatic allomorphy is observed.
Mid Tone Spreading (minimal)	11	14	4	1	The contiguous span which contains the morphemes which show positive evidence for Mid Tone Spreading.
Accentuation (minimal)	10	15	6	3	The contiguous span which is attested to be assigned prominence, which includes the verb base.
Non-permutability	10	15	6	3	Elements in this span cannot be permuted or variably ordered.
Non-interruption1 (movable element)	10	15	6	3	Elements in this span cannot be interrupted by an element that can occur in more than one position in the planar structure (e.g., a 2nd position clitic).
Tone Sandhi (minimal)	11	19	9	1	The contiguous span which contains elements which show positive evidence for Tone Sandhi.
Ciscategorial selection (maximal)	4	14	11	1	Outside of this span no element is unique to verbs.
Glottal Dissimilation	3	15	13	2	The span of positions which contain elements which display no evidence against Glottal Dissimilation.
Accentuation (maximal)	3	15	13	2	Within this domain, there can only be one prominent syllable.
Serialization1 (maximal)	10	23	14	1	The largest span that can be repeated in typical serialization.
Rising Tone Levelling	10	24	15	1	The span whose positions contain elements that display positive evidence for Rising Tone Levelling

Non-interruption2 (by an NP)	4	22	19	2	Elements in this span cannot be interrupted by a free form (by an NP)
Minimum free form (maximal)	4	22	19	2	A span that is contiguous on its edges with the minimal free form that contains elements with the largest difference from one another.
Syllabification (maximal)	1	28	28	4	The maximal span where elements of adjacent positions may resyllabify
Tone Sandhi (maximal)	1	28	28	4	The maximal span where Tone Sandhi may apply.
Mid Tone Spreading (maximal)	1	28	28	4	The span that contains elements where Mid Tone Spreading may apply.
Final Glottalization	1	28	28	4	The span where the final atonic vowel-final syllable is glottalized.

Figure 4 provides an overview of the results of the constituency variables applied to TdVZ verbs in terms of layers.[13] Assuming that words are areas of convergence, the best candidates for the word are the 10–12 span (4 diagnostics) and the 1–28 span (4 diagnostics).

The following Figures 5 and 6 show an overview of the results of the morphosyntactic and phonological constituency variables applied to TdVZ in terms of layers, respectively.[14]

As we can observe, according to the words = convergence/clustering assumption, a morphosyntactic word is the 10 - 12 span (4 morphosyntactic diagnostics) and the best candidate for the phonological word is the 1 - 28 span (4 phonological diagnostics). Both categories appear to be motivated in TdVZ verbal domain, but they cover spans that are not very intuitive for linguists. In other words, TdVZ contains very small (maximum 3 morphs) morphosyntactic words and very large (covering the sentence) phonological words. One cannot really get a more radical misalignment, but Post (2009) obtained a similar result in Galo (a Sino-Tibetan

[13]These figures are from Sandra Auderset and Adam Tallman.

[14]Note that for the purposes of this chapter we interpret 'indeterminate' domains as morphosyntactic tests.

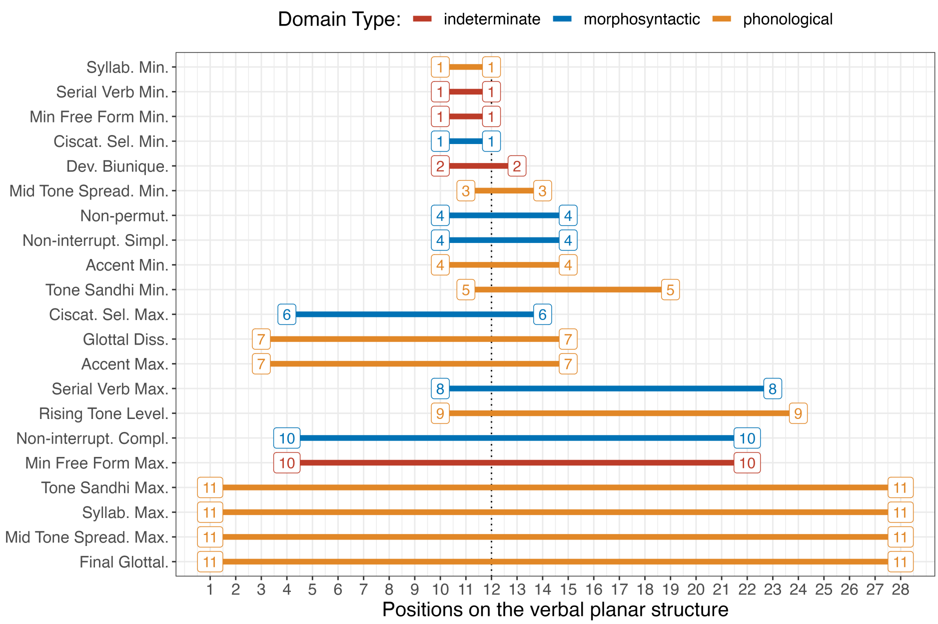

Figure 4: Constituency domains organized by converging layers in TdVZ verbs

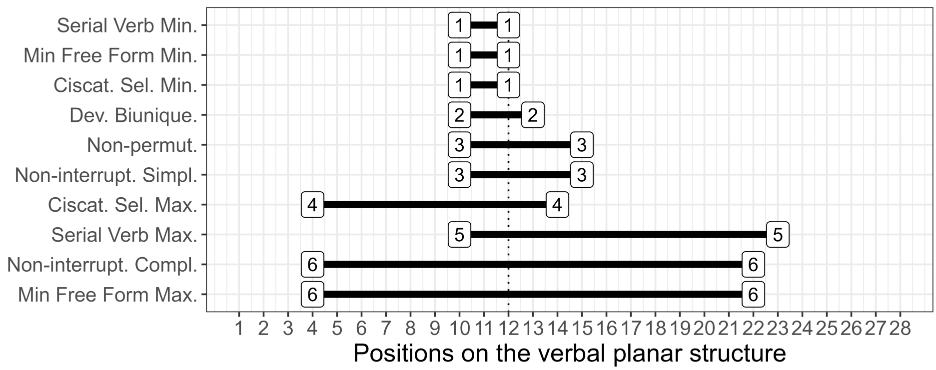

Figure 5: Morphosyntactic and indeterminate constituency domains organized by converging layers in TdVZ verbs

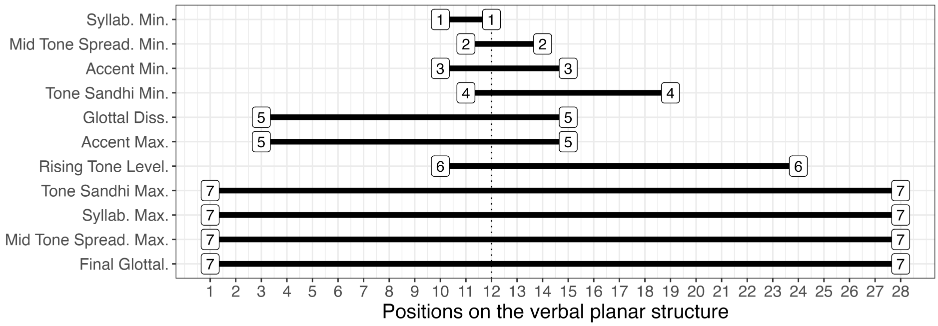

Figure 6: Phonological constituency domains organized by converging layers in TdVZ verbs

Language). One solution to these results could be to drop the convergence criteria for wordhood from consideration and assume that phonological words are just those phonological domains that are closest to morphosyntactic words.

5 Nominal domain

In this section, we discuss the tests applied to the nominal domain. Most of them are similar to those shown above for the verbal domain, with some important differences.

5.1 Morphosyntactic diagnostics

5.1.1 Minimum free form test (8-8, 6-9)

Just as in the verbal domain, the free occurrence test for the nominal domain is fractured in two. Below we explain this fracturing.

(90) Minimum free form (minimum): The free form that contains elements from positions with the shortest distance from each other with respect to positions in the planar structure.

(91) Minimum free form (maximal): The free form that contains elements from positions with the largest distance from each other with respect to positions in the planar structure. If one adds morphemes outside of this span, the sequence no longer constitutes a single free-standing form.

The smallest possible span that is contiguous on its edges with a minimal free form consists of just the nominal base: position 8. This is shown below.

(92) ˈ*nis* ‘water’
nis
n:8
‘water’

(93) ˈ*gi:* ‘fire’
gi:
n:8
‘fire’

The maximal free occurrence is the span containing the positions 6–9, as shown below. That is, the only bound morpheme that can be added on the right side without generating two free forms is the second element of a compound in position 9; if a (free form) adjective in position 10 is added, we will have two independent free forms. On the left side, the morphemes that can be added without generating two free forms occupy positions 6 (plural *d=́*) and 7 (possessive marker *ʃ-*) as in (94). Thus, the maximal domain of the free form is 6–9.

(94) ˈdʃgæ̂sˈgḭ:b ˈLlú:py

d´=	*ʃ-*	*gæ̂s*	*+gḭ:b*	*Llú:py*
n:6=	7-	8-9		17
PL=	POSS-	pot	+metal	Guadalupe

‘Guadalupe’s pots’

5.1.2 Non-interruptability (6-12, 1-9)

We fracture the (non-)interruptability test to TdVZ nominal domain as defined below.

(95) Non-interruption1: A span that cannot be interrupted by an element that can occur in more than one position in the planar structure (i.e. a second position clitic).

(96) Non-interruption2: A span that cannot be interrupted by any free form (e.g. an adjective).

The non-interruption1 test identifies the span 6–12. This is shown in the following examples. In (97), note that the second position clitic may occur on the relational noun *kwæˀ* ‘side of’ in position 2. On the right side, the second position clitic must occur after the intensifier (position 12) as in (98), but not before unless the elements in position 10–12 do not occur, as seen in (99). Recall that second position clitics can only occur on the nominal domain when the nominal moves to the preverbal focus position. Also, the occurrence of the intensifier(s) depends on the occurrence of adjectives. That is, if adjectives do not occur, intensifiers do not occur either.

(97) ˈkwæˀ**zá** ˈdmě:ʒrǣ ˈzṳ:bdēn
kwæˀ =zá d´= mě:ʒ =rǣ ø- zṳ:b =dēn
v:2 10- 12 =23
n:2 =4 6= 8 =16
side.of =**also** PL= table =DEM.DIST STAT- POS.V.placed =3PL.INAN
'Those (things) are also placed next to those tables.'

(98) ˈkwæˀ ˈdmě:ʒ ˈrôˀw ˈ**tæ̰:zá**rǣ ˈzṳ:bdēn
kwæˀ d´= mě:ʒ rôˀw tæ̰: =zá =rǣ ø- zṳ:b
v:2 10- 12
n:2 6= 8 10 12 =14 =16
side.of PL= table big **INTENS** =**also** =DEM.DIST STAT- POS.V.placed
=dēn
=23

=3PL.INAN
'Those (things) are also placed next to those very big tables.'

(99) *ˈkwæˀ ˈdmě:ʒ ˈrôˀw**zá** ˈ**tæ̰**:rǣ ˈzṳ:bdēn
kwæˀ d´= mě:ʒ rôˀw=zá tæ̰: =rǣ ø- zṳ:b
v:2 10- 12
n:2 6= 8 10=14 12 =16
side.of PL= table big=**also** **INTENS** =DEM.DIST STAT -POS.V.placed
=dēn
=23

=3PL.INAN
Intended reading: 'Those (things) are also placed next to those tables.'

The non-interruption2 test, on the other hand, identifies a span from positions 1–9, as illustrated in the following example. This span cannot be interrupted by a free form element, such as an adjective. In (101), we show that placing an adjective between positions 2–8 triggers ungrammaticality.

(100) ˈʃtḛːn ˈdæts ˈyuˀ ˈ**ngǐts**kánēn
ʃtḛːn *dæts* *yuˀ* *ngǐts* *=kán* *=ēn*
n:1 2 8 10 =16 =20
PREP.of back.of building white =DEM.MED =FOC
'It is from/of behind the white building.'

(101) *ˈʃtḛːn ˈdæts ˈ**ngǐts** ˈyuˀkánēn
ʃtḛːn *dæts* *ngǐts* *yuˀ* *=kán* *=ēn*
n:1 2 10 8 =16 =20
PREP.of back.of white building =DEM.MED =FOC
Intended reading: 'It is from/of behind the white building.'

5.1.3 Nonpermutability (6-20)

(Non-)permutability identifies spans where the ordering of elements cannot be permuted. In the nominal domain, this test identifies the span 6–20, as in (102).[15] In (103), we show that the order of the elements in this span is strict. Outside of this domain, a second position clitic that attaches to the noun (base) when moved to the focus position may occur on the noun or on the preceding element in position 2, as shown in (104).

(102) ˈdʃkûˀn gwēˈnîˀn ˈtæ̰ːrwánkī bâ̰ːnīn
d´= *ʃ-* *gûˀn* *gwěːn* ***-iˀny*** *tæ̰ː* *=rú* *=an* *=kī*
v:2
n:6= 7- 8 10 -11 13 =15 =17 =19
PL= POSS- bull small -**DIM** INTENS =more =3SG.INF =DEM.TPRL
b-a̰ːny *=īn*
10-12 =24

COMPL-do =3SG.INAN
'Those smallest bulls of her/his did it.'

(103) *ˈdʃkûˀnæˀn ˈgwěːn ˈtæ̰ːrwánkī bâ̰ːnīn
d´= *ʃ-* *gûˀn* ***-æ'ny*** *gwěːn* *tæ̰ː* *=rú* *=an* *=kī* *b-*
v:2 10-
n:6= 7- 8 -11 -10 13 =15 =17 =19
PL= POSS- bull -**DIM** small INTENS =more =3SG.INF =DEM.TPRL COMPL-

[15]When two adjectives occur in position 10, they usually follow the order of: color +size + human propensity, although the order of color and size may vary with some specific colors (black and white). However, since this does not occur with most color terms, we consider that adjectives still have a non-permutable pattern.

a̰:ny =īn
12 =24

do =3SG.INAN
Intended reading: 'Those smallest bulls of her/his did it.'

(104) kwæˀzá ˈdʃkûˀn gwēˈnîˀn ˈtæ̰:rwánkī zû:m
*kwæˀ =**zá** d´= ʃ- gûˀn gwě:n -iˀn tæ̰: =rú =an*
v:2
n:2 =4 6= 7- 8 10 -11 12 =15 =17
side.of =also PL= POSS- bull small -DIM INTENS =more =3SG.INF
=kī ø- zu: =(u)m
10- 12 =23
=19
=DEM/TPRL STAT- stand =3SG.ANML
'It (the animal) is/was also standing next to those smallest bulls of her/his.'

5.1.4 Deviations from biuniqueness (8-8)

The only deviations from biuniqueness present in the noun complex are multiple forms to one meaning mappings. In nominal planar structure, only the noun base in position 8 may show non-automatic allomorphy. First, noun bases may undergo suppletion (strong, in the cases of (106) and (107)) according to their possessive status: the possessed and unpossessed forms are segmentally unrelated. The following are such examples:

(105) a. ˈge:ʤ 'village'
b. ˈla:ʤ 'village of'

(106) a. ˈyuˀ 'building'
b. ˈli:z 'building of'

(107) a. ˈla:dy 'clothes'
b. ˈʃa:b 'clothes of'

(108) a. ˈbya̰:g 'shirt'
b. ˈʒyā̰:g 'shirt of'

(109) a. ˈbækw 'dog'
b. ˈʃikw 'dog of'

Furthermore, noun bases may undergo unpredictable tonal (and in some rare cases, phonation) alternation when the possessor is the 1sg. In the following example, the base form without possessor is *la̰:z* 'essence', with a low tone and a creaky vowel. However, when the possessor is 1sg, the base tone alternates with a rising tone and the creaky vowel with the modal:

(110) ˈlā:zá
lǎ:z *=a*
n:8 =17
essence:1sg =1sg
'my essence/center'

5.1.5 Ciscategorial selection (7-8)

In the nominal planar structure, the only positions unique to nouns are the noun base in position 8 and the possessive prefix in position 7. This defines the span of ciscategorical selection. The morphemes in the positions outside of this span may occur with other parts of speech. For instance, the plural *d=´* in position 6 may occur with the subordinator or a numeral; the postponed elements in positions 9–17 may also occur with adjectives or verbs, as we have seen in §4.

5.2 Phonological diagnostics

5.2.1 Glottal dissimilation (8-9, 3-15)

As mentioned above in §4.2.1, TdVZ has a Glottal Dissimilation rule such that a glottalized syllable is deglottalized when followed by another glottalized syllable (CVˀCVˀ > CVCVˀ). The effect of this rule is evident with the diminutive (in the position 11 in the nominal template), which itself has a glottalized vowel. When the noun base has a glottalized vowel, the glottalization of the root vowel is lost when it is followed by the diminutive suffix, as shown in the following example.

(111) gúˈnæˀn
gûˀn -æˀny
n:8 -11
bull -dim
'little / nice bull'

For the nominal domain, this test has been fractured in the following fashion:

(112) Glottal Dissimilation (minimal): The minimum contiguous span overlapping the noun stem where this process is attested.

(113) Glottal Dissimilation (maximal): the span of positions which contain elements which display no evidence against Glottal Dissimilation. Outside of this domain Glottal Dissimilation is never observed.

The minimal span where Glottal Dissimilation is attested is between position 8–9. That is, within this span, all morphemes undergo Glottal Dissimilation when they meet the structural requirement, as shown in the following.

(114) ruˈryuˀ
ruˀ *+ryuˀ*
n:8 +9
mouth +HAB.enter
'entrance'

Outside of this domain, within the span of positions 3–15, this process may or may not be observed. As we have shown above, it is applied in the sequence of position 8 (noun base) and position 11 (diminutive), but it is not applied between positions 8 and 10, as shown in the following. The generalization is that Glottal Dissimilation is not applied between independent prosodic words (but Glottal Dissimilation is not always applied between the noun base and a bound morpheme either, as we will see in (116) below).

(115) tuˈbruˀ ˈriˀ ˈngâˀ (*tuˈbru ˈri ˈngâˀ)
tubruˀ *riˀ* *ngâˀ*
n:2 8 10
QR.some pitcher blue
'Some blue pitchers'

In other cases, we simply cannot tell if Glottal Dissimilation is applied or not, since some positions do not contain any morphemes with a glottalized vowel. This is the case with the positions 1, 3, 4, 5, 6, 7, 12, and 20.

Outside of the span of 3–15, Glottal Dissimilation is known not to be applied; this defines the maximal span of Glottal Dissimilation. For instance, this process is not applied between a quantifier in position 2 and the noun base in position 8, or between the noun base and the proximal demonstrative in position 16, as shown below.

(116) tuˈbruˀ ˈbǣˀræ̋ˀ[16]
tubruˀ *bǣˀ* *=ræ̋*
n:2 8 =16
QR.some mushroom =DEM.PROX
'Some of this mushroom'

5.2.2 Accentuation (8-9, 7-11)

We have fractured Accentuation in the following manner to test constituency:

(117) Accentuation (minimal): The minimal contiguous span where prominence is attested to be assigned.

(118) Accentuation (maximal): Elements in this span interact with stress assignment but not necessarily. Outside of this domain, each element has its own prominence or never has prominence.

Prominence is assigned to the last syllable of the minimal span of Accentuation. In the case of a simple root as in (119), or when the noun base contains a fossilized prefix as in (120), all of which are in position 8, the prominence is assigned to the last syllable.

(119) *ˈbiː*
n:8
'air'

(120) *guˈtǐp*
n:8
'wasp'

In compounds which consist of the morphemes in the positions 8–9, prominence is assigned to the last syllable, as in the following example; the preceding (syllable) root does not have prominence. This is the span where prominence is attested, thus, the minimum domain.

(121) *diʒˈzaː*
dḭːʤ *+zaː*
n:8 +9
language +Zapotec?
'Zapotec language'

[16]The final glottalization in the first line is due to final glottalization (§4.2.7).

The morphemes outside of this domain, within the span of 8–11, may or may not be assigned prominence. For instance, the diminutive suffix in position 11 is within the domain of Accentuation. When a noun root in position 8 and the diminutive suffix in position 11 constitute independent syllables, the prominence is assigned to the syllable of the suffix and the root preceding these suffixes does not have prominence.

(122) gubáˈniˀn
gubâˀny -iˀny
n:8 -11
broom -DIM
'little/nice broom'

However, the adjectives in position 10 project prominence independent from the noun, and thus constitute a separate domain of Accentuation from the noun base:

(123) teˈyuˀ naˈʒé:n dǔʃˈtæ̰:
te= yuˀ naʒé:n dǔʃtæ̰:
n:2= 8 10 12
INDF= building narrow INTENS
'a very, very wide building'

On the right side, the diminutive suffix is the last element that can be assigned prominence; on the left side, we know that stress assignment does not interact with positions 1–6, but position 7 only contains a morpheme (*ʃ-*) that does not form a syllable. Thus, it is included within the maximal domain. Elements outside of this domain are never assigned prominence (as in positions 3, 4, 5, 6, 13, 14, 15, 16, 17 (when enclitic), 19, and 20) or have their own prominence (1, 2, 12, 17 (when NP), and 18).

5.2.3 Syllabification (6–8; 1–20)

Segments in the nominal domain are syllabified in the sequences of the noun base in position 8 and the compounded root in position 9 as in the following. Here, the coda consonant of *ya:g* 'tree' is realized as part of the onset cluster in the following syllable.

(124) ya.ˈgyu:
ya:g +yu:
n:8 -9
tree +soil
'soil tree (a type of tree from the region)'

To the left side of the nominal planar structure, the possessive prefix *ʃ-* in position 7 syllabifies with the noun base in position 8 as in (125); this is also the case with the plural proclitic in position 6 *d=´* as in (126). Thus, the span 6–8 is the minimal domain of syllabification.

(125) ˈʃā:r.mán
ʃ- ǎ:rm =an
n:7- 8 =17
poss- container.used.for.measure =3sg.inf
'his container used for measure.'

(126) ˈdî:z
d=´ i:z
n:6= 8
pl= year
'years'

Beyond this minimal span, syllabification may or may not apply within the whole span of 1–20. A sequence of morphemes are also resyllabified between a base + diminutive suffix in position 11, as in (127), or between the noun base and the pronominal enclitic in position 17, as in (128). Syllabification also applies between the noun base and the focus enclitic in position 20, as in (129). Thus, the right edge of the domain of syllabification includes all post-nominal elements.

(127) bæ.ˈkwæˀn
bækw -æˀny
n:8 -11
dog -dim
'little/nice dog'

(128) ˈʃpā:.yú
ʃ- bǎ:y =u
n:7- 8 =17
poss- scarf =2sg.inf
'your scarf'.

(129) ˈgīː.dín
gǐːdy *=īn*
n:8 =20
hen/female =FOC
'It is (a) hen.'

However, other positions in this domain (6 - 10) are known not to participate in syllabification. Thus, resyllabification is not observed between the noun base and the following adjective in position 10:

(130) ˈi:z.ˈyuʃ (*i.zyuʃ)
i:z *+yuʃ*
n:8 +10
year +old
'old year, the year that ended'

In addition, syllabification is not observed between independent prosodic words (this is also the case with (130) above). Thus, when position 17 is occupied by a possessor NP, syllabification is not applied, as in (131). Syllabification is also not observed between independent prosodic words in position 1 and the noun base as in (132) or between position 2 and the noun base as in (133).

(131) ˈʃkæt ˈÁ:n
ʃ- *gæt* *á:n*
n:7- 8 17
POSS- tortilla Ana
'Ana's tortilla'

(132) ˈʃtḛ̂:n ˈÁ:n
ʃtḛ̂:n *á:n*
n:1 8
possession Ana
'Ana's/of Ana'

(133) ˈzyē:n ˈî:z
zyē:n *i:z*
n:2 8
various year
'various years'

Other positions within this span do not contain any morphemes that would allow us to see if syllabification is applied with the noun base. Additionally, the first morpheme has to end in a consonant and the following with a vowel or a glide (which is not common), one of the morphemes has to be bound, since as we have seen above, syllabification is not applied between independent prosodic words.

5.2.4 Rising tone levelling (8-20)

As mentioned above in §4.2.4, Rising Tone Levelling is a tonal process where a rising tone is split into a mid tone and a high (or falling) tone on the following syllable. In the nominal domain, Rising Tone Levelling is known to apply between the noun base in position 8 and the diminutive suffix in position 11:

(134) ʒīˈtæ̂ˀn
ʒĭt -æˀny
n:8 -11
cat -DIM
'little/ nice cat'

Rising Tone Levelling is also applied between the noun base in position 8 and a pronominal enclitic in position 17 as in (135) or a focus enclitic in position 20 as in (136):

(135) ʃpā:yú
ʃ- bă:y =u
n:7- 8 =17
POSS- scarf =2SG.INF
'your scarf.'

(136) gī:dín
gĭ:dy=īn
n:8 =20
hen/female =FOC
'It is (a) hen.'

Outside of this span, Rising Tone Levelling is not attested, thus Rising Tone Levelling identifies the span 8–20. This is possibly due to the structural requirement of this process: for this process to apply, the first morpheme has to have a rising tone and is closed (all underived morphemes with a rising tone are closed), and the next morpheme has to begin with a vowel. It is not applied when the following morpheme begins with a consonant, even if the sequence falls within the span of 8–20, as in the following:

(137) ˈʃǔːbdán
ʃ- *ʒǔːb* *=dán*
n:7- 8 =17
POSS- corn =3PL.INF
'their corn'

5.2.5 Mid tone spreading (8-9, 1-20)

As we saw above in §4.2.5, Mid Tone Spreading is a process whereby a mid tone spreads to the preceding syllable with a lexical low tone. Mid Tone Spreading is observed between positions 8 and 9, as shown below. This is the shortest span where mid tone is always observed.

(138) gǣsˈgēˀw
gæs *+gēˀw*
n:8 +9
pot +lime
'lime container'

Mid Tone Spreading also applies in the sequences of a base (position 8) + a pronominal clitic indicating the possessor (position 17), as in (139). Also, this process is observed in the sequence of a base + the focus marker (position 20), as in (140).

(139) ˈʃkītsdān
ʃ- *gits* *=dān*
n:7- 8 =17
POSS- chapter =3PL.F
'their paper.'

(140) ˈgītsēn
gits *=ēn*
n:8 =20
paper =FOC
'It is paper.'

On the left side, Mid Tone Spreading is applied between the indefinite proclitic *te=* and the noun base as in (141); however, this process is not applied when this position is occupied by an independent prosodic word, as in (142).

(141) tēˈbēnny
te= *bēnny*
n:2= 8
INDF= person
'a person'

(142) tuˈbruˀ ˈgæ̀ll (*tuˈbrūˀ ˈgæ̀ll)
tubruˀ gæ̀ll
n:2 8
a.little anonas.fruit
'Some of (the) anonas (fruit)'

There is no way to verify if this process would apply in positions 1, 3, 4, 5, 6, and 7 since no morpheme in this position has a low tone; recall that the syllable has to have a lexical low tone to undergo Mid Tone Spreading. Thus, we conclude that the maximal domain of Mid Tone Spreading is the span of positions 1–20; within this span, some morphemes may undergo Mid Tone Spreading, but not always.

5.2.6 Tone sandhi (8-11, 1-20)

As we saw in §4.2.6, Tone Sandhi is a process where a syllable (with a low or mid tones) following one with a mid tone is assigned a high or falling tones. In the post-nominal positions, Tone Sandhi applies between the noun base in position 8 and the morphemes in position 9 (compounded roots) as in (143), position 10 (adjectives) as in (144), and position 11 (diminutive) as in (145). The intensifiers in position 12 are dependent on the occurrence of an adjective as in (146), thus, (empirically) we cannot test if Tone Sandhi applies between position 8 and 12. Therefore, we consider that the minimal domain for Sandhi is 8–11.

(143) bēnˈgḭ̂:w
bēnny +ngḭ:w
n:8 +9
person +man
'male person / señor'

(144) ˈbēnny náˈda:w
bēnny nada:w
n:8 10
person patient
'patient person'

(145) bǣˈllæ̂ˀn
bǣll -æˀny
n:8 -11
woman's.sister -DIM
'(nice) sister'

(146) tēˈzā *(ˈngæ̌s) ˈtæ̰:
tē= zā ngæ̌s tæ̰:
n:2= 8 10 12
INDF= cloud black INTENS
'a very dark cloud'

Beyond this domain, not all the morphemes can be shown to participate in Tone Sandhi. Thus, the enclitics in positions 13, 14, 15, 16, 19, and 20 have mid or high tones on an atonic syllable, which cannot participate in Tone Sandhi. The possessor in position 17 participates in Tone Sandhi, whether it is occupied by an enclitic or a free-standing NP:

(147) ˈbǣllú
bǣll =u
n:8= 17
woman's.sister =2SG.INF
'your sister'

(148) ˈbǣll yáˈné:t
bǣll yané:t
n:8 17
woman's.sibling Janet
'Janet's sister'

In the pre-nominal positions, Tone Sandhi applies within positions 2–8, as in (149), between an adverbial enclitic in position 3 and the noun base as in (150), and between a proclitic in position 6 and the noun base as in (151).

(149) ˈzyē:n ˈbénny
zyē:n *bēnny*
n:2 8
QR.various person
'Various people'

(150) ˈrá:zī ʃíˈnéky
rá: *=zī* *ʃīnéky*
n:2 =3 8
all =only thing
'Almost all the things / Any object around'

(151) dākréˈsě:nsy
dā= *krese̋:nsy*
n:6= 8
Mr.= Crescencio
'Mr. Crescencio'

Positions 1, 4, 5, and 7 do not have any morpheme with a mid tone, thus we would not know if Tone Sandhi is applied between these positions and the noun base in position 8. Thus, the maximal domain of Tone Sandhi is 1-20.

5.3 Coincidence and convergence in the nominal domain

In this section, we display all the tests applied to the nominal domain. Below we show a summary of the convergence of these tests.

Table 5: Tests and convergence in the nominal domain in TdVZ

Test	L	R	Size	Conv.	Definition
Minimum free form (minimal)	8	8	1	2	A span that is contiguous on its edges with a minimal free form that contains elements from positions with the shortest distance from each other.
Deviation from biuniqueness	8	8	1	2	A span where non-automatic allomorphy is observed.
Glottal Dissimilation (minimal)	8	9	2	3	The contiguous span where Glottal Dissimilation is attested.

Mid Tone Spreading (minimal)	8	9	2	3	The span that contains contiguous positions where Mid Tone Spreading applies.
Accentuation (minimal)	8	9	2	3	The contiguous span where prominence is attested to be assigned.
Ciscategorial selection	7	8	2	1	A span that contains elements that are unique to nouns.
Syllabification (minimal)	6	8	3	1	The contiguous span where elements of adjacent positions interact in syllabification.
Minimum free form (maximal)	6	9	4	1	A span that is contiguous on its edges with the minimal free form that contains elements with the largest difference from one another.
Tone Sandhi (minimal)	8	11	4	1	The contiguous span where tone sandhi is observed.
Accentuation (maximal)	7	11	5	1	Elements in this span interact with stress assignment, but not necessarily. Outside of this domain, each element has its own prominence or is never assigned prominence.
Non-Interruption1 (moveable element)	6	12	7	1	Elements in this span cannot be interrupted by a moveable element.
Non-Interruption2 (by an NP)	1	9	9	1	Elements in this span cannot be interrupted by a free form element.
Glottal Dissimilation (maximal)	3	15	13	1	The span of positions which contain elements which display no evidence against Glottal Dissimilation.
Rising Tone Levelling	8	20	13	1	The span whose positions contain elements that display positive evidence for Rising Tone Levelling.

Non-permutability	6	20	15	1	Elements in this span cannot be permuted or variably ordered.
Syllabification (maximal)	1	20	20	3	The longest span where elements of adjacent positions interact in syllabification.
Tone Sandhi (maximal)	1	20	20	3	The span where Tone Sandhi may apply.
Mid Tone Spreading (maximal)	1	20	20	3	The span containing elements which display no evidence against Mid Tone Spreading.

Figure 7 provides an overview of the results of the constituency variables applied to TdVZ nouns in terms of layers. We can observe that the convergences are found in the spans 8-9 and 1-20, both of which have the convergence of three diagnostics, which are the best candidates for the word in TdVZ nouns.

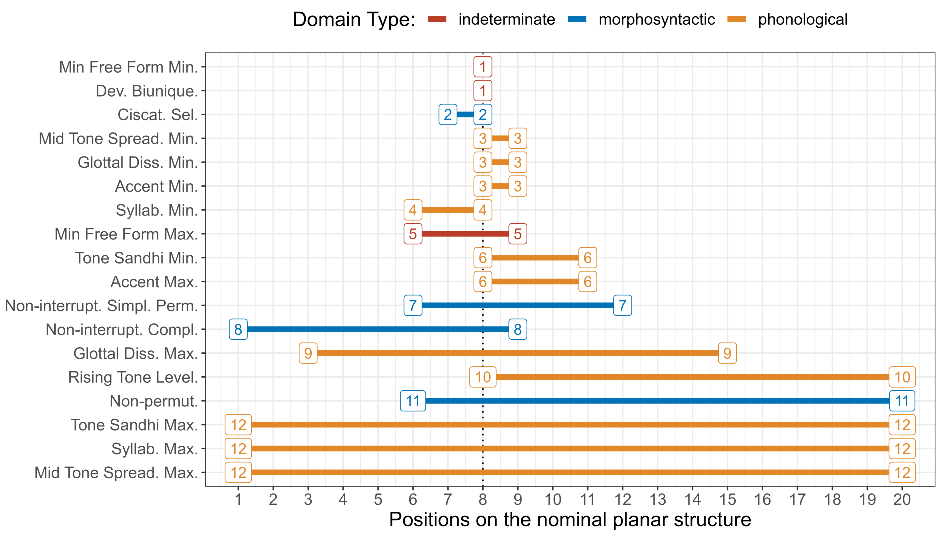

Figure 7: Constituency domains organized by converging layers in TdVZ nouns

The following Figures 8 and 9 show an overview of the results of the morphosyntactic and phonological constituency variables applied to TdVZ in terms of layers, respectively. As we can observe, taking the assumption that words are areas of convergence, there is no clear candidate for a morphosyntactic word in the nominal domain in TdVZ. On the other hand, the best candidate for the phonological word is the 8–9 span and the 1–20 span, where three diagnostics converge each.

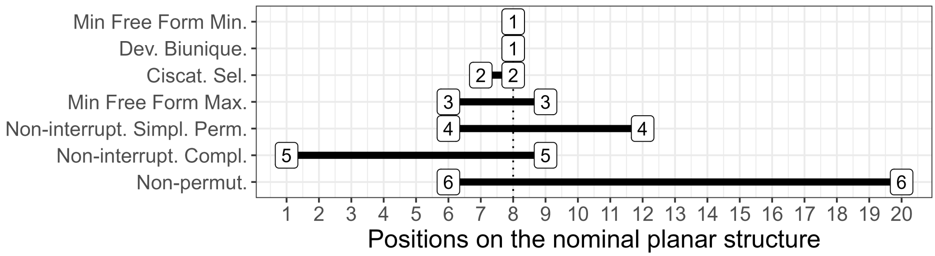

Figure 8: Morphosyntactic and indeterminate constituency domains organized by converging layers in TdVZ nouns

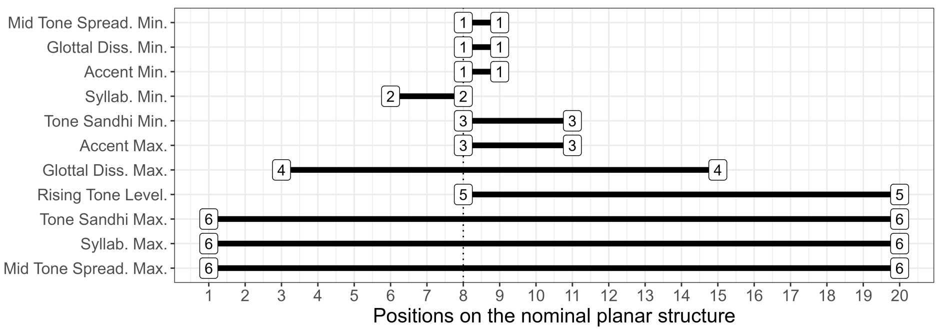

Figure 9: Phonological constituency domains organized by converging layers in TdVZ nouns

6 Conclusions and further research

In this chapter, we have reported the results of the application of 21 constituency tests to the verbal complex and 18 tests to the nominal complex in Teotitlán del Valle Zapotec (TdVZ). Assuming "words" are identified as domains of structure where constituency diagnostics converge (e.g. Matthews 2002), our goal was to assess what type of word constituents, if any, are motivated in TdVZ. In contrast to recent work emphasizing the ubiquity of wordhood domain divergence (Haspelmath 2011; Bickel & Zúñiga 2017; Tallman 2021), we showed that the data of

TdVZ provide support for at least some types of word constituent in this language: the span of positions 10–12 at the morphosyntactic level (convergence of 4 diagnostics) and 1–28 at the phonological level (4 diagnostics) in the verbal domain, and the spans of positions 8-9 and 1–20 at the phonological level (3 diagnostics each) in the nominal domain.

This study thus suggests that the high degree of misalignments found in Bickel & Zúñiga (2017) may result from the consideration of an arbitrarily low number of diagnostics; Bickel & Zúñiga (2017) only consider 6. Given that we applied the same methodology Tallman (2021) applied to Chácobo, the results suggest that languages vary in terms of the degree to which wordhood diagnostics cluster. In fact, we showed that such divergence/convergence varies language internally when we compare the morphosyntactic structure of part of speech categories.

As we showed, there are some particularities in the application of tests that need to be included in the methodology proposed by Tallman (2020). The planar structure strategy used here has advantages for comparison and for testing convergences, but we encountered some difficulties in applying this methodology. For instance, there are elements that show inter-dependencies; these elements will only occur if an element they attach to occurs. For instance, the focus marker in position 3 in the verbal domain will only occur when a phrase takes the preverbal position in position 2. This could be captured with the free occurrence test or through deviation from biuniqueness test.

Another difficulty we encountered basing purely on the linear order of the morphemes is capturing the difference in the behavior of the bound and free morphemes that occupy the same position. For instance, positions 23 - 25 in the verbal domain and position 17 in the nominal domain can be occupied either by a pronominal enclitic or an independent NP. When these positions are occupied by the enclitics, they undergo various phonological processes, such as Syllabification, Rising Tone Levelling, and Mid Tone Spreading, but they do not when they are occupied by an independent NP. This difference could be captured by test fracturing, which is not done in this chapter for the sake of space.

Finally, the question remains if words should really be defined just based on clustering of diagnostics in the way we have done here. If not, then how? Is there a non-ad-hoc way to define morphosyntactic and phonological words such that they correspond more closely to "intuitive words" employed by speakers and linguists?

Abbreviations

ANML	animal	MED	medial
COM	comitative	POS	positional
COMPL	completive	POSS	possessive
DEM	demonstrative	PREP	preposition
DIM	diminutive	PRON	independent pronoun
F	feminine	PROX	proximal
FOC	focus	QR	quantifier
FOR	formal	RECP	reciprocal
IMP	imperative	REST	restorative
INAN	inanimate	TPRL	temporal
INDF	indefinite	V	verb
INF	infinitive	VEN	venitive
INTENS	intensifier		

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Chapter 8

Constituency in Zenzontepec Chatino

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This chapter presents morphosyntactic and phonological constituency tests in the Zenzontepec Chatino language of southern Mexico, with data and analysis based almost entirely on a corpus of language use of varied genres. The language displays a notably wide range of segmental and suprasegmental sound patterns, some of which have strong convergences around the verbal lexical core, and which in turn align with some of the morphosyntactic tests. In light of recent typological and descriptive work on wordhood (including many contributions to this volume) that shows constituency tests do not tend to converge as they are emergent in dynamic language use and change, Zenzontepec Chatino presents a notable case as a language with a relatively strongly motivated word constituent.

1 Introduction

This chapter investigates constituency in the Zenzontepec Chatino language, a Zapotecan language of the Otomanguean stock of Mesoamerica (Mechling 1912; Boas 1913). Following the methodology outlined in Tallman (2021, and this volume), the structure of verbal predications is flattened out into a verbal planar structure. No constituency is assumed *a priori*, and language specific constituency tests are applied, and fractured as necessary, to identify possible constituents in the language where the tests might converge.

Zenzontepec Chatino presents an interesting and important case in the empirical study of constituency in human language, for several reasons. First of all, in a previous pilot study that looked at 17 languages of the Americas (Tallman et al. 2019), Zenzontepec Chatino was one of only a few that displayed evidence that could motivate both phonological and grammatical words beyond

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chance, and additionally, a word-like constituent substantiated by pooling together morphosyntactic and phonological constituency tests. Zenzontepec Chatino also stands out in this project for the plethora of phonological tests – both segmental and suprasegmental – that can be observed. Of additional interest is special and illuminating evidence for constituency from a play language, or *ludling* (Laycock 1972), which converges with other sound patterns. Finally, the language is tonal but displays a low tonal density (Campbell 2014, 2016), meaning that many tone-bearing units are not specified for tone, and this affords tonal processes that may operate across wide spans in the planar structure, interacting with intonational factors such as declination and pitch reset at the start of new intonational units. Due to the large number of tests identified for the verbal domain and considerations of space, constituency in the nominal domain is not treated here.

The chapter is organized as follows. Some background on the language community and the data are provided in §2. The verbal planar structure is introduced in §3. Morphosyntactic tests are presented in §4, and (morpho)phonological tests in §5. Evidence for constituency from the play language is provided in §6, followed by a discussion of the findings (§7) and a short conclusion (§8).

2 The language and the data

The Zenzontepec Chatino language is spoken widely in the municipality of Santa Cruz Zenzontepec, and by a few elders in the municipality of Santa María Tlapanalquiahuitl, both located in the district of Sola de Vega in southwestern Oaxaca, Mexico. The language is also spoken in diaspora communities in other parts of Mexico and the United States, especially California. According to the 2020 Mexican national census (INEGI 2020), the municipality of Santa Cruz Zenzontepec has about 19,000 inhabitants, of whom roughly 12,000 people report speaking an indigenous language (presumably Zenzontepec Chatino for most).

The data presented in this study are drawn from a corpus of about 21 hours of transcribed and translated language use (Campbell 2012), supplemented by an analytical lexical database consisting of about 10,000 entries, some with limited elicited or offered examples, from collaborative language documentation and description that is ongoing since 2007. About 20 participants from a handful of villages and of varied age and gender have contributed to the corpus in a range of speech genres, including but not limited to personal narrative, description, conversation, advice-giving, and folklore. While the data do not reflect the full range of genres and uses of the language, they nevertheless present a reasonably broad picture of its structure and use. Following the free translations in interlinear examples are reference words and time positions that registered users of the

Endangered Language Archive (ELAR) can use to find most of the passages in their larger discourse context (Campbell 2012).

It is important to highlight that the documentary corpus and usage-based nature of this study limit the amount of evidence that is brought to bear on the analysis via ungrammaticality judgments about constructed examples. This is especially relevant for the morphosyntactic constituency tests, which by nature require testing in addition to observation for determining finer details. Nonetheless, the study shows that with substantial documentation and rigorous analysis even domains of morphosyntactic tests can be fairly precisely delimited. Phonological patterns, on the other hand, lend themselves more to observation in language use and depend less on grammaticality judgements for outlining the details.

3 Verbal planar structure

This section presents the verbal planar structure of Zenzontepec Chatino. For the distinction between verbs and other word classes in the language, see Campbell (2014), but for present purposes, verbs are defined as forms that directly and obligatorily inflect for aspect-mood. Nouns do not inflect for aspect-mood, and they may be followed by forms expressing property concepts that attributively modify them (adjectives), and/or demonstratives. Nouns, but not verbs, may be preceded (and quantified) by numerals and/or articles. If a noun phrase is followed by another noun phrase with a distinct referent (in some cases with prepositional *hiʔį̄*) then that following form (or span) is understood as referring to a possessor of the preceding form, and not as subject or object. On the other hand, a noun or noun phrase that immediately follows a verb will encode the verb's subject, an object, an oblique participant, or an adverbial expression involved in the clause.

The Zenzontepec Chatino verbal planar structure is presented in Table 1.[1] The simplex verbal root occurs in the slot in position 13; a compounded stem that derives another verbal lexeme may occur in position 14. Other details about the

[1]The main orthography used in this chapter is an IPA-based phonemic orthography. Deviations from the IPA are as follows: r = [ɾ]; V̄ = M tone, V́ = H tone, V = no tonal specification on a mora, V̨ = phonologically nasal vowel, VV = phonologically long (bimoraic) vowel, =V(ʔ) = demonstrative enclitic with unspecified vowel quality. As needed, fine phonetic transcriptions that display allophonic realizations, or the lack of such, are provided in square brackets. Textual examples consist of the following lines and conventions. First line: surface phonemic form, showing results of elision and contraction but not allophonic alternations such as H tone spreading, downstep, nasality spreading or palatalization of coronals. Second line: planar structure position numbers (v: verbal planar structure). Third line: underlying phonological representation without allophonic alternations, contractions, or fusion; hyphen (-) represents a prefix, equals sign (=) indicates an enclitic, plus sign (+) precedes the second stem in a compound stem. Fourth line: glosses and grammatical abbreviations, which follow the Leipzig Glossing Rules. Fifth line: free English translation including key words and time stamp of the source media file.

core of the verbal planar structure near the lexical root are outlined in §4 via morphosyntactic constituency tests.

Table 1: Zenzontepec Chatino verbal planar structure

Positions	Type	Elements
(1)	Slot	Conjunction
(2)	Zone	NP {A, S, P}
(3)	Zone	Adverbial (*niī*, others)
(4)	Slot	Mood (Conditional *tī*, Interrogative *ʔā*)
(5)	Zone	Mood (Negation *ná*, *naʔā*, *nītsáʔ*, *wílā* Hypothetical *tu*, Assertive *tala*, *ta*)
(6)	Zone	Adverbial (*tíʔ*, *tʲāʔ*)
(7)	Slot	Aspect-mood
(8)	Slot	Transitivity
(9)	Slot	Auxiliary
(10)	Slot	Aspect-mood
(11)	Slot	Causative *u-*, Iterative *i-*
(12)	Slot	Transitivity *s-*, *t-*, *j-*
(13)	Slot	Verb root
(14)	Slot	Compound stem (any lexical class), Applicative *lóʔō*
(15)	Zone	Adverbial
(16)	Slot	Essence *=tīʔ*, *=rīké*
(17)	Slot	Subject NP (A, S)
(18)	Zone	NP {P, T, R}
(19)	Zone	Adverbial
(20)	Slot	Tense
(21)	Zone	Discourse marker, Adverbial

Establishing the verbal planar structure of Zenzontepec Chatino in this methodology posed some challenges. First of all, aspect-mood inflection is partly prefixal and partly expressed by tone melody alternations (or lack thereof) on verb stems (Campbell 2019). This nonconcatenativity and deviation from biuniqueness does not fit neatly into a discrete linear model. Second, most verbs of emotion and cognition are idiosyncratically formed by combining a verb stem in position(s) 13(+14) with an “essence” element (Cruz & Stump 2018), like a body part, in position 16: *=tīʔ* ‘living core’ or *=rīké* ‘chest’ (Campbell 2015). However, the two components of these verbal lexemes are not contiguous in the planar structure when optional adverbial elements intervene, while other multi-stem verbal lexemes consist of rigidly contiguous lexical elements in positions 13+14. Thus, the verbal “lexeme” does not have a consistent and non-interruptible span in the planar structure. Third, there is some variable ordering between the adverbial zone in position 15 and the “essence” elements in position 16. The details of this ordering and its relevance for constituency are discussed in §7. Fourth, subject person marking occurs in position 17, but there are nonconcatenative processes that do not fit neatly and discretely into our linear planar structure model: (i) 2nd-person singular is marked by tonal ablaut on the preceding element, which could be in position 13, 14, 15 (adverbial) or 16 (essence), and (ii) vowel-initial subject markers in position 17 fuse with some verb stems (or the immediately preceding element in the same positions just mentioned).

Although the language displays fairly flexible constituent order (Campbell 2021a), this plays out largely in the zones in positions 2 and 18, where nominal spans occur in varied orders or varied positions with respect to the verb. Finally, some finer detailed work remains to be done with respect to any different meanings or implicatures that arise from the variable placement of adverbials in positions 3, 15, 19, and 21.

An important fact about the language is that there is only one set of pragmatically neutral short pronouns, and a parallel set of longer, mostly bimoraic pronouns, whose use is for emphasis or disambiguation. Setting aside contractions in natural speech that can be unpacked (Campbell 2014), there are no distinct forms of pronouns for different grammatical relations: the role of a participant expressed by a pronoun or any NP is conveyed by context and by its position in the clause with respect to other elements, or unexpressed for topical 3rd persons (zero anaphora).

4 Morphosyntactic tests

The morphosyntactic constituency tests that have so far been identified for the Zenzontepec Chatino verbal domain include free occurrence (§4.1), non-permutability (§4.2), non-interruptability (§4.3), and coordination (or subspan repetition, §4.4).

4.1 Free occurrence

In this study “free occurrence” in the verbal domain is defined as the minimal span of positions (in the verbal planar structure) that must occur to form a complete utterance (i.e., to be produced in isolation) and which includes the verb root.

However, the span that may function holophrastically depends on the person and topicality of the subject of the verb, and also whether the verb occurs with a lexicalized auxiliary. Thus, this constituency test is fractured in Zenzontepec Chatino.

4.1.1 Free occurrence (minimal), positions 10–13

Zenzontepec Chatino verbs obligatorily inflect for aspect-mood via prefixes and tonal alternations that are largely independent of one another (Campbell 2019). Third person referents that are highly topical in discourse are often omitted in non-ambiguous contexts (Campbell 2015, 2021a), regardless of syntactic function, which I refer to as anaphoric zero (Givón 1983). Thus, the (smallest) minimum free occurrence form that includes a verb root (and can express a proposition) consists of the root in position 13 and aspect-mood inflection in position 10, as shown in (1), but note that these positions are fused for certain verbs (see e.g., (4a).

(1) Minimum free occurrence (small), positions 10–13
jaku
j-aku
v:10-13
PFV-eat.3
'(They) ate (him).' (kwiten7 nkatzen 6:24)

4.1.2 Free occurrence (large), positions 7–17

Zero anaphora is not possible for first- or second-person reference, so pronouns must occur, and a set of several third-person pronouns are also used for maintaining referential continuity or for stylistic purposes. If a subject occurs, it occurs in position 17, delimiting the final edge of a maximal free occurrence span, as shown in example (2). Some auxiliaries have lexicalized with certain verbs; these are bound to (and precede) the main verb and are not able to stand as free forms themselves, as also illustrated in (2). The causative auxiliary and its associated positions (positions 7–9) occur obligatorily in order to express the intended meaning. Therefore, the minimum free occurrence test is fractured to include this larger span based on person and lexicalized auxiliaries.

(2) Free occurrence (large), span 7–17
laaʔ laa nkʷēkūtūʔúūʔ hiʔį̄

	laaʔ	*l-*	*aa*	***nkʷ-***	***ē+***	*k-*	*ū-*	*t-*	*ūʔú*	***=ūʔ***	*hiʔį̄*
v:	3	3-	3	7-	9+	10-	11-	12-	13	=17	18
	like.so	STAT-	be	PFV-	CAUS+	POT-	CAUS-	TRVZ-	be.inside	=3PL	OBJ.(3)

'That's how they dressed her.' (4 bailes 6:11)

4.2 Non-permutability

Most Otomanguean languages have adverbial elements that follow the verb and precede the subject (Campbell 2017: 21–22), modifying the event expressed in the clause. In Zenzontepec Chatino, multiple adverbs may co-occur, in variable order in the position 15 zone, as in related languages (Gutiérrez 2014: 41). Since the positions of the verb root (and compound stem if present) are fixed, as is the position of the subject, we can speak of a rigid non-permutability span (§4.2.1), and a non-rigid non-permutability span (§4.2.2) around the core of the verbal planar structure.

4.2.1 Non-permutability (rigid), positions 7–14

Elements from the aspect-mood marker of an auxiliary (position 7) to a post-pound stem of a compound verb (position 14) occur in a rigidly fixed order and are non-permutable. The textual example in (3a) becomes ungrammatical if the order of the auxiliary and (compound) main verb is switched or if the order of the two stems within the (compound) main verb is reversed (3b). However, the order of elements outside of this span is more flexible.

(3) Non-permutability, span 7–14

a. *nkʷitakakūʔwí tī na kʷiniʔ lahaaʔ*

	nkʷi-	*ta+*	*k*	*-a*	*+kūʔwí*	*tī*	*na*	*kʷiniʔ*	*laha*	*=Vʔ*
v:	7-	9+	10	-13	+14	17	17	17	17	=17
	PFV-	finish+	POT	-become	+drunk	TPLZ	DEF	person	wild	=ANA

'The devils finished getting drunk.' (amigo borracho 3:55)

b. * k- a +kūʔwí **+nkʷi- ta** tī na kʷiniʔ laha =Vʔ
*nkʷi- ta+ **kūʔwí** +k- a tī na kʷiniʔ laha =Vʔ

4.2.2 Non-permutability (scopal), positions 7–17

Following position 7, it is not until the adverbial zone in position 15 that the ordering of any elements may be manipulated. The examples in (4) display alternate orders of the adverbial elements *=ri* 'only' and *=kāʔá* 'again, also' following the verb root. Available evidence suggests that there are subtle scopal differences expressed by the alternate orders, with *=ri* having scope over *=kāʔá* ‘again’ in (4b).

(4) Permutability in position 15

a. *t^{j}aa**rikāʔá** tsaka somanā n^{j}āʔā*

t^{j}aa	***=ri***	***=kāʔá***	*tsaka*	*somanā*	*n^{j}āʔā*
v:10.13	=15	=15	17	17	21
POT.finish	=only	=again	one	week	see.2SG

‘A week just finishes, again, you see.’ (chu ti7yu 10:36)

b. *jaku**tsoʔōkāʔári**ju*

j-	*aku*	***=tsoʔō***	***=kāʔá***	***=ri***	*=ju*
v:10-	13	=15	=15	=15	=17
PFV-	eat	=well	=again	=only	=3SG.M

‘He only ate well again.’ (offered)

The offered (not elicited from a contact language) example in (4b) contains three elements in the adverbial zone in position 15. The initial one, adjective *=tsoʔō* ‘good’ (functioning adverbially as ‘well’) may also occur later, in the zone in position 19, as shown in (5). If there is a meaning difference conveyed by these different positions for adverbials, it is not yet clear to me.

(5) Adverb in position 19

*nu ntēʔják^{w}entāą tī hnuwēʔ **tsoʔō** tsa hn^{j}āʔá*

	nu	*ntē-*	*ʔjá*	*+k^{w}entā*	*=ą*	*tī*	*h-*	*nuwēʔ*	***tsoʔō***	*tsa.hn^{j}āʔá*
v:	1	10-	13	+14	=17	18	18-	18	19	21
	SUB	PROG-	buy	+account	=1INCL	TPLZ	OBJ-	3ANA	well	truly

‘We are watching over this very well.’ (lukwi proceso 6:01)

What is clear is that an element that occurs in position 18, like the direct object *leta* ‘path’ in (6a), cannot be positioned anywhere among positions 7–17. The example in (6b) has the same root in position 14, but this is a compound verb with a conventionalized and very distinct meaning.

(6) Direct objects cannot interrupt the span of positions 7–17

a. nkatūʔúūʔ **leta** wá

nka-	*t-*	*ūʔú*	*=ūʔ*	***leta***	*wá*
v:10.11-	12-	13	=17	18	18
PFV.CAUS-	TRVZ-	be.inside	=3PL	path	DIST

‘They put in that path.’ (offered, verb examples5 19:22)

b. kutūʔú**leta**ą̄ʔ hiʔį̄wą
*k- u- t- ūʔú +**leta** =ą̄ʔ hiʔį̄ =wą*
v:10- 11- 12- 13 +14 =17 18 =18
POT- CAUS- TRVZ- be.inside +path =1SG OBJ =2PL
'I will guide you (pl.).' (offered, verb examples5 21:34)

Likewise, if an element in the position 15 adverbial zone, as shown in (7a), is placed after the subject (position 17), as in (7b), the meaning is significantly different, as the adverb modifies the subject instead of the verb.

(7) Adverbials modifying verb, or subject

a. tāká**kāʔá** migū nāáʔ jākʷá nakʷę
*tāká =**kāʔá** migū nāáʔ jākʷá nakʷę*
v:13 =15 17 17 19 21
exist =also friend 1SG there say.3
'"I **also have** a friend there", he said.' (escarabajo 3:10)

b. tāká migū**kāʔá** nāáʔ nakʷẽ
*tāká migū =**kāʔá** nāáʔ nakʷẽ*
v:13 17 =17 17 21
exist friend =also 1SG say.3
'"I have **another friend**", he said.' (piedra rajada 1:43)

The domain of scopal non-permutability in positions 7–17 is referred to as the Verbal Complex. This span deserves a special name because lexicalization of verbal meanings can involve in some cases the auxiliary span (7–9), and in emotion and cognition verbs, it includes the essence element in position 16. Moreover, subjects in position 17 are obligatory for certain persons, and if vowel-initial, they lengthen or fuse with the element that precedes them (see §5.3.4).

4.3 Non-interruptability, positions 7–14

Non-interruptability constituency tests are used to identify the span of positions that cannot be interrupted by any free occurrence form. The main elements for testing this in Zenzontepec Chatino are the adverbials just discussed, which can interrupt the Verbal Complex in position 15. A select set of these adverbials can freely occur. Looking back at the example in (5), the adverbial *tsoʔō* 'well' modifies the verb but occurs in position 19, following the verb's arguments. This form (from the adjective 'good') can occur freely on its own, and is commonly used to express agreement with one's interlocutor.

(8) Adjective-adverbial *tsoʔō* as free occurrence
tsoʔō
tsoʔō
v:-
good
'It's good.' (nkoon lisu 2:13)

The example in (9) illustrates that the adverb can interrupt the verbal complex. The verb 'dance' is a compound verb (positions 13 +14, 'make.music +foot') that occurs in both clauses in the construction. In the second clause, the adverbial *tsoʔō* 'well' occurs in position 15 between the verb stem and the subject.

(9) Adverb in position 15
*hnii jūlákijaą̄ʔ tʲāʔ hjánā nt͡ʃūlákijaʔ**tsoʔō**ǫ́ʔ*

	hnii	*j-*	*ūlá*	*+kijaʔ*	*=ą̄ʔ*	*tʲāʔ*	*hjánā*	*nt͡ʃ-*	*ūlá*
v:	2	10-	13	+14	=17	19	19	10-	13
	song	PFV-	make.music	+foot	=1SG	still	year.ago	PROG-	make.music

+kijaʔ	*=**tsoʔō***	*=ą̄ʔ*
+14	=15	=17
+foot	=well	=1SG

'The dance that I performed a year ago, I am dancing it better.' (dos cuentos raton 2:17)

As shown in (10), the same adverb could just as well occur in position 19 – which, as mentioned earlier, may have a slightly different meaning – but it cannot interrupt the two stems of the compound, as shown in example (11). If we add an auxiliary in positions 7–9, the adverb cannot occur between the auxiliary span and the main verb (12).

(10) Adverb in position 19
*hnii j-ūlá +kijaʔ =ą̄ʔ tʲāʔ hjánā nt͡ʃ- ūlá +kijaʔ =ą̄ʔ **tsoʔō***
'The dance that I performed a year ago, I am dancing it better.'

(11) Adverb between stems of a compound, ungrammatical
hnii j- ūlá +kijaʔ =ą̄ʔ tʲāʔ hjánā nt͡ʃ- ūláʔ **tsoʔō +kijaʔą̄ʔ*
'The dance that I performed a year ago, I am dancing it better.'

(12) Adverb cannot interrupt auxiliary 'begin' and main verb
hnii j-ūlá +kijaʔ =ą̄ʔ tʲāʔ hjánā ntē -tá + **tsoʔō j-ūlá +kijaʔ =ą̄ʔ*
'The dance that I performed a year ago, I am starting to dance it better.'

The examples above have shown that the span of non-interruptability that includes the verb root is positions 7–14.

4.4 Coordination (subspan repetition)

In Zenzontepec Chatino, spans of varied lengths in the verbal planar structure may be coordinated. Following Tallman (2021: 350), this is a type of subspan repetition whose informativeness for constituency requires fracturing the test into subtests: a maximal (repeated) subspan and a minimal repeated subspan, where the minimal subspan refers to the span of elements in which none can be elided or have wide scope over both subspans.

4.4.1 Minimal (repeated) subspan positions 5–16

The example in (13) illustrates asyndetic coordination of two verbs functioning as adverbial purpose clauses modifying a matrix clause. The first-person exclusive subject is elided on the first verb and occurs on the second verb, where it has scope over both subspans of positions 10–13. The dative oblique argument in position 18 likewise occurs only once, following the subject in the second subspan, and it also has scope over both subspans. Therefore, the subject in position 17 and non-subject arguments in position 18 are not within the minimal repeated subspan domain.

(13) Coordination of positions 10–18

nteē nihjaą jakʷa ***kikʷiʔ ketsāʔja*** *hjū*

	nteē	*nihjaą*	*jakʷa*	***ki-***	***akʷiʔ***	***k-***	***etsāʔ***	***=ja***	*hiʔį̄*	*=ju*
v:	3	10.13	17	[10-	13]	[10-	13]	=17	18	=18
	here	POT.come	1EXCL	POT-	speak	POT-	inform	=1EXCL	DAT	=3SG.M

‘We shall come here to speak and inform him.’ (ntelinto itza7 4:18)

The example in (14), illustrates that the minimal subspan includes position 14 (for both verbs in this case) and position 16, neither of which can be elided and neither of which may have scope over both subspans. Again, the subject NP in position 17 has scope over both subspans and is elided following the first verb. If the essence form in position 16 were omitted, this would yield a different verbal lexeme altogether, ‘have sexual relations.’ Thus, the final edge of the minimal repeated subspan is position 16.

(14) Verbal coordination

ʔniléē ʔnikíʔjūrīké tī kʷaʔą tīkʷá =wą

[ʔni	*+léē]*	*[ʔni*	*+kíʔjū*	*=rīké]*	*tī*	*kʷaʔą*	*tīkʷá*	*=wą*
v:[10.13	+14]	[10.13	+14	=16]	17	17	10.13	=17
POT.do	+strong	POT.do	+male	=chest	TPLZ	2PL	POT.sit	=2PL

'You all will make efforts and feel manly so that you sit (in power).' (ntelinto itza7 3:07)

Since aspect-mood inflection is obligatory for Zenzontepec Chatino verbs, a smaller subspan excluding position 10 (or lack of inflectional tone on a verb for which positions 10 and 13 are fused) would be unutterable. However, the initial edge of the minimal repeated subspan domain remains to be demonstrated. As discussed in §4.1.2, for some verbs the auxiliary positions 7–9 are lexicalized and obligatory, which is relevant for free occurrence. For most verbs, however, auxiliaries are not obligatory, and they compositionally add their meaning to the clause. The example in (15) shows two repeated subspans of auxiliary, verb and subject, with the same auxiliary occurring in both. The free translation provided by a collaborator includes the meaning of the motion auxiliary in each clause.

(15) Subspan repetition

lēʔ janaʔaūʔ jatūkʷá kāʔáūʔ ike niʔi

lēʔ	*j-*	*a+naʔa*	*=ūʔ*	*j-*	*a+tūkʷá*	*=kāʔá*	*=ūʔ*	*ike*	*niʔi*
v: 1	7	9+13	=17	7-	9+13	=15	=17	18	-
then	PFV-	go+see	=3PL	PFV-	go+CAUS.be.placed	=again	=3PL	head	house

'Then they went to see and they went to climb on top of the roof of the house again.' (nkwitzan tiʔi 15:58)

To exclude the auxiliary on the first verb, the verb would take perfective aspect inflection, but the meaning changes, as shown in (16a) (elided material is crossed out). If the auxiliary is omitted from the second span, perfective aspect again provides the closest meaning, but the meaning changes slightly in (16b). Although the structure in (16b) can be interpreted as having the original meaning in (15), due to context and inference, it also has a subtly different literal meaning and can have other interpretations. Therefore, the auxiliary span of positions 7–9 is best treated as part of the minimal repeated subspan.

(16) Subspan repetition with auxiliaries omitted

a. *lēʔ ~~ja~~**nka**naʔaūʔ jatūkʷá kāʔáūʔ ike niʔi*
'Then they **saw** and they went to climb on top of the roof of the house again.'

b. *lēʔ janaʔaūʔ ~~ja~~**nkā** tūkʷá kāʔáūʔ ike niʔi*
'Then they went to see and they **climbed** on top of the roof of the house again.'

In example (17), subspans including the adverbial particle in position 6 are repeated, and the particle cannot be elided in one subspan or the other without yielding a different interpretation, as shown in (18), and thus position 6 is also part of the minimal span.

(17) Verbal coordination, positions 10–14
tʲāʔ kīkʷīʔ tʲāʔ tʲāá+tíʔ ʃī kīkʷīʔ
tʲāʔ kī- *akʷīʔ* *tʲāʔ tʲāá* *+tíʔ* *ʃī* *kī-*
v:[6 10- 13] [6 10.13 +14] 1 10-
still POT- speak.2SG still POT.ITER.give +living.core.2SG CONJ POT-
akʷīʔ
13
speak.2SG
'Speak and still remember what you want to speak about.' (ntetakan7 jute7 1:37)

(18) Verbal coordination, positions 10–16
~~tʲāʔ~~ kīkʷīʔ tʲāʔ tʲāá+tíʔ ʃī kīkʷīʔ
~~tʲāʔ~~ kī- *kʷīʔ* *tʲāʔ tʲāá* *+tíʔ* *ʃī* *kī-*
v: [10- 13] [6 10.13 +14] 1 10-
POT- speak.2SG still POT.ITER.give +essence.2SG CONJ POT-
akʷīʔ
13
speak.2SG
'Speak and still remember what you want to speak about.'

The example in (19) illustrates repeated subspans with adverbial-modal particles in position 5 that cannot be elided and neither can have scope over the other, as shown by the unacceptable translations beneath the free translation. Thus, the minimal repeated subspan includes at least positions 5–16.

(19) Verbal coordination, positions 16

ta tākárúʔ nkʷítsą hjā ná t͡ʃáʔąja

ta	*tāká*	*=rúʔ*	*nkʷítsą*	*hiʔį̄*	*=jā*	*ná*	*t͡ʃáʔą*	*=ja*
v:[5	10.13	=16]	17	17	=17	[5	10.13]	=17
already	exist	=even	child	GEN	=1EXCL	NEG	POT.get.accustomed	=1EXCL

'We already have kids and we still don't get along.' (historia medicina 2:40)

*'We *still* already have kids and we still don't get along.'

*'We already have kids and we *already* still don't get along.'

4.4.2 Maximal (repeated) subspan, positions 2–20

Having defined the minimal repeated subspan as the span of positions in which no element can be elided or have scope over the other, the maximal repeated subspan is defined as the span of positions that can be repeated without reference to whether elements of one can be elided or have scope over both. Just as the preceding examples have shown that an elided subject in position 17 may have scope over multiple repeated subspans, thus delimiting the final edge of the minimal repeated subspan domain, some other less immediate elements may likewise be omitted from one subspan and have scope over both.

Example (20) shows that a significant span of pre-verbal elements may also be included in repeated subspans; the two clauses have fronted subjects in position 2. Also, the locative NP in position 18 only occurs following the second subspan, but it has scope over the first span as well.

(20) Subspan repetition, positions 2–18

hā maʃi nuʔu tsāā maʃi ahentē tsaaju nanēʔ kīkʷą́

hā	*[maʃi*	*nuʔu*	*ts-*	*āā]*	*[maʃi*	*ahentē*	*ts-*	*aa*	*=ju]*	*nanēʔ*
v: 1	[2	2	10-	13]	[2	2	10-	13	=17]	18
SUB	even	2SG	POT-	go.2SG	even	agente	POT-	go	=3SG.M	stomach

kīkʷą́
18
metal

'...because even you may go and even the *agente* may go to jail.' (ntelinto itza7 4:01)

Another example shows that adverbial particles that function as tense markers in position 20 also occur in repeated subspans, as shown in example (21).

(21) Subspan repetition, positions 2–20

nkatāká koʔma nkā ntuhwi kʷaa koʔma nkā

	nk-	*a*	*+tāká*	*koʔma*	*nkā*	*ntu-*	*hwi*	*kʷaa*	*koʔma*	*nkā*
v:	[10-	13	+14	17	20]	[10-	13	17	18	20]
	PFV-	be	+exist	macaw	PST	PFV-	kill	2EXCL	macaw	before

'There were many macaws before and we would kill the macaws before.' (no hay brujos 9:45)

The discourse markers in position 21 do not express information that contributes to the lexical interpretation of a proposition, but rather express a speaker's appeal to an interlocutor. No examples were found in the corpus in which any of these could be understood as having scope over repeated subspans. Thus, the maximal repeated subspan domain includes positions 2–20.

Although the domains of subspan repetition are already defined, one more example serves to illustrate a ternary subspan repetition, but more importantly, it serves to make a point that is relevant later for tonal processes, which interact with intonation. Since the preferred strategy for coordinating clauses in Zenzontepec Chatino is asyndesis, that is, without any overt segmental marker indicating the clausal relation, one can wonder if these are cases of coordination at all or whether they are simply sequences of sentences. How real and strong of a difference is this anyway? The key cues are intonational. The example in (22) involves three instances of the same verb, each with a distinct lexical noun subject, and all of these VS spans (positions 10–17) are coordinated asyndetically. Figure 1 shows that all three clauses fall into one pitch contour with no pitch reset among them, with stylistic and expressive emphasis added to the final clause, especially on its subject.[2]

(22) Ternary coordination V S + V S + V S

nt͡ʃatę̄ ketǫʔ nt͡ʃatę̄ ʃikaʔ nt͡ʃatę̄ tatījá

[n-	*t͡ʃatę̄*	*ketǫʔ]*	*[n-*	*t͡ʃatę̄*	*ʃikaʔ]*	*[n-*	*t͡ʃatę̄*	*tatījá]*
v:[10-	13	17]	[10-	13	17]	[10-	13	17]
HAB-	get.washed	pot	HAB-	get.washed	gourd	HAB-	get.washed	all

'The pots get washed, the gourds get washed, *everything* gets washed.' (ntelinto itza7 32:16)

Finally, syndetic coordination is also possible with the form *lóʔō* occurring between the repeated subspans. The example in (23) illustrates coordination of two verbs with a coreferential subject expressed by a short pronoun on both verbs (position 17) and coreferential direct objects also overtly expressed after each verb in position 18.

[2] All pitch tracks were made by Adam J.R. Tallman using a script developed by José Elias-Ulloa.

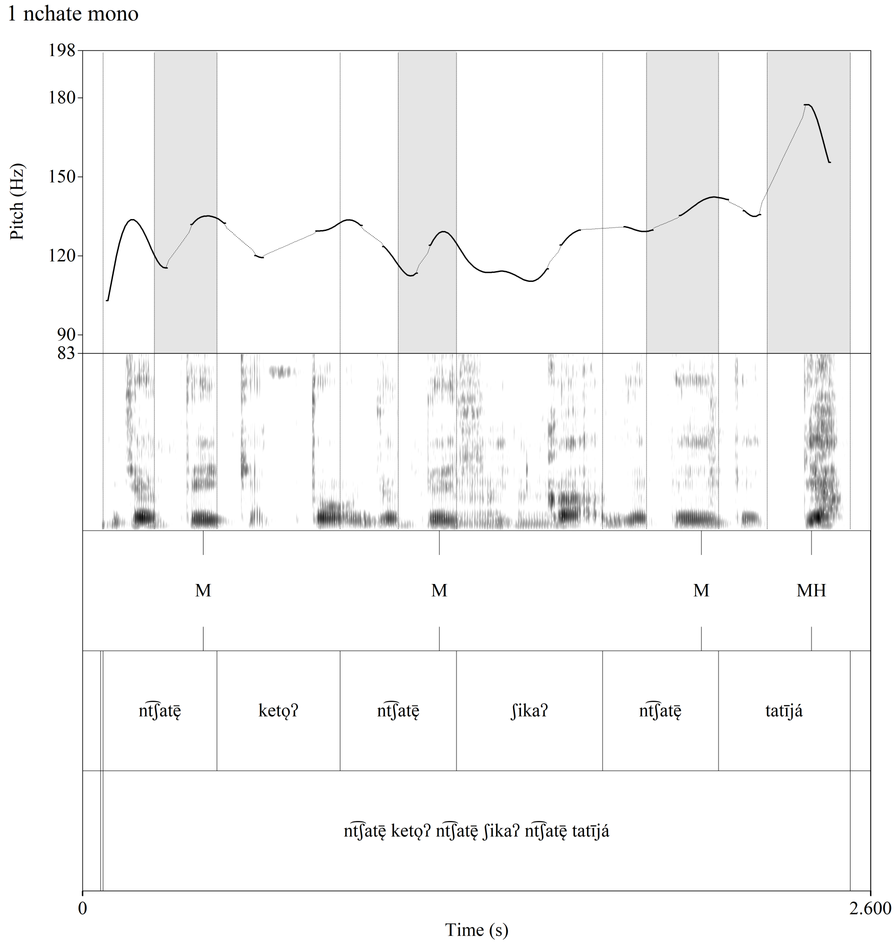

Figure 1: Ternary asyndetic V S coordination

(23) Coordination of V=A O spans

nkajúnēja hnā jooʔ ***lóʔō*** *nkāhnʲája hnā jooʔ*

[nkaj-	*únē*	*=ja*	*h-*	*nā*	*joo*	*=Vʔ]*	***lóʔō***	*[nkā-*	*hnʲá*	*=ja*	*h-*	*nā*
v:[10-	13	=17	18-	18	18	=18]	1	[10-	13	=17	18-	18
PFV-	dig	=1EXCL	OBJ-	DEF	oven	=ANA	and	PFV-	make	=1EXCL	OBJ-	DEF

joo	*=Vʔ]*
18	=18]
oven	=ANA

'We dug the oven and we made the oven.' (historia maguey 2:44)

More work is needed on exploring syndetic coordination, but it is relatively rare in discourse. It may be the preferred strategy when elidable positions (like subjects and objects) are restated in full form in each subspan, or perhaps it explicitly encodes temporal subsequence.

5 (Morpho-)Phonological constituency tests

There are many distributional sound patterns, morphological alternations involving tone, and phonological processes that can be observed in Zenzontepec Chatino. Lexical and inflectional tone melodies are presented in §5.1, suprasegmental culminativity constraints in §5.2, segmental phonological processes in §5.3, and tonal phonological processes in §5.4.

5.1 Lexical and inflectional tone melodies

5.1.1 Paradigmatic lexical tone melodies (positions 10-13)

The tone bearing unit (TBU) in Zenzontepec Chatino is the mora, on which there is a three-way tonal specification contrast: High tone (H), Mid tone (M), or no tone ∅ (Campbell 2014, 2016). Unless affected by tonal processes, sequences of toneless TBUs are realized as mid-to-low gradually falling pitch (intonational declination, see §5.4.2). There is a bimoraic minimality preference for lexical forms, which bear one of five BASIC TONE MELODIES: ∅∅, ∅M, MH, HM, H∅. Monomoraic forms display ∅, M, or H. In trimoraic forms, the bimoraic melodies align to the end of the form, and the antepenultimate mora tone is predictable. Note that word class or root class matters, so antepenultimate tone fill-in is not a strictly phonological process:

- For the ∅∅ and ∅M melodies, the antepenultimate mora is always tonally unspecified (∅)
- For the MH melody, it is ∅ for forms based on noun roots (∅MH) and M for forms based on verb roots (MMH)
- For the HM melody, it is ∅ if the (derived) form is a verb (∅HM) and M if the form is not a verb (MHM)
- For the H∅ melody, the antepenultimate mora tone is always M (MH∅)

Table 2: Basic tonal melodies on lexical forms

Melody	Bimoraic monosyllable		Bimoraic disyllable		Trimoraic di- or trisyllable	
(∅)∅∅	j-aa	‘went’	t͡ʃano	‘will stay’	kukehę	‘will scratch’
(∅)∅M	j-oō	‘ground it’	n-tʲehnā	‘begins’	nka-lʲaʔā	‘smelled it’
(∅/M)MH	tāá	‘will give’	nk-jātę́	‘entered’	nkū-tsāʔą́	‘changed’
					kʷi-līʃí	‘butterfly’
(∅/M)HM	kʷ-íī	‘morning star’	j-únẽ̄	‘dug it’	nka-wíī	‘cleaned it’
					lā-wíī	‘clean (adj.)’
(M)H∅	tíi	‘ten’	nkʲáku	‘got eaten’	nkū-tákʷi	‘flew’

The basic tone melodies are exemplified in Table 2, on bimoraic monosyllables, bimoraic disyllables, and trimoraic forms (disyllables or trisyllables).

In the verbal planar structure, the five basic tone melodies span a domain that includes the verbal root and any derivational and inflectional material immediately preceding it (altogether, positions 10–13), as illustrated in (24).

(24) (∅)∅M tone melody in positions 10–13
__kuʃiką̄ʔ__ja hį̄ laaʔ laa

k-	***u-***	***ʃi-***	***ką̄ʔ***	*=ja*	*hiʔį̄*	*laaʔ.laa*
v:[10-	11-	12-	13]	=17	18	19
POT-	CAUS-	TRVZ-	tie.up	=1EXCL	OBJ.(3)	like.so

‘that we tie it up like so.’ (naten7 michen 5:04)

As shown in example (25), the basic tone melodies occur separately and independently in the auxiliary span of positions 7–9 (MH melody). Also in (25), the main verb root in position 13 (HM) and disyllabic adverbial element in position 15 (MH) bear their own basic tone melodies.

(25) Basic tonal melodies in a verb with auxiliary and adverbial
lēʔ nu __nkūtá__ʃáʔā__kāʔá__ na la kʷajūuʔ nʲāʔā

	lēʔ.nu	***nkū-***	***tá+***	*ʃáʔā*	*=**kāʔá***	*na*	*la.kʷajū*	*=Vʔ*	*nʲāʔā*
v:	1	[7-	9+]	[13]	=15	17	17	=17	21
	then	PFV-	begin+	scream	=also	DEF	horse	=ANA	see.2SG

'Then the horse also began to scream, you see.' (rey david 0:56)

Moreover, as example (26) shows, the basic tone melodies occur separately and independently on the second stem of a compound verb in position 14 (HM) and on the essence element 'chest' in position 16 (MH). The issue of the reversed order of positions 15 and 16 is discussed further in §7.

(26) Basic tonal melodies on verb stem, postpound stem and essence element
ntesuʃíīrīkékāʔá naa

nte-	*su*	*+**ʃíī***	*=rīké*	*=kāʔá*	*naa*
v:[10-	13]	[+14]	[=16]	[=15]	17
PROG-	lie	+light	=chest	=also	1INCL

'We are also awakening.' (la familia 23:52)

What we observe here is that the domain within which contrastive tonal melodies occurs that includes the verb root is the span of positions 10–13. Basic tonal melodies also occur independently over the spans of positions 7–9, 14, 15 and 16.

5.1.2 Deviation from biuniqueness: TAM tonal alternations (positions 10–13)

Aspect-mood exponence consists of two largely orthogonal types of morphological expression, each of which displays significantly unpredictable allomorphy: prefixes (typically position 10, but position 7 when the verb occurs with an auxiliary; Campbell 2011), and tonal alternations (Campbell 2016, 2019). Single-stem (non-compound) inflected verb forms bear one of the five basic tone melodies just discussed in §5.1.1, spanning positions 10–13.

Although some verbs have an invariant tone melody in all aspect-mood forms, such as the verb 'pass' in Table 3, which bears the ∅M melody in all of its forms, other verbs display tonal melody alternations among the aspect-mood forms. For example, the verb 'shell, degrain' is toneless in the potential mood and habitual aspect forms but bears the HM tone melody in the progressive and perfective aspect forms. The verb 'get cooked' displays another tonal alternation pattern: it bears the MH melody in the potential, habitual, and perfective forms and the ∅M melody only in its progressive form. These unpredictable tonal alternations are an integral part of the exponence of TAM inflection, a deviation from biuniqueness and in some ways acting as a phonological test while in others ways

Table 3: Tonal alternations in TAM inflection

	-tehę̄ ‘pass’		-u-s-úkʷā? ‘shell, degrain’		-ākéʔ ‘get cooked’	
Potential mood	tʲehę̄	∅M	k-u-s-ukʷaʔ	∅∅	k-ākéʔ	MH
Habitual aspect	n-tʲehę̄	∅M	nt-u-s-ukʷaʔ	∅∅	ntī-kéʔ	MH
Progressive aspect	nte-tehę̄	∅M	nte-s-úkʷāʔ	HM	nt͡ʃ-akēʔ	∅M
Perfective aspect	nku-tehę̄	∅M	nka-s-úkʷāʔ	HM	nkū-kéʔ	MH

a morphosyntactic one. The domain of TAM tonal melody alternations that includes the verb root is the span of positions 10–13.

Beyond position 13, a new tone melody domain begins. In the example in (27a), the main verbal inflectional tone melody is (M)MH, spanning positions 10–13, and it can be observed that the preceding demonstrative is toneless and the following stem in the compound is monomoraic and toneless (position 14). The example in (27b) illustrates the non-compound verb upon which the compound verb in (27a) is based, inflected for the same aspect; what follows is a bare noun as direct object NP with its own lexical tone domain (HM).

(27) Tonal aspect-mood inflection in positions 10–13, not 14

a. *tsúna hakʷa na lítʲúu nkáʔāaʔ* ***nkātēʔę́****tsaūʔ wiʔ*

tsúna	*hakʷa*	*na*	*lí.tʲúu*	*nkáʔā*	*=Vʔ*	***nkā-***	***tēʔę́***	*+tsa*
v: 1	-	-	-	-	=-	[10-	13]	+14
three	four	DEF	adobe	red	=ANA	PFV.CAUS-	be.located	+placed

=ūʔ	*wiʔ*
=17	19
=3PL	there

‘Three or four red (adobe) bricks, they put in there.’ (ni7 rosa 3:24)

b. ***nkātēʔę́*** *húų̄ janeju*

nkā-	***tēʔę́***	*húų̄*	*jane*	*=ju*
v: [10-	13]	18	18	=18
PFV-	CAUS.be.located(.3)	rope	neck	=3SG.M

‘He put rope around his neck.’ (offered)

As a further demonstration, consider the TAM inflectional paradigms of the three verbs shown in Table 4 that all contain the verbal root *-ūlá* ‘make music’, which has aspect-mood tone alternation ∅M ~ MH. In the compound verb

-ūlá+tuʔwa 'sing' the compounded element *+tuʔwa* 'mouth' in position 14 is a toneless noun whose (lack of) lexical tone is independent of the verbal inflectional stem and does not participate in the aspect-mood tonal alternation. In the verb *-ūlá=rīké* 'long for' the final element *=rīké* 'chest' in position 16 displays its own invariant MH tone melody that does not alternate with the TAM melodies in positions 10–13. Thus, tonal alternations as part of TAM inflection only identify the span of positions 10–13.

Table 4: Tonal alternations in complex verbal lexemes

	-ūlá 'make music'		*-ūlá+tuʔwa* 'sing'		*-ūlá=rīké* 'long for'	
Potential Mood	k-ulā	∅M	k-ulā+tuʔwa	∅M+∅∅	k-ulā=rīké	∅M=MH
Habitual Aspect	nt-ulā	∅M	nt-ulā+tuʔwa	∅M+∅∅	nt-ulā=rīké	∅M=MH
Progressive Aspect	nt͡ʃ-ūlá	MH	nt͡ʃ-ūlá+tuʔwa	MH+∅∅	nt͡ʃ-ūlá=rīké	MH=MH
Perfective Aspect	k-ūlá	MH	k-ūlá+tuʔwa	MH+∅∅	k-ūlá=rīké	MH=MH

Finally, in auxiliary constructions, the TAM inflection of the entire auxiliary construction with main verb occurs on – and only on – the auxiliary in positions 7–9. The verb 'be afraid' with the causative auxiliary illustrates: in (28a), the progressive aspect form displays the ∅M melody, and in (28b) the potential mood form is monomoraic and toneless ∅ (the monomoraic correlate of the ∅∅ melody), realized on positions 7–9 in both cases.

(28) Tonal aspect-mood inflection on positions 7–9

a. *maʃi* ***ntekē****kutsę̄ūʔ hį̄ laaʔ*

	maʃi	***nte-***	***k-***	***ē+***	*k-*	*utsę*	*=ūʔ*	*hį̄*	*laaʔ*
v:	1	[7-	8-	9+]	[10-	13]	=17	18	19
	even.if	PROG-	POT-	CAUS+	POT-	be.afraid	=3NSPEC	OBJ	like.so

'Even if they are frightening her like so.' (nino chiquito 1:35)

b. ***ke****kutsę nūwą́ nkʷítsą*

k-	***e+***	*k-*	*utsę*	*nūwą́*	*nkʷítsą*
V:[7-	9+]	[10-	13]	17	18
POT-	CAUS+	POT-	be.afraid	3DIST	child

'That one is going to frighten the children.' (juan oso 7:02)

To illustrate the locus of aspect-mood inflection in the auxiliary span, Table 5 presents the paradigm of aspect-mood inflection for the verb in the examples in (28).

Table 5: Aspect-mood tonal alternation in an auxiliary construction

	-ē+ k-utsę 'frighten'	
Potential Mood	k-e+k-utsę	∅+∅∅
Habitual Aspect	nt-e+k-utsę	∅+∅∅
Progressive Aspect	nte-k-ē+k-utsę	∅**M**+∅∅
Perfective Aspect	nk^{w}-ē+k-utsę	**M**+∅∅

5.1.3 Deviation from biuniqueness: 2sg tone melodies (positions 10–13)

As already discussed, subjects occur in position 17 of the verbal planar structure. The pragmatically-neutral, short pronouns encoding subject immediately follow the last element in the range of positions 13–16. However, 2sg person is encoded by replacing the basic lexical tone melody of the preceding element or the TAM-inflected Verbal Core in positions 10–13 with one of two specialized 2sg tone melodies: (∅)(∅)H and (M)(M)M. These melodies are only and always found in 2sg inflection. The process works as follows.

- If the preceding element bears the (∅)(∅)M tone melody, the 2sg inflected form will bear (∅)(∅)H
- If the final element bears any other lexical tone melody (i.e.; ∅∅, MH, HM, H∅ or their trimoraic counterparts), then the 2sg inflected form will bear (M)MM: a Mid tone on each mora.

Some examples of minimal free form verbs (positions 10–13) with 2sg subject inflection illustrate the patterns in Table 6.

The locus of the tonal 2sg inflection is always the element that immediately precedes where any NP or short pronoun in the same grammatical function would occur. In example (29), the 2sg tone melody MM is found on the adverbial element *kāʔá* 'again' in position 15 in the second clause, which otherwise bears the MH melody.

Table 6: 2sg tone melodies on verbs

Uninflected for person				Inflected for 2sg		
nt͡ʃ-uhwīʔ	∅M	'is selling'	→	nt͡ʃ-uhwíʔ	∅H	'you are selling'
k-u-nakʷą̄	∅∅M	'will bless'	→	k-u-nakʷą́	∅∅H	'you will bless'
k-ōó	MH	'will grind'	→	k-ōō	MM	'you will grind'
nk-j-ánō	HM	'stayed'	→	nk-j-ānō	MM	'you stayed'
nku-líhī	∅HM	'got lost'	→	nkūlīhī	MMM	'you got lost'

(29) Second-person tonal inflection on adverbial in position 15

*ta nkʷitaa na ja nt͡ʃakę nʲāʔā hā tsa+k-iʔja=**kāʔā***

	ta	*nkʷi-*	*taa*	*na*	*ja.nt͡ʃakę*	*nʲāʔā*	*hā*	*ts-*	*a+*	*k-*
V:	5	10-	13	17	17	21	1	7-	9+	10-
	already	PFV-	finish	DEF	firewood	see.2SG	CONJ	POT-	go+	POT-

iʔja	*=**kāʔā***
13	[=15]
transport	=again.2SG

'If the firewood has been used up, well, you have to go and bring more.' (juan oso 9:29)

The examples in Table 7 illustrate the 2sg tone melody on positions 10–13, 14, 15, and 16, following the corresponding structures with the 3SG.F pronoun *=t͡ʃūʔ* in position 17.

5.2 Suprasegmental culminativity

A range of suprasegmental phonotactic restrictions can be observed around the Zenzontepec Chatino verbal core. These involve culminativity of H tone (§5.2.1), glottal stop (§5.2.2), contrastive vowel nasality (§5.2.3) and contrastive vowel length (§5.2.4).

5.2.1 Culminative H tone constraint (positions 10–13)

None of the basic (∅∅, ∅M, MH, HM, H∅) or second-person (MM, ∅H) tone melodies just presented, or their trimoraic extensions, contain more than one H tone. The same is true for the tonal alternations in aspect-mood inflection; they never contain multiple H tones. This distributional pattern is referred to as culminative H tone. However, multiple M tones (or unspecified moras ∅), may occur

Table 7: 2sg tone melodies on varied positions and spans

Inflected for 3SG.F			
nt-e+k-**ū**-l**íhi**=t͡ʃūʔ	V: 10-13	'she loses (tr.)'	→
nka-ʔni+tsoʔ**ō**=t͡ʃūʔ	V: 14	'she fixed it'	→
t͡ʃ-uʔu=tsoʔ**ō**=t͡ʃūʔ	V: 15	'she will live well'	→
ʔne+tii=rī**ké**=t͡ʃūʔ	V: 16	'she can guess'	→
Inflected for 2sg			
nt-e+**k-ū-līhī**	MH∅→MMM	'**you** lose (tr.)'	
nka-ʔni+**tsoʔó**	∅M→∅H	'**you** fixed it'	
t͡ʃ-uʔu=**tsoʔó**	∅M→∅H	'**you** will live well'	
ʔne+tii=**rīkē**	MH→MM	'**you** can guess'	

in the lexical tone melody domain, and therefore, the restriction on multiple H tones is best explained by a culminativity constraint. It should be noted that this constraint operates at the phonological level, but due to H tone spreading in language use (§5.4.1), we find significant stretches of high-pitch plateaus. Furthermore, one may wonder if culminative H tone is really a distinct test from the inflectional tone alternations. However, tonal alternations could imaginably operate on larger spans, but they do not (for example, including the auxiliary span as well, 7–13), and the alternations can't simply be derived from positing a culminative H constraint. Forms that have more than one H tone reflect different tonal domains. Consider the analyzable compound verb in (30), in which the main, inflected verb stem (positions 10–13) has the H∅ melody while the second stem (position 14) has monomoraic H (the result here is downstep of the second H tone; see §5.4.3).

(30) Two H tones, in different tone melody domains

*nku**túʔuhná** tī nāáʔ nakʷę̄*

nku-	***túʔu***	***+hná***	*tī*	*nāáʔ*	*nakʷę̄*
V:10-	13	+14	18	18	21
PFV-	leave	+flee	TPLZ	1SG	say.3

'Well, I ran, he said.' (nagual tigre 1:43)

One can review example (25) and see that the auxiliary span (positions 7–9) bears the MH melody, the main verb stem (position 13) has HM, and the adverbial (position 15) has the MH melody. Another example is (26), in which the first, inflected stem in the compound verb (positions 10–13) is toneless ∅∅, the second stem in the compound (position 14) bears the HM melody, and the adverbial form in position 15 and essence form in position 16 each independently bear the MH melody.

5.2.2 Culminative glottal stop

No lexical tone melody domain ever contains more than one glottal stop. Roots that historically did have multiple glottals in proto-Zapotecan have all reduced them to maximally one, in all Chatino languages (Campbell 2021b).

5.2.2.1 Culminative glottal stop (minimal) (positions 10–13)

One can peruse the example sentences throughout this chapter and note the lack of multiple glottal stops in any domain of the lexical tone melodies, such as the verb root and its derivational and inflectional prefixes (positions 10–13). A more interesting fact can be appreciated when this test is fractured and we look for a maximal domain.

5.2.2.2 Culminative glottal stop (maximal), positions 7–13

No aspect-mood formatives (positions 7 and 10), derivational formatives (positions 8, 11, 12), or auxiliary verbs (position 9) contain a glottal stop, a generally very frequent consonant in the language. If this is not due to chance – as the inventories of elements in these categories are small – then there is a limit of a maximum of one glottal stop in the combined auxiliary and main verb span (positions 7–13). The auxiliary construction in (31) has a main verb that is a compound and both compounded stems contain a glottal stop (positions 13 and 14) showing that this culminativity domain does not reach past position 13. Another auxiliary construction is shown in (32). The main verb contains a glottal stop, and the following glottal stop is part of the subject pronoun in position 17.

(31) Glottal stops in positions 13 and 14

t͡ʃajuʔuseʔęna

	t͡ʃa+	*j-*	***uʔu***	*+**seʔę***	*=na*
v:	7.9+	12-	13	+14	=17
	POT.go+	ITR-	**be.inside**	**+place**	=1INCL

‘We are going to go rest.’ (historia1 4:40)

(32) Glottal stops in positions 13 and 17
kenaʔa tī kʷítī ta jakīʔjáą̄ʔ

kenaʔa	*tī*	*kʷítī*	*ta*	*j-*	*a+*	*k-*	*īʔjá*	*=ą̄ʔ*
v: 2	2	2	5	7-	9+	10-	13	=17
a.lot	TPLZ	remedy	already	PFV-	go+	POT-	transport	=1SG

'I have gone to get a lot of medicine already.' (historia medicina 47:33)

The example in (33) illustrates the proximative aspectual particle that occurs in position 6; it contains a glottal stop, as does the verb root and subject pronoun in positions 13 and 17, respectively.

(33) Glottals in positions 6, 13, and 17
tíʔ kikʷeʔę̄ʔ

tíʔ	*ki-*	*kʷiʔ*	*=ę̄ʔ*
v: 6	10-	13	=17
PRX	POT-	speak	=1SG

'I am just about to speak…' (medicina2 4:17)

Thus, the maximal domain around the verb root in which glottal stop culminativity holds does not include position 6 and includes only positions 7–13.

5.2.3 Culminative and final-position vowel nasality

Contrastive vowel nasality only occurs in the final syllable of lexical roots, long and short pronouns, and bimoraic function words. There is a minimal span in which the constraint can be observed, and a larger (maximal) span that includes positions for which evidence is not available.

5.2.3.1 Culminative vowel nasality (minimal), positions 7–13

The verb *yaą* 'come' of the temporal adverbial clause in (34a) has a nasal vowel. The same verb, reduced as an auxiliary (positions 7–9) lacks vowel nasality, as shown in (34b), which is strong evidence of this distributional restriction on nasal vowels.

(34) Loss of vowel nasality in auxiliary position

a. *ná nteʔękāʔā **nkjaą**kāʔája*

ná	*n-*	*teʔę*	*=kāʔā*	***nk-***	***jaą***	*=kāʔá*	*=ja*
v: 5	10-	13	=15	10-	13	=15	=17
NEG	STAT-	be.located	=again.2SG	PFV-	come	=again	=1EXCL

'You weren't here when we came the other time.' (historia1 29:25)

b. *tsáʔ wiʔ laa **nkja**hnáʔ huteę̄ʔ hją́ʔ*

	tsáʔ.wiʔ	*laa*	***nk-***	***ja+***	*hnáʔ*	*huti*	*=ą̄ʔ*	*hiʔį̄*	*=ą̄ʔ*
v:	3	3	7-	9+	13	17	=17	18	=18
	word.ANA	be	PFV-	come+	throw.away	father	=1SG	OBJ	=1SG

'Because of that my father came to throw me away.' (nkwitzan ti7i 7:08)

Vowel nasality may occur in both stems of a compound verb, showing that the culminative nasality restriction applies separately to positions 13 and 14, as illustrated in (35).

(35) Vowel nasality in both stems of a compound verb
*nkalātíʔ tī na tukalāaʔ niī lēʔ ja**saʔąseʔę**ju*

nka-	*lātíʔ*	*tī*	*na*	*tukalā*	*=Vʔ*	*niī*	*lēʔ*	*j-*	*a+*
v:10-	13	17	17	17	=17	21	1	7-	9+
PFV-	stop	TPLZ	DEF	cloudiness	=ANA	now	then	PFV-	go+

saʔą	***+seʔę***	*=ju*
13	+14	=17
be.attached	+place	=3SG.M

'The cloudiness ceased, and then he went to rest.' (muchacha ixtayutla 6:33)

5.2.3.2 Culminative vowel nasality (maximal), positions 4–13

There are no modal particles that occur in positions 4–5 or adverbials of position 6 that contain contrastive nasal vowels. The inventories of elements that occur in these positions are small, so this may be due to chance, but nonetheless the test can be fractured: a maximal span for culminative vowel nasality is positions 4–13.

5.2.4 Culminative and final-position vowel length

Similar to vowel nasality, contrastive vowel length occurs mostly in final syllables of lexical roots. It also occurs in independent pronouns and some bimoraic function words. This test must also be fractured because evidence for the initial point of the span may be lacking due to chance.

5.2.4.1 Culminative vowel length (minimal), positions 7–13

Within the auxiliary and main verb span of positions 7–13, long vowels only occur in final syllables of position 13. The pair of examples in (34) above illustrate, in part, this distribution. In (34a) the verb *-yaą* 'come' in position 13 contains a long vowel, but as an auxiliary in position 9 in (34b) it lacks its original vowel length (and nasality, as discussed in §5.2.3).

The example in (36) shows a compound verb in which both stems of the compound (positions 13 and 14) have long vowels. Thus, position 14 is beyond the domain of culminative final-position vowel length.

(36) Distribution of long vowels

*nkjánō nteē lēʔ nka**lōónaa**ūʔ saperū*

	nk-	*j-*	*ánō*	*nteē*	*lēʔ*	*nka-*	***lōó***	***+naa***	*=ūʔ*	*saperū*
v:	10-	12-	13	19	1	10-	13	+14	=17	18
	PFV-	ITR-	stay(.3)	here	then	PFV-	take.out	+name	=3PL	San.Pedro

'Here it remained, and they named it San Pedro.' (medicina1 38:23)

5.2.4.2 Culminative vowel length (maximal) (positions 4–13)

Like vowel nasality, vowel length does not occur in modal particles or adverbials in positions 4–6. The example in (37) illustrates the adverb *niī* 'now' in the position 3 zone, which is the last position before the verb complex in which long vowels occur.

(37) Long vowel in adverbial position 3

*wī laaʔ laa **niī** tʲāʔ ntikʷiʔntakǫʔ*

wī	*laaʔ.laa*	***niī***	*tʲāʔ*	*nti-*	*kʷiʔ*	*=ntakǫʔ*
CONJ	like.so.be	now	still	HAB-	speak	=a.lot(3)
v:1	3	3	6	10-	13	=15

'And like so, at the time he still spoke a lot.' (santa maria1 4:28)

It should be noted that the presence of bimoraic *disyllabic* forms in position 5 (e.g.; *tala* 'for sure') suggests that the lack of forms with long vowels in position 5 and perhaps position 6 could be due to chance, since the inventory of forms that occur in those positions is limited.

5.3 Segmental processes

Several segmental phonological processes are observable in Zenzontepec Chatino, especially in verbal aspect-mood inflection.

5.3.1 Vowel elision

Vowel hiatus is not permitted in several spans of the verbal planar structure, and vowel elision occurs due to this constraint. There are minimal and maximal domains to distinguish because some positions do not provide observable evidence.

5.3.1.1 Vowel elision (minimal), positions 7–13

Within the span of positions 10–13, where hiatus would occur, one of two vowels elides; the details are not quickly formalizable in rule notation but are explained in more depth elsewhere (Campbell 2011, 2019). This is illustrated in the aspect-mood inflection of vowel-initial verb stems that combine with vowel-final aspect-mood formatives. In the following examples, each verb belongs to a distinct inflectional class based on the allomorphy of aspect-mood prefixes and tonal alternations. In (38) the /a/ of the stem *-akʷiʔ* 'speak' in position 13 elides in contact with the vowel /i/ of the potential mood and habitual aspect prefixes in position 10.

(38) Aspect/mood inflection for verb *-akʷiʔ* 'speak'

Potential mood	/k**i**-**a**kʷiʔ/	[k**i**-kʷiʔ]	'will speak'
Habitual aspect	/nt**i**-**a**kʷiʔ/	[nd**i**-kʷiʔ]	'speaks'
Progressive aspect	/nt͡ʃ-akʷiʔ/	[nd͡ʒakʷiʔ]	'is speaking'
Perfective aspect	/j-akʷiʔ/	[jakʷiʔ]	'spoke'

The causative prefix *u-* in position 11 elides when following the vowels /e/ and /a/ of the progressive and perfective aspect markers, respectively (39). No derivational prefixes that occur in position 12 contain a vowel that would illustrate the process at the juncture 11–12.

(39) Aspect/mood inflection for verb *-u-lukʷā* 'sweep (tr.)'

Potential mood	/ki-u-lukʷā/	[kulukʷā]	'will sweep'
Habitual aspect	/nti-u-lukʷā/	[ndulukʷā]	'sweeps'
Progressive aspect	/nt**e**-**u**-lukʷā/	[nd**e**lukʷā]	'is sweeping'
Perfective aspect	/nk**a**-**u**-lukʷā/	[ng**a**lukʷā]	'swept'

Vowel elision is also observed in the auxiliary span of positions 7–9. For example, the vowel /i/ in the potential mood, habitual aspect and perfective aspect prefixes (position 7) on the verb 'feed, make eat' in (40) is elided by the following vowel /e/ of the causative auxiliary *-ē+* in position 9. Note that the velar /k/ palatalizes automatically when preceding /e/, and only /e/ (/kee/ 'stone' → [kʲee]), so the phonetic palatalization we see in potential mood and progressive aspect forms is due to that process.

(40) Aspect/mood inflection for verb *-**e**+k-aku* ‘feed’

Potential mood	/k**i**-**e**+k-aku/	[k^{j}**e**kaku]	‘will feed’
Habitual aspect	/nt**i**-**e**+aku/	[nd**e**kaku]	‘feeds’
Progressive aspect	/nte-k-ē+k-aku/	[ndek^{j}ēkaku]	‘is feeding’
Perfective aspect	/nk^{w}**i**-**ē**+k-aku/	[ng^{w}**ē**kaku]	‘fed’

Vowel elision *does not* occur when the second element in a sequence is a vowel-initial short pronoun in subject function in position 17, as shown in (41). The same example illustrates the lack of vowel elision when the same pronoun functions as inalienable possessor following the head noun in position 18.

(41) Lack of vowel elision in a short pronoun
*[nde.ʔnẽ.**ū̃**ʔ ......hut**i**.**ū**ʔ]*

/nte-	*ʔne*	*=**ūʔ***	*hn^{j}á*	*lóʔō*	*huti*	*=**ūʔ**/*
v: 10-	13	=17	18	18	18	=18
PROG-	do	**=3PL**	work	WITH	father	**=3PL**

‘They were working with their father.’ (michen 1:49)

5.3.1.2 Vowel elision (maximal) (positions 3–16)

The vast majority of realized vowel sequences in Zenzontepec Chatino occur at the juncture between short pronouns in position 17 and a preceding element, which in the verbal planar structure may be any position from 13 through 16. Otherwise, the lack of vowel elision is not easily observable because Zenzontepec Chatino phonotactics strongly prefer syllable onsets. Only a handful of native lexical forms begin with a vowel /i/, and these present the main examples of domains in which elision does not occur where it imaginably could. We can fracture the vowel elision domain because there are positions around the verbal complex in which the elements that may occur do not provide instances where vowels could occur in sequence. No adverbial or modal elements in positions 3–6 and no aspect-mood prefixes in position 7 begin with vowels. The example in (42) shows a fronted subject noun phrase in the zone in position 2, where the form *ītsáʔ* ‘word’, ‘thing’ is vowel-initial and not elided despite the final vowel of the preceding quantifier.

(42) Lack of vowel elision
kenaʔa ītsáʔ ntetaʔą tī hiʔį̄ tselā juu

kenaʔa	*ītsáʔ*	*nte-*	*taʔą*	*tī*	*hiʔį̄*	*tselā.juu*
v:2	2	10-	13	18	18	18
many	thing	PROG-	pass(.3)	TPLZ	DAT	world

‘Many things pass in the world.’ (lengua tlaco 58:06)

No post-verbal adverbials or essence elements in positions 15 or 16 begin with vowels. Therefore, the maximal domain of vowel elision spans positions 3–16.

5.3.2 Palatalization of non-sibilant coronals

Non-sibilant, non-rhotic coronal consonants /t/, /n/, /l/ palatalize when they follow [i] in certain contexts.

5.3.2.1 Palatalization (minimal), positions 10–13

In the verb *-nāá* 'get cleared (field)' the initial /n/ of the stem (position 13) palatalizes only in the potential mood and habitual aspect forms, whose prefixes (position 10) end in /i/ (43).

(43) Aspect/mood inflection for verb *-nāá* 'get cleared (field)'

Potential mood	/k**i**-nāá/	[kī**n**ʲā̰á̰]	'will get cleared'
Habitual aspect	/nt**i**-nāá/	[ndī**n**ʲā̰á̰]	'gets cleared'
Progressive aspect	/nte-nāá/	[ndē**n**ā̰á̰]	'is getting cleared'
Perfective aspect	/nku-nāá/	[ŋgū**n**ā̰á̰]	'got cleared'

Palatalization also occurs between the iterative prefix *i-* (position 11) and a stem-initial coronal, as shown in (44a), while the same consonant of the same stem does not palatalize in the absence of the iterative prefix (44b).

(44) Palatalization of coronal, and lack thereof

a. *nkʷ**īt**ʲākǫ́ʔ tī na kūʔwíiʔ hnā tuʔwa na lometāaʔ*

nkʷ-	***i-***	***tʲ-***	*ākǫ́ʔ*	*tī*	*na*	*kūʔwí*	*=Vʔ*	*hiʔį̄*	*nā*	*tuʔwa*	*na*	
v:10-	11-	12-	13	17	17	17	=17	18	18	18	18	
PFV-	ITER-	TRVZ-	close	TPLZ	DEF	drunk	=ANA	OBJ	DEF	mouth	DEF	

lometā	*=Vʔ*
18	=18
bottle	=ANA

'The drunk closed the opening of the bottle again.' (amigo borracho 5:02)

b. *nte**t**ākǫ́ʔwą niʔií hiʔį̄ja*

nte-	***t-***	*ākǫ́ʔ*	*=wą*	*niʔi*	*=V́*	*hiʔį̄*	*=ja*
v:10-	12-	13	=17	18	=18	18	=18
PROG-	(CAUS)TRVZ-	close	=2PL	house	=DIST	OBJ	=1EXCL

'You (pl.) are closing our house there.' (amigo borracho 2:44)

Although the inventory of auxiliaries is limited, the completive auxiliary *-ta+* 'finish' has aspect-mood inflection that allows palatalization to be observed in the auxiliary span as well, as shown in (45).

(45) Palatalization in auxiliary span (positions 7–9)
*nkʷ**it**ʲ**a**jālú kitsą̄ʔ ke*
*nkʷ**i**- **t**ʲ**a**+ j- ālú kitsąʔ ke*
v: 7- 9+ 12- 13 17 17
PFV finish+ ITR- spill hair head(.3)
'Her hair finished falling out.' (mateya 3:41)

Palatalization does not occur between two stems in a compound verb (positions 13 and 14), as shown in (46) nor does it occur between a verb stem and a short pronoun, as shown in (47).

(46) No palatalization at compound juncture
[kátī kʲee ŋgaʔnĩ**t**ēʔḗhnáʔ] (*[kátī kʲee ŋgaʔnĩ**t**ʲēʔḗhnáʔ])
*kátī kee nka- ʔn**i** +**t**ēʔę́ =hnáʔ*
v: 2 2 10- 13 +14 =15
seven stone PFV- hit +TR.be.located =forcefully(.3)
'seven stones he forcefully threw.' (no hay brujos 1:19)

(47) No palatalization at subject pronoun juncture
[...ŋguhnĩĩ**n**ã] (*[ŋguhnĩĩ**n**ʲã])
Tī nāʃíʔi laaʔ nku- hnii =na nkā
v: 3 3 3 10- 13 =17 20
TPLZ NEG like.so PFV- grow =1INCL PST
'We (incl.) did not grow up like that in the past.' (antes aparatos 41:23)

The preceding discussion shows that positions 10–13 are the minimal domain of palatalization that includes the verb root.

5.3.2.2 Palatalization (maximal), positions 7–13

Among the inventory of auxiliaries, four of them end in /a/ (GO, COME, START, FINISH) and one ends in /e/ (CAUS). There are a handful of verbs for which the iterative marker occurs in the auxiliary position 9 instead of the usual prefixal position 11, such as *nkʷ-**i**+k-ikʷą* 'restitch'; however, none of these cases display an initial coronal consonant in the main verb span that could undergo palatalization if it were to apply at the juncture [9]-[10]. Thus, we can speak of a maximal domain of palatalization that includes positions 7–13 since palatalization cannot be observed to fail to apply within positions 7–10. Otherwise, in examples such as (47), palatalization does not occur among the particles in position 3.

5.3.3 Nasality spreading, positions 13–17

Vowel nasality in vowel-initial person markers spreads regressively to a stem, if only a laryngeal consonant, or no consonant, intervenes. Such nasality will further regressively spread within a stem across a medial laryngeal consonant but not across a non-laryngeal consonant (48). The example in (48) illustrates that the spreading within the main verb span does not reach position 10. This is notable, since in the discussion so far, this is the only pattern observed that includes position 13 but not also position 10.

(48) Regressive spreading of vowel nasality

a. /ki-ʃaʔa/ ⟶[kiʃaʔa] ‘will scream’
b. /ki-ʃaʔa=ą/ ⟶[kiʃãʔãã] ‘we will scream’
c. /nka-húʔū/ ⟶[ŋgahúʔū] ‘got embarrassed’
d. /nka-húʔū=ą̄ʔ/ ⟶[ŋgah**ṍ**ʔ**ȭȭ**ʔ] ‘I got embarrassed’
e. /k-alaʔ/ ⟶[kalaʔ] ‘will hold’
f. /k-alaʔ=ą̄ʔ/ ⟶[kal**ã**ʔ**ã̄**ʔ] ‘I will hold’

The verbal examples in (48) illustrate regressive nasality spreading from position 17 to 13, and we can also observe nasal spreading from position 17 to position 15 in (49).

(49) Nasality spreading from position 17 to 15
[*nt͡ʃuwetīʔk**ãʔã́ã***]

tī	*nu*	*nālá*	*nkʷítsą*	*hiʔį̄*	*-na*	*nt͡ʃ-*	*uwe*	*=tīʔ*
v:-	-	-	-	-	-	10-	13	=16
COND	SUB	NEG.exist	child	GEN	1INCL	PROG-	get.ground	=living.core

=kāʔá	***=ą***
=15	=17
=also	=1INCL

‘If we don’t have children then we are also sad.’ (ntetakan7 jute7 4:44)

We can observe vowel nasality spread in the other direction, from a stem to a following vowel-initial person marker that otherwise has no nasal vowel, as in the 3rd person plural/nonspecific pronoun *=ūʔ* shown in the second example in (50b).

(50) Vowel nasality spreading and not spreading from position 13 to 17

a.	/k-alaʔ=ūʔ/	[kalaʔūʔ]	'they will hold'
b.	/nakʷę=ūʔ/	[nakʷẽ**ū̃ʔ**]	'they said'

In the example in (51), we observe that the vowel nasality of the final mora of the object marker *hiʔį̄* in position 18 does not progressively spread through the initial syllable of the following form with initial glottal fricative. Thus, nasality spreading is not operative beyond position 17.

(51) Progressive nasality spreading not applying in position 18
nkāsāʔą́tsǫʔju hiʔį̄ hutiju (*[*nkāsāʔą́tsǫʔju hiʔį̄ hũtiju*])

	nkā-	*sāʔą́*	*+tsǫʔ*	*=ju*	*hiʔį̄*	*huti*	*=ju*
v:	10-	13	+14	=17	18	18	=18
	PFV.CAUS	be.attached	+back	=3SGM	OBJ	father	=3SGM

'He carried his father (on his back) …' (santa maria2 5:16)

5.3.4 Vowel fusion, positions 13–17

The first-person singular *=ą̄ʔ* and first-person inclusive *=ą* short pronouns elongate or undergo fusion of vowel quality with the final vowel of a preceding element (in positions 13, 14, 15, or 16), as shown in (52).

(52) Vowel fusion at position 17

/nte-ʔn**e**=**ą̄**ʔ/	[nde.ʔn**ẽẽ̄**ʔ]	'I am doing'
/ts-a+lóʔ**ō**=**ą**/	[tsalṍʔ**ȭõ**]	'We'll go to leave it'
/nku-hw**ī**=**ą̄**ʔ/	[ŋgu.hɸ**ẽ̄ẽ́**ʔ] ~ [ŋgu.hɸ**ĩ̄ĩ́**ʔ]	'I got'
/ki-is**u**=**ą**/	[kis**õõ**] ~ [kis**ũũ**]	'We (incl.) will pay'

Note that this process is in contrast to what occurs between positions 10 or 11 and a verb root's initial vowel in position 13, where vowel elision, not fusion, is observed (§5.3.1).

5.4 Tonal processes

As discussed earlier, Zenzontepec Chatino has a privative tone system, in which a mora may be specified for H tone, M tone or no tone (∅). Toneless strings display a default intonational declination from mid to low pitch; no tones are inserted on toneless moras, and no intonational boundary tones have been encountered. Zenzontepec Chatino has a relatively low tonal density, with about 60% of basic vocabulary bearing no lexical tone (Campbell 2014). Thus, whole utterances may be toneless, gradually descending from mid to low pitch within a speaker's range. The main tonal processes are H tone spreading, H and M tone downstep, and M tone replacement (Campbell 2014, 2016).

5.4.1 H tone spreading (positions 1–21)

H tone spreads progressively through subsequent toneless moras until another tone, or pitch reset (see §5.4.2), occurs. In example (53) the H tone of the final mora of the existential predicate *nk-ā+tāká* spreads until it reaches the M tone of the form *nʲatę̄* 'person' (Figure 2).

(53) H tone spreading
nkātāká tsaka nʲatę̄

nk-	*ā*	*+tāká*	*tsaka*	*nʲatę̄*
v:10-	13	+14	17	17
PFV-	be	+exist	one	person

'There was a person.' (cotita 0:19)

To demonstrate that the intervening moras are in fact toneless, consider the example in (54), which has much the same meaning as example (53) but contains a different, toneless existential predicate. Intonational declination (from mid-level pitch slowly descending) is observed throughout the tonelessness of the clause until the rise to the final M tone of *nʲatę̄* 'person' (Figure 3).

(54) Declination and M tone target
nkjuʔu tsaka nʲatę̄

nk-	*j-*	*uʔu*	*tsaka*	*nʲatę̄*
v:10-	12-	13	17	17
PFV-	ITR-	be.inside	one	person

'There was a person.' (ketu kela7 china7 0:43)

Finally, pitch reset at the start of another intonational unit is shown to block H tone spreading in example (55). The final H tone of the first relative clause would spread through the following toneless subordinator of the second relative clause, but instead, pitch reset occurs and declination from a mid-level pitch is observed to reinitiate on the subordinator (Figure 4). Pitch reset occurs here because non-restrictive relative clauses have their own prosodic packaging apart from their matrix clause (Campbell 2021a). In this case, there is also a pause, but the pause does not trigger the reset. There are examples with longer pauses beyond which tone spreading continues.

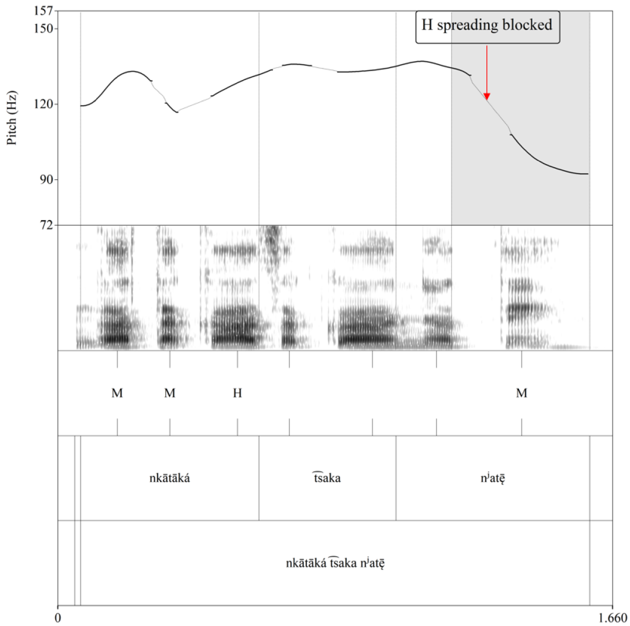

Figure 2: H tone spreading interrupted by M tone

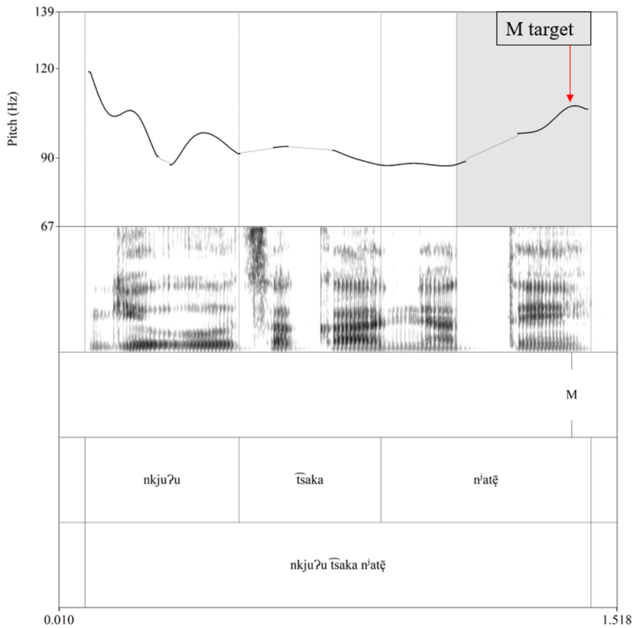

Figure 3: Declination and rise to M tone

(55) Pitch reset interrupts H tone spreading
tatīj́á nʲatę̄ nu t͡ʃu ʔne ***hnʲá nu*** *n-tūkʷá tī ntsukʷā?*

tatīj́á	*nʲatę̄*	*nu*	*t͡ʃu*	*ʔne*	***hnʲá***	***nu***	*n-*	*tūkʷá*	*tī*	*ntsukʷāʔ*
v: 2	-	-	-	10.13	18	1	10-	13	18	18
all	person	SUB	HUM	HAB.do	work	SUB	HAB-	plant	TPLZ	corn

'All of the people who work, those who plant corn … ' (luna y siembra 0:28)

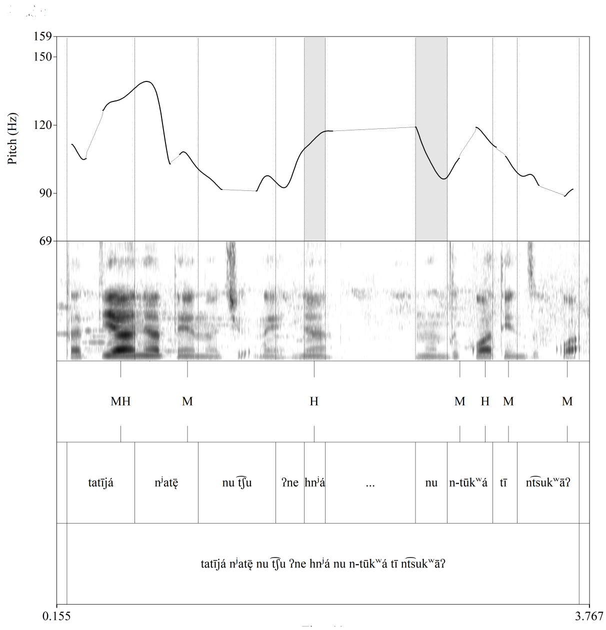

Figure 4: Pitch reset blocks H tone spreading

In contrast, pitch reset does not occur at the relative clause boundary in (56), where the H tone of the noun *kʷējáʔ* 'time' spreads through the subordinator and verb of the following relative clause (Figure 5). This is a restrictive relative clause, and H tone spreading is not blocked at restrictive relative clause junctures.

(56) H tone spreading into restrictive relative clause
tala tāká kʷējáʔ nu nti- ʔnʲa nʲatę̄

tala	*tāká*	*kʷējáʔ*	*nu*	*nti-*	*ʔnʲa*	*nʲatę̄*
v: 5	10.13	17	1	10-	13	17
for.sure	exist	time	SUB	HAB-	clear.field	person

'For sure there are times when people clear fields.' (kuna7a kusu7 4:07)

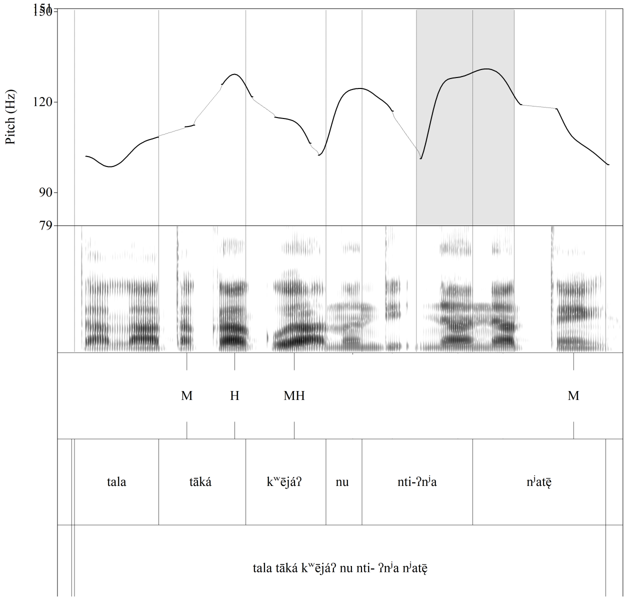

Figure 5: H tone spreading into restrictive relative clause

5.4.2 Declination and pitch reset, positions 1–21

Now that the intonational pattern of declination along a string of tonally unspecified moras has been introduced, a question arises: What is the domain of this process? We already saw that pitch reset occurs at the start of a parenthetical remark (Figure 4).

In toneless declination the pitch will continue to decline until a tone occurs, or until the pitch is reset to a phonetically-mid level. Pitch reset between two utterances is illustrated by the example in (57). In the first clause, after the M tone at the end of the form *laʔā*, the pitch begins to decline through the following, toneless form *nikʷę=ą* (see Figure 6). After a pause, the next clause is entirely toneless, but instead of continuing the declination from the previous clause, the pitch is reset to a mid level, whence it begins to decline through the entire toneless utterance.

(57) Declination, pitch reset, more declination
nkʷítsą tiʔi laʔā nikʷęę

nkʷítsą ti?i la?ā nikʷę =ą
v:2 2 3 10.13 =17
child poor like.so IRR.say =1INCL
'An orphan, so we say.'
nteta?ãju laha ni?i
nte- ta?ã =ju laha ni?i
v:10- 13 =17 19 19
PROG- go.around =3SG.M between house
'He was walking around in the street.' (juan oso 0:11)

Further study is needed on the information structural and discursive factors that determine the domains of declination and pitch reset. However, we can posit that declination may maximally span the entire verbal planar structure, positions 1–21, but likely beyond that in coordination, because coordinated spans may fall together within one intonational contour as shown in §4.4.2.

5.4.3 Downstep, positions 1–21

H tone causes a following H tone to downstep to a slightly lower pitch and a following M tone to sharply downstep to low pitch; the process is allotonic and downstepped H and M tones still behave phonologically as such. In (58), the final H tone of the adverbial *=kā?á* that follows the first verb causes the initial H tone of the second verb to downstep (Figure 7). The second, downstepped H tone recovers to a high pitch as it spreads through the following entirely toneless restrictive relative clause.

(58) H tone downstep and spreading of the downstepped H
tsaakā?á tʲánaja ʃaa? nu t͡ʃu tsaa
ts- aa =kā?á tʲána =ja ʃaa? nu t͡ʃu ts- aa
v:10- 13 =15 10.13 =17 18 18 18 18- 18
POT- go =again POT.look.for =1EXCL other SUB HUM POT- go
'Another can go; we're going to look for another who can go.' (ku7wi lo jo7o 2:34)

Example (59) illustrates two instances of M tone downstep. The final H tone of the initial first-person singular independent pronoun *nāá?* downsteps the M tone of the following vocative particle. The H tone of the negator particle spreads through the following compound verb and downsteps the M tone of the first person singular pronominal enclitic (Figure 8).

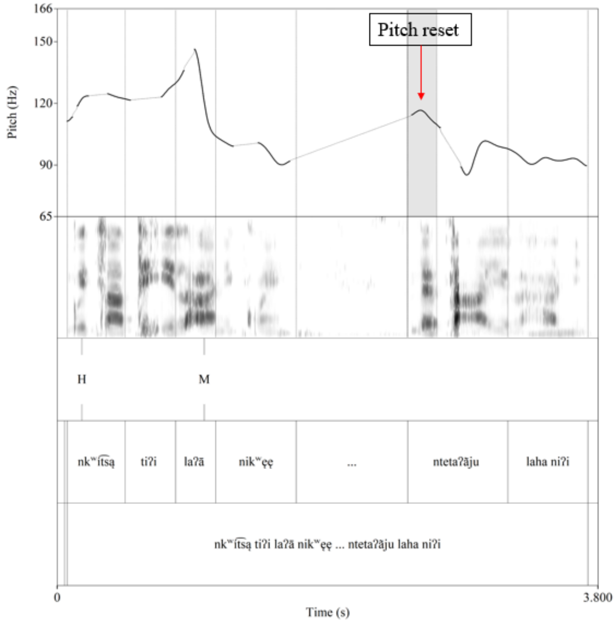

Figure 6: Declination and pitch reset

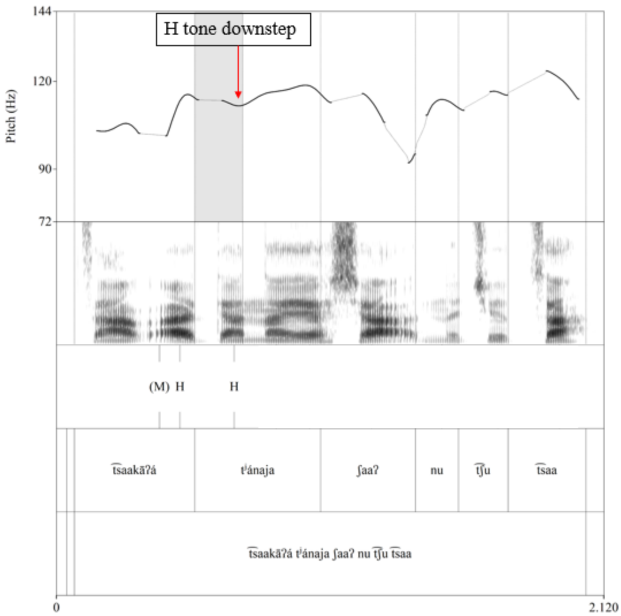

Figure 7: H tone downstep

(59) M tone downstep

nāáʔ nī t͡ʃoō nakʷę nāáʔ ná ntsuʔuntoǭʔ hiʔį́

	nāáʔ	*nī*	*t͡ʃoō*	*nakʷę*	*nāáʔ*	*ná*	*n-*	*tsuʔu*	*+ntoo*	*=ą̄ʔ*	*hiʔį́*
v:	-	-	-	-	2	5	10-	13	+14	=17	18
	1SG	VOC	friend	say(.3)	1SG	NEG	STAT-	be.inside	+face	=1SG	OBJ.2SG

'"Me, friend', he said. Me ... I don't know you.' (ku7wi lo jojo 4:39)

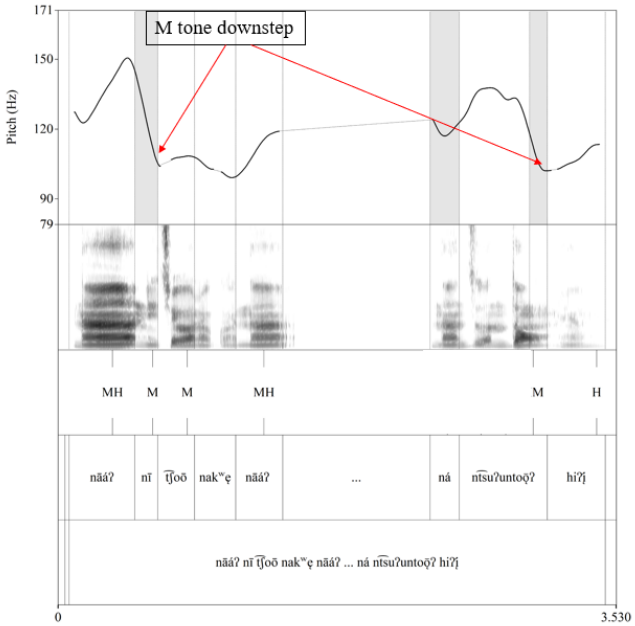

Figure 8: M tone downstep

5.4.4 Mid tone replacement, positions 10–17

A mid tone on a monomoraic element in position 17 (short pronoun) is replaced by a H tone if and only if the preceding element has only a M tone on its final mora. The example in (60) illustrates this alternation on the third person plural dependent pronoun *=ūʔ*. The sharp fall in pitch at the end of the first clause is due to the M tone of the pronoun being sharply downstepped by the final H tone of the essence form *=rīké* 'chest' (Figure 9). The sharp pitch rise in the second clause is due to the H tone that has replaced the pronoun's M tone because the preceding verb bears only a final M tone.

(60) Alternation showing M tone replacement

*lēʔ nkjalarīké**ūʔ** nkahnʲā**úʔ** jaą*

	lēʔ	*nk-*	*jala*	*=rīké*	***=ūʔ***	*nka-*	*hnʲā*	***=ūʔ***	*jaą*
v:	1	10-	13	=16	=17	10-	13	=17	18
	then	PFV-	fill	=chest	=3PL	PFV-	make	**=3PL**	sweat.bath

'They made a plan and built a sweat bath.' (ni7 rosa 2:24)

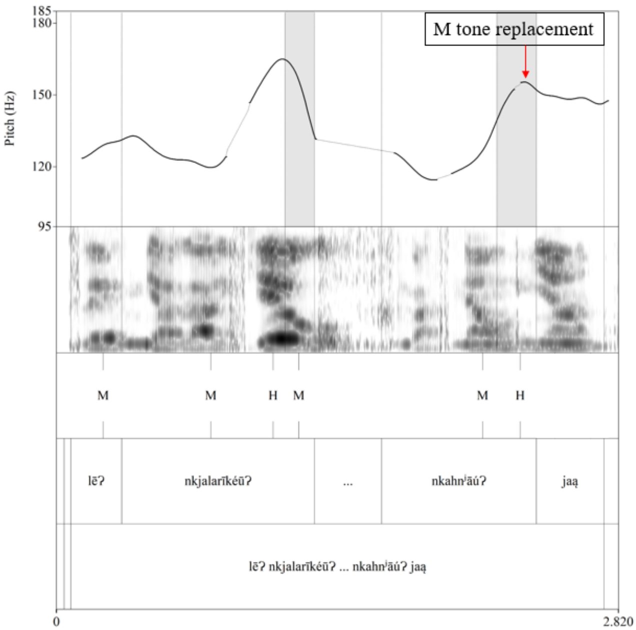

Figure 9: M tone replacement on third-person plural pronoun

Mid tone replacement occurs in position 16 as well if the specific tonal and moraic conditions apply. The essence element *=tīʔ* 'living core' displays its basic M tone following most tone melodies (61), and it bears H tone when the preceding element bears only a final M tone (62).

(61) Essence predicates with no Mid tone replacement on *=tīʔ*

j-a+toǫ=tīʔ	'like'	[lit. 'go be standing living core']
nk-j-uʔu=tīʔ	'remember'	[lit. 'be inside living core']
nka-tāá=tīʔ	'think'	[lit. 'give living core']

(62) Essence predicates with Mid tone replacement on *=tīʔ*

nku-tehę̄=**tíʔ**	'fall in love with'	[lit. 'pass living core']
nkʷi-tsā=**tíʔ**	'forget'	[lit. 'mistake living core']

The example in (63) illustrates that the element triggering Mid tone replacement of an essence form may occur as a postpound in position 14.

(63) Mid tone replacement between positions 14 and 16

*tī ʔnehlʲūt**íʔ** nuʔu seʔju hā tsaa nāáʔ lóʔō nuʔu*

tī	*ʔne*	*+hlʲū*	*=**tīʔ***	*nuʔu*	*seʔju*	*hā*	*ts-*	*aa*	*nāáʔ*	*lóʔō*	*nuʔu*
v:4	10.13	+14	=16	17	17	1	10-	13	17	18	18
COND	POT.do	+big	=essence	2SG	sir	CONJ	POT-	go	1SG	WITH	2SG

'Forgive me sir but I will go with you.' (muchacha ixtayutla 1:20)

The example in (64) illustrates Mid tone replacement on the feminine singular pronoun *=t͡ʃūʔ* in position 17 and also shows that the process does not occur between the two stems in a compound verb that occupy positions 13 and 14, which in this case display the moraic and tonal requisites that should trigger the process.

(64) Lack of M tone replacement between positions 13 and 14

*nkāhlʲūt͡ʃ**ú**ʔ tī niī*

	nk-	*ā*	*+hlʲū*	*=t͡ʃ**ū**ʔ*	*tī*	*niī*
v:	10-	13	+14	=17	19	19
	PFV-	be	+big	=3SG.F	TPLZ	now

'Now yes, she has developed well.' (offered)

Mid tone replacement thus affects only monomoraic elements in positions 16 and 17. No adverbial elements that occur in position 15 are monomoraic with a M tone, so we are not able to observe if the process applies there. Nevertheless, the domain in which this process occurs is positions 10–17, when a monomoraic element with M tone in position 16 or 17 immediately follows a form within the same span whose only tone is a M tone on its final mora.

6 Play language and constituency, positions 10–13

There is a play language in which speakers transpose the initial syllable of a form to the end of the form (Campbell 2020). The examples in (65) show a numeral, some basic nouns, and some inflected verbs (positions 10–13).

(65) Play language basic forms

kátī	→	tí**ka**	‘seven’
kʷetǫ	→	tǫ́**kʷe**	‘bee’
kūnáʔa	→	nāʔá**ku**	‘woman’
kʷilīʃí	→	lʲīʃí**kʷi**	‘butterfly’
nte-lákʷi	→	lākʷí**nte**	‘is boiling’
nkaj-ūná	→	jūná**nka**	‘cried’
nt͡ʃ-ūná	→	ná**nt͡ʃu**	‘is crying’
k-aku	→	kú**ka**	‘will eat’

The play language forms in (66) show that dependent pronouns expressing subject (position 17) do not fall in the target domain of the play language, as they are added after transposition has applied. The final example in (66) illustrates that a second stem in a compound verb (position 14) forms its own transposition domain apart from the first stem of the compound in the span 10–13.

(66) Short pronouns do not participate in the transposition

nkā-sāʔą́=ju	→	sāʔą́**nka**=ju	‘he wrote’
nka-ʃiti=t͡ʃūʔ	→	ʃītí**nka**=t͡ʃūʔ	‘she laughed’
nka-ʃiti=ja	→	ʃītí**nka**=ja	‘we (excl.) laughed’
j-aku=wą	→	kú**ja**=wą	‘you (pl.) ate’
nt͡ʃ-ūlá+**tu**ʔwa	→	lá**nt͡ʃu**+ʔwá**tu**	‘(he) is singing’

The example in (67) shows a complete utterance in the play language. Note that the transposition occurs in the tonal melody domain of each form of a lexical class: it excludes function words. Also of note is that a glottal stop is inserted in the bimoraic monosyllabic vocative form *t͡ʃoō* ‘friend’ so that it can undergo transposition.

(67) Play language utterance

[kʷí**tu** kʷę́**na** hiʔį́ laʔā ʔó**t͡ʃo**]

/tukʷi	*nakʷę*	*hiʔį́*	*laʔā*	*t͡ʃoō/*
v: 2	13	18	19	21
who	PFV.say	DAT.2SG	like.so	friend.VOC

‘Who told you that, friend?’

The play language, thus, applies to basic tonal melody domains (positions 10–13), and like many other phonological patterns, treats bound (pronominal) forms in position 17 very differently from positions in the tonal domain that includes the lexical verb root.

7 Discussion

This study of constituency in Zenzontepec Chatino, following the methodology outlined by Tallman (2021) produces interesting results. Figure 10 is a convergence plot for the domains discussed in this chapter, showing phonological domains in yellow, morphosyntactic domains in blue and indeterminate domains in red.

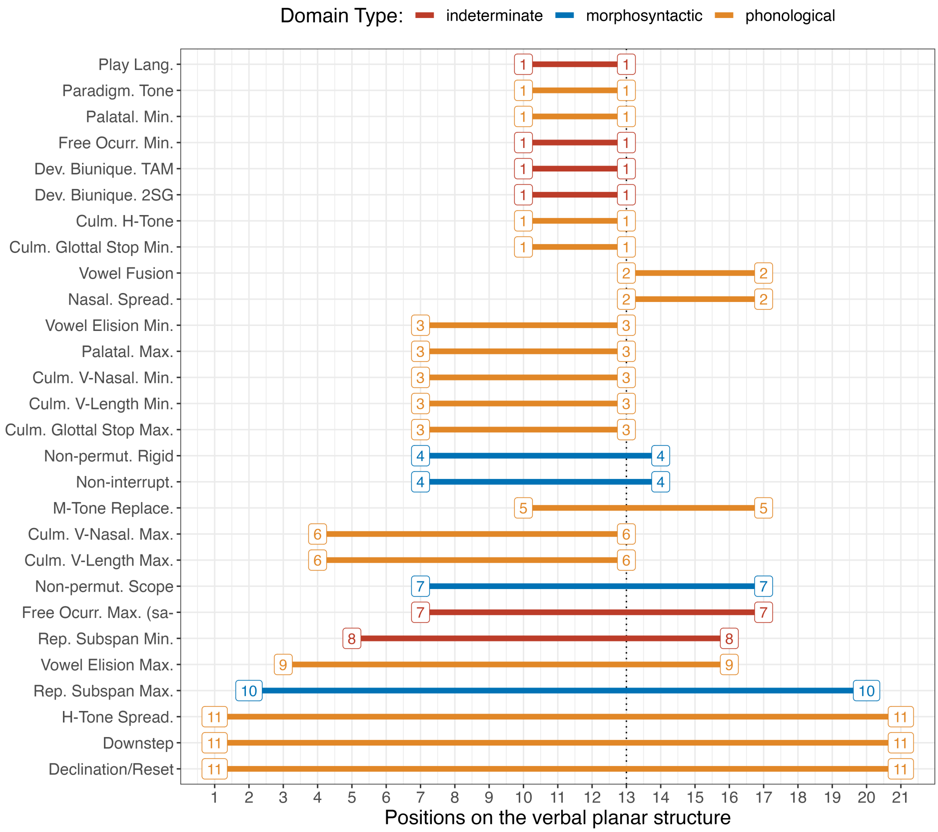

Figure 10: Zenzontepec Chatino constituency tests

7.1 A phonological word in Zenzontepec Chatino?

One can see from Figure 10 that the first layer contains eight converging tests: one morphosyntactic (minimal free occurrence) and seven which are phonological or indeterminate which might be more traditionally classified as "morphophonological" (paradigmatic tone melody; TAM tone alternation; 2sg tonal inflection; culminative H tone; culminative glottal stop [minimal]; palatalization [minimal]; and play language). Since seven of the tests are (morpho)phonological, the span of positions from 10 to 13 is a strong candidate for a phonological word in Zenzontepec Chatino. In light of recent research on phonological wordhood, it is somewhat surprising to find such a strong convergence of tests. Schiering et al. (2010), for example, find that in Vietnamese (Austroasiatic) no single domain emerges as a best candidate for phonological word, and in Limbu (Sino-Tibetan) multiple constituents emerge as equally plausible phonological word domains. They argue, therefore, that phonological words are not a universal feature of human language as assumed by the prosodic hierarchy (e.g.; Nespor & Vogel 1986) and in other works (Hall 1999), but rather they are emergent in language structure in the dynamics of language use and change (see also Epps 2024 [this volume]).

As Dixon & Aikhenvald (2002: 6) point out, a challenge in the study of wordhood is that the best candidate for grammatical word is often not isomorphic with the best candidate for phonological word in a language and the two types of tests should be distinguished. That the minimal free occurrence test in Zenzontepec Chatino aligns with the strongest phonological word candidate is also striking. Moreover, the patterns of deviation from biuniqueness we find in TAM tonal inflection and 2sg person tone are just as much morphosyntactic as they are phonological in nature (Woodbury 2019). Such strong convergence points to general (not strictly phonological or grammatical) wordhood in the language and cries out for an explanation. The Verbal Core, as an inflectable lexical domain, is a fitting name for this constituent.

7.2 Other convergences

The second strongest layer in terms of convergences spans position 7 to 13 and includes the following: culminative glottal stop (maximal); culminative V nasality (minimal); culminative vowel length (minimal); vowel elision; and palatalization. This span in turn consists of the auxiliary span in positions 7–9 and the Verbal Core 10–13. Due to the fact that the second stem in compound verbs (position 14) is a separate domain for several sound patterns (tone melodies; culminativity constraints), the closest span in morphosyntactic tests is identified by the tests of non-permutability (rigid) and non-interruptability, which refer to positions 7–14.

Next we find a convergence of three unique tests over positions 1–21, that is, the entire verbal planar structure: H tone spreading, declination-pitch reset, and downstep. These tests are all prosodic in nature and point to a possible phonological constituent of *utterance*. The autosegmental nature of lexical tone in Zenzontepec Chatino and its low tonal density afford for such large domains to be active in the prosodic structure.

On the morphosyntactic side, the presence of essence elements as obligatory parts of verbal lexemes in position 16 and the obligatoriness of subject expression for speech act participants (1st and 2nd persons) in position 17 lead to the misalignments of the final edges of salient morphosyntactic and phonological domains. Since subjects can have scope over repeated subspans that precede them, the minimal repeated subspan test does not align with minimal free occurrence, non-permutability, or non-interruptability, and we find something more like a patchwork of not-quite-aligning domains of morphosyntactic tests. Therefore, positing a most promising candidate for morphosyntactic word in Zenzontepec Chatino is less straightforward than for a phonological word, and such conflicting evidence has been reported in other studies that challenge the notion of wordhood (Evans et al. 2008; Bickel & Zúñiga 2017).

7.3 Essence elements and adverbials

The main issue that arises in laying out the verbal planar structure is the variable ordering of (transcategorial) adverbials in position 15, a zone in which they may be iterated, and the essence element slot in position 16.

In some cases, the essence element precedes the adverbial (68), and in other cases, the order is reversed (69). However, the cases in which the essence element precedes the adverbial(s) display fusion and/or suppletion, and the essence element *tīʔ* does not alternate freely with *=rīké* in these lexemes as it does in others with the alternate order.

(68) Essence element preceding adverbial
*ná ntʲāá**tīʔtsoʔō**ǫ́ʔ hī̧*

	ná	*n-*	*tʲāá*	***+tīʔ***	***=tsoʔō***	*=ą̄ʔ*	*hiʔį̄*
v:	5	10-	13	+14	=15	=17	18
	NEG	HAB-	ITER.give	+living.core	=good	=1SG	OBJ(.3)

‘I don’t remember it well.’ (leonardo 10:02)

(69) Essence element following adverbial

*nkʷeja**kāʔátīʔ** tī na kojotē*

nkʷ	*-eja*	***=kāʔá***	***=tīʔ***	*tī*	*na*	*kojotē*
v:10	-13	=15	=16	17	-	-
pfv	-lie	=also	=living.core	tplz	def	coyote

'The coyote believed (him) again …' (500 toads 5:45)

In trying to resolve this issue, one must watch out for adverbial elements that appear to occur in an unexpected place, but are actually in the nominal domain. In example (70), the adverbial enclitic *=kāʔá* is likely modifying the light-headed relative clause, a topical NP coreferential with the subject of the matrix clause.

(70) Adverbial *=kāʔá* in the nominal domain

*nu t͡ʃu ná ntejatīʔ**kāʔá** nʲāʔā ʔnetsǫʔūʔ hiʔḭ̄*

[nu	*t͡ʃu*	*ná*	*nte-*	*ja*	*=tīʔ]*	***=kāʔá***	*nʲāʔā*	*ʔne*	*+tsǫʔ*	*=ūʔ*
v: 2	-	-	-	-	-	=2	2	10.13	+14	=17
sub	hum	neg	prog-	lie	=living.core	=also	see.2sg	pot.do	+back	=3pl

hiʔḭ̄
18
dat(.3)

'Those who do not believe as well, they turn their backs on it.' (4bailes 11:37)

A few verbs of cognition, like 'know' display stem suppletion, reduced aspectual inflection (stative semantics), and what appears to be an essence element adjacent to an otherwise opaque verb root, as shown in (71).

(71) Fossilized essence element in verb of cognition

*lēʔ ntʲō**tíʔ**kāʔá tī nāáʔ tula ʔneęʔ*

lēʔ	*n-*	*tʲō.**tíʔ***	*=kāʔá*	*tī*	*nāáʔ*	*tula*	*ʔne*	*=ą̄ʔ*
v: 1	10-	13	=15	17	17	18	18	=18
then	hab-	**?.living.core**	=again	tplz	1sg	what	pot.do	=1sg

'Then I do also know what I'm going to do.' (medicina2 2:43)

In cases such as (71) adverbial elements can no longer occur between the original verb root and the essence element. All of these facts suggest that such cases are now best analyzed as compounds, with the essence element having been reanalyzed as a postpound stem and now occurring in position 14. Therefore, the decision was made to treat the default order as adverbial followed by essence element as in (69) above, despite the discontinuity of verbal lexemes that it entails.

8 Conclusion

Zenzontepec Chatino presents an interesting case in the cross-linguistic study of constituency. There is a multitude of observable sound patterns, both segmental and suprasegmental, and some convergence around a bi- or trimoraic constituent that includes a verb root and its derivational and inflectional prefixes. The study also illustrates that play language sheds useful light on constituency, and which, in this case, mostly aligns with other evidence. The method of using almost entirely naturalistic language use for this study has not very much limited how much detail could be provided for some of the morphosyntactic tests. On the other hand, the structure of the verbal lexical core and verbal complex is informed by extensive lexicographic work on the language and a resulting analytical database that includes roughly 10,000 lexemes, including the inflectional paradigms of roughly 1,500 simplex, derived, compound and phrasal verbs. Such lexicographic work informs the analysis of language structure in discourse. Finally, because of the nature of tone in Zenzontepec Chatino, its larger-domain behavior is able to, and in fact does, align with intonational patterns such as declination and pitch reset and discourse-grammatical distinctions such as that between restrictive vs. non-restrictive relative clauses (and perhaps other parenthetical remarks). Despite the recent challenges to notions of wordhood after long having presupposed that word constituents were manifested in all languages, Zenzontepec Chatino presents a counter case study in which constituency tests show some striking convergences and plausible candidates for phonological and general word constituents.

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Abbreviations

ANA	anaphoric demonstrative ('aforementioned')	ITER	iterative
CAUS	causative	ITR	intransitivizer
COND	conditional	M	masculine
CONJ	conjunction	NSPEC	non-specific (3rd) person
DAT	dative	PFV	perfective
DEF	definite	POT	potential
DIST	distal	PROG	progressive
EXCL	exclusive	PRX	proximative aspect
GEN	genitive	STAT	stative
HAB	habitual	TPLZ	topicalizer
HUM	human	TR	transitive
INCL	inclusive	TRVZ	transitivizer
IRR	irrealis	VOC	vocative

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Chapter 9

Constituency in Martinican (creole, Martinique)

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In this corpus-based study, fourteen morphosyntactic and two phonological word diagnostics are applied to the Martinican predicative planar structure to investigate whether any grammatical and phonological words are identified. In so doing, I contribute to Tallman's research on the empirical groundings of the distinction between grammatical and phonological words. I also provide linguistic-based arguments to nourish the ongoing debate on the Martinican orthographic system and more specifically its words' boundaries.

1 Introduction

This chapter provides a fine-grained description of the results of constituency diagnostics applied to the predicate complex of Martinican (Glottolog: mart1259), a French-based creole language of Martinique spoken by about 600.000 speakers according Colot & Ludwig (2013). Martinique is a Lesser Antilles island first inhabited by Amerindian peoples which became a French colony in 1635[1]. During the triangular trade era that extended from the 16th to the 18th centuries, the need for human resources was fulfilled by successive deportation waves coming from the coast of African countries. Martinican (creole, Martinique) arose in this heterogeneous social and linguistic context in which communication between the French settlers and the slaves was crucial. After the abolition of slavery in 1848, low-cost human resources were brought from India and took part in the evolution of the creole language. After Martinique became a French department on

[1] https://www.zananas-martinique.com/histoire

Minella Duzerol. 2024. Constituency in Martinican (creole, Martinique). In Adam J.R. Tallman, Sandra Auderset & Hiroto Uchihara (eds.), *Constituency and convergence in the Americas*, 419–446. Berlin: Language Science Press. DOI: 10.5281/zenodo.13208556

March 19th 1946, French became the official language of administration and instruction in Martinique, according to the French Constitution. This institutional support of French plus its age-old international prestige contributed to a hierarchical distribution and perception of French and Martinican by the speakers. Nowadays, both languages still coexist in a "dominant contact" setting (Gadet et al. 2009 cited by Colot & Ludwig 2013) that perpetuates the linguistic asymmetry. Today, a substantial majority of Martinican speakers are bilingual. However, there is an ongoing debate on whether Martinicans are really bilingual, sustained by the controversial decreolization thesis.[2] While this chapter does not address this question, the study is based on the understanding that Martinican, like every other language, shows variation. Little corpus-based work on Martinican varieties has been done so far. Therefore, no statement on the categorization of Martinican varieties will be made here. Still, the corpus used in this study was built to target different sociolinguistic profiles regarding age, geographic origin, and professional status. Twenty bilingual speakers participated, aged from 21 to 75 years old.

This chapter is based on 12 hours of spontaneous speech (of which 110 minutes were fully transcribed with ELAN-CorpA software 2022) recorded by the author and a number of elicited sentences. For the spontaneous speech, 18 speakers were asked to either talk about a subject of their choosing or to describe one of the five set of pictures proposed by the linguist.[3]

First, I discuss the planar structure of the predicate complex. Second, I deal with the constituency diagnostics applied to Martinican, starting with the morphosyntactic constituency diagnostics and ending with the phonological constituency diagnostics. For each type of diagnostics, I identify the convergent and divergent tests as well as wordhood candidates. The orthographic system for Martinican is still subject to ongoing debate (Zribi-Hertz & Jean-Louis 2017; Bernabé 2013). The results of the constituency diagnostics in Martinican are thus of particular interest with respect to the 'word' in the current orthographic system and whether the convergences match this orthographic word or other candidates emerge.

2 Martinican predicative planar structure

As seen in the introduction of the volume, Tallman's approach questions the empirical justification for postulating a distinction between morphology and syntax.

[2]See Siegel (2010) and Degraff (2005) for example.

[3]For a more detailed presentation of the methodology, refer to Duzerol 2021a: 17–22.

Thus, the structure to which the constituency tests are applied puts morphological and syntactic elements at the same level.

Tallman (Tallman 2021: 10) specifies that planar structures are composed of elements, “a formative, morpheme, affix, clitic, root, stem, phrase, clitic, or compound”, that occupy positions in these structures. These positions are numbered “to account for relative ordering of its elements within the planar structure.”

While Tallman’s methodology distinguishes between nominal versus verbal planar structures, I oppose predicative versus non-predicative planar structure for the Martinican case. Given the widespread transcategoriality in Martinican (Colot 2002: 75–76), I refer to any element that expresses “the semantic content of a predication’ (Payne 1997: 111) as predicate, regardless of its part of speech.

Based on the corpus used for this chapter, the Martinican predicative planar structure consists of 27 positions. As defined by Tallman (2020) there are two types of positions in a planar structure: zones where “all elements can occur and in any order” and slots where “all elements are mutually exclusive and only one can occur”. Martinican predicative planar structure counts 11 zones and 15 slots as Table 1 shows. This structure starts and ends with sentence adverbs (positions 1 and 27). The predicate base occupies position 18. Since Martinican is an SVO language, subjects and unique arguments precede the predicate base, they occur at position 5. Tense, aspect and modality are also encoded by markers placed before the predicate. Object pronouns and their phrasal and clausal equivalents occur after the predicate base. So far, the behavior of adverbials is not clear: their integration into an adverbial phrase is not certain.

The following example in (1) illustrates how an affirmative declarative sentence is constructed in Martinican.

(1)

yo	*té*	*ka*	*sèvi*	*gomié*	*-a*	*pou*	*alé*	*chèché*	*pwason*
5	9	11	18	22		26			
3pl	pst	impf	use	gommier	-def.art	sub.purp	go	look.for	fish

‘they used to use the gommier to look for fishes.’ (Descrip[5] REU 016)

In this corpus-based predicative planar structure, some morphemes can occur in multiple positions. This is the case for adverbial clauses (positions 2 and 26), noun phrases (positions 5 and 22), negative marker *pa* (positions 8 and 13), adverbials (positions 6, 10, 16, 21 and 23) and sentence adverbs (positions 1 and 26).

Adverbial clauses, that is to say temporal, purpose and reason clauses, can occur at the beginning of the planar structure in position 2, before the predicate base or at the end of the planar structure position 26 after the predicate

[4]The label *adverbial* was used as convenient way of naming “any word with semantic content that is not cleary a noun, a verb or an adjective” (Payne 1997: 69).

[5]*Descrip* stands for ‘description’.

Table 1: Martinican predicative planar structure

Position	Type	Elements
(1)	zone	Sentence adverbs
(2)	zone	Adverbial clauses
(3)	slot	Interrogative marker
(4)	slot	Obligation *fok*
(5)	zone	NP, subject pronouns (A, S)
(6)	zone	Adverbial [4]
(7)	slot	Copula *sé*
(8)	slot	Negative marker *pa* (NEG), *pé* (NEG), *poko* (NOT.YET)
(9)	slot	Tense marker *té* (PST)
(10)	zone	Adverbial
(11)	slot	Tense marker *ka* (IPFV), *ké* (FUT), *key* (FUT), *kay* (FUT)
(12)	slot	Modal *pé* 'can'
(13)	slot	Negative marker *pa* (NEG)
(14)	slot	Causative *fè*
(15)	slot	NP (causee); causee pronouns
(16)	zone	Adverbial
(17)	slot	Derivational morpheme
(18)	**slot**	**V base**
(19)	slot	Object pronouns (recipient)
(20)	slot	Object pronouns (patient)
(21)	zone	Adverbial
(22)	zone	NP, complement clauses
(23)	zone	Adverbial
(24)	slot	PP
(25)	slot	Negative marker ...*ankò*
(26)	zone	Adverbial clauses
(27)	zone	Sentence adverbs

base. Their position does not convey any syntactic nor semantic difference but an emphatic effect that has to do with information structure. In example (2), the purpose clause *pou kay-la pwop* appears in position 26, i.e. in one of the last positions of the planar structure.

(2) *tout moun -nan ka fè menm bagay -la* ***pou kay***
5 11 18 22 26
every person -DEF.ART IMPF do same thing -DEF.ART **SUB.PURP home**
-la pwop

-DEF.ART clean
'every person does the same thing for the house to be clean.' (Narr LOR_part_1 074)

Example (3) shows that it is possible for a purpose clause to be placed in one of the first positions of the planar structure i.e. position 2.

(3) *apré* ***pou stabilizé hm yol -la*** *nou ka itilizé*
1 2 5 11 18
after **SUB.PURP stabilize hum yole -DEF.ART** 1PL IMPF use
dé bwa drésé
22
ART.INDF.PL bwa drésé
'then, to stabilize hum the yole, we use *bwa drésés*.'[6] (Descrip HAT 037)

Noun phrases are also elements that occupy different positions in the planar structure. When noun phrases occupy position 5, they are the subject or the single argument of the predicate base. In example (4), the definite noun phrase *paran-an* is the subject of *pati*.

(4) ***paran -an*** *ka pati*
5 11 18
parent -DEF.ART IMPF leave
'the parent leaves' (Narr[7] TYR_part_1 052)

Noun phrases and their pronominal equivalent (position 15) occur in causative constructions and encode the causee as in example (5) where the causee is the first person singular pronoun *mwen*.

[6] *hm* = Hesitation phenomenon.
Bwa drésés are wood pieces maneuvered by humans for *yole*'s balance. *Yole* in Martinican and *yole* in French is a Martinican boat that pertains to the Intangible Cultural Heritage of UNESCO.
[7] *Narr* stands for 'narration'.

(5)

papa	*-mwen*	*té*	*ka*	*fè*	***mwen***	*dansé*	*bèlè,*	*danmié*
5		9	11	14	15	18	22	
father	-1SG	PST	IMPF	make	**1SG**	dance	bèlè	danmié

'my father used to make me dance *bèlè, danmié*'[8] (LUI Descrip_part_1_013)

Finally, noun phrases can also appear at position 22. In that case they are objects of the predicate base. In example (6), *bannann* is the direct object of the predicative base *livré*.

(6)

alò	*i*	*té*	*ka*	*livré*	***bannann***	*ba*	*lakopérativ*
1	5	9	11	18	22	24	
so	3SG.S	PST	IMPF	deliver	**banana**	PREP.for	cooperative

'so he used to deliver bananas to the cooperative.' (LAU Descrip 052)

There is another morpheme that occupies several positions in the planar structure: the negative marker *pa*. *Pa* occupies positions 8 and 13. Standard negation is encoded by the negative marker *pa* occurring in position 8, as in example (7).

(7)

avan	*ou*	***pa***	*té*	*ni*	*sa*
1	5	8	9	18	22
before	2SG	**NEG**	PST	have	DEM.PR

'you did not have that before.' (LAU Descrip 056)

However, when the modal *pé* (position 12) is used without any overtly expressed TAM marker, the negative marker is not placed in position 8 but in position 13, which is illustrated by example (8).

(8)

man	*pé*	***pa***	*fè*	*-y*	*épi*	*sè*	*-mwen*
1	12	13	18	20	24		
1SG.S	can	**NEG**	do	-3SG.OBJ	PREP.with	sister	-1SG

'I cannot do it with my sister.' (Narr MUR 079)

When the modal *pé* is used an overtly expressed TAM marker, the negative marker is placed in position 8 as in example (9).

(9)

man	***pa***	*té*	*pé*	*alé*	*antréné*
1	8	9	12	18	22
1SG.S	**NEG**	PST	can	go	exercise

'I could not go exercise.' (ELO Narr_part_1 022)

[8] *Bèlè* and *danmié* are Martinican traditional dances.

In the corpus, adverbials can appear in multiple positions: 6, 10, 16, 21 and 23. Although the question of how these various positions work has not been solved yet[9], it seems that the placement depends on the adverbial used. Some adverbials have a single position while others appear at several places. In the corpus, the adverbial *vit* only appears in position 23 as in example (10).[10]

(10) *pay -la pa ka izé* ***vit***
5 8 11 18 23
straw -DEF.ART NEG IMPF wear.down **quickly**
'straw does not wear down quickly.' (Narr LOR_part_1 060)

On the other hand, the adverbial *vréman* is placed in positions 16 or 21. There may be a bias in the corpus data in that *vréman* only occur with nominal and adjectival predicates including either the copula *sé* or the predicate *ni* used as light predicative bases. In example (11), the nominal predicate is an existential construction involving the predicate base *ni*. The adverbial *vréman* appears in position 16.

(11) *pa* ***vréman*** *ni kouw*
8 16 18 22
NEG **really** have class
'there is not really class.' (Narr HAT 007)

Example (12) illustrates another existential construction involving the predicate base *ni*. This time, the adverbial *vréman* occupies position 21. The meaning of *vréman* does not change.

(12) *pa ni* ***vréman*** *non kréyol ba sa*
8 18 21 22 24
NEG have **really** noun creole PREP.for DEM.PR
'there is not really a creole noun for this.' (Narr HAT 002)

Last come the sentence adverbs. They appear in the very first or the very last positions of the planar structure. It seems that each sentence adverb has a preferential position without being restricted to this placement. In the corpus, the sentence adverb *donk* is mainly placed in position 1 as in (13).

[9] I still need to evaluate how speakers perceive each adverbial placement to see if they are judged to be more Martinican-like or more French-like. I do not know yet if Martinican allows a free positioning of any adverbial, if the speakers' bilingualism (Martinican-French) interacts with the placement of the adverbials or leads to change in the modern Martinican structure.

[10] In the original data, this construction was in a subordinate clause. Example (10) is the corresponding independent clause.

(13) ***donk*** *yo chayé -nou an fon bato -a*
1 5 18 20 24
so 3PL carry -1PL PREP.in bottom boat -DEF.ART
'so they carried us in the bottom of the boat.' (Descrip MAU 054)

The sentence adverb *aprézan* is mainly used in position 27.

(14) *bagay -la ka entérésé tout moun* ***aprézan***
5 11 18 22 27
thing -DEF.ART IMPF interest all person **nowadays**
'the thing interests everyone nowadays.' (Descrip ELO 028)

With respect to the orthographic word, it is defined by the academic writing system, the GEREC, named after the Martinican research center GEREC-F, (*Groupe de Recherches en Espace Créolophone et Francophone*, Research Group in Creole-speaking and French-speaking area), in which its authors worked. This writing system has three versions namely GEREC-1, GEREC-2 and GEREC-3 (see Zribi-Hertz & Jean-Louis 2017). For Martinican, it is the GEREC-2 that is mainly used. According to this version of the writing system, the orthographic predicative word gathers positions 17 to 20 with some writing specificities for positions 19 and 20. The following example (15) shows how a predicate receiving a preposed derivational morpheme is written. According to GEREC-2, no space is to be put between the derivational morpheme *ri-* and the predicate base *fè*.

(15) *man rifè lapenti-a*
man **ri-** **fè** lapenti -a
5 17 18 22
1SG.S **again-** **do** paint -DEF.ART
'I did the painting again.' (Elicitation)

Positions 19 and 20 are part of the orthographic predicative word only when they are pronouns of second and third persons singular. These pronouns have two phonetic realizations for both positions: *ou* [u] and *w* [w] for the second person singular, *li* [li] and *y* [j] for the third person singular. Only *w* [w] and *y* [j] are part of the orthographic predicative word. However, they have to be preceded by an apostrophe as examples (16) and (17) show. In (16), it is the patient pronoun *y* that appears in the orthographic predicative word *woti'y.*

(16) i di man pé pa menm ***woti'y***
i *di* *man* *pé* *pa* *menm* ***woti*** *-y*
5 18 5 12 13 16 18 20
3SG.S say 1SG.S can NEG even **roast -3SG.OBJ**
'she[11] said: "I cannot even roast it."' (Descri OTA 1 110)

In example (17) the orthographic predicative word *ba'y* is composed of the predicate base *ba* and the recipient pronoun *y*.

(17) … *nou* ***ba'y*** *do-nou*
… *nou* ***ba*** *-y* *do* *-nou*
… 5 18 19 22 22
… 1PL **give -3SG.OBJ** back -1PL
'we turned our back to it.' (Descrip MAU 082)

This presentation of the Martinican predicative planar structure and the predicative word according to the GEREC-2 writing system allows us to move on to the constituency diagnostics and the subspans of the planar structure that these diagnostics identify. I start by considering the morphosyntactic diagnostics and their results in §3. Then, in §4, I focus on the phonological diagnostics and their results. I end by considering questions related to wordhood in Martinican from a typological perspective.

3 The morphosyntactic diagnostics

In this section, I present in detail the fourteen morphosyntactic tests that have been applied to the Martinican predicative planar structure. They were established on the basis of six of the abstract morphosyntactic constituency tests present in Tallman (2021: 16)'s taxonomy. Then, I present their results.

3.1 Free occurrence (18-18, 17-20)

The free occurrence test identifies "a well-defined contiguous subspan of positions whose elements can be uttered as a minimal free form" (Tallman 2021: 16). It was fractured into smallest and biggest free occurrence tests:

1. free occurrence (smallest) identifies the smallest span of structure that can be a single free form;

[11]The pronoun *i* is not gender-specified. In example (16), the gender is identified thanks to the context. The speaker was talking about a woman.

2. free occurrence (largest) identifies the largest span of structure that can be a single free form.

In the corpus, the predicate base (position 18) is the smallest subspan of structure to be a single free form. This single free form appears in constructions such as imperative, as in example (18).

(18) *Sòti!*
18
get.out
'Get out!' (Bernabé 1983: 462; elicitation)

Such a construction is described by Bernabé (1983: 1:462) as a "positive imperative exhortative".[12]

The largest span of structure to be a single free form is subspan 17-20. This subspan gathers the predicate base (position 18), preposed derivational morphemes (position 17), recipient object pronouns (position 19) and patient object pronouns (position 20). The largest single free form is also specific to imperatives. Only ditransitive predicates that have a double direct object construction can show such a structure. This corresponds to what Pinalie & Bernabé (1999: 49) call "attribution constructions". In example (19) the predicate base *ba* has two pronominal direct objects: the recipient pronoun *-mwen* and the patient pronoun *-y*.

(19) Ba mwen'y
Ba -mwen -y!
18 -19 -20
give -1SG -3SG.OBJ
'Give it to me!' (Elicitation)

3.2 (Non-)interruptibility (17-20, 17-20)

The non-interruptibility test targets "a well-defined contiguous subspan of positions whose elements cannot be interrupted by element(s) of class I[13]" (Tallman 2021: 16). This test was fractured into two subtests:

1. (non)-interruptibility (one free form) where the subspan of structure cannot be interrupted by an element that is a single free form;

[12] Translated from French : « *impératif exhortatif positif* » (Bernabé 1983: 462).
[13] Class I elements are those identified by the free occurrence diagnostics.

2. (non)-interruptibility (more than one free form) where the subspan of structure cannot be interrupted by an element of more than one free form.

However, in the corpus, these tests identify the same result. Since these tests share the same result, there is no need for a fracture based on simple vs. multiple free form interruption. The span identified by free form interruption is 17 to 20. Positions 16 and 21 contain adverbial elements that are single free forms. It also seems that adverbial elements can be composed of more than one free form as in an adverbial phrase. However, more investigation needs to be done to confirm this last statement.

Examples (20) and (21) illustrate cases where positions 16 and 21 are filled by a free adverbial form, *za* and *vréman* respectively.

(20)

man	*té*	***za***	*ba*	*-w*	*-li*
5	9	16	18	-19	-20
1SG.S	PST	**already**	give	-2SG.OBJ	-3SG.OBJ

'I had already given it to you.' (Elicitation)

(21)

man	*fè*	*-y*	***vréman***
5	18	-19	21
1SG.S	do	-3SG.OBJ	**really**

'I really did it.' (Elicitation)

3.3 (Non-)permutability (17-20, 17-20, 4-25, 3-25)

The (non)-permutability test determines "a well-defined contiguous subspan of positions that cannot be variably ordered with one another (if a-b, then b-a must not occur)" (Tallman 2021: 16). This test was fractured following two criteria: whether (non)-permutability is considered in a strict or a scopal way and whether the construction is interrogative or declarative/imperative. Rigid (non)-permutability means that the elements cannot be variably ordered. Scopal (non)-permutability is when the variable ordering of an element goes with a difference in scope for this element. Consequently, there are four subtests:

1. (Non)-permutability - rigid - (declarative/imperative)

2. (Non)-permutability - rigid - (interrogative)

3. (Non)-permutability - scopal - (declarative/imperative)

4. (Non)-permutability - scopal - (interrogative)

In the corpus, declarative/imperative clauses and interrogative clauses show the same results for the rigid (non)-permutability test. The subspan identified in the corpus extends from position 17 to position 20. Within this subspan as well as at its margin, declarative/imperative clauses and interrogative clauses do not have any structural differences. Thus, they share the same result. The elements occurring in positions 16 and 21 can be variably ordered. As mentioned in the presentation of the Martinican predicative planar structure, the adverbial *vréman* can occur either in positions 16 or 21 in the corpus. Examples (22) and (23) were cited to illustrate it.

(22) *pa* ***vréman*** *ni* *kouw*
8 16 18 22
NEG **really** have class
'there is not really class.' (Narr HAT 007)

(23) *pa* *ni* ***vréman*** *non* *kréyol* *ba* *sa*
8 18 21 22 24
NEG have **really** noun creole PREP.for DEM.PR
'there is not really a creole noun for this.' (Narr HAT 002)

The subspan that extends from position 4 to position 25 is identified by the scopal (non)-permutability test for declarative and imperative sentences. The left edge of this subspan is preceded by position 3 that contains interrogative markers. These markers are not part of declarative/imperative sentences. The position following the right edge of the subspan, i.e. position 26, has elements that can be variably ordered without any scopal change. The adverbial clauses can equally occupy positions 2 and 26 without any scopal change. Adverbial clause will still depend on the predicate base. Its placement before or after the predicate base is matter of stylistic choices and information ordering. In example (24), the preposed purpose clause *pou twouvé gwo lanmè-a* is in position 2.

(24) ***pou*** ***twouvé*** ***gwo*** ***lanmè*** ***-a*** *fok* *ou* *alé* *lwen* *lwen* *lwen*
2 4 5 18 23
SUB.PURP **find** **big** **sea** **-DEF.ART** OBL 2SG go far far far
déwò

outside
'**to find the deep sea**, you have to go far far far away, outside.' (Descrip MAU 040)

Pou twouvé gwo lanmè-a could equally appear in position 26 as in the elicited example (25).

(25) *fok ou alé lwen lwen lwen déwò* ***pou twouvé gwo lanmè -a***
4 5 18 23 26
OBL 2SG go far far far outside **SUB.PURP find big sea -DEF.ART**
'you have to go far far far away, outside **to find the deep sea**.' (Elicitation)

The scopal (non)-permutability test for interrogative sentences points to the subspan 3-25. The only difference between the results for interrogative sentences and the declarative/imperative sentences is that subspan 3-25 includes interrogative markers (position 3), elements that cannot be variably ordered either. Consequently, a similar reasoning justifies the identification of the subspan 3-25. The right and left edges of subspan 3-25 are occupied by adverbial clauses. As previously illustrated, adverbial clauses are elements that can be variably ordered. Furthermore, this variable ordering does not condition any scopal change. The following examples (26) and (27) show that the temporal clause *lè ou té piti* can equally be placed in position 2 or 26.

(26) ***Lè ou té piti***, *es ou té ka gadé kous yol?*
2 3 5 9 11 18 22
SUB.when 2SG PST little Q 2SG PST IMPF look race yole[14]
'**When you were young**, would you look at yole races?' (Elicitation)

(27) *Es ou té ka gadé kous yol* ***lè ou té piti*** *?*
3 5 9 11 18 22 26
Q 2SG PST IMPF look race yole **SUB.when 2SG PST little**
'Would you look at yole races **when you were young**?' (Elicitation)

3.4 Ciscategorial selection (17-18, 2-26)

Ciscategorial selection tests target "a well-defined contiguous subspan of positions whose elements can only semantically combine with one part of speech class" (Tallman 2021: 16). To obtain unambiguous results this test was fractured into two subtests:

[14]Yoles are traditional Martinican boats that appear on the UNESCO Register of Good Safeguarding Practices since 2020.

1. ciscategorial selection (predicate only): a test that considers elements combining with predicative bases that do not combine with non-predicative bases;

2. ciscategorial selection (with the predicate): a test that considers elements combining with predicative bases that could also combine with non-predicative bases.

The ciscategorial selection (predicate only) test identifies a subspan composed of positions 17 to 18 according to the speakers' productions. Preposed derivational morphemes (position 17) are the only elements that only combine with predicates. In the corpus, the derivational morpheme *ri-* only occur with predicates. In (28), *ri-* combines with the predicate *fè* 'do'.

(28) *man* ***rifè****'y*
man ***ri-*** ***fè*** *-y*
5 17- 18 -20
1SG.S **again** -do -3SG.OBJ
'I did it again.' (Elicitation)

Adverbials come in position 16. Adverbials are elements that can combine with parts of speech other than predicates, such as adjectives and other adverbials. Examples (29) and (30) show that the adverbial *bien* can combine with the predicate *enmen* but also with the adverbial *lwen*.

(29) *man té* ***bien*** *enmen'y*
man té ***bien*** *enmen -y*
5 9 16 18 -20
1SG.S PST **well** like -3SG.OBJ
'I really liked it.' (Descrip ELO 055)

(30) [...]*nou té ka garé* ***bien*** *lwen*
5 9 11 18 23
1PL PST IMPF park **well** far
'We used to park really far.' (Descrip TUO 056)

After the left-edge of this subspan, there are recipient object pronouns (position 19). These forms are transcategorial since they combine with nouns as possessive determiners (Colot & Ludwig 2013). Examples (31) and (32) show that *mwen* '1SG' functions as an object pronoun and a possessive marker respectively.

(31) *yo di* ***mwen*** *sa sé pa kréyol sa*
5 18 19 22
3PL tell **1SG** DEM.PR be NEG Creole DEM.PR
'They told me this, this is not Creole.' (Narr AUG 110)

(32) *manman-****mwen*** *té ka fè'y osi*
manman ***-mwen*** *té ka fè -y osi*
5 9 11 18 20 23
mother **1SG** PST IMPF do -3SG.OBJ too
'My mother used to do it too.' (Narr PRU 039)

Subspan 2-26 is the result of the ciscategorial selection (with the predicate) test. In the predicative planar structure, sentence adverbs (positions 1 and 27) are the only elements that do not combine with the predicate since they have scope over the whole sentence. In example (33) the sentence adverb *efektivman* expresses the speaker's position regarding the whole sentence *yo di mwen atann* attesting that the predication really did happen.

(33) ***efektivman*** *yo di mwen atann*
1 5 18 19 22
indeed 3PL tell 1SG wait
'they told me to wait indeed.' (Elicitation)

3.5 Biuniqueness deviation domain: negation *pa ankò* 'no more' (8-25)

A devation from biuniqueness domain is "a well-defined contiguous subspan of positions whose elements display deviations from biuniqueness (one meaning-one form)" (Tallman 2021: 16). In the corpus, to express that the predication does not hold at the time of the event but was true before the time of the event, a negative discontinuous morpheme is used. This discontinuous morpheme is also identified in Pinalie & Bernabé (1999: 41). *Pa* NEG occupies position 8 and *ankò* 'again' occupies position 25. The positions of these morphemes do not vary in the corpus. Thus, the biuniqueness deviation domain for the negation *pa ankò* is subspan 8-25. The speaker of example (34) explains that following the Martinican traditional *yole* racing was a custom before but is not one anymore.

(34) *donk atjelman man* ***pa*** *ka suiv touw -la* ***ankò***
1 5 8 11 18 22 25
so nowadays 1SG.S **NEG…** IMPF follow race -DEF.ART **…anymore**
'so, nowadays, I do not follow the race anymore.' (Descrip BEL 051)

3.6 Biuniqueness deviation domain: second and third singular object pronouns allomorphy (18-20; 18-19)

The second and third singular persons of the object pronouns (positions 19 and 20) display a morpheme-specific allomorphy. The diagnostic has been split into two subtests to target each position:

1. Biuniqueness deviation domain: second and third singular object pronouns (patient) allomorphy
2. Biuniqueness deviation domain: second and third singular object pronouns (recipient) allomorphy

The patient object pronouns (position 20) of second and third singular persons display a morpheme-specific allomorphy (Pinalie & Bernabé 1999: 23–24). Both second and third singular persons have two allomorphs. Their distribution is summarized in Table 2 below and does not show any variation in the corpus.

Table 2: Second and third patient object pronouns allomorphy

Patient object pronoun realizations		Preceding syllable type
2nd person singular	[u]	Closed
	[w]	Open
3rd person singular	[li]	Closed
	[j]	Open

Examples (35) and (36) illustrate the allomorphy for the second person singular patient pronoun (position 20). In (35), the pronoun comes after a closed syllable [tãn] and is realized [u].

(35) *man pa ka tann **ou***
[mãpakatãn**u**]
*man pa ka tann -**ou***
5 8 11 18 -20
1SG.S NEG IMPF hear -**3SG**
'I do not hear you.' (Elicitation)

In (36), the pronoun comes after an open syllable [ʁe] and is realized [w].

(36) *nou ka préparé'**w***
[nukapʁepaʁe**w**]
*nou ka préparé -**w***
5 11 18 -20
1pl impf prepare **-2sg.obj**
'we are preparing you.' (Elicitation)

(37) and (38) exhibit the allomorphy of the third person singular patient pronoun (position 20). In (37), the pronoun is preceded by a closed syllable [diw] and is realized [li].

(37) *man té di'w **li***
[mãtediw**li**]
*man té di -w -**li***
5 8 18 -19 -20
1sg.s pst tell -2sg.obj **-3sg.obj**
'I had told you that.' (Elicitation)

In (38), it is the open syllable [di] that precedes the pronoun that is realized [j].

(38) *man rédi'**y***
[mãredi**j**]
*man rédi -**y***
5 18 -20
1sg.s take -3sg.obj
'I took it.' (Elicitation)

Since it is the syllable that immediately precedes the pronoun that conditions the form of the pronoun, the deviation from biuniqueness domain for second and third singular patient object pronoun allomorphy is subspan 18-20; that is to say the predicate base, the object pronouns (recipient) and the object pronouns (patient). Examples (35) to (38) show cases where the patient pronoun is preceded by the predicate base. In the next example (39), the patient pronoun comes after a recipient pronoun (position 19). The patient pronoun realized [li] is post-posed to the closed syllable [baw].

(39) *man ba'w **li***
[mãbaw**li**]
*man ba -w -**li***
5 18 -19 -20
1sg.s give -2sg.obj -**3sg.obj**
'I gave it to you.' (Elicitation)

Recipient object pronouns of the second and third singular persons (position 19) undergo the same morpheme-specific allomorphy rules as the patient object pronouns. These rules are summarized in Table 3.

Table 3: Second and third recipient object pronouns allomorphy

Recipient object pronoun realizations		**Preceding syllable type**
2nd person singular	[u]	Closed
	[w]	Open
3rd person singular	[li]	Closed
	[j]	Open

In the data transcribed, no context where recipient pronouns were post-posed to closed syllable was found. Examples (40) and (41) illustrate the phonetic realizations of the second and third recipient object pronouns when they follow the open syllable [ba]. They are realized [w] and [j] respectively.

(40) *lanné pasé, man ba'**w** fos pou vansé*
[lãnepasemãba**w** fɔspuvãse]
*lanné pasé, man ba -**w** fos pou vansé*
1 5 18 19 22 26
year pass 1sg.s give -**2sg.obj** strength prep move.forward
'last year, I gave you strenght to move forward.' (Elicitation)

(41) *lanné pasé, man ba'**y** fos pou vansé*
[lãnepasemãba**j**fɔspuvãse]
*lanné pasé, man ba -**y** foss pou vansé*
1 5 18 -19 22 26
year pass 1sg.s give -**3sg.obj** strength prep move.forward
'last year, I gave him/her strenght to move forward.' (Elicitation)

As a result, the deviation from biuniqueness domain for second and third singular recipient object pronouns' allomorphy is subspan 18-19 which includes the pronouns themselves (position 19) and the predicate base (position 18). Indeed, the predicate base is the position that comes right before the second and third singular recipient object pronouns and it is its last syllable that conditions the phonetic variation.

3.7 Subspan repetition test: finite declarative complement clauses (4-27)

A subspan repetition test identifies "a well-defined contiguous subspan of positions that occurs more than once for a given construction" (Tallman 2021: 16). The subspan repetition test presented in this section only considers finite declarative complement clauses. Based on the data available, only the largest repeated subspan has been identified.

Finiteness receives a language specific definition (Duzerol in prep) to take into account relevant features that do not necessarily correspond to the traditional morphological ones as Migge et al. (2018) pointed out. Thus, in this chapter, finiteness is considered as a continuum with two poles corresponding to the prototypical finite predicate and the prototypical non-finite predicate. They are identified according to three criteria: the presence of TAM markers, the presence of an overtly expressed subject, and negation. These features are presented in Table 4.

Table 4: Finiteness in Martinican (Duzerol 2021b: 3)

	Presence of TAM markers	Subject overtly expressed	Negation
Prototypical finiteness	+	+	+
Prototypical non finitess	-	-	-

In the corpus, when the predicate's object is a finite declarative complement clause, the largest subspan of structure that is repeated goes from position 4 to position 27. In fact, the syntactic difference between an independent finite declarative clause and a subordinate finite declarative clause relies on the dependent syntactic status of the subordinate clause – it saturates the valency of the main clause predicate – and the possible presence of a non-mandatory complementizer between the two clauses (Duzerol 2021b)[15]. However, because the complement clause is a declarative clause, there is no interrogative marker (position 3). That is why the left edge of the subspan is position 4. In (42), *sa ka entérésé tout moun aprézan* is the declarative clause identified by the recursion-based test for finite declarative complement clauses. There, position 4 is empty because there is no obligation marker.

(42)

man	*sav*	***sa***	***ka***	***entérésé***	***tout***	***moun***	***aprézan***
5	18	5	11	18	22		27
1SG.S	know	**DEM.PR**	**IMPF**	**interest**	**all**	**person**	**nowadays**

'I know it interests everyone nowadays.' (Elicitation)

3.8 The grammatical predicative word candidate

Table 5 summarizes the spans identified by each of the fourteen morphosyntactic diagnostics.

Fundamentally, these corpus-based results of the morphosyntactic diagnostics used in this study do not converge with one another consistently. Ten subspans are identified in total. There is one subspan which is a good candidate for the grammatical predicative word candidate: subspan 17-20. This word candidate would be comprised of the preposed derivational morphemes, the predicate base and the object pronouns. The other spans are less likely candidates since they do not converge with any other span (as the smallest free occurrence) or isolate a part of a clause or entire clauses what would make Martinican an extremely polysynthetic language. Therefore, on the basis of this study, free occurrence (largest), non interruptibility (one free form), (non)-interruptibility (more than one free form), (non)-permutability - rigid (declarative/imperative), (non)-permutability - rigid (interrogative) would be relevant predicative morphological wordhood tests for Martinican.

Interestingly, this morphological predicative word candidate partially corresponds to what the GEREC-2 defines as a word. Indeed, as mentioned in the presentation of the corpus-based Martinican planar structure used in this chapter (§2), the predicative word according to the GEREC-2 always comprises positions 17 and 18, namely the preposed derivational morphemes and the predicate base. The GEREC-2 word contains positions 19 or 20 only when they are filled by the forms *-y* and *-w*. Besides, when included in the word, the elements of positions 19 and 20 are submitted to a specific writing rule: they have to be preceded by

[15] When the main clause predicate is an utterance predicate, pronominal shift in the subordinate clauses also indicates that the clause is subordinate.

Table 5: Results of the morphosyntactic diagnostics

N°	Test ID	Left	Right	Size	Layer ID
1	Free occurrence (smallest)	18	18	1	1
2	Free occurrence (largest)	17	20	4	2
3	(Non)-interruptibility (one free form)	17	20	4	2
4	(Non)-interruptibility (more than one free form)	17	20	4	2
5	(Non)-permutability - rigid - (declarative/imperative)	17	20	4	2
6	(Non)- permutability - rigid - (interrogative)	17	20	4	2
7	(Non)- permutability - scopal - (declarative/imperative)	4	25	22	3
8	(Non)- permutability - scopal - (interrogative)	3	25	23	4
9	Ciscategorial selection (predicate only)	17	18	2	5
10	Ciscategorial selection (with the predicate)	2	26	25	6
11	Biuniqueness deviation domain: negation pa *ankò* ’no more’	8	25	18	7
12	Biuniqueness deviation domain: second and third singular object pronouns (patient) allomorphy	18	20	3	8
13	Biuniqueness deviation domain: second and third singular object pronouns (recipient) allomorphy	18	19	2	9
14	Recursion-based test: finite declarative complement clauses (largest)	4	27	24	10

an apostrophe. On the basis of the convergence of the corpus-based morphological results, one could question why all the elements of positions 19 and 20 are not included in the predicative word. This possibility is precisely brought up by Zribi-Hertz & Jean-Louis (2017).

After examining the morphosyntactic diagnostics, it is time to move on to the phonological ones to investigate the divergences and convergences of their results.

4 The phonological diagnostics

This section is dedicated to the presentation of the phonological diagnostics applied to the Martinican predicative planar structure and the spans of structure defined by the aforesaid diagnostics. One phonological diagnostic is presented. It was established on the basis of one of the phonological abstract constituency tests presented in Tallman (2021: 16)'s taxonomy, which is the stress domain.[16]

4.1 Stress domain (17-20)

According to Tallman (2021: 16), the stress domains identifies "a well-defined contiguous subspan of positions that define the domain for the application of a stress rule". Little exhaustive corpus-based work has been done on Martinican's prosody. Thus, I present here preliminary results.

Colot & Ludwig (2013) argue that "word stress is always on the last syllable" and "phrase and sentence stress is also in final position". The core question for the predicative planar structure is to know if the dependent elements filling positions 17, 19 and 20 bear stress. The elements of positions 16 and 21, namely adverbials, are considered free forms. Thus, one would expect them to be in line with the rule stated by Colot & Ludwig (2013).[17]

A preliminary analysis of twelve elicited clauses and one spontaneous clause where positions 17, 19 and 20 are filled was used to investigate the stress domain. I collected the elicited data with three speakers. They were asked to repeat the clauses three times. Examples (43) to (55) are the transcriptions of these clauses. Examples (43) and (44) were previously mentioned in the chapter.

(43) *man rifè'y*
[mãʁifɛj]

man	*ri-*	*fè*	*-y*
5	17-	18	-20
1SG.S	again-	do	-3SG.OBJ

'I did it again.' (Elicitation)

(44) *mwen ba'w li*
[mwɛ̃bawli]

mwen	*ba*	*-w*	*-li*
5	18	-19	-20
1SG	give	-2SG.OBJ	-3SG.OBJ

'I gave it to you.' (Elicitation)

[16]There might be other phonological domains that are not identified yet due few phonological and prosodic corpus-based litterature on Martinican.

[17]This investigation falls outside the scope of this chapter.

(45) *man bat ou*
[mãbatu]
man bat -ou
5 18 -20
1sg.s hit -2sg.obj
'I hit you.' (Elicitation)

(46) *man té di'y sa*
[mãtedijsa]
man té di -y sa
5 9 18 -19 22
1sg.s pst tell -3sg.obj dem.pr
'I had told her/him that.' (Elicitation)

(47) *mwen té di'y sa*
[mwɛ̃tedijsa]
mwen té di -y sa
5 9 18 -19 22
1sg pst tell -3sg.obj dem.pr
'I had told her/him that.' (Elicitation)

(48) *i té di mwen monté épi'y*
[itedimwɛ̃mõteepij]
i té di -mwen monté épi -y
5 9 18 19 22
3sg.s pst tell -1sg go.up prep.with -3sg.obj
'(S)he had told me to come with her/him.' (Elicitation)

(49) *man té di zot monté épi mwen*
[mãtedizɔtmõteepimwɛ̃]
man té di -zot monté épi -mwen
5 9 18 19 22
1sg.s pst tell -2pl go.up prep.with -1sg
'I had told you to come with me.' (Elicitation)

(50) *man té di yo sa*
[mãtedijosa]
man té di -yo sa
5 9 18 19 22
1sg.s pst tell -3pl.obj dem.pr
'I had told them that.' (Elicitation)

(51) *i té di mwen mwen té épi'y*
[itedimwɛ̃mwɛ̃teepij]
i té di -mwen mwen té épi -y
5 9 18 19 22
3SG.S PST tell -1SG 1SG PST PREP.with -3SG.OBJ
'(S)he had told I was with her/him.' (Elicitation)

(52) *mwen té di zot sa*
[mwɛ̃tedizɔtsa]
mwen té di -zot sa
5 9 18 19 22
1SG.S PST tell -2PL.OBJ DEM.PR
'I had told you that.' (Elicitation)

(53) *man té di yo monté épi mwen*
[mãtedijotmõteepimwɛ̃]
man té di -yo monté épi -mwen
5 9 18 19 22
1SG.S PST tell -3PL go.up PREP.with –1SG
'I had told them to come with me.' (Elicitation)

(54) *mwen té di zot monté épi mwen*
[mwɛ̃tedizɔtmõteepimwɛ̃]
mwen té di -zot monté épi -mwen
5 9 18 19 22
1SG PST tell -2PL go.up PREP.with -1SG
'I had told you to come with me.' (Elicitation)

(55) … *nou pa menm konet* ***li***
[nupamɛmkonɛtli]
… *nou pa menm konet* ***-li***
… 5 8 10 18 20
… 1PL NEG even know **-3SG.OBJ**
'[…] we do not even know it.' (Narr MUR 067)

Discussions with bilingual speakers of Martinican and French seem to show that the concept of stress does not make much sense out of a specific discursive context. In this case, the judgments collected do not deal with stress domains but with intonation choices motivated by pragmatic concerns. Therefore, I collaborated with four linguists to investigate Martinican's prosody. They were sent the audio files and asked to identify the syllable(s) where the stress occur. Based on these files, they all agreed on the fact that the position of a possible stress varies and that it seems that Martinican would not have a stress system. The salience of some syllables over others would be intonation instead. Two linguists indicated where they perceive the stress. Table 6 shows that their analyses do not always converge.

Table 6: Stress analysis of examples (43) to (55) by two linguists

Example	Speaker	Linguist 1	Linguist 2
(43)	LOR	[mãʁiˈfɛj]	[mãʁiˈfɛj]
(44)	LOR	[mwɛ̃ˈbawli]	[mwɛ̃ˈbawli]
(45)	LOR	[mãbaˈtu]	[mãbaˈtu]
(46)	JUV	[mãteˈdijsa]	[mãteˈdijsa]
(47)	PAT	[mwɛ̃tedijˈsa]	[mwɛ̃tedijˈsa]
(48)	JUV	[itediˈmwɛ̃mõˈteeˈpij]	[iteˈdimwɛ̃mõteeˈpij]
(49)	JUV	[mãtedizɔtmõˈteepiˈmwɛ̃]	[mãteˈdizɔtmõteepimwɛ̃]~ [mãtediˈzɔtmõteeˈpimwɛ̃]
(50)	JUV	[mãtedijoˈsa]	[mãteˈdijosa]
(51)	PAT	[itediˈmwɛ̃mwɛ̃ˈteeˈpij]	[itediˈmwɛ̃mwɛ̃teeˈpij]
(52)	PAT	[mwɛ̃ˈtedizɔtˈsa]	[mwɛ̃ˈtedizɔtsa]
(53)	PAT	[mwɛ̃tediˈjomõteeˈpiˈmwɛ̃]	[mwɛ̃ˈtedijomõˈteeˈpimwɛ̃]
(54)	PAT	[mwɛ̃tediˈzɔtmõteepiˈmwɛ̃]	[mwɛ̃ˈtedizɔtmõˈteeˈpimwɛ̃]
(55)	MUR	[nupamɛmkonɛˈtli]	[nupamɛmkonɛˈtli]

The linguists' results suggest that the salient syllables do not always occur on the same position of the planar structure. For some examples, no salient syllable is identified in positions 17 to 20. For these cases, it would mean that there is not a subspan of structure that contains the predicative base and that has a salient syllable. It seems to be the case for examples (47), (50), and (52) where the two linguists either identify the TAM marker *té* [te] (position 9) or the demonstrative pronoun *sa* [sa] (position 22) as the salient syllable. When the linguists identify a salient syllable within a subspan of structure that contains the predicative base (position 18), the salient syllable is not consistent throughout the data. For instance, the syllable *di -y* [dij] (positions 18-19) is either salient, as in (46), or not salient, as in (47). *Di -zot* [dizɔt] (positions 18-19) is another example of this inconsistency as in examples (49), (52) and (54).

Consequently, more investigation needs to be pursued to address the question of the stress system of Martinican, if there is one.

Nevertheless, these preliminary thoughts shed a new light on the GEREC-2 writing system. As was explained in the introductory section dedicated to the presentation of the planar structure (§2), according to this writing system, object pronouns undergo different orthographic treatments. One could wonder if this convention is motivated by prosodic differences. The object pronouns that are preceded by a hyphen and integrated into the predicative word, in the GEREC-2 system, the third person singular -*y* [j] for instance, do not seem to have prosodic features distinct from the pronouns which are not integrated into the predicative word, as -*zot* [zɔt]. Hence the fact that they are not written with the same orthographic conventions cannot be justified on the grounds of a difference in their prosodic features.

5 Conclusion

Based on this corpus-based investigation on constituency, it has been highlighted that, within the morphosyntactic domain, the tests do not systematically converge. Out of fourteen morphosyntactic tests, five diagnostics converge namely free occurrence (largest), non-interruptibility (one free form), non-interruptibility (more than one free form), (non)-permutability - rigid (declarative/imperative), (non)-permutability - rigid (interrogative). Hence, dissociating between morphosyntactic and phonological tests does not solve the misalignments observed between the tests' results, as Tallman (2021: 2) suggested.

The word candidate identified by the five converging morphosyntactic diagnostics comprises the predicate base, predicative derivational morphemes and object pronouns. This word candidate differs from the word defined by the GEREC-2 writing system. It is interesting to note that the word candidate based on constituency tests corresponds to how I have seen some speakers separate orthographic domains when writing in Martinican without using the official conventions. It would be of major interest to look at written corpora to see how Martinican speakers discriminate between words since most of Martinican speakers have not been initiated into the GEREC-2 writing system.

To sum up, if there is a convergence between morphosyntactic and phonological domains is still to be found. Further work on adverbials, derivational morphemes, and phonology will help to enhance the predicative planar structure and with it the investigation on constituency in Martinican.

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Abbreviations

ART	article	PREP	preposition
DEF	definite	PURP	purposive
IMPF	imperfective	Q	question particle
INDF	indefinite	S	argument of intransitive verb
OBL	oblique		
PR	pronoun	SUB	subordinator

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Chapter 10

Constituency in Hup: Synchronic and diachronic perspectives

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This chapter provides a fine-grained description of the result of constituency diagnostics applied to Hup (Naduhup family, NW Amazonia). It describes the planar structures in the verb and noun complex, the set of morphosyntactic constituency diagnostics considered and their outcomes as applied over the verb and noun complexes, and the phonological domains applied over the noun and verb complexes. This chapter is based on dozens of hours of naturalistic speech and a large number of sentences from elicitation (see ailla.utexas.org). As this chapter explores, a feature of particular typological and theoretical relevance concerning Hup constituency is the fact that the criterion of non-interruptability does not apply straightforwardly in the Hup verb – a challenge for proposals that non-interruptability is a key test for wordhood cross-linguistically. The degree of mismatch among morphosyntactic and phonological criteria as defining particular spans as units also has practical implications, in that it creates difficulties in establishing principled conventions for representing the orthographic word. These mismatches are also implicated in the varying assessments of the Naduhup languages as isolating vs. polysynthetic.

1 Introduction

Languages of the western Amazon have been observed to have a relatively fuzzy distinction between morphology and syntax, challenging the view that a discrete divide separates these two areas of grammar (Payne 1990, Tallman 2020). A more precise prediction that emerges from this generalization is that diagnostics of constituency should be relatively non-convergent, such that one diagnos-

Patience Epps. 2024. Constituency in Hup: Synchronic and diachronic perspectives. In Adam J.R. Tallman, Sandra Auderset & Hiroto Uchihara (eds.), *Constituency and convergence in the Americas*, 447–482. Berlin: Language Science Press. DOI: 10.5281/zenodo.13208558

tic might not align closely with another. This expectation may apply on a synchronic level, relating to diagnostics applied both across and within languages, but also on a diachronic one: It is grounded in the observation that processes of grammaticalization lead to independent elements becoming more bonded (i.e. forming tighter units of constituency) over time;[1] but it also allows for the possibility that elements may become less bonded – a process that has to do in part with a mismatch in constituency criteria across domains, such that escaping one can lead to escaping others.

This chapter considers these questions through an investigation of constituency in Hup, a member of the small Naduhup language family of the northwest Amazon, following the procedure developed by Tallman (2021). Through the application of various constituency diagnostics to verb and noun structure, I show that the different measures of constituency in this language are notably non-convergent, especially in verbal constructions. Among particular challenges to assumptions relating to wordhood, I note the failure of the non-interruptability test for Hup verbs, which allow particular etyma to intervene and/or switch positions among other morphological elements; another is the lack of convergence among different phonological domains relevant to assessments of wordhood in Hup. As I argue below, an account of these mismatches is further illuminated by a diachronic perspective, which underscores the motivations behind particular diagnostic outcomes, and highlights the way in which developments that might be construed as relatively minor can have major implications for wordhood. The discussion in this chapter is informed by original research in collaboration with Hup speakers, and draws on dozens of hours of naturalistic speech and a large number of sentences from elicitation.

The chapter is organized as follows. Section §2 introduces the Hup language within the context of the Naduhup family, and §3 describes the planar structures in the verb and noun complex, and the categories of elements that make them up. Section §4 considers a set of morphosyntactic constituency diagnostics and their outcomes as applied over the verb and noun complexes, and §5 does the same for phonological domains. Section §6 offers some diachronic and comparative considerations; §7 concludes.

[1]The use of the term *bonded* in this chapter refers to relative tightness of constituency, while *bound* is reserved for nouns that require a preceding nominal element within a compound construction (see §3.2).

2 Hup and the Naduhup language family

Hup is spoken in the Upper Rio Negro region, in the border area of Brazil and Colombia. Like its Naduhup sister-languages Yuhup, Dâw, and Nadëb, the speakers of Hup traditionally inhabit the interfluvial zones of the Rio Negro region (see Figure 1). Hup has approximately 2500 speakers (according to a 2017 regional census) – the most of any of the Naduhup languages, with Dâw comprising the smallest population at about 130 speakers. Hup is still robustly transmitted to children, and while most Hup speakers today are bilingual in Tukano (and probably have been fluent in a range of East Tukanoan languages over time), only a few are competent in Portuguese.

Figure 1: Hup and the Naduhup languages

While the Naduhup languages were formerly lumped together with Kakua and Nukak (and, by some accounts, Puinave to the north) as the "Makú" family, comparative evidence indicates that they constitute an independent grouping (Epps & Bolaños 2017). According to our current understanding of relationships within the family, Hup and Yuhup are quite closely related, while Dâw is a more distant sister, and Nadëb occupies a distinct primary branch (Figure 2). Despite a clear-cut signal of genetic relationship in the lexicon, the languages are typologically divergent, due in large part to grammatical restructuring driven by contact with their respective neighbors – in particular, East Tukanoan languages on the part of Hup and Yuhup, and (probably) Arawakan languages on the part of Nadëb (Epps 2007, Epps & Bolaños 2017).

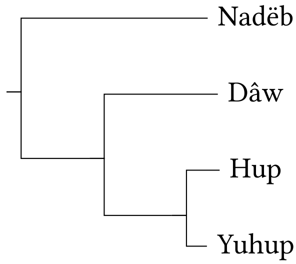

Figure 2: The Naduhup language family

Like its sister languages, Hup received only minimal description through the early 21st century. The discussion in this chapter draws on my work with the language, informed by approximately 18 months of fieldwork carried out between 2000 and 2016. A comprehensive grammatical description of Hup is provided in Epps (2008a); an extensive corpus of natural discourse and elicited material is housed in the Archive for the Indigenous Languages of Latin America (Epps 2001), and a dictionary of Hup is also available (Ramirez 2006). The Hup examples in this chapter are all drawn from my corpus, and most of them are also represented in Epps (2008a). More information on all aspects of Hup grammar addressed here can be found in Epps (2008a).

I turn here to a brief overview of Hup grammar, as context for the following discussion. Hup has nine vowels (i, ɨ, u, e, ə, o, æ, a, ɔ) and nineteen consonants, including a glottalized series (p, t, c, k, ʔ, b, d, ɟ, g, b', d', ɟ', g', ç, h, w, j, w', j'). Hup also has two contrastive tones, realized on stressed syllables, and prosodic nasalization, by which most morphemes are entirely nasal or entirely oral.[2] Constituent order is strongly verb-final, although with some flexibility associated with information structure (see §3.1.1 below); core arguments

[2]The orthographic conventions used in this chapter (which follow those in Epps 2008a) are the following: The representation of consonants and vowels is consistent with the IPA values, with the exception of <j> for /ɟ/ and <y> for /j/, and the use of /m, n, ŋ/ to represent /b, d, g/ in nasal contexts. With reference to the latter convention, morpheme-level nasalization is conveyed orthographically by the presence of nasal segments within the morpheme (i.e. either consonants or vowels, although all are in fact targets for nasalization within the relevant domain). Finally, tone is indicated via diacritics above the vowel in the relevant syllable: v́ indicates high tone (or its falling allophone); v̌ indicates rising tone.

are frequently dropped. Alignment is robustly nominative-accusative and favors dependent-marking, with case-marking on some core and oblique nominal arguments. Grammatical categories marked within the verb complex include tense, aspect, mood, evidentiality, associated motion, and others; some of these elements can also associate with nouns, as explored below, while nouns also may receive number marking and classifiers. Many of these features of Hup grammar match those seen in Tukanoan and Arawakan languages of the same region, and at least some are undoubtedly the outcome of contact-driven restructuring (see Epps 2007, 2008c, *inter alia*).

In Hup, verbs in particular tend to occur in complex serial expressions, in which as many as five or six conjoined roots may be followed by multiple grammatical formatives (example (1)). These formatives can be distinguished on phonological and morphosyntactic grounds into several categories, as discussed in more detail in §3 below. They are given the following labels: *inner suffixes* (such as telic *-yɨʔ* in example (1)), *boundary suffixes* (of which one, and normally only one, occurs obligatorily on verbs in nearly all contexts; e.g. the *dynamic* suffix *-V́y*), *enclitics* (e.g. reported evidential *=mah*), and associated *particles* (effectively enclitics as well, but which tend to occur further toward the end of the verb complex and are more phonologically independent). As discussed below, Hup also has a restricted set of prefixes/proclitics.

(1) *ʔapɨd nutkán puhu-hi-cĩp-kəd-cak-yɨ́ʔ-ɨ́y=mah*
right.away here.DIR swell-FACT-complete-pass-climb-TEL-DYNM=REP
'Right away it had already swelled up and spread quickly up to here [on her leg], it's said.'

While there has been very little evaluation of constituency in Hup beyond my own work, the representations of the orthographic word – particularly for verbs – are notably variable across the different sources that do exist, a fact that reflects the relative lack of convergence among the constituency diagnostics explored below. In Epps (2008a) and the examples provided here, phonological criteria relating to stress rules have been taken as a key guide for the orthographic representation of the word, together with domains defined by obligatory morphological combinations (particularly the boundary suffix position). These morphological domains also relate to constraints on free occurrence and interruptability (i.e. whether certain classes of morphemes cannot occur independently, and what can intervene between them), as explored below.

On the other hand, in the practical orthography that has recently been adopted in Hup communities (and also used for Ramirez' 2006 dictionary), consonant-initial morphemes in both verbal and nominal constructions are normally represented as separate orthographic words. This convention reflects the fact that CVC/CVV is both a minimal phonological word and the minimal freely occurring morphological unit in the language, alongside the fact that Hup strongly prefers single-syllable morphemes (see §5 below). As such, the verbal construction in (1) above would be orthographically represented as (2) in these materials. Similar criteria may have been applied in the brief description of Hup by SIL missionaries Moore & Franklin (1980), referenced in Payne's (1990: 219) comment that "the two dominantly isolating families in the [Lowland South American] region are Jê and Makú [Naduhup]".

(2) *puhu hicĩp kəd cak yɨ́ʔ-ɨ́y mah*
swell FACT.complete pass climb TEL-DYNM REP
'...already swelled up and spread quickly up to here, it's said.'

3 Planar structures

This section presents the planar structures for the verb and noun complexes, following the approach presented in Tallman (2021). These are based on flattening out and elaborating the template representations and/or phrase structure rules of Hup, as described in detail in Epps (2008a). The discussion provided in this and the following sections attends most closely to verb structure, in light of the overall complexity of its morphological composition and implications for constituency diagnostics. Noun structure is included for comparative purposes and provides context for the diachronic considerations addressed in §6 below.

The majority of the positions in the planar structures are slots, in which only one element can occur at a time; among these slots, relatively fixed ordering applies. A few positions are zones, in which multiple elements may co-occur with variable ordering. The relative ordering of elements within zones is primarily determined by scope, as in the case of the evidentials in position 23 of the verb structure below (Table 1), or the stacking of multiple possessors in the nominal construction (position 2, Table 2). The order of compounded verb roots (position 6, Table 1) tends to reflect temporal iconicity, and the order of NP arguments of verbs (positions 1 and 30, Table 1) is sensitive to information structure. The precise assignment of ordered slots and zones in the tables below is informed by extensive work on this language, as noted above, but some points may be refined by further testing.

3.1 Verbal structure

Table 1 introduces the verbal structure.

Table 1: Verbal planar structure in Hup

Position	Type	Elements
(1)	Zone	NP{A,S,O,Oblique}
(2)	Slot	Subject Proclitic {S, A} (marginal)
(3)	Zone	Valence: (causative root), Interactional ʔũh-, Reflexive/passive hup-, O (simplex)
(4)	Slot	Causative root
(5)	Slot	Factitive hi-
(6)	Zone	**Verb base (one or more compounded roots)**
(7)	Slot	Telic -yɨʔ
(8)	Slot	Venitive -ʔay
(9)	Slot	Applicative -ʔũh
(10)	Slot	Completive -cɨ̃p / -cɨ̃w
(11)	Slot	Emphasis -pog
(12)	Slot	Counterfactual -tæ̃ʔ
(13)	Slot	Perfective -ʔeʔ
(14)	Slot	Clausal negative -nɨh
(15)	Slot	Habitual -bɨg , Distributive -pɨd, Future -teg
(16)	Slot	evidentials -hɔ̃, -cud, -mah, frustrative -yæ̃h, repetitive -b'ay
(17)	Slot	Inchoative -ay
(18)	Slot	Inferred -ni
(19)	Slot	Filler -Vw
(20)	**Slot**	**Boundary**
(21)	Slot	Counterfactual =tih
(22)	Slot	Emphatic Coordinator =nih
(23)	Zone	Evidentials =cud, =hɔ
(24)	Slot	Repetitive =b'ay
(25)	Slot	Emphasis =pog
(26)	Slot	Reportative =mah
(27)	Slot	Habitual bɨg, Distributive pɨd
(28)	Slot	Frustrative yæ̃́h
(29)	Slot	Contrast j'ám / j'ʌ̃́h, páh, tán

(30)	Zone	intensifier MÚN, adversative conjunction KǍH, persistive TÆ, epistemic modality ʔŨH, etc.
(31)	Zone	NP{A,S,O,Oblique}
(32)	Slot	Declarative *-Vh*

Below, I discuss the positions in the template according to the principal categories of verbal morphology that were introduced in §2 above, and as schematized in (3). Position 6 is occupied by the verb stem, which as noted above may be composed of multiple serialized roots. The bolding of positions 6 and 20 reflects their obligatory status within (most) verb words. The labels used here should be understood primarily as heuristics reflecting language-specific distinctions, as the discussion below explores.

(3) *hup-* *yəd* *-cɨ̃́w* *-ɨ̃́y* *=cud* *yæ̃́h*
Preformative[3]- Stem -Inner.Suffix -Boundary.Suffix =Enclitic Particle
(3-5)- (6) -(7-19) -(20) =(21-26) (27-30)
REFL- hide -COMPLETIVE -DYNAMIC[4] =INFER.EVID frustrative
'had already hid himself, apparently, in vain'

3.1.1 Positions 1-2: Nominal arguments

Nominal arguments in Hup are largely independent of the verbal complex, according to the constituency diagnostics discussed below. However, pronominal subjects are particularly likely to occur in pre-verbal position, where they are unstressed, and in one dialect of Hup (Upper Rio Tiquié) they are further phonologically reduced (from *tɨh* to *tV-*, with the vowel quality matching that of the following syllable). Subjects occurring post-verbally are subject to certain restrictions: in declarative clauses, they require the clause-level declarative suffix *-V́h* (which can function as a boundary suffix on clause-final verbs), whereas uninflected post-verbal pronominal subjects are a feature of polar interrogatives (example (3)). Simplex nominal O arguments can also intervene between a valence-adjusting proclitic and the verb, as addressed below. Otherwise, whether a nominal argument or other adjunct precedes or follows the verb appears to depend largely on information structure.

(4) a. *kɨt-d'ák-áy=mah* ***tɨ́h-ɨ́h***
chop-be.against-DYNM=REP 3SG-DECL
'She hit (her machete) against (the fishtrap).'

b. *wæ̌d=yíʔ nɨ́h-ɨ̃́y nɨ́ŋ-ăn tɨ́h ?!*
food=ADV be.like-DYNM 2PL-OBJ 3SG
'Is it just like food for you all?!'

3.1.2 Positions 3-5: Preformatives

Morphological elements that precede the verb stem are relatively few in Hup and are associated with valence-adjusting. These are the preformatives *ʔũh* 'interactional (reciprocal') and *hup* 'reflexive/passive' (with an additional, more limited reciprocal function); and the prefix *hi-* 'factitive', which is relatively unproductive and semantically idiosyncratic, but tends to increase valency.[5] There is also a small set of verb roots that have been semi-grammaticalized within serial verb constructions as causativizers, of which the most productive element is *d'oʔ* 'take'.

Position 3 is identified as a zone, reflecting the fact that the interactional, reflexive, and causative preformatives may co-occur and variably order with one another. The relative ordering of these elements is primarily scope-dependent, as seen in (5–6). Factitive *hi-* almost always forms a tight unit with a single verb root – as can be seen in the fully lexicalized verb *hipãh* 'know' in 6; no semantically relevant form *pãh* exists. However, and unlike the suffixes and other post-stem verbal elements, these preformative + stem combinations can form scopally nested units, as seen in (6). In certain cases, such integrated or semi-lexicalized preformative + root combinations can occur in the midst of a serialized set of verb roots (within position 6), thus representing a minor exception to the template above; this is true of factitive *hi-* in particular (see (1) above).

(5) *hɨd* ***ʔũh-hup****-yə́d-ə́y*
3PL INTRC-REFL-hide-DYNM
'They are hiding from each other.'

(6) *wɔ̌h=n'ăn(...)* ***d'oʔ-[[hup-hipãh]-næn]****-ní-h*
River.Person=PL.OBJ take-REFL-know-come-INFR-DECL
'He brought the River People to be educated.' (lit., he caused them to come and have knowledge)

[5]The term *preformative* is used here as a generic term for grammatical elements that precede a root (i.e. prefixes and/or proclitics).

Another notable feature of the preformatives is that a simplex O argument can intervene between the verb and interactional *ʔũh* or reflexive *hup*, as seen in example (7). This O argument is understood as incorporated, since it cannot be inflected with any nominal morphology (whereas any potential incorporation elsewhere in Hup is obscured by the general preference for OV constituent order). However, the preformative in this context receives stress/tone and as such is more phonologically independent than it is in the immediately pre-verbal position, where it is always unstressed (see §5 below). There is also no indication in my corpus that a preformative followed by a simplex O can itself be preceded by a causative root (cf. example (6)). The separation of slots 3 and 4 for causative roots reflects this apparent co-occurrence constraint.

(7) a. *yãʔambŏʔ=d'əh ʔũh-g'ə́ç-ə́y*
dog=PL INTRC-bite-DYNM
'The dogs are fighting.' (lit. 'biting each other')

b. *hɨd ʔũ̌h nam nɔ́ʔ-ɔ̃́y*
3SG INTRC poison give-DYNM
'They give poison to each other.'

3.1.3 Positions 7-19: Inner suffixes

A Hup verb can include from zero to multiple elements associated with the inner suffix category, which precede the obligatory boundary suffix. As seen in Table 1, these morphemes occupy a wide semantic range, encoding aspect, mood, negation, associated motion (the venitive *-ʔay*), and even one valence-related form (the applicative *-ʔũh*). They are for the most part templatically rather than scopally ordered, and are subject to relatively limited co-occurrence restrictions. The set of forms in slot 16 appear to be an exception, though this requires further testing. Note also that the elements in slot 16 are *fluid* formatives – i.e. they can occur *either* as members of the inner suffix or the enclitic categories, as discussed below (Sections 3.1.5 and 6). The stacking of multiple elements from positions 7-19 can be seen in example (8).

(8) *yúp hɨd g'oʔwow'-tuʔ-y'æt-**yɨʔ-pog-ʔé-w**-ăn-áh*
that 3PL squeeze-dunk-leave-**TEL-EMPH-PFV-FILL**-OBJ-DECL
'(He drank) that which they had squeezed, dunked and left.' (fish-poison vine in his drink)

The distinction between serialized verb roots (position 6) and inner suffixes in Hup is relatively non-discrete, in that there are virtually no definitive phonological or morphosyntactic cues to distinguish an element that occupies the end of a string in position 6 from one at the beginning of a string involving positions 7-19. This blurred distinction reflects the fact that many inner suffixes are quite obviously grammaticalized from verb roots, and these grammaticalization processes both facilitate and are facilitated by the lack of a clear-cut distinction between these two parts of the verb template.[6] This point is further addressed in §6 below.

3.1.4 Position 20: Boundary suffix

Verbs in nearly all predicative contexts in Hup require a boundary suffix. While apparent exceptions to this generalization appear in imperative and apprehensive moods, the bare verb stem in these contexts requires a specific tone assignment on the final syllable which may be analyzed as a boundary suffix. The most frequently encountered boundary suffixes are the principal markers of clause type: declarative *-V́h*, interrogative *-Vʔ*, dependent (subordinate) *-Vp* (and arguably imperative/apprehensive *-Ø* + tone). They, together with the dynamic aspectual suffix *-V́y* (which occurs primarily in declarative clauses, but also in some interrogatives), copy their vowel from the preceding syllable – or lose their vowel altogether when the preceding syllable ends in a vowel (see (6) above) – and are thus phonologically highly dependent on their hosts.[7] Other boundary suffixes mark TAM, various forms of subordination, etc. Boundary suffixes in Hup are lexically specified for stress/tone, and some also condition stress on the preceding verb root, such that every verbal predicate in Hup normally has either one or two syllables bearing primary stress (see §5). In most contexts, only a single member of the set of boundary suffixes can appear on a verb. Exceptions are mostly encounted in the context of the clause-level declarative marker *-V́h*, which can only occur clause-finally but is particularly promiscuous with respect to its possible hosts (as per position 32; see also example (4a) above). Several of the other clause-level boundary suffixes also may attach to clausal constituents other than verbs, and as such have properties that are often associated with clitics rather than affixes. The clausal negative *-nih* and the inchoative *-ay* are excep-

[6]See, for example, the form *cĩp* 'complete' in (1) above, where it appears as a serialized verb root, but which is semantically and formally equivalent to the full form of the completive inner suffix *-cĩp* of position 10 (which also has a phonologically reduced form *-cĩw*).

[7]The dynamic suffix (*-V́y*), like several other suffixes in Hup, has an unspecified vowel slot, which is filled by a copy of the vowel (including its specification as nasal or oral) in the preceding syllable; see §5.

tional in that they can occur as either inner suffixes or boundary suffixes, with certain combinatory limitations.

3.1.5 Positions 21-26 and 27-30: enclitics and particles

The Hup verbal complex includes two robust categories of enclitics, the second of which are referred to as *particles* in light of their greater independence from the verb core. Many of these elements can also associate with nonverbal predicates, and a few can also occur with focused non-predicative constituents of a clause. The enclitics proper are normally encountered immediately after the boundary suffix and are unstressed, while the particles typically come later and receive stress/tone (as in example (3) above). A verbal construction may involve several of these elements. While their order is relatively fixed, it displays a certain sensitivity to scope, such that in certain cases particular scopal arrangements can override the expected templatic order. Such scope-determined variations are most evident when a large number of enclitics/particles co-occur; in (9), for example, the emphatic coordinator *=nih* actually follows the habitual particle *bɨg*.

(9) *yɨ-d'ə̌h-ăn pe̕ʔ-nɨ́h=pog bɨ́g=nih j'ám hə́ʔ*
DEM-PL-OBJ hurt-NEG=EMPH HAB=EMPH.CO DST.CNTR TAG
'So (the insects) have never bothered those guys at all, huh?!'

3.2 Noun structure

Table 2 provides the structure of the noun phrase, focusing on elements that occur with nominal arguments of predicates. Many of the formatives that are understood here as primarily associated with the verb (see Table 1) can in fact associate with nominal (and other) predicates as well (and thus can be understood as transcategorial; see §4.3); these include some aspectual elements (e.g. perfective *-ʔeʔ*) and some evidentials. Nouns may also be associated with (and even phonologically host) still other formatives which are understood to occur at a clausal level; among others, these include the declarative suffix *-V́h* (example (4a) above). These formatives are not included in Table 2.

In contrast to verbs, a noun phrase can consist minimally of a bare noun root. Various modifying elements can precede the noun: demonstratives, possessors, quantifiers, relative clauses, or other nouns, and further elements (classifiers and adjectives) can follow it; see (10). Most of these modifying elements can themselves head noun phrases (i.e. occupy zone 5), but usually require additional morphology to do so – typically either the plural marker *=d'əh* (primarily for

Table 2: Nominal planar structure in Hup

Position	Type	Elements
(1)	Slot	Demonstrative
(2)	Zone	NP{Poss}-nɨh
(3)	Slot	Quantifier, Numeral
(4)	Slot	Relative clause
(5)	Zone	**root (or compounded roots)**
(6)	Zone	Classifier
(7)	Zone	Adjective
(8)	Slot	'Respect' markers =wəd (m), =wa (f)
(9)	Slot	Deceased marker =cud
(10)	Slot	Augmentative =pog, diminutive =mæh
(11)	Slot	Plural =d'əh
(12)	Zone	Case -ăn, -an, -V́t
(13)	Slot	Intensifier =hup
(14)	Slot	Parallel marker =hin
(15)	Zone	Topic/Focus/Contrast/Evidentiality

elements in positions 1-4, preceding the root) or the dummy head *tɨh=* (for elements in positions 6-7, following the root). The stacking of some elements in the positions preceding or following the root (such as demonstratives and relative clauses, as in (11), or multiple adjectives, as in (12)) requires them to take these derivational elements. While the resulting constructions (especially those involving number, as in (11)) could be argued to involve agreement within the NP, they could alternatively be analyzed as involving multiple nominals in a compounding or appositional relationship. The function of classifiers in Hup is primarily derivational, as opposed to agreement-related, and classifiers have been shown to have developed quite transparently from nouns in compound constructions (Epps 2007, 2008a). (Compare, for example, *pɨhɨ́t=tat* [banana=FRUIT] 'banana (fruit)'; *hɔ̃=tat* [burn=FRUIT] 'light bulb'; cf. example (12).

(10) *yúp mɔy pŏg-an mah j'ám*
DEM house big-DIR REP DST.PST
'in that big house, it's said, long ago.'

(11) *cã-d'ə̃h ʔɨd-hipãh-nɨ́h=d'əh ni-bɨ́-h*
other=PL speak-know-NEG=PL be-HAB-DECL
'There are others who don't know how to speak (that language).'

(12) *núp=tat tɨh=pŏg tɨh=păy nɔh-yɨ́ʔ-ɨ́y*
this=fruit 3.SG=big 3SG=bad fall-TEL-DYNM
'This big ugly fruit fell.'[8]

Grammatical formatives associated with nominal arguments include the *respect* and *deceased* markers, the augmentative and diminutive, number, case, and various other elements, many of which relate to topic, focus, and/or contrast. Many of these elements can associate with verbs as well as nouns, but tend to have somewhat non-analogous functions; for example, the augmentative *=pog* has an emphatic function in verbal predicates, and the case markers function as case-specified subordinators on verbs within headless relative clauses. Some functions are arguably still more distinct: e.g. the suffix *-Vp* marks topicality when it occurs on nouns, but on verbs it functions primarily as a marker of subordination (principally in relative and converbal clauses), and *=b'ay* is a topic-switch marker on nouns but indicates repetition of an event in verbal contexts. For some of these morphemes, of course, evidence of a diachronic relationship may not mean that they should be considered the same morpheme synchronically; however, deciding where to draw this line is often non-trivial (see Epps 2008a for discussion).

For nouns, some of the distinctions among the various sub-classes of formatives defined above for verbs do not apply. In particular, there is no inner/boundary suffix distinction, reflecting the fact that there is no obligatory position beyond the nominal root. While the morphemes occurring in positions 8-14 are labelled and segmented here as enclitics and suffixes – on a par with the corresponding categories in verbal contexts, where many of the same forms also occur – for nouns any distinction is entirely phonological (whereas for verbs it is also morphosyntactically relevant; see also §5 below): Enclitics are unstressed CVC morphemes that follow a noun, while suffixes are morphemes lacking an onset consonant (and thus violating the minimal prosodic word requirement of Hup); the latter set includes the case markers (position 12) and a few of the topic/focus markers (position 15), such as *-Vp* 'topic'. All of these -VC nominal suffix forms also occur as boundary suffixes on verbs, though sometimes with quite distinct functions, as noted above. As with verbs, some of these forms copy their vowel

[8]'Fruit' is a *bound* noun; i.e. it must be preceded by another nominal element.

from the preceding syllable (or delete it where the preceding syllable lacks a coda consonant), and they are lexically specified for stress/tone. However, in partial contrast to verbal contexts, the nominal suffixes tend to occur at the end of the entire noun phrase, following any post-nominal modifiers, including various clitics. Thus, any distinction between suffix and clitic for nouns is not particularly meaningful in Hup. The (unstressed) enclitic vs. (stressed) particle distinction is also only marginally relevant for Hup nouns, since most of the elements that may be identified as particles and can follow a noun have clause-level scope.

4 Morphosyntactic constituency

In this section, I explore the application of various constituency diagnostics relating to morphosyntactic domains in Hup, in light of the planar structures introduced above. Each of these tests represents a generalization over the constructions of the language that identifies a subspan in a planar structure. I consider the following diagnostics: free occurrence, non-permutability, ciscategorial selection, subspan repetition, and non-interruptability.

4.1 Free occurrence (v: 6-20, 2-30; n: 5-5, 5-15)

This variable relates to both the minimal and the maximal units that can occur as an independent utterance. For verbs, the minimal free occurrence domain spans positions 6-20, reflecting the obligatory presence of a root and a boundary suffix, as evidenced in utterances like (13) – a very frequent response to any inquiry concerning the presence or existence of a person or thing. For nouns, this domain is represented by a single root (position 5), which may form a complete utterance in contexts such as identifying or presenting someone with an object.

(13) *ní-íy*
v:6-20
be-DYNM
'(X is) present/exists.'

The maximal free occurrence domain spans the largest number of positions that can occur together as a single free unit (with the caveat that *single* here is necessarily defined according to other constituency diagnostics). For Hup verbs, this covers positions 2-30, and includes preformatives, roots, inner suffixes, the boundary suffix, enclitics, and particles, according to the language-specific categories defined above. While examples indicating the full span (2-30) within a single construction have not been identified, example (14) illustrates a span covering positions 6-30.

(14)

tɨ́h-ɨp	*húp*	*ham-yíʔ-ay*	*=mah*	*kăh*
v:--	-	6-7-20	=26	30
3sg-dep	person	go-tel-inch	=rep	advr

‘But as for him, the man, (he) got away.’

For nouns, the minimal domain is simply 5-5, as in *hup* ‘(it’s a) person’. The maximal nominal domain spans positions 5 (root) through 15 (a zone relating to topic, focus, and contrast). Example (15) shows a relatively complex noun with elements filling multiple positions, while 16 illustrates a full span from positions 5-15. In both of these examples, the possessor plus inalienably possessed noun can be understood as a compound construction (occupying position 5), whereas an alienable possessor (with possessive morphology) is more separable from the root and appears in position 2.

(15)

ʔɨn	*=pã́ç*	*=wəd*	*=cud*	*peʔ-ní-h*
n:5	=5	=8	=9	-
1pl	=father’s.brother	=resp	=dcsd	sick-infr-decl

‘Our late uncle was sick.’

(16)

yɨ́-nɨ́h-mɨ̌ʔ	*j’ám*	*ʔɨ́n*	*=b’ay,*	*ʔɨn*	*=tæ̃́h*	*=n’ăn*[9]	*=hin*
n:---	-	-	-	5	=5	=11+12	=14
that.itg-be.like-sim	dst.cntr	1pl	=again	1pl	=offspring	=pl.obj=	also

=b’ay,	*“nɨŋ*	*b’oy-ʔáy*	*hám!”*	*nɔ-nɨh*	*ʔɨn*	*ni-bɨ-hə́ʔ*
=15	-	-	-	-		
=again	2pl	study-ven	go.imp	say-neg	1pl	be-hab-tag

‘Even so, we don’t tell our kids “go to school!”’

4.2 Non-permutability (v: 2-10, 7-10; n: 8-11, 1-15)

The non-permutability diagnostic makes reference to spans where elements must occur in a fixed order. This order may be either templatically defined or determined by scope.

In Hup verbs, scopally defined non-permutability holds across positions 2-10, according to the properties of these elements as set out in §3.1 above. Rigid (non-scopally defined) non-permutability, on the other hand, applies only across a set

[9]The element *n’ăn* is a fused morpheme composed of plural *d’əh* + object *-ăn*.

of the inner suffixes following the verb base, from positions 7-10. The verb base itself is excluded because serialized root combinations may be nested and may include preformatives, as in example (17); see also (1) above. Accordingly, there seems to be no rigid (templatic) non-permutability in the span that overlaps the verb core (position 6).

(17) *mə̆h tɨh yæ̃ʔ-wæd-**[hi-wág]**-áh*
v:- - 6-6-5-6-20
tinamou 3sg roast-eat-fact-day-decl
'He cooked and ate tinamou birds until daybreak.'

After slot 10, we find formatives that can occur in variable order by appearing either as inner suffixes or as enclitics (see §4.5 below), such as emphasis *pog* (positions 11 and 25; compare examples (18) and (19)) and evidentials (positions 16 and 23).

(18) *yúp baʔtɨ̆b' g'ə̃h-**pog**-ʔé-ew-ăn hɨd wæd-yiʔ kəd-hám-ə̃́y=mah*
v:- - 6-11-13-19-20 - -- ----
that spirit be_2-emph-pfv-flr-obj 3pl eat-tel pass-go-dynm=rep
'Then that spirit that she really had become, they ate (her) up.'

(19) *yɨ-d'ə̆h-ăn peʔ-nɨ́h=**pog** bɨ́g=nih j'ám hə́ʔ*
v:--- 6-14=25 27=30 30 -
dem-pl-obj hurt-neg=emph hab=emph.co dst.cntr tag
'And (the insects) have never bothered those guys at all, huh?!'

Rigid non-permutability also appears to hold further out in the verbal planar structure (likewise in spans that do not include the core). These spans are 18-20 (inferred evidential *-ni*, filler suffix *-Vw*, and boundary suffix; see example (20)); and probably also the span represented by positions 29 -30.

(20) *pɨ̆ŋ deh=nə́ pótʔah... wəhə́d=d'əh*
v: - -- --
tree.grape water=mouth above old.man=pl
*j'ɔm-b'eh-ʔeʔ-**ní-p***
6-6-13-18-30
swim-cross.water-pfv-infr-dep
'Above the mouth of Cucura Igarapé... the Ancestors swam across.'

For nouns, rigid permutability arguably holds across positions 8-11, although this observation bears further testing as some of these formatives rarely if ever co-occur. The domain of scopal permutability holds across the entire set of positions represented in Table 2.

4.3 Ciscategorial selection (v: 3-10, 2-18; n: 5-6, 1-13/14)

As discussed above (see §3.2 in particular), the distinction between nominal and verbal constructions in Hup is not very clear-cut. Nouns and verbs can take many of the same morphological elements, although assessing "sameness" is often complicated by the fact that some elements have developed different functions (and sometimes only subtly so) in these distinct contexts, despite being formally identical and (often) obviously historically related. In addition, nominal predicates can associate with still other formatives that otherwise are found primarily with verbs, as well as clause-level elements (such as the declarative marker *-V́h*, which also occurs as a boundary suffix on clause-final verbs); in some cases, these phenomena can be attributed historically to the extension of morphology to nominal predicates following its emergence through grammaticalization in verbal contexts. A further diachronic observation involves the reanalysis of some nominal constructions as verbal, which explains why they still retain certain features associated with noun phrases – e.g. an instrument nominalization ('thing for doing V') is the probable source of a purpose adverbial and thence a future construction, with idiosyncratic constraints on co-occurring verbal morphology, particularly negation (Epps 2008b). Finally, a subset of nouns relating to periods of time or human lives (e.g. 'day', 'night', 'child', 'old man') behave effectively as though they are intermediate between nouns and verbs; for example, *wăg* 'day' can head noun phrases without derivation (e.g. *kaʔap wăg* 'two days'), but can also head some verbal predicates and take morphology that otherwise does not occur with nouns, e.g. *wag-yiʔ-cɨ́w-ɨ́y* (day-TEL-COMPL-DYNM) '(it is) already / has become day' (see also example (17) above).

Despite these complications, we can make a distinction between ciscategorial and transcategorial elements, here counting those morphemes that have a highly divergent function in nominal vs. verbal contexts as ciscategorial. For verbs, the minimal span (overlapping the verb base) – i.e. which contains positions that can only have verb-ciscategorial elements – spans positions 3-10 in the planar structure. Position 2 is excluded in light of the fact that pronominal elements can also occur with nouns as inalienable possessors, while position 11 is excluded because the emphatic form *pog* can appear with nouns (example (21)) as well as with verbs (see (18–19) above), with little or no difference in meaning. A maximal span extends between positions 2 and 18 (i.e., all morphemes in the positions outside of this span are transcategorial), since the inferred evidential *-ni* (position 18) can only occur with verbs (see (20) above for an example), whereas some of the intervening elements (e.g. distributive *pɨd*, evidential *mah*) can occur with nominal arguments as well as nominal predicates.

(21) *húp=**pog*** *ʔʉ̃́h* *tɨh=ʔĩh !*
person=EMPH EPIST 3SG=M
'Could that be a person?!'

For nouns, the minimal span of clearly noun-ciscategorial elements is limited to positions 5-6 (root and classifier), with the understanding that when classifiers attach to verb roots they necessarily derive a nominal construction. In limited cases, relative clause constructions (position 4) can occur as main clauses (through an insubordination process), and most adjectives (position 7) can also function as adverbs. The maximal span covers positions 1 (demonstratives) to either 13 ('intensifier' *=hup*) or 14 ('parallel' marker *=hin* ['also']), given that *=hin* can associate with adverbial elements, though not with verbs. Several of the intermediate elements – most notably the oblique case marker *-V́t* and the plural marker *=d'əh* can occur with verbs to form certain types of adverbial clauses.

4.4 Subspan repetition (V: <6>, 1-32; n: 1-15, 1-15)

This diagnostic relates to "a well-defined contiguous subspan of positions that occurs more than once for a given construction" (Tallman 2021: 337), as indicated by elision in contexts of subordination or coordination, and by evidence of scope over a repeated series of subspans. For Hup verbs, subspan repetition applies at several levels.

Verb serialization and clausal subordination/coordination constructions offer domains in which to consider subspan repetition in the verb. Serialization in Hup involves the combination of verb roots within position 6. The sequence of serialized verb roots is included within a single tone/stress domain (see §5.5 below), and as a unit takes a single boundary suffix. The boundary suffix and any inner suffixes or enclitics/particles that follow position 6 scope over the entire serialized unit, as can be seen in the case of negation in (22). This scopal behavior distinguishes a serial verb construction from subordinated or coordinated clauses, in which the verbs are inflected independently, with affixes scoping only over their host root(s) (example (23)).

(22) *nu-cóʔ hɨ́d-ăn tɨh [ye-yæ̃h]-**nɨ́h***
-- -- - 6-16-20
this-LOC 3PL-OBJ 3SG enter-request-NEG
'He forbids them to come in here.'

(23) *tɨnɨ̌h ʔɨ́d [wɨʔ-nɨ́h] [g'et-g'oʔ-tú-ay=d'əh=nih]*
- - 6-20 6-6-6-17-20-22
3SG.POSS speech hear-NEG stand-go.about-want-INCH=PL=EMPH.CO
'And we'd go about without understanding her language.'

For serial verbs, *post*posed affixes scope over the entirety of position 6, as example (22) shows; however, *pre*-posed affixes (preformatives, specifically those relating to positions 3 and 5) scope instead over individual serialized verb roots. This can be seen in 24, where the reflexive preformative *hup-* scopes over *hi-cuʔ* 'cover', which itself is composed of the factitive prefix *hi-* and the verb *cuʔ* 'grab' (see also example (17) above). In light of this scopal behavior of preformatives, then, the minimal domain of subspan repetition for the Hup verb is best understood as the single root, which itself can be a component *within* position 6 (here represented as <6>).

(24) ***[hup-[hi**-cuʔ]]-ham-túʔ-ay-áh*
3-5-6-6-6-17-20
REFL-FACT-cover-go-immerse-INCH-DECL
'(The crab) went and covered himself up in the water (to hide).'

One other context that may relate marginally to subspan repetition involves clauses linked via the etyma *-yóʔ* 'simultaneous' or *-mɨʔ* 'sequential' (both of which are boundary suffixes). The 'simultaneous' construction normally involves the same subject across the two clauses, which is usually (though not obligatorily) elided, as in (25); the 'sequential' construction almost always involves different subjects (26). However, this same/different subject pattern allows exceptions; moreover, as far as elision is concerned, arguments in general may be freely elided when understood from the discourse. The same is generally true for evidentials and other elements in positions 21–30, following the boundary suffix, which may also be dropped when already activated within the discourse context. Thus these processes of elision are common in contexts of clause combination, but are not exclusive to them.

(25) *"hǝ̆ʔ", nɔ-yóʔ, tɨ́h-ǎn tɨh yók-ay-áh*
- 6-20 -- 1 6-17-20
OK say-SEQ SG-OBJ 3SG poke-INCH-DECL
'Having said "all right", he poked him.'

(26) *j'ɔ́m-ɔ̃p tɨh kǝd-d'ŏb-mɨ̌ʔ=mah, d'ŭç hɨd*
-- 1 6-6-20-26 - 1
bathe-DEP 3SG pass-go.to.river-SIM=REP timbó 3PL
tǝtǝd-d'óʔ-óy=mah
6-6-20-26
beat.timbó-take-DYNM=REP
'While she (their mother) went down to bathe, they beat the timbó (to release the poison), it's said.'

For verbs, a maximal subspan repetition domain – i.e. the largest set of positions that clause combination may target – is represented by the entire planar structure. The same is true for nouns, in which there appears to be no substantive difference between the minimal and maximal subspan domains.

4.5 Non-interruptability (v: 3-10, 2-30; n: 5-15)

The diagnostic of non-interruptability is particularly interesting for verbs in Hup, especially in light of the key role attributed to this diagnostic in prior work in morphological theory (Booij 2009, Bauer 2017: 17). Non-interruptability also relates to a related consideration, extended exponence – i.e. the deviation from biuniqueness that is often associated with morphological relations. For nouns, there seems to be little to say regarding this diagnostic, which identifies a span between positions 5 and 15. For verbs, we can identify the span between the preformatives in position 3 and the modal elements in position 30 as a domain in which a complex free form (e.g. a multi-word noun phrase) cannot intervene. However, the non-interruptability test for verbs otherwise breaks down for a number of positions and etyma.

One exception to non-interruptability relates to the valence-related preformatives in position 3 (interactional *ʔũh* and reflexive *hup*). As discussed above (§3.1.2 and example (7)), a simplex O argument can intervene between the preformative and the rest of the verb. While this O argument may be best understood as incorporated, insertion of a nominal argument within this verbal span is otherwise not attested (with the marginal exception of the 'verby' nouns mentioned in §4.3 above, which can occur as serialized roots within position 6). Moreover, the insertion of the O argument in these constructions has additional phonological outcomes that also challenge our understanding of this span as a single word, namely the assignment of independent stress/tone to the interrupted preformative (see §5 below).

The non-interruptability test is also challenged by the set of *fluid formatives* – morphemes that may appear in more than one place within the verbal construction, as introduced in §3.1.3 above (a distinct property from that of transcategoriality). This set consists of emphasis, habitual, distributive, repetitive, and frustrative markers, and evidentials, and these etyma can occur variably as either inner suffixes, preceding the boundary suffix (positions 11, 15, and 16), or as enclitics, occurring later in the verb (positions 23 -18). Because these etyma can occur at more than one point in the verbal construction, they make the interruptibility tests ambiguous.

As shown for repetitive *b'ay* and frustrative *yæ̃h* in (27–29), these relatively bonded but positionally variable interrupting elements cut up the verb complex into distinct layers. As these examples also illustrate, the position of the fluid formative is sensitive to the type of boundary suffix present – the fluid etymon necessarily occurs in the inner suffix position when the boundary suffix is the (obligatorily) clause-final declarative form *-V́h* ((27a) and (28a)), but as an enclitic/particle in the context of other boundary suffixes ((27b) and (28b)). This situation may be compared to what happens with non-fluid formatives: For an etymon (e.g. venitive/associated motion *-ʔáy* 'go, do X, and return') that is always an inner suffix, it occurs in this position regardless of the type of boundary suffix that is taken by the verb. For one that is always an enclitic/particle (e.g. the distant past contrast marker *j'ám* in example (29)), it necessarily follows the boundary suffix (which cannot be declarative *-V́h* but can itself host the declarative marker).[10]

(27) a. *yúp=mah tɨh hí-**b'ay**-áh*
v:-- - 6-16-20
that=REP 3SG descend-again-DECL
'Then he came down again.' (inside verb core; inner suffix status)

b. *yúp=ʔǽ̃y-ăn ʔãh b'uy-d'əh-yíʔ-ɨp=**b'ay***
v:--- - 6-6-7-20-24
DEM=woman-OBJ 1SG throw-send-TEL-DEP=again
'I got rid of that woman, too.' (outside verb core; enclitic status)

[10] Evidence from both comparative and internal reconstruction indicates that these fluid morphemes began as verb roots in serial constructions, and developed their less bonded enclitic/particle instantiations subsequently (see §6 below and Epps 2008a for discussion).

(28) a. *núw-ăn ʔãh tuk-**yæ̌́h**-æ̌́h*
v:-- - 6-16-20
this-OBJ 1SG want-FRUST-DECL
'I'd like this one (but I don't expect to get it).' (inside verb core; inner suffix status)

b. *núw-ăn ʔãh túk-úy* ***yæ̌́h***
v:-- - 6-20 28
this-OBJ 1SG want-DYNM FRUST
'I'd like this one (but I don't expect to get it).' (outside verb core; particle status)

(29) *nutæ̌n-æ̌́y=d'əh-ə́h, nɨh-nɨ́h-ay* ***j'ám**-ə̌́h, nutæ̌n-æ̌́h*
v:---- 6-14-20 29-32 --
today-DYNM=PL-DECL be.like-NEG-INCH DST.CNTR-DECL today-DECL
'People of today, they don't do like this anymore, these days.'

While flexible assignment and interruptability are features that are generally considered less typical of bonded morphology, the fluid etyma actually exhibit a greater deviation from biuniqueness than is typical of most formatives in Hup, and in this sense appear more *morphological*. This deviation is evident in that one meaning-form combination is associated with multiple slots in the template; moreover, for several of these elements, the -CVC inner suffix + *-V́h* boundary suffix has an optional and/or contextually determined -CV-h variant (as in 30c; compare 30a-b). This process of phonological reduction corresponds quite closely to degree of grammaticalization, and is encountered more generally in Hup among other CV(C) root +VC suffix combinations (see §5 below).

(30) a. *ʔãh hám-ə̌́y* ***bɨ́g***
1SG go-DYNM HAB
'I go regularly.'

b. *ʔãh ham-**bɨ́g**-ɨ́h*
1SG go-HAB-DECL
'I went regularly.' (more emphatic)

c. *ʔãh ham-**bɨ́**-h*
1SG go-HAB-DECL
'I went regularly.' (more neutral)

5 Phonological constituency

Criteria associated with the prosodic word in Hup are notably non-convergent (cf. Schiering et al. 2010). As observed above, different phonological criteria are associated with different morphological units in Hup, several of which are reasonable candidates for an orthographic word. These criteria are associated with a concentric series of domains, ranging from one to multiple morphemes. This section begins with a general overview of the principal domains, and then focuses one by one on a set of particular phonological diagnostics as they apply across these domains for nouns and verbs: segmental constraints, vowel copying, final consonant deletion, and stress/tone locus.

5.1 Overview: Concentric phonological domains

Concentric domains involve particular quantitative and qualitative relationships among morphemes, syllables, segments, and stress/tone loci. These domains consist of at least five levels:

a) The canonical (and minimal, as noted below) monomorphemic prosodic word is a single CVC syllable with one stress/tone locus; e.g. *mɔ̌y* ‘house’.

b) Monomorphemic words with two syllables are much less frequent and normally take the form CV_1CV_1C (or, more rarely, $CV_1CV_1V_1$); e.g. *mɔhɔ̌y* ‘deer’. In the vast majority of such forms, the intermediate consonant is restricted to a glottal or glide, and the vowels are identical; i.e. the segmental melody tier permits just a single vowel that multiply associates when there is more than one V slot in the skeleton. Again, there is only one stress/tone locus, which occurs almost without exception on the second syllable.

c) Reduplicative words, which are morphologically complex but only marginally so, occupy the next level. These consist of a $C_1V_1[C]C_1V_1C$ structure, as in *bəbə̌g* [bəʔˈbə̌gᵑ] ‘cubiu fruit’. In these forms, the vowel is necessarily identical between the two syllables (as in monomorphemic bisyllabic words), while the primary intermediate consonant is identical to the onset but otherwise effectively unconstrained, and an underspecified C slot forms the coda of the second syllable. Words of this kind also have a single stress/tone locus on the second syllable.

d) The next level involves units composed of two distinct morphemes, of which the second is a vowel-initial suffix. Those suffixes that copy their vowel from the preceding syllable represent a particularly close approximation of the canonical word form (as evident in levels a-c discussed above), while other -VC suffixes are specified for a particular vowel quality. The coda consonant of the root copies to the onset of the second syllable: $CV_1(C_1)[C_1]V_{1/2}C$, e.g. *wǽd-V́y* [wǽd^n-ˈdǽy] 'eating'. CV roots with -VC suffixes simply appear as CVVC. Bimorphemic combinations of this type can have either one or two stress/tone loci, which are lexically conditioned by the suffix and may fall on either or both syllables (see above).

e) For units with two or more morphemes composed of syllables with onsets (which normally also have codas), there are no particular constraints on the quality of either the consonants or the vowels involved: $CV_1(C_1)C_2V_2(V/C)$, e.g. *wæd-tég* [wæd^n-ˈtég^ŋ] (eat-FUT) 'will eat', *bɨʔ-wæd-tég* [bɨʔ-wæd^n-ˈtég^ŋ] (work-eat-FUT) 'will prepare food'. Such multimorphic strings may include one to two vowel-initial suffixes; in certain contexts involving grammaticalization, combinations of CVC + VC formatives are reduced to CV + C, resulting in a new form of the canonical CVC structure. The complex combinations described here can be identified as prosodic units on the basis of stress/tone – like the strings in (d), they have maximally one to two primary stress/tone loci, which normally occur on the boundary suffix and/or on the syllable that precedes it (with one or two exceptional patterns, which are also lexically determined by the boundary suffix).

5.2 Segmental constraints: Consonant and vowel quality

As observed above, the minimal free form in Hup is a syllable with an onset and two morae, of which all possible targets for nasality must be either uniformly nasal or oral. The canonical morpheme is CVC, but a few etyma are CV and as free forms surface as CVV, with prosodically motivated vowel lengthening. For bisyllabic and reduplicated morphemes, constraints limit the quality of the intermediate consonant(s) and require identical vowels, although a few exceptions exist. With respect to the planar structures, the minimal and maximal domains of these basic segmental constraints applies to a single, simplex root, occupying position 6 in the verb structure and position 5 of the noun structure.

5.3 Vowel copying (v: 6-20, 2-32; n: 5-5, 5-12)

A parameter related to the constraints on vowel quality is seen in the morphophonological process of vowel copying, which occurs across morpheme boundaries. Out of all Hup morphemes, only a few bonded formatives lack onsets (-VC), and a subset of these copy their vowel from the preceding syllable (as in the dynamic suffix in example 30). Hup's -VC formatives are exclusively boundary suffixes (including declarative *-V́h*), with the exception of the "filler" syllable *-Vw* and the suffix *-ay* 'inchoative' – and these two are non-canonical as inner suffixes in that *-Vw* is a semantically empty element that must directly precede a boundary suffix, and *-ay* may also occur as a boundary suffix. Vowel copying is marginally licensed in only one other context, that of the procliticized third person pronoun, which occupies position 2 in the verbal structure (but is limited mainly to one dialect of Hup).

In the noun phrase, as discussed above, phonologically bonded -VC suffixes (such as case markers) normally occur toward the end of the noun phrase, and may therefore be hosted by adjectives and other elements following the nominal root, and can also occur with nouns as an inalienable possessor or 'dummy' head for an obligatorily bound noun (see §3.2). In a few lexical items – principally the words for 'man' and 'woman' – the 'dummy' third person pronoun has undergone vowel harmony, but this is specific to these contexts and has to do with lexicalization processes. Example (31) shows lexicalized vowel copying in these words, plus the obligatory copying in the 'oblique' *-V́t* suffix.

(31) tiyĭʔ nawyɨ́ʔɨ́y tã̌ʔã́yã́t
tɨh-yĭʔ naw-yɨ́ʔ-V́y tɨh-ʔã́y-V́t
3SG-man good-TEL-DYNM 3SG-woman-OBL
'The man got well / became fully good in the company of the woman.'

Because vowel copying can apply clause-finally when declarative *-V́h* is present, its maximal domain in the verbal construction applies from positions 2-32; that is, outside of this maximal domain no morpheme is known to undergo vowel copying. Its minimal domain spans positions 6-20; within this domain, all morphemes that satisfy the structural requirement undergo vowel copying (in practice, it is the morphemes in positions 19 and 20 that copy the vowel of whatever morpheme in position 6-18 that directly precedes them). For nouns, vowel copying may apply maximally to positions 5-12, and minimally within position 5.

5.4 Final consonant deletion (6-20)

In Hup verbs, most inner suffixes are of the form CVC. However, a subset of these undergo coda deletion when followed by a vowel-initial boundary suffix; in this context, the boundary suffix itself loses its vowel, resulting in a -CV-C form that approximates the canonical monomorphemic form in Hup, and may reflect a maximality requirement that prefers that a stem be monosyllabic.

This phonological reduction reflects a grammaticalization process: In many cases, inner suffixes display both more and less grammaticalized variants, with only the former exhibiting coda deletion. For example, the inner suffix *-teg* encodes both purpose (the historically older function) and future tense (the more recently grammaticalized function, see Epps 2008b); this suffix is almost always realized as *-te* in the context of a vowel-initial boundary suffix when it encodes future, but as *-teg* when encoding purpose (examples (32)-(33)). However, in slow, careful and/or emphatic speech, the future suffix may also be realized with the coda consonant, while the purpose reading is occasionally found without the coda consonant in fast, casual speech. The final consonant deletion process is only relevant for Hup verbs, and spans positions 6-20.

(32) *hɨd ʔũ̌h kəwəg wɔ̃t-**té**-ay-áh*
3PL INTRC eye pull.out-FUT-INCH-DECL
\- \- \- 6-15-17-20
'One is going to pull out the other's eyes.'

(33) *núp=yɨʔ ʔɨn ni-nʼɨ̌h-**tég**-éh*
this=ADV 1PL be-NMLZ-PURP-DECL
– \- 6-20-15-20
'This is where/how we are supposed to live.'

5.5 Stress/tone loci (v: 2-26, 3-26; n: 5-15)

In verbs, as noted above, multimorphemic strings maximally take between one and two primary stress/tone loci. These normally occur on the boundary suffix and/or on the preceding syllable, as seen in example (33) and many others above. (There are two exceptions to this generalization: the "filler" suffix *-Vw* and the 'inchoative' suffix *-ay*, which never receive stress/tone, as in 32 above; note that these suffixes are also exceptional in other respects; see 5.3.) The domain of stess/tone loci normally spans positions 2 through 26; elements following position 26 are phonologically more independent in that they receive independent stress/tone (thus the label 'particle' to distinguish them); example (34) and many others above illustrate. However, a simplex O argument that intervenes between the valence-adjusting preformatives (interactional and reflexive/passive) in position 3 is unstressed, while the preformative in this context receives independent stress/tone (see (7b) above). Thus the minimal stress/tone domain is assessed as spanning positions 3-26, the maximal as 2-26.

(34) *ye-tǽ̃ʔ-ǽ̃y* *yǽ̃h*
6-12-29 28
enter-CNTR.FACT-DYNM FRUST
'(It) almost went in!'

For nouns, the principal stress/tone domain spans positions 5-15, but the identity of elements as roots, adjectives, classifiers, or particular suffixes determines which syllables will attract stress. As with verbs, stress in the nominal construction is normally culminative, but certain suffixes are lexically marked to receive an additional stress.

In considering how phonological units relate to the morphosyntax, we can observe that the stress pattern in verbs is sensitive to the obligatory inflectional position (the boundary suffix). In nouns, stress makes reference to the noun phrase, such that combinations of demonstrative-noun, noun-adjective, etc. receive one primary stress, just as they behave as a unit for the purposes of case marking and other morphological processes. Different diagnostics (particularly relating to the minimal free form vs. stress/tone loci) thus yield conflicting results in defining the word in Hup, a point I return to in §7 below.

6 Diachrony

As the constituency tests in §4–5 indicate, there are relatively few domains in which different diagnostics converge in Hup, raising challenges for a clear definition of the word in this language. However, as this section briefly explores, some insights into why these mismatches exist can be gleaned from evidence of the historical processes that have shaped Hup's morphological structure. As van der Tuuk (1971 [1864]: xliii) put it, "every language is more or less a ruin" – and as such, it is not clear why we should expect a heterogeneous set of diachronic process to necessarily converge on a consistent set of outcomes (see e.g. Nichols 2008: 287-288, Cristofaro 2019, and Schmidtke-Bode & Grossman 2019 for further discussion of this question).

The failure of the non-interruptability test as a robust constituency diagnostic in Hup is one area in which diachrony can shed some light. As explored in Epps (2008a, 2010), both of the valence-related preformatives are relatively transparently grammaticalized from nouns; 'sibling' for interactional *ʔũh*, and 'person' for reflexive/passive *hup*. Their development into verbal preformatives would have involved an incorporation process, possibly via a simple reanalysis of a preverbal O argument (already the canonical order in Hup for independent clausal arguments) as part of the verb. Since the incorporated O that intervenes between the preformative and the verb root would have undergone effectively the same set of processes, we can suppose that the {preformative + O + verb} structure is retained from an earlier stage in which the erstwhile nominal arguments were indeed independent from the verb.

Diachrony may also help us to understand the status of the 'fluid' formatives, another area in which the non-interruptability diagnostic breaks down. As noted above, serialized verb roots in Hup are a productive historical source of new inner suffixes, through processes of grammaticalization (see Epps & Ananthanarayan 2022 for further discussion). Many of the 'fluid' etyma can be traced to verb roots; e.g. *yæ̃̆h* (frustrative) is also a verb meaning 'order, send'; *b'ay* (repeated event) as a verb means 'return'; *hɔ̃h* (nonvisual evidential) as a verb means 'produce noise/sound'; etc. The inner suffix position in the Hup verbal template may be seen as both an outcome of and a catalyst for this grammaticalization trajectory, in light of the formal ambiguity between serialized verb roots and inner suffixes in Hup. For the etyma in the 'fluid' category, however, a widening of scope from the verb to the predicate and even the clause would have facilitated the extension of these elements to non-verbal predicates – particularly nominal predicates, where the lack of any significant distinction between inner suffixes, boundary suffixes, and enclitics would have led to a reanalysis of the new morpheme as equivalent to the enclitics that appear on verbal predicates (33). This in turn arguably facilitated the *re*-extension of this etymon back to verbal predicates as an enclitic, a position that is consistent with its new scope. Similar examples of scope-driven reorganization of morphemes can be seen in other languages (see e.g. Mithun 2000); however, in Hup both options remained, with the retention of the earlier arrangement motivated by the ambiguous identity of the *-V́h* suffix as both a verbal boundary suffix and as an obligatorily clause-final element. Thus, while synchronically the two instantiations of the 'fluid' formatives may be identified as the same morpheme (i.e. as allomorphs) in light of their formal and semantic resemblance, diachronically they represent two distinct stages of grammaticalization.

(35) *pæ̆j=**hɔ̃***
umari=NONVIS
'It's umari fruit.' (identifying a smashed mess by the smell)

A comparative approach provides further insights into the historical developments that gave rise to Hup's morphological structure. If we compare Hup to its sister-language Dâw, we find a similar structure, but with several key differences. As example (34) illustrates,[11] the Dâw verb resembles the Hup verb in that it involves multiple serialized roots, followed by grammatical formatives having scope over the preceding elements. Also like Hup, the canonical morpheme (and minimal prosodic word) structure in Dâw is CVC while a small set of suffixes are -VC (e.g. negation). However, in Dâw each element in the complex verbal construction is phonologically independent, in that it receives its own stress and/or tone value, whereas in Hup the entire complex is within a single stress/tone domain. Furthermore, there is no equivalent to Hup's boundary suffix in Dâw; accordingly, any verb root can stand alone as a minimal free form, and the formatives that follow the root are not demarcated into ordered categories with particular phonological or morphosyntactic behaviors (cf. the inner suffixes, boundary suffix, and enclitics/particles in Hup). The Dâw constructions in (34) can be compared to their (constructed) Hup counterparts in (35) (in which the boundary suffixes correspond to position 20).

(36) Dâw

ʔabɨg	*tɨm*	*pôj*	***ʃĕt***	***dŏʔ***	***wɨ̂d***,	*ʔabɨg*	*tih*	***ʃĕt***	***jũt-ẽh***
thus	eye	big	carry	take	FRUST	thus	3SG	carry	PFV-NEG

'So Big-Eyes tried to carry his basket, but he did not (succeed in) carrying it.'

(37) Hup

cet-d'oʔ-yə̃́h-ə̃́h	… *cet-ham-nɨ́h*
6-6-16-20	6-6-20
carry-take-FRUST-DECL	carry-go-NEG
'carr(ied), in vain.'	'did not go carrying it.'

As this comparison illustrates, the verb structures in both Hup and Dâw might be described as relatively isolating or as morphologically complex, depending on which constituency diagnostics are prioritized, and furthermore on whether the domains relating to particular diagnostics are understood as word-level or rather phrase-level. If we consider the diagnostics of culminative/obligatory stress/tone and minimal free occurrence, these identify a larger, multimorphemic constituent

[11] The Dâw examples are transcribed in IPA. Syllables may take rising (v̌) or falling (v̂) tone, or no tone. Nasalization in Dâw is a segmental feature, not morpheme-level as in Hup. The Dâw data come from original work with speakers in Waruá community (2013, 2017); see Epps et al. (2013+). See also Martins (2004) for a description of Dâw.

in Hup but a single-morpheme constituent in Dâw. On the other hand, if we consider the diagnostics of non-interruptability by a complex free form and scopal relations, these identify a multimorphemic constituent in both languages.

At an earlier stage of Hup's development, it is likely that its morphological structure closely resembled that of contemporary Dâw. It is also probable that contact with Tukanoan languages was a key factor in directing the particular changes that led to Hup's current profile. Tukanoan-driven restructuring of Hup grammar has been wide-ranging (see e.g. Epps 2007, 2008a,c, *inter alia*), and the order and identity of elements within contemporary Hup phrase and clause structure closely mirror those seen in Tukanoan languages. The structure of the Kotiria (Wanano) finite verb provides an instructive example (Stenzel 2013: 244-245). As the template in Figure 3 illustrates, a Kotiria verb consists of a primary root (position 1), optionally followed by a series of noninitial roots (2-4), to make up the 'lexical stem' of the verb. This unit may itself be followed by nonroot stem morphemes (5-6), which together with positions 1-4 make up the full verbal stem. This unit is obligatorily inflected by one of a set of markers associated with clause modality (evidential, directive, irrealis, and interrogative). The entire verbal complex forms a single phonological unit in relation to tonal spread. The parallels with the Hup verbal structure are obvious: a Kotiria root must minimally be inflected by a suffix relating to clause modality, like the boundary suffix in Hup; elements that intervene between the initial root and this suffix include verb roots and nonroot morphemes, with a blurred distinction between these, like the serialized verb roots and inner suffixes of Hup; and finally, the entire unit in both Kotiria and Hup represents a phonological unit as defined by tone and/or stress.

In sum, the diachronic pathway to relative polysynthesis in Hup has involved several components. These include the development of a culminative/obligatory stress domain that overlaps with that defined by the minimal free form (root + boundary suffix), and the development of the boundary suffix as an obligatory verbal element, leading to a minimal free form in verbs that spans more than one morpheme. On the other hand, the fact that constituency in the nominal domain has developed differently (in particular, with no correlate to a boundary suffix), and the propensity of Hup morphology to associate with both verbal and nonverbal predicates (and even arguments), have facilitated a relatively low degree of ciscategoriality and various violations of non-interruptability.

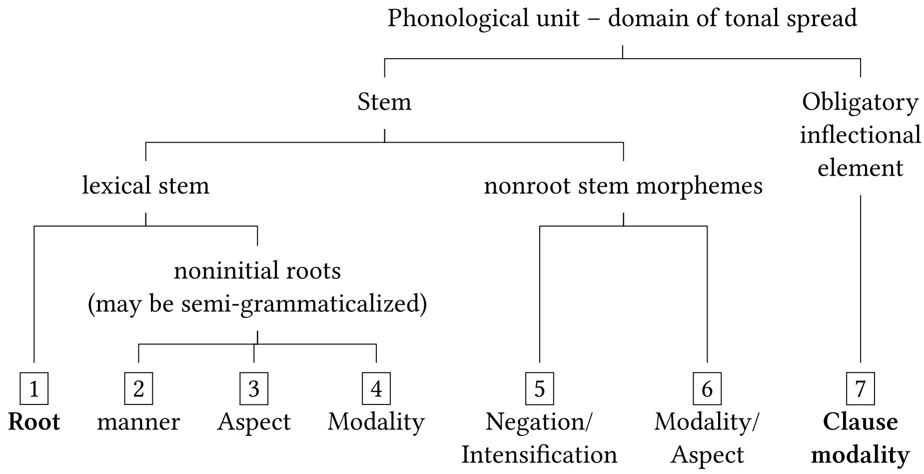

Figure 3: Kotiria finite verb structure (adapted from Stenzel 2013: 245)

7 Conclusion

As this investigation of Hup morphological structure has explored, different diagnostics of constituency applied to the Hup verb are highly nonconvergent. Figure 4 illustrates this relative lack of isomorphism in the test results. A feature of particular typological and theoretical relevance concerning Hup constituency is the fact that the criterion of non-interruptability does not apply straightforwardly in the Hup verb – a challenge for perspectives on wordhood that prioritize non-interruptability as a cross-linguistically relevant diagnostic.

Nonetheless, the span between positions 6 (the verb root or base) and 20 (the boundary suffix) is meaningful in Hup, in that it delimits a morphosyntactic unit of minimal free occurrence, and a phonological unit relating to the minimal domain of stress (tone), as well as to the minimal domain of vowel copying and to final consonant deletion. As observed in §6 above, the properties that define this span probably emerged following Hup's divergence from its two more distant sister-languages (Nadëb and Dâw), propelled by contact with Tukanoan languages.

In comparison to the verb, the constituency diagnostics relevant to the Hup noun are more convergent (Figure 5). In particular, the span between positions 5 (the noun root) and 15 (elements relating to information structure and evidentiality) emerges as meaningful, representing the maximal unity of free occurrence, non-interruptability, and stress.

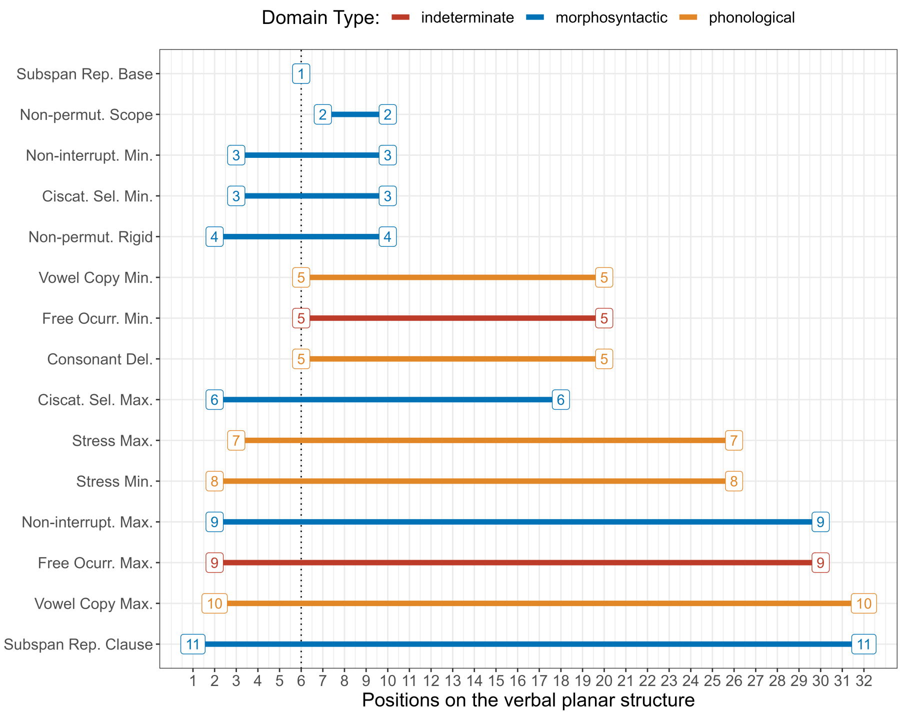

Figure 4: The Hup verb: constituency diagnostics compared

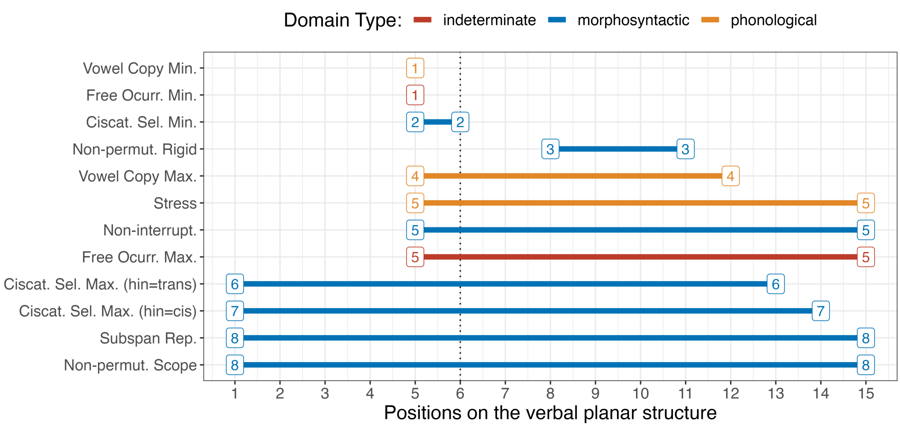

Figure 5: The Hup verb: constituency diagnostics compared

The degree of mismatch seen here among Hup morphological spans, as defined by different morphosyntactic and phonological criteria, is undoubtedly behind the conflicting characterizations of Hup in the literature as relatively isolating or polysynthetic, particularly for the Hup verb. These mismatches also have practical implications, in that they create difficulties in establishing principled conventions for representing the orthographic word. Interestingly, a comparison with Dâw suggests that while these two languages might be construed as quite distinct with respect to their degree of synthesis, they actually differ only according to a few criteria, while others correspond. Ultimately, historical change relating to "degree of synthesis" involves realigning a whole set of features associated with constituency; there may be no principled reason to expect that these should all fall into line together and at the same time. Thus a view that constituency diagnostics must necessarily align across languages, or even within them, may be as untenable diachronically as it appears to be synchronically.

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Abbreviations

ADV	adverbial	DYNM	dynamic
ADVR	adversative	FACT	factitive
CNTR	contrastive	FILL	filler
CO	coordinator	FLR	filler
DCSD	deceased	FRUST	frustrative
DECL	declarative	IMP	imperative
DEP	dependent	INCH	inchoative
DIR	directional	INFR	inferred
DST	distant past	INTRC	interactional

ITG	intangible	REP	reportative
LOC	locative	RESP	respect
NONVIS	nonvisual	SIM	simultaneous
OBJ	object	TAG	tag
OBL	oblique	TEL	telic
POSS	possessive	VEN	venitive
REFL	reflexive		

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Chapter 11

Constituency in Yukuna

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This study provides an overview of constituency in the verbal domain in Yukuna, an Arawakan language of Colombian Amazonia, on the basis of a firsthand corpus of texts. Using the methodology developed in Tallman (2021), we establish a verbal planar structure, to which we applied a total of 30 constituency tests pertaining to different domains (morphosyntactic, phonological, indeterminate), including both cross-linguistic and language-specific tests. The results show that, similarly to many other languages in this book, there is no strict convergence of tests around a single layer across different domains, nor strict convergence within domains. Instead of a strict phonological vs. grammatical word distinction, the results point to a distinction between positions placed before and after the verb core, so that in Yukuna, diagnostics tend to select either a span including person indexes and the verb core to the exclusion of all following formatives, or a span including the verb and its following formatives, to the exclusion of person indexes.

1 Introduction

This chapter provides an overview of constituency in the verbal domain in Yukuna, following the methodology in Tallman (2021).

Yukuna (ISO 693-3:ycn, Glottocode: yucu1253) is a North-Amazonian Arawakan language spoken by under one thousand speakers in South Eastern Colombia. This study is based on ongoing work on the Yukuna language by the author, and the Yukuna grammar sketch in Lemus Serrano (2020). All examples come from firsthand data collected during three fieldtrips in various Yukuna speaking communities between 2015 and 2018. The corpus contains roughly five hours of annotated texts.

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The examples are transcribed alphabetically with a slightly modified version of the Yukuna writing system used in the Yukuna dictionary (Schauer et al. 2005), based on Spanish. The following alphabetic conventions are used: <j> /h/, <ñ> /ɲ/, <y> /j/, <V'> /V̰/ (creaky vowel), <Ch> /C^h/ (aspirated plosive), <jC> /C̥/ (voiceless sonorant). High tone is transcribed with an acute accent. The surface manifestation of H tones is very variable, so the same morpheme may be transcribed with or without an accent depending on the context (e.g. past tense *-cha* is found in examples both as *-cha* and as *-chá*). Lastly, each example contains a source indicating the name of its audio file, and the ELAN/Flex line. Examples taken from elicitation come from the first author's field notes.

2 Yukuna language and its speakers

Yukuna is an Arawakan language of the Japurá-Colombia branch (Ramirez 2001), spoken in various communities along the Mirití-Paraná River in North-Western Amazonia (Figure 1). The Yukuna language is spoken by the Yukuna and Matapí ethnic groups, who are in intense, long-term contact with the (Tukanoan) speaking groups Tanimuka and Letuama (Fontaine 2001: 57). Despite the overall small number of speakers, the language continues to be transmitted to new generations within the Mirití-Paraná communities, so most ethnic Yukuna and Matapi of all ages speak their language. The relative stability of the language in the Mirití-Paraná contrasts with the sharp decline in vitality of the language when speakers move to nearby towns and cities, where Spanish and Portuguese are the dominant languages (Lemus Serrano 2016: 24).

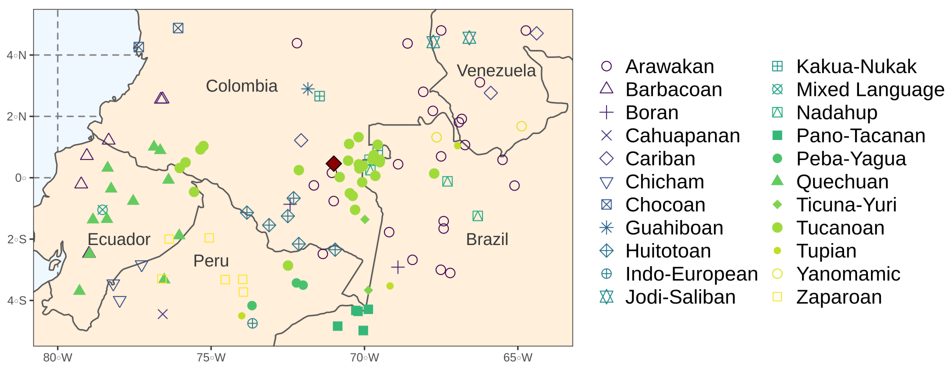

Figure 1: Languages of North-West Amazonia (Yukuna is marked with a red diamond) (Hammarström et al. 2019)

Typologically, Yukuna is a nominative-accusative language. The lexical word classes are nouns, verbs, adverbs, adjectives, and postpositions. Formatives, that is to say, grammatical morphemes, mostly follow a lexical core, and they are concatenative, monoexponential, with little allomorphy. As such, Yukuna can be said to be an agglutinating, suffixing language. Core arguments are not case-marked, and obliques are marked with postpositions. The predominant constituent order is SVO. The Subject is rigidly placed before the verb and it is adjacent to it, whereas objects and obliques are not necessarily adjacent to the verb, they are variably ordered with respect to each other (SVOX/SVXO), and can also be preposed to the verb (XOSV) (see Lemus Serrano 2020: 97–102).

3 Planar structure of the verbal complex

This section presents the verbal planar structure of Yukuna. A planar structure represents all the elements that can occur in a clause with a verbal predicate, by flattening all hierarchical distinctions between morphemes, words and constituents. This planar structure does not represent other types of phrases such as noun phrases (NPs) or postpositional phrases (PPs), as they have their own internal structure. Yukuna's planar structure is detailed in Table 1. Positions within the planar structure are numbered (from 1 to 21) and classed per type (slot or zone) depending on whether elements inside mutually exclude one another, or can freely co-occur. For each position, a broad description of the type of elements that it contains as well as the specific forms used. Empty cells correspond to positions filled with elements from open word classes. An in-depth description of all of the markers in this planar structure is given in §5 of the Yukuna grammar sketch in Lemus Serrano (2020).

As shown in this table, the structure contains 21 positions, with the verb core placed in position 10. Grammatical markers of the verb core are placed from positions 9 through 20. Henceforth, I refer to this set of positions as the verb complex. Constituents, obliques, and adverbials are placed either before or after the verb complex, and display quite a lot of variation depending on polarity, speech acts, and information structure. As planar structures aim to avoid a potentially arbitrary classification of verbal clauses into different *constructions*, the planar structure in Table (1) merges together all structures in the language containing a verbal predicate, including all clause types. Doing so raises at least two methodological challenges.

The first challenge concerns the issue of synchronically ambiguous clefts. In Yukuna, there are several structures that could be analyzed either as non-verbal

Table 1: Yukuna verbal planar structure

Pos.	Type	Elements	Forms
(1)	slot	connectors	
(2)	slot	adverbial interrogatives	*náje, méño'jó*
(3)	zone	adverbials	
(4)	slot	negation	*unká*
(5)	slot	constituent focus/interrogative	
(6)	slot	negation	*unká*
(7)	slot	indefinite proforms	*ná, méké*, etc.
(8)	slot	S/A NP	
(9)	slot	person indexes (S/A)	*nu-, pi-, ri-, ru-*, etc.
(10)	slot	**verb core**	
(11)	slot	valency	*-ta, -ñaa, -ka*
(12)	slot	negation	*-la*
(13)	slot	tense	*-cha, -je, -khe, -jika*
(14)	slot	nominalization, mood	*-ka, -kare*
(15)	slot	gender/number	*-ri, -yo, -ño*
(16)	slot	imperative	*-chi, -re, -niña*
(17)	slot	middle	*=o*
(18)	slot	perfective	*=mi*
(19)	zone	habitual, frustrative	*=no, jlá*
(20)	slot	discourse markers	*=ko, =ja*
(21)	zone	P, PP, OBL, ADV, remote past	

predicates (pseudo-clefts), or as verbal predicates used in focalization. Pseudo-clefts have the same syntactic structure as equative non-verbal predicates formed by juxtaposing the predicate and the argument without any copula. The focused constituent is placed in clause initial position, followed by a clausal nominalization in the position of the argument, as in (1).

(1) *Ná kéelé wáa' -ri?*
INDF DEM call -M
'Who is that one calling?' ycn0068,123

Some uses of these pseudo-clefts are synchronically ambiguous, as their surface structure is almost identical to that of main verbal clauses. To avoid arbitrarily excluding a type of verbal predicate, these ambiguous cases were also integrated into the planar structure. Their inclusion required adding additional positions, as the focused constituent can be separated from the verb complex by various elements (notably pre-verbal negation marker *unká*), while the S/A NP in non-focused clauses is strictly adjacent to the verb complex. This leads to two different positions in the template where the S/A NP can be placed: position 5 when focused (2a), and position 8 when not focused (2b).

(2) a. *Kawayá iphí -cha -ri.*
5 10 -13 -15
deer arrive -PST -M
'*The deer* arrived.' ycn0041,156

b. *Unká iná i'jna -lá matha' -jé.*
6 8 10 -12 10 -
NEG INDF go -NEG cut -PURP
'One does not go cutting.' ycn0119,29

The second methodological challenge concerns word order variations. As stated previously, Yukuna displays variable ordering of some constituents (objects and obliques) as well as some formatives (notably, negation). However, despite the attested variability, the ordering of elements is constrained by several restrictions, especially for elements in positions before the verb complex. In order to fully capture these ordering restrictions, I opted for increasing the number of slots before the verb complex, placing the same elements in multiple positions, and simply placing the freely ordered elements after the verb complex in a single zone (21). For instance, the negation marker *unká* is placed variably with respect to focused constituents (position 5), but it is obligatorily placed immediately before indefinites (position 7), so it is placed in two different positions in the planar structure (positions 4 and 6). The variable positioning of the negative marker *unká* with respect to focused constituents is illustrated in examples (3a) and (3b).

(3) a. *Unká na=jló nu= yuí -la -je rikhá.*
4 5 9= 10 -12 -13 21
NEG 3PL=to 1SG= leave -NEG -FUT 3SG
'I will not leave it to *them*.' ycn0092,117

b. *Rikhá unká amá -la nukhá.*
5 6 10 -12 21
3SG NEG see -NEG 1SG
'*He* did not see me.' ycn0117,93

While increasing the number of positions captures all ordering possibilities, multiplying the positions within the planar structure also has the disadvantage of leading to uncertainty in the numbering of elements in examples. For instance, in a given occurrence of standard negation without focused constituents, indefinite pronouns or an overt A/S NP like in (4), it is not possible to know for certain that the negative marker *unká* is in position 4 or 6. In these cases, I assume that negation is placed in position 6 unless there is an overt focused constituent placed before it, as in (3). These arbitrary decisions were necessary for coherency in numbering throughout the chapter, but note that they have no consequence for the results of the diagnostics applied.

(4) *Unká ru= ajá -lá -cha.*
6 9= 10 -12 -13
NEG 3SG.F= fly -NEG -PST
'She did not fly.' ycn0041,29

4 Diagnostics and layers

We applied a total of 30 constituency tests to the planar structure in (1). Each test is given an ID number, and is assigned to one of three domains used in this volume (morphosyntax "MS", indeterminate "IND" and phonology "PH"), a name (name of the diagnostic), a fracture (different interpretations of the same diagnostic), and a span size (minimal vs. maximal). Figure 2 provides the results of the tests. Each line provides the name of the test, the span of positions identified (from 1 to 21), and the size of the layer identified (numbers in squares at the edges of each line). Tests are sorted by relative size of the identified span, from largest (top) to smallest (bottom). For instance, the last test in (1), the minimal application of one kind of subspan repetition test (lexical nominalizations) selects a span of positions from 10 to 11, meaning that it has a size of one.

The following sections discuss diagnostics per domain, and provide examples for each identified layer. Morphosyntactic diagnostics are presented in §5, indeterminate diagnostics, which concerns both phonological and morphosyntactic factors, are presented in §6, and finally, phonological diagnostics in §7.

5 Morphosyntactic domains

This section presents the results of the morphosyntactic diagnostics applied. In sum, nine different diagnostics were applied, each with multiple fractures, for a total of 14 tests, as provided in Figure 3. Diagnostics concerning both the domains

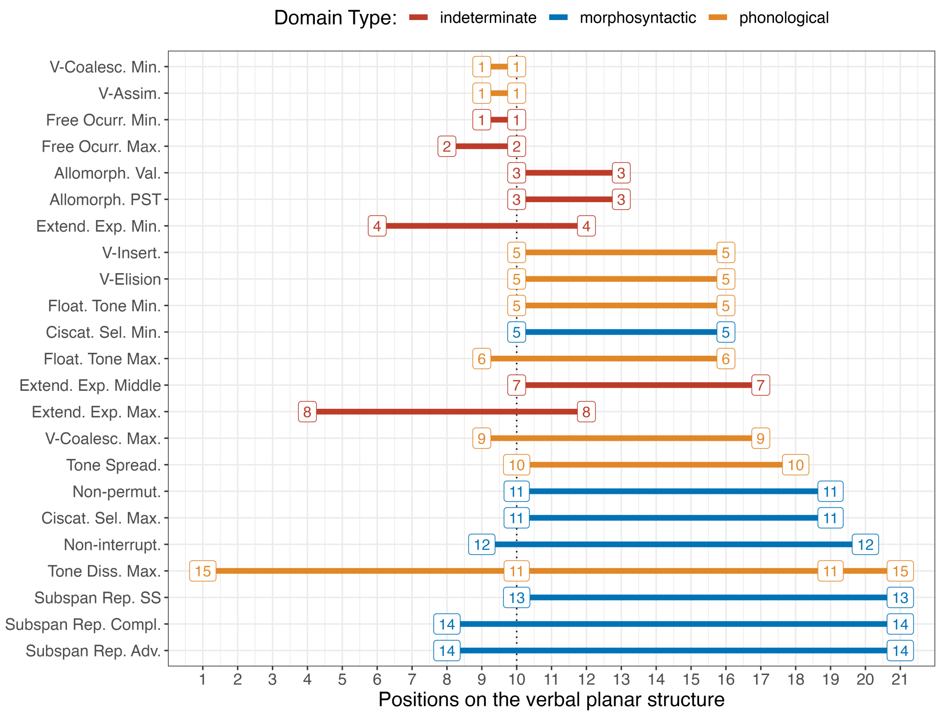

Figure 2: Constituency tests per converging layers

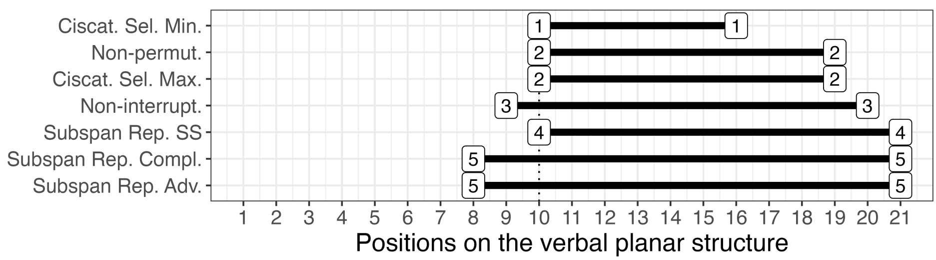

Figure 3: Morphosyntactic constituency tests per converging layers

of phonology and morphosyntax (e.g. free occurrence, opaque allomorphy) are presented in §6 on indeterminate domains.

5.1 Non-interruptability

This diagnostic identifies spans within the planar structure that cannot be separated by free and/or promiscuous elements. Different interpretations of this diagnostic require fracturing it into two tests, namely non-interruptability by a free form and non-interruptability by a promiscuous form, holding multiple positions within the planar structure.

5.1.1 Non-interruptability by a free form (9-20)

The first fracture identifies a span from positions 9 to 20, with the core in position 10. The positions placed immediately before and after this span contain the verbal arguments, the S/A NP in 8, and the object plus all obliques in 21. The results of this test are the same regardless of the type of free form, whether simplex or complex. Example (5) illustrates the non-interruptability test, by showing that free forms, such as nominal and pronominal arguments (a noun with a bound person index in the position of the subject 8, and an independent pronoun in the position of the object in 21) are placed before and after the span selected by this test from positions 9 to 20.

(5) *Kája ri=pirá nó -cha rikhá.*
1 8 10 -13 21
then 3SG=pet kill -PST 3SG
'Then his pet killed him.' ycn0053,33

Examples (6) and (7) illustrate the same test, showing that the same span of the planar structure is identified even when arguments are expressed with complex free forms, such as a complex A/S NP , and a complex object NP respectively (in brackets).

(6) *[kéelé na=e'wé phe'jí] kémí -cha*
8 10 -13
DEM 3PL=sibling eldest say -PST
'their eldest sibling said' ycn0189,146

(7) *kája yáwi tá nó -cha =mi [kéelé nu=yajná michú]*
1 8 10 -13 =18 21
then jaguar EMPH kill -PST =PFV DEM 1SG=husband deceased
'The jaguar already killed my late husband.' ycn0053,88

5.1.2 Non-interruptability by a promiscuous form (9-18)

The second fracture of this diagnostic, the test of non-interruptability by a promiscuous form, identifies a slightly smaller span, from positions 9 to 18. This is due to the fact that the habitual marker *=no* can appear in multiple positions within the planar structure (positions 19 and 21), as shown in example (8).

(8) *ri=* *puri'* *-chá* *=o* ***=no*** *ri=jwa'té=**no***
9= 10 -13 =17 =19 21
3SG= talk -PST =MID =HAB 3SG=with=HAB
'he was always talking to him' ycn0041,142

5.2 Ciscategorial selection

This diagnostic identifies a span of positions within the planar structure containing formatives exclusive to the verb complex, which only combine with verb roots. The application of this diagnostic required fracturing into a minimal and maximal tests in Yukuna.

5.2.1 Ciscategorial selection minimal (10-16)

The minimal fracture of this diagnostic identified a span from positions 10 to 16 including valency markers, verbal negation, tense markers, nominalizers and dependency markers, as well as various imperative mood markers. These categories are either not encoded on other word classes, or encoded with other markers, as is the case for negation, double-marked with particles *unká … kalé* (9) as opposed to the verbal marking with *unká … -la* (3).

(9) *unká* *o'wé* *kalé*
NEG brother NVNEG
'It is not my brother.' ycn0041,126

Before and after these positions we find multicategorial markers such as person indexes (position 9), the middle voice marker *=o* (position 17) and the perfective aspect marker *=mi* (position 18). Person indexes encode possessors on nouns, *=o* encodes reflexivity on nouns (10), and *=mi* encodes former possession on nouns as well (11).

(10) *na=* *mená* *=o*
3PL= cropland =MID
'their own cropland' ycn0058,41

(11) *pají* *=mí*
house =PFV
'an abandoned house' ycn0079,18

5.2.2 Ciscategorial selection maximal (10-19)

The ciscategoriality test allows a second interpretation in Yukuna, as there are verbal-exclusive markers beyond the multicategorial markers in positions 17-18, namely, the frustrative mood marker *=jlá* in the position 19. In order to capture this, the ciscategoriality diagnostic was fractured into two tests, a minimal test and a maximal test. The latter identifies a larger span ranging from positions 10 to 19, outside of which all elements are transcategorial.

Lastly, while Yukuna has non-verbal predicates, no additional fracturing was necessary to capture the behavior of these predicates with respect to ciscategorial selection. Yukuna displays an alternation between a zero copula clause type where the non-verbal predicate displays no ciscategorial verbal markers at all, and a verbal copula clause type, where the verbal copula combines with all ciscategorial verbal markers.

5.3 Non-permutability (9-18)

This diagnostic seeks to identify which spans from the planar structure contain rigidly ordered elements. The application of this diagnostic excludes zones, positions within the planar structure that contain variably ordered elements, as well as promiscuous elements, placed in various positions within the planar structure (see §5.1). The identified span ranges from positions 9 to 18. This span includes only one lexical element, the verb core, and its grammatical markers up until the perfective marker. At the right edge of this span we find a zone of variable ordering in position 19 containing the markers *=jlá* 'frustrative' and *=no* 'habitual', which can be freely ordered with respect to one another without any identified difference in scope. The variable ordering of the elements in position 19 is illustrated in (12-13).

(12) *ri=* *nó* *-cha* *=jlá* *=no* *kamejérí*
9= 10 -13 =19 =19 21
3SG= kill -PST =FRUST =HAB animal
'he kept trying to kill animals' elicited

(13) *ri=* *nó* *-cha* *=nó* *=jlá* *kamejérí*
9= 10 -13 =19 =19 21
3SG= kill -PST =HAB =FRUST animal
'he kept trying to kill animals' elicited

Before the left edge of this span, we find a promiscuous element, the subject NP, which is found in positions 5 for focused constituents, and in 8. The different positions of subjects were illustrated previously in examples (2) and (3).

5.4 Deviations from biuniqueness: extended exponence

This section focuses on a specific type of instance of deviations from biuniqueness, namely, cases of extended exponence involving discontinous markers. There are two such cases in Yukuna, used as two different diagnostics, and three different tests. Other instances of deviations from biuniqueness (allomorphy) are discussed in §6.2.

5.4.1 Discontinuous stems with *=o* (10-17)

The first diagnostic concerns extended exponence of verbal stems with the middle marker *=o*, and identifies a span of positions starting from the verb core 10 up to 17. As a derivational device, the use of *=o* displays many idiosyncrasies. There are, for instance, multiple cases where the stem is not at all attested without the middle marker, and where the semantics of these stems are not compositional. A case in point concerns the verb *jecho'=o* 'run' (see example (17) below), where the stem is discontinuous, and includes the verb core in position 10 and the marker *=o* in position 17.

5.4.2 Discontinuous negation minimal (6-12) and maximal (4-12)

The second diagnostic concerns extended exponence of verbal negation, which is obligatorily double-marked with the free form *unká* in positions 4 and 6, and the bound marker *-la* in position 12.[1] As the free form *unká* is promiscuous and appears twice in the planar structure, this diagnostic is fractured into a minimal and a maximal domain. The minimal domain identifies a span from positions 6 to 12, and the maximal domain identifies a larger span, from positions 4 to 12.

[1]Although both markers are required to encode negation, there are a few instances in which only the pre-verbal free form *unká* is used, and the suffix *-la* is omitted: when the far past tense suffix *-khe* is used, and in certain types of subordinate clauses (negative conditional subordinate clauses).

These two spans depending on the position of *unká* are illustrated in examples (3a) and (3b) in §3.

Another type of deviation from biuniqueness is opaque allomorphy. It is discussed in §6.

5.5 Subspan repetition

This section presents different types of subspan repetition strategies in Yukuna. These strategies allow the creation of complex sentences, formed by repeating spans from the planar structure. In this sense, an element found only once in the planar structure can appear twice in a complex sentence. Crucially, because the repeated spans form a single sentence, they also display signs of forming a grammatical unit, as they share elements that scope over the entire sentence.

Complex sentences in Yukuna are mostly formed via the use of nominalizers, postpositions, and other subordinating markers. There are many such markers in the language, but they can be grouped into four types, depending on the structural features of the dependent clause. Each of these four types corresponds to a different diagnostic, and some diagnostics are further fractured into various tests, for a total of six tests. For more details on complex sentences in Yukuna, see Lemus Serrano (2020).

5.5.1 Complement clauses with lexical nominalizers (10-11); (10-17); (10-21)

The first subspan repetition diagnostic includes complement clauses with lexical nominalizers *-kana* and *-kaje*. These sentences are formed by placing a nominalization (as *motho'-kána* 'the act of cooking' in example (14)) in the position of the object argument (in brackets) of a complement-taking predicate (as 'finish' in examples (14) and (15)). This verb category includes aspectual predicates (start, finish), modal predicates (want), and perception and cognition predicates (see, hear, know). Complement clauses with lexical nominalizers typically require subject co-referentiality, so that while there is no subject marking on the dependent element, it is understood to be the same as in the main predicate as in (14).

(14)

ru=	*ñapáchi*	*-ya*	*[na=*	*motho'*	*-kána]*
9=	10	13 -		10	-
3SG.F=	finish	PST	3PL=	cook	NMLZ

'She finished the cooking of them.' ycn0189,20

(15) *na= ñapáchi -ya [rikhá]*
9= 10 13 21
3PL= finish -PST 3SG
'They finished it.' ycn0151,21

Verb roots marked with lexical nominalizers lack all inflectional features of verbs (subject indexation in position 9, and all markers from positions 12 to 16). However, they can still show valency marking, given that their use is lexically determined, as illustrated in the previous section with the marker *=o* MID. Since valency markers are placed in two discontinuous positions of the planar structure (11 and 17) this diagnostic is fractured into two.

The first fracture identifies a small layer including the verb core in 10 and the valency markers in position 11, as shown in example (16). The second fracture of this diagnostic identifies a larger layer, from the verb core 10, up to the middle marker in position 17. This is illustrated with example (17), where the middle marker *=o* is an integral part of the discontinuous stem 'study', placed after the event nominalizer *-kaje*.

(16) *majő pi= wakára'a [ri=la'jőwa* ***pa'*** ***-tá*** *-kana phiyúké]*
3 9= 10 - 10 -11 - 21
here 2SG= order 3SG=ornament return -CAUS -NMLZ entirely
'Order them to bring all of their ornaments over here.' ycn0018,5

(17) *eyá nu= ñapáta [**jewíña'*** *-kaje* ***=o**]*
1 9= 10 10 - 17
then 1SG= finish transform -NMLZ =MID
'Then I finished studying.' ycn0018,5

Lastly, a third fracture of this diagnostic is required, given that lexical nominalizations in Yukuna show a hybrid structure, with features of both the nominal and verbal complex. For instance, these nominalizations show possessor marking of the P argument (similarly to English action nouns like in 'the destruction of the city') as in example (14). However, as is clear from example (16), they may also include adverbs and postpositional phrases, which are absent from the nominal complex. The only way to capture this was by applying a third fracture, identifying a span from the verb core (10) up to verbal obliques (21). The presence of oblique arguments in this subspan repetition strategy is illustrated with (18), where the oblique *ri=jló* 'for him' can only be analyzed as part of the verbal complex of the verb stem 'kill', and not of the main verb 'start'. In contrast, the noun *pú'ju-na* is a possessor, and not a verbal argument, and thus it is not considered as being part of the span from the verbal planar structure identified by the diagnostic.

(18) *Ri= keño' -chá [pú'ju-na nó -kana ri=jló].*
9= 10 -13 - 10 - 21
3SG= start -PST rodent-PL kill -NMLZ 3SG=for
'Lit. He started the killing of *tintin* rodents for him.' ycn0053,15

5.5.2 Complement clauses with *-ka* (8-21)

There are three further subspan repetition strategies used as diagnostics. They differ from the strategy discussed above because they select much larger spans from the verbal planar structure. I use the term Clausal nominalization to refer to this type of structure, which is internally very clause-like, but are externally used as NPs. Clausal nominalizations with *-ka* are used in Different Subject complement clauses, as well as in many types of adverbial subordinate clauses combined with postpositions. This diagnostic identifies a span from positions 8 to position 21. Clausal nominalizations with *-ka* are thus internally almost identical to main verbal clauses, although they lack some of their features (word order freedom, focused constituents, mood marking), but similarly to NPs, they can freely combine with postpositions. The layer identified by this diagnostic is shown in brackets in (19).

(19) *Kája na= ka'á rikhá leyuná chojé, a'jná [na= ñapáta -ka rikhá]*
1 9= 10 21 21 21, 21 9= 10 - 21
then 3PL= throw 3SG pot into DIST 3PL= finish -NMLZ 3SG
ejená.
21
until
'Then they throw it into a pot, until they finish it.' ycn0059,29

5.5.3 Same subject clause-chaining (10-21)

Another subspan repetition strategy is Same subject clause-chaining with gender and number markers. This diagnostic identifies a span from positions 10 to 21, including almost the entirety of the verbal planar structure, but leaving out all subject markers (person indexes in 9, and subject NPs in 5 and 8), as the Agent participant of the linked clause is understood as being co-referential with the subject argument of the main clause. Example (20) shows this diagnostic with an instance of same subject clause-chaining (in brackets), where the chained-clause shows a verb core marked for tense and valency, with a postpositional argument. Typically, the choice of the gender and number suffix on the verb depends on the referent. So in (20), the suffix *-yo* F agrees in gender with the subject 'she' marked with the person index on the main verb.

(20)

Pherú	*ké*	*=ja*	*ru=*	*jecho'*	*-chá*	*=o,*	*[ja'*	*-chá*	*-yo*	*=o*	*maloca*
3			9=	10	-13	=17	10	-13	-	17	21
quick	like	=EMPH	3SG.F=	run	-PST	=MID	fall	-PST	-F	=MID	house

jupichúmi	*éjó].*
old	toward

'Then she ran quickly, and (she) ran into the old house.' ycn0151,105

5.5.4 Adverbial clauses (8-21)

Lastly, the last subspan repetition diagnostic concerns adverbial clauses with adverbial subordinators *-chí* PURP, *-ré* PURP, and *-noja* CONC. The attested patterns suggest that this diagnostic identifies the same span of positions as clausal nominalizations with *-ka* used in complement clauses, from positions 8 to 21, as in example (21). Elicitation would be required to test whether all positions before 8 are excluded from this span. Given that complement clauses with *-ka* and the adverbial clauses presented here are nevertheless functionally and structurally different, I treat them as two different diagnostics (see Lemus Serrano 2020: 115–123).

(21)

Marí	*na=*	*a'*	*-chá*	*nu=*	*jló*	*[pi=*	*wáa'*	*-chí*	*ri=jló*	*tá*	*me'tení*
3	9=	10	-13	21		9=	10	-	21		21
PROX	3PL=	give	-PST	1SG=	to	2SG=	call	-PURP	3SG=to	EMPH	now

ilé=eyá].
21
MED=from

'Here they've just given me (his number) for you to call him right now from there.' ycn0504,9

An important note concerning markers used in subspan repetition strategies in Yukuna is that some of them have grammaticalized as main clause markers as well. For instance, the markers *-chí* and *-ré* used as purposive subordinators are synchronically distinct from the formally identical *-chí* and *-ré* used to encode first and third person imperatives in main clauses, although they diachronically originate in the same markers. In this latter function, they are included within the planar structure in Table 1 (position 16). However, as subordinators, they are not included within the planar structure, so in example (21), *-chí* is not numbered.

6 Indeterminate domains

This section presents diagnostics involving both the domains of phonology and morphosyntax, namely, free occurrence §6.1, and opaque allomorphy §6.2.

6.1 Free occurrence

This diagnostic identifies a span of positions, including the verb core, which can stand alone as an utterance. In Yukuna, this usually corresponds to lexical roots with their own lexical tone. Only alienable and non-possessible nouns can be used on their own as utterances without combining with any bound markers. Obligatorily possessed nouns and verbs minimally require indexation of possessors and subjects respectively.

This diagnostic is fractured into three tests depending on its interpretation.

6.1.1 Free occurrence minimal (9-10) ; (8-10)

The first two fractures of this diagnostic seek to identify the smallest possible span of positions that could be used as an utterance. In Yukuna, a verbal utterance minimally requires a verb core with subject encoding, achieved either with a person index 9 or an overt subject NP 8. These two options mutually exclude each other, leading to two fractures: a layer including the verb core 10 with a subject person index 9 (22a), and a layer including the verb core 10 and an overt subject NP 8 (22b).

(22) a. *Ri= iphí -cha.*
9= 10 -13
3SG= arrive -PST
'He arrived.' ycn0041,32

b. *Ri=i'rí iphí -cha.*
8 10 -13
3SG=son arrive -PST
'His son arrived.' ycn0089,103

6.1.2 Free occurrence maximal (10-20)

The third fracture of this diagnostic identifies the largest span of positions including the verbal core that could stand as an utterance. This fracture identifies a span from positions 10 to 20. This span includes only one lexical element (the verb core) and its formatives, with no overt arguments nor obliques, as in (23).

(23) *Pi= kapií -cha =o =jlá.*
9= 10 -13 =17 =19
3SG= lose -PST =MID =FRUST
'You almost got lost.' ycn0058,66

Note that *=jlá* FRUST has its own lexical tone, and it does not undergo any phonological processes with adjacent forms, but it is still a bound form in the sense that it cannot be used on its own as an utterance, it is a formative of the verb complex.

6.2 Deviations from biuniqueness: opaque allomorphy

This section presents cases of opaque allomorphy in Yukuna, as opposed to non-opaque allomorphy, motivated by phonological constraints of the language (see §7.2). In Yukuna, I have identified two such cases, each used as a different diagnostic.

6.2.1 Valency allomorphy (10-13)

The first diagnostic, in test 18, concerns opaque allomorphy between the valency markers in position 11 and the tense marker *-cha* in 13. The three valency markers /-ta/ CAUS, /-ɲaa/ APPL and /-ka/ 'associative' undergo allomorphy when followed by past tense /-ʧa/. Their last vowel changes from /a/ to /i/, so /-ta/ becomes /-ti/ (phonetically produced either as [ti] or [ʧi]) (24-25), /-ɲaa/ becomes /-ɲai/, and /-ka/ becomes /-ki/. This instance of allomorphy is opaque. While it only targets morphemes ending in /a/, it does not apply to all morphemes ending in /a/, in fact, the negation marker /-la/ NEG does not trigger this allomorphy (26). Note that in examples (25-26) there are two forms of the past tense marker: /ja/ and /ʧa/. This leads us to the second instance of opaque allomorphy.

(24) pa.pó.ta.he nu.kʰá
/pi= apô ***-ta*** *-he nukʰá/*
9= 10 -11 -13 21
3SG= wake.up -CAUS -FUT 1SG
'you will wake me up' ycn0053,70

(25) no.pó.ʧi.ja ɾikʰá
/*nu*= *apô* ***-ti*** ***-ja*** *rikʰá*/
9 10 11 13 21
1SG= wake.up -CAUS -PST 3SG
'I woke him up.' ycn0089,103

(26) uŋ.ká ɾi.pʰá.lá.ʧa
/*unká* *ɾi*= *ipʰá* ***-la*** ***-ʧa***/
6 9= 10 -12 -13
NEG 3SG= arrive -NEG -PST
'he did not arrive' ycn0041,130

6.2.2 Past tense allomorphy (10-13)

This diagnostic identifies the same set of spans as the former, from the verb core 10 to tense markers 13. In this instance of allomorphy, the past tense suffix /-ʧa/ changes its form if the preceding syllable (whether the last syllable of the verb core, or a valency marker) is phonologically /ti/ [ʧi], as in (24). Interestingly, the rule does not apply if the preceding syllable is phonologically /ʧi/ [ʧi], showing that this instance of allomorphy is entirely idiosyncratic. Indeed, the verb /iʧá/~/iʧí/ 'dig' combines with past tense /ʧa/ leading to the form /iʧí-ʧa/ 'dug' and not */iʧí-ja/.

7 Phonological domains

There are seven phonological processes used as constituency diagnostics in Yukuna, shown in Figure 4. This section presents each of these diagnostics, per phonological domain: diagnostics concerning tonal processes are discussed in §7.1, and segmental diagnostics in §7.2.

7.1 Tonal diagnostics

This section presents three tonal processes in Yukuna, namely, floating tone placement §7.1.1, tonal spreading §7.1.2, and tonal polarity §7.1.3.

7.1.1 Floating tone placement: minimal (10-16) and maximal (9-16)

Yukuna's tonal system is a zero vs. H system, with no low tone (underspecified) and two H tones: a spreading H tone (/H/, transcribed as V́) and a non-spreading

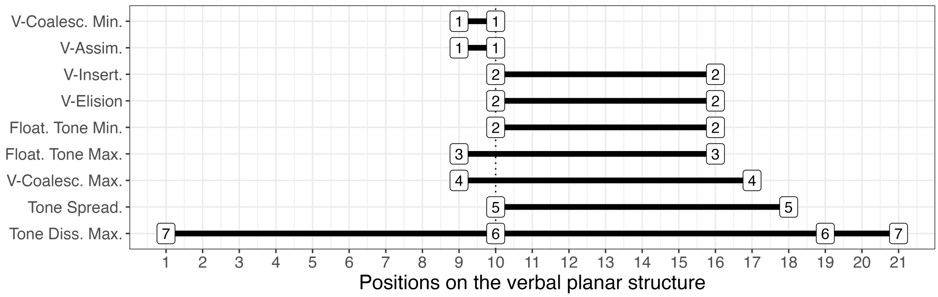

Figure 4: Phonological tests per converging layers

H tone (/HL/, transcribed as V̂). Each of these tones can be either bound to a specific TBU, or floating (transcribed as V^{H} if spreading, and as V^{HL} if non-spreading). Inherent tone is a feature of lexical roots, and most bound formatives are toneless, but as detailed next, the surface manifestation of H tones varies depending on the tone type of the root, and on whether the root combines with certain formatives or not (see Lemus Serrano et al. 2021 for a description of Yukuna's tonal system). This system is very similar to that found in 'pitch-accent' languages like Japanese, where verb roots are divided into accented and unaccented roots, and the position of the pitch drop depends on the suffixes that follow (Kawahara 2015).

Floating tones usually attach rightward to the first bound marker placed after the verb core. This diagnostic identifies a span from positions 10 to 16. With most verbs, this process only concerns what follows the verb core regardless of syllable count, as shown in (27), where the root's floating tone (/ka̰^{HL}/ 'throw') surfaces immediately after the root, on the second syllable of the group.

(27) [ka̰.ké.ha]
/ka̰^{HL} -keha /
10 -
throw -PTCP
'thrown' ycn0108,272

However, with a small subset of verbs, the presence or absence of a person index affects the placement of floating tones. This leads to a diagnostic fracture, as this latter application of the floating tone test identifies a larger span of positions, from subject indexes in 9 to imperative markers in 16. For instance, the floating tone of the root /la̰ ^{HL}/ 'do' attaches to the third syllable counting from the left, so the /HL/ tone attaches to the first marker after the core if there is a person index such as in (28a), but it attaches to the second marker after the root if there is no person index such as in (28b).

(28) a. [ɾi.la̰ .lá.ʧa]
/*ɾi= la̰ᴴᴸ -la -ʧa*/
9= 10 -12 -13
3SG= do -NEG -PST
'he did not do' ycn0041,155

b. [la̰ .la.ɲó]
/*la̰ᴴᴸ -la -ɲo*/
10 -12 -15
do -NEG -PL
'(they) did not do.' ycn0117,93

This diagnostic excludes markers beyond position 16. Example (29) illustrates the behavior of the verb root /a̰ ᴴ/ 'give', followed by two bound markers in each case, so the number of syllables is the same. The counting rule applies when the root combines with markers up to position 16, so that in (29a) the floating tone attaches to third syllable from the left, corresponding to the marker /-ɾi/ M in position 15. In contrast, in (29b), the floating tone attaches to the second syllable from the left, corresponding to the tense marker in position 13, since the marker /=mi/ PFV in position 18 is excluded from the span identified by this diagnostic.

(29) a. a̰ .he.ɾí
/*a̰ᴴ -he -ɾi*/
10 -13 -15
give -FUT -M
'(he) will give' elicited

b. a̰.ʧá.mí
/*a̰ᴴ -ʧa =mi*/
10 -13 =18
give -PST =PFV
'have given' elicited

Note that the perfective marker /=mi/ in (29b) is produced with an H tone. This is due to the fact that despite being excluded from the domain of floating tone attachment, this marker is included in the domain of tonal spreading, which leads us to the final tonal diagnostic.

7.1.2 Tonal spreading (10-18)

In Yukuna, once attached to a given syllable, /H/ tones spread one syllable rightward, from the verb core in 10 up to the perfective marker in 18. Beyond this position, markers have very different tonal features. For instance, *=jlá* FRUST in position 19 has its own lexical tone, and in the same position, *=no* HAB displays tonal polarity, so even if preceded by a spreading /H/, it will be produced with low tone. Consider the pair of examples in (30). In (30a) the floating /H/ tone attaches to the first marker after the verb core and spreads rightward to the nominalizer /-ka/. In contrast, in (30b), the /H/ tone does not spread rightward, as the following marker /=no/ is beyond the domain of tonal spreading.

(30) a. ɾi̯.hĩ.ʧá.ká.no

/ri=	*i̯hĩ^{H}*	*-ʧa*	*-ka*	*=no/*
9=	10	-13	-	=19
3SG=	go	-PST	-NMLZ	=HAB

‘his constant going’ ycn0189,41

b. ɾi̯.hĩ.ʧá.no

/ri=	*i̯hĩ^{H}*	*-ʧa*	*=no/*
9=	10	-13	=19
3SG=	go	-PST	=HAB

‘he constantly goes’ ycn0041,12

7.1.3 Tonal polarity minimal (10-19) and maximal (1-21)

In both (30a) and (30b), *=no* HAB is preceded by an H tone, and it is produced with a low tone (untranscribed). Because the marker *=no* is also a promiscuous one, placed in several positions of the planar structure, the process of tonal polarity also applies no matter what element precedes it. See for instance its use in (8), where *=no* appears after a postpositional phrase in position 21. In the absence of any evidence showing that there is a limit beyond which tonal polarity does not apply, this diagnostic is considered as identifying the entire planar structure, from position 1 all throughout position 21.

7.2 Segmental diagnostics

There are five segmental processes used as constituency diagnostics in Yukuna, discussed next.

7.2.1 Vowel coalescence minimal (9-10)

The first process applies at the juncture between person indexes in position 9 and the verb core in 10. When combined with a vowel initial verb root, the final vowel of the person index and the vowel of the verb root undergo vowel coalescence. The result of this process may be a vowel of a different quality than the two vowels involved, as in (31-32).

(31) no.há
/nu= ahá/
9= 10
1SG= fly
'I fly' elicited

(32) wḛ.n̥a.hé
/wa= ḭn̥a^{H} -he/
9= 10 -13
1PL= go -FUT
'we will go' ycn0063,182

7.2.2 Vowel coalescence maximal (9-17)

The minimal application of this diagnostic clearly identifies a span from 9 (person indexes) to 10 (verb core), as shown in (31-32). However, there is no evidence that this process does not apply further, beyond the verb core and the formatives that follow it, as it requires a polymorphemic vowel sequence but most markers placed after the verb core have a CV shape. The only exception is the middle marker *=o* in position 17, and this marker does not undergo vowel coalescence with the preceding vowel, but another phonological process (vowel elision, §7.2.5). As such, in the absence of evidence of non-application of this process before position 17, we consider that one possible interpretation of the vowel coalescence diagnostic identifies a maximal span from positions 9 up to 16, outside of which this process does not apply.

7.2.3 Vowel assimilation (9-10)

The second segmental process also applies at the index-core juncture, and concerns person indexes ending in /u/ (*nu=* 1SG and *ru=* 3SG.F) and verb cores where the first vowel nucleus is /o/. The vowel /o/ of the verb core triggers total assimilation, turning the /u/ of the index into [o], in a process of vowel harmony, as in (33a).

(33) a. ɾo.nó.ʧa
/ru= nó -ʧa/
9= 10 -13
3SG.F= kill -PST
'she killed' elicited

b. ne.nó.ʧa
/na= nó -ʧa/
9= 10 13
3PL= kill -PST
'they killed' elicited

This process also affects person indexes ending with /a/ (/wa=/ 1PL and na=/ 3PL), turning the /a/ into an [e], in a process of partial assimilation (33b). Note that the marker following the verb core /-ʧa/ also ends with /a/ and it is not at all affected by the assimilation process. The vowel harmony diagnostic thus only has one application, identifying a small layer (9-10).

7.2.4 Consonant aspiration minimal (9-10) and maximal (9-12)

Yet another process at the index-core juncture is consonant aspiration. This process applies between all person indexes and roots starting with /h/, wherein the /h/ of the root merges with the onset of the person index, and leads to either an aspirated plosive [Cʰ] or a voiceless sonorant [C̥], as in (34a-34b) respectively.

(34) a. pʰa̰.pá
/pi= ha̰pá/
9= 10
2SG= walk
'you walk' ycn0053,83

b. n̥o̰pá
/nu= ha̰pá/
9= 10
1SG= walk
'I walk' ycn0018,7

Note that once the process of consonant aspiration applies, leading to the merger of the two onsets from the person index and the verb core, the process of vowel coalescence applies, leading to the merger of the two vowel nuclei as well. In (34b), the vowels /u/ and /a̰/ merge, leading to a creaky [o̰]. As the process of consonant aspiration requires a polymorphemic /CV.hV/ syllable sequence to take place, once more, the only evidence that it is not applying beyond the index-root juncture is that the markers /-he/ FUT and /-hĩka/ FAR.HAB in position 13 also start with /h/ and they are not affected by this process. This leads to a diagnostic fracture, where the maximal interpretation of this diagnostic identifies a span from positions 9 to 12.

7.2.5 Vowel elision (10-16)

The following process, vowel elision, applies whenever the middle marker *=o* is used, as this marker systematically replaces the preceding vowel of any element from the verb core in position 10 (example (35a)) up to the imperative markers in position 16 (example (35b)).

(35) a. nu.ju.ɾó
/nu= jurî =o/
9= 10 =17
1SG= stay =MID
'I stay' ycn0018,8

b. pi.ɲa.ní.ɲo
/pi= ɲa^{HL} -niɲa =o/
9= 10 -16 =17
2SG= escape -PROH =MID
'Don't escape!' ycn0041,68

7.2.6 Copy vowel insertion (10-16)

Lastly, the process of copy vowel insertion applies when a root ending with a creaky vowel is not followed by any markers up until position 16. In such cases, if the root is not followed by any markers at all, a copy vowel of the same quality of the creaky vowel is inserted, as in (36a). The same process applies when the root is followed by markers from positions 17-20, such as *=no* in position 19 (36b).

(36) a. pi.kaʔ.á
/pi= ka̰^{HL}/
9= 10
2SG= throw
'you throw' ycn0058,101

b. naʔ.á.no
/*na= a̰^H =no*/
9= 10 19
3PL= give =HAB
'they always give!' ycn0068,181

If the root is followed by a marker before position 17, copy vowel insertion does not take place (37). Note that the inserted copy vowels in (36) carry the H tone, while in (37) it is the marker *-niɲa* PROH that carries the H tone.

(37) pi.ka̰ .ní.ɲa
/*pi= ka̰^HL -niɲa*/
9= 10 -16
2SG= throw -PROH
'Don't throw!' ycn0058,101

As a constituency diagnostic, this process identifies a span from positions 10 to 16. This process is tightly connected to the process of floating tone association, discussed previously §7.1. Indeed, the right edges of the two tests on floating tone association converge on position 16. Beyond this position, it is necessary to insert a copy vowel for roots ending in a creaky vowel, as a support for the floating tone, which cannot attach to the markers to its right (as in (36b)). However, this process is not related to minimality constraints in the language. There are multiple monosyllabic lexical roots that do not undergo such a process as they do not end in a creaky vowel (e.g. the verb /nó/ 'kill', the indefinite pronoun /ná/ 'what/who, something/someone').

As detailed in this section, most segmental processes in Yukuna are motivated by hiatus avoidance. Indeed, there are no instances of cross-morph hiatus in the language at all. Morpheme internally, however, vowel sequences (analyzed as adjacent vowel nuclei, and not as diphthongs) are attested, and even sometimes spontaneously produced by optional intervocalic elision in speech.

8 Summary and discussion

In total, out of the 30 tests applied to a planar structure of 21 positions, a total of 17 different layers were identified. That is to say that there were many instances where several tests fully converged in identifying the same spans of positions from the planar structure, although they did not always identify the same span.

In terms of the identified edges, the results show that, quite unsurprisingly for a mostly "suffixing" language, there is little variation on the left edge of the layers, with most tests starting either in positions 9 (person indexes) or 10 (verb core), while there is a lot of variation concerning the right edge (five tests end in position 10, five tests in position 16, three in position 18, two in position 20). This is illustrated in Figure 5, where the "left" and "right" boxes provide the left and right edges of tests, respectively. The Y axis provides the position of the template at which a test starts/ends (from 0 to 20). The X axis provides the number of tests that converge at a given edge. The main left and right edges appear in green.

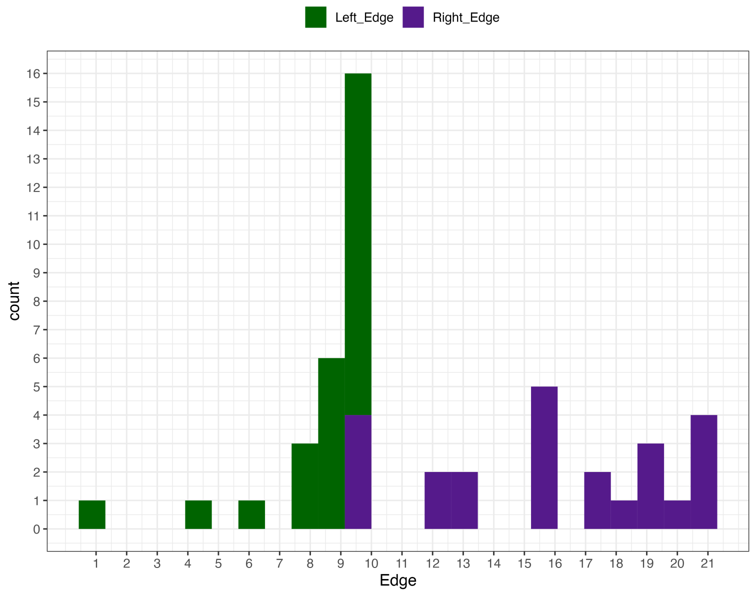

Figure 5: Left and right edges of constituency tests

What these results suggest is that the left edge of the verb complex is quite unproblematic as opposed to the right edge, which is less easily identified. From an Arawakan perspective, it is worth noting the ambiguous status of person indexes in the language, placed in position 9 right before the verb core. In Yukuna, the morphosyntactic status of person indexes is rather ambiguous, as they are included within roughly half of the spans identified by constituency tests, and excluded from the other half. Phonologically, they are bound to the core that they combine with, but less so that bound markers placed after the core, as most tonal processes apply from the core rightward (see §7.1). Syntactically, they function as pro-indexes, as they are mutually exclusive with nominal subjects and possessors, which are rigidly placed before the core as well.

The synchronic features of person indexes in Yukuna fit very well with the diachronic scenario posited by Danielsen (2011) for the southern branch of the family, wherein person indexes are said to come from a single set of free person forms (reconstructed for proto-Arawakan by Payne 1991) that grammaticalized into bound forms in the different languages, with varying degrees of morphophonological fusion with the verb core depending on the language.

Next, in terms of rates of span convergence, that is to say, the degree to which different diagnostics identified the exact same span from the planar structure, we note that in Yukuna, out of all the 17 layers identified, only three had a convergence rate above two. The three identified layers are presented in Table 2, with their size, convergence rate, and the domains of the tests that identify them (phonological or other and morphosyntactic plus indeterminate tests).

Table 2: Layers, convergence, and domains

layer	left edge	right edge	convergence	main domain
1	10	16	3 tests	PH
2	9	10	4 tests	PH
3	10	17	3 tests	MS

When we break down the convergence rate per test domain, we note that layers 1 and 2 are mostly identified by language specific phonological tests, while layer 3 is mostly identified by cross-linguistically common morphosyntactic constituency tests. At such low convergence rates (of 3-4), it is unclear whether these different layers could be analyzed in terms of a split between the phonological (layers 1-2) vs. grammatical words (layer 3). In fact, note that layers 1 and 3 are almost identical in their identified spans (layer 1 excludes the middle voice marker in 17, while layer 3 includes it), despite being identified by tests from different domains. To contrast these results with the practical definition of words in Yukuna adopted in the grammar sketch, layer 1 corresponds to what I considered to be the phonological and grammatical word in the language, with all remaining formatives of the verb complex being classified as ‘clitics’. However, as the results of this methodology have shown, there is no real reason to consider layer 1 as being a more valid word candidate than layer 3. In other words, the results do not clearly point in the direction of a bisection between phonological vs. grammatical words, with high convergence of tests within each domain but not across domains; nor do they suggest a single wordhood candidate with high convergence of tests across all domains. What the results do suggest, however, is that there is a split between the core and its preceding formatives on one hand (layer 2), and the core and its following formatives on the other (layers 1 and 3).

In terms of layer size, the results show that layers in Yukuna vary from a very small layer of two positions (layer 2) including the person indexes and the verb core, to a larger layer of eight positions (layer 3), which excludes person indexes and includes postposed verb formatives up until position 17. Given the differences in layer size and low degrees of convergence, it is hard to provide a precise account of the degree of synthesis of Yukuna, but tentatively using the largest layer in Table 2 (layer 3) as the maximally inflected verb form would give us a total of 7 categories per word (counting valency markers twice, in position 11 and 17). This score places Yukuna as a language with a moderately high degree of synthesis (compared with the scales in Bickel & Nichols 2013), in contrast with languages in the higher ends of the scale (with 12 to 13 cpw). It is interesting also to contrast the maximally inflected verb form with a frequency-based definition of synthesis. Impressionistically, verbs in Yukuna show a strikingly low degree of synthesis, with most verbs showing only 2 to 3 marked categories per word (typically, person, tense and valency). On this account, Yukuna can be considered as a language with a moderately low degree of synthesis. These results fit well with the widespread idea according to which Northern Arawakan languages are less synthetic than those from the Southern branch (Aikhenvald 1999).

Finally, in terms of orthographic conventions used by Yukuna speakers, the orthographic word broadly corresponds to layer 3 (positions 9 to 20), including the verb core and all of its formatives, regardless of their phonological properties (frustrative *jlá* in position 19 is written within the same orthographic word despite having its own tone).

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Abbreviations

APPL	applicative	MED	medial
CAUS	causative	MID	middle
CONC	concessive	NMLZ	nominalizer
DEM	demonstrative	NVNEG	non-verbal negation
DIST	distal	PFV	perfective
F	feminine	PROH	prohibitive
FAR	far past	PROX	proximal
FRUST	frustrative	PST	past
HAB	habitual	PTCP	participle
INDF	indefinite	PURP	purposive
M	masculine	SG	singular

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Chapter 12

Constituency in Mẽbêngôkre independent clauses

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This paper presents a sketch in templatic form of the morphology and syntax of Mẽbêngôkre, a Jê language from central Brazil, and evaluates various diagnostics for wordhood and constituency in the language. Diagnostics for constituent structure converge to identify a verb stem approximately coinciding with the word boundaries of my earlier practice, though its left edge is somewhat diffuse. Factors other than constituent structure, such as argumenthood and idiomaticity, are claimed to influence how elements in the template behave with respect to various diagnostics, and this effect is particularly clear with the elements that immediately precede the verb stem.

1 Introduction

This chapter describes independent verbal clauses in Mẽbêngôkre, a Northern Jê language spoken in Central Brazil by approximately 13,000 people, divided among the Xikrin and the Kayapó nations. The methodology proposed in Tallman (2021) is applied to the planar structure of these clauses to establish whether the various diagnostics for constituency converge to a clearly discernible "word".

The Jê languages of eastern South America are often described as being of the isolating type. This is not an adequate characterization. As will be evident in the following pages, the morphology of Mẽbêngôkre, quite typical of what one finds in other Jê languages, is rather complex. One may nevertheless concede that the morphology of Mẽbêngôkre contains relatively few productive concatenative affixes, and falls instead mainly into two classes: on the one hand, there is highly fusional morphology very close to the verb root, sometimes displaying limited

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productivity; on the other hand, there are a number of "particles" exhibiting little morpho-phonological interaction with their hosts other than being phrased with them prosodically.

To my knowledge, the question of wordhood has not been explicitly broached in previous work on Jê languages. The practical considerations surrounding the creation of writing systems have forced certain decisions that may or may not be based on consistent application of phonological or morpho-syntactic criteria. The writing system of Mẽbêngôkre was devised by SIL missionaries in the 1970's (Stout & Thomson 1974) and suffered a series of revisions before being stabilized at the time of the publication of the New Testament in 1996. The placement of word boundaries in this standard is not consistent from a phonological or morphological point of view, and seems quite counter-intuitive to most literate native speakers. In this chapter, I find that in independent verbal clauses the diagnostics mostly converge around a verb stem, with specific points in the planar structure where boundaries are less well-defined. Before I describe the issues, I offer an overview of the Mẽbêngôkre language and speakers and of the main facts of Mẽbêngôkre phonology and morphosyntax.

2 Mẽbêngôkre speakers and the author's fieldwork

Mẽbêngôkre belongs to the Northern branch of the Jê language family that in the period that preceded the European conquest occupied most of the Central Brazilian Plateau, as well as the interior regions of Southern Brazil. Jê is the main branch of the larger Macro-Jê family, which includes small families both to the east of Jê proper (Maxakalian, Kamakanan, Borum), to the west (Jabutian, Rikbaktsa, Chiquitanoan) and in pockets within Jê territory (Ofayé, Karajá); for classification, see Nikulin (2020). All Macro-Jê languages except for Chiquitano, its most distant member, are spoken entirely within the present-day borders of Brazil, in an area south and west of the Amazon and Madeira, and just shy of the Atlantic coast to the east. The Jê are known for living in large circular villages with a central plaza used for political debate and ritual, and for their efficient military organization, which kept Brazilian colonization at bay until the mid-20th century in many parts of the region.

The Mẽbêngôkre ('those that are *ngôkre*', i.e., 'cavity of the water', an opaque reference never satisfactorily explained in the literature) or Ngôkrejê, currently live mostly within the Xingu basin, with a few villages in the basin of western tributaries of the Araguaia. They most likely hail from farther east, though they were known to raid as far west as the Tapajós during the 20th century. All contemporary Mẽbêngôkre share this self-designation, yet for most of their recorded history they did not see themselves as a unified polity, but rather lived as relatively small autonomous communities showing varying degrees of mutual antagonism; for a detailed history, see Verswijver (2018). Linguistically, their subdivisions are of little consequence except for the oldest of them, that between the Xikrin and the Kayapó, but even in this case the differences are relatively minor. The Kayapó account for at least four fifths of the total Mẽbêngôkre population, and live in over two dozen villages in a mostly continuous stretch of land in southern Pará and northern Mato Grosso. The Xikrin live in around ten communities in two separate territories further north. The Kayapó's major subdivisions are Mẽkrãknõti, which includes Northern, Central and Southern Mẽkrãknõti – the latter also known as Mẽtyktire – to the west of the Xingu river, and Gorotire or Djudjêtykti, which includes Kubẽkrãkênh and Kôkrajmôrô, to the east. This division is quite clear in sociological and political terms – the groups were contacted more than twenty years apart by different colonization fronts, and their post-contact history differs significantly – but irrelevant linguistically.[1] A further branch of the Kayapó, the Irã'ãmrãjre, living farther east in the savannas of the Araguaia, became extinct in the first half of the 20th century. Their language is documented in Sala (1920).

The Jê languages closest to Mẽbêngôkre are Apinajé to the east and Kĩsêdjê and Kajkwakhrattxi (also known as Suyá and Tapayúna, respectively) to the west and south. After contact, the Kajkwakhrattxi were relocated to Mẽbêngôkre-Mẽtyktire villages and maintain close ties with them. On the whole, however, peaceful contacts with neighboring groups only occurred exceptionally during the known history of the Mẽbêngôkre. One case is the alliance between the Mẽbêngôkre-Xikrin and the Xambioá (Karajá), later broken. Another case of an initially friendly contact that later soured is that between the Kayapó-Mẽkrãknõti and the Yudjá, also known as Juruna (see Verswijver 1982). Salanova & Nikulin (2020) discuss the linguistic effects of these contacts.

I conducted my first visit to the Mẽbêngôkre-Xikrin in early 1996, and to the Mẽbêngôkre-Kayapó later that same year, and have returned to the field almost yearly except for a 4-year period during my doctoral studies and in the peak years

[1]Nowadays, and perhaps throughout the recent history of the Mẽbêngôkre, the identification of dialect differences is complicated by a number of recent migrations and influences. To cite only one example, many Gorotire Kayapó migrated to Xikrin communities starting in the late 1980's or early 1990's, and fulfill important roles due to their greater experience with non-indigenous society. The ascendancy of Kayapó in the Xikrin communities of Cateté makes identification of dialect differences difficult without a systematic survey, which I never carried out. Any differences between the varieties that are identified in my work are impressionistic, though confirmed by my main consultants, who are familiar with both varieties.

of the Covid-19 pandemic. Villages where I've recorded language data include the two main Xikrin villages in the Cateté Indigenous land, the Mẽkrãknõti villages west of the Xingu (Baú, Kubẽkàkre, Mẽtyktire, Kapôt), the Gorotire village of Motukôre, and the small Gorotire settlement at Las Casas. I have also conducted linguistic research in the Brazilian city of Redenção, where an increasing number of Kayapó-Gorotire have been taking residence. I have recorded texts from both Kayapó and Xikrin speakers, going from the generation born just before contact (now over 80 years old) to people more or less contemporaneous with me (i.e., now in their 40's and 50's). The more careful linguistic elicitation – as well as the annotation and correction of translations and transcriptions – has been carried out since 2007 primarily with two individuals, both of them Kayapó-Gorotire by birth, but with strong Xikrin links.

In part because of the inability to return to the field during the period that the chapter was written, I've used very little elicitation to back the findings in this chapter. The methodology used can be described as corpus-assisted: my knowledge of the language, decanted over 25 years of research, is sufficient to produce hypotheses that can be easily tested by consulting the corpus of texts. Particularly useful for this chapter given its size was consultation of the New Testament translation mentioned above, very idiosyncratic in terms of lexicon but fairly reliable for questions such as order of particles. This corpus-assisted methodology yields easily verifiable results; however, with it certain questions can only be pushed so far: the template will rarely be densely filled in texts, and examples where more than one particle occurs in a certain zone are hard to come by, even if I know such configuration to be possible. The correct interpretation of the examples was verified during a trip to the field in the summer of 2022, when most of the chapter was already written.

3 Brief introduction to Mẽbêngôkre syntax

Like most other Jê languages, Mẽbêngôkre is consistently head-final and predominantly head-marking. The one clear inflectional category, which cross-cuts the noun, verb and adposition classes, is person. Essentially a single series of person indices ("absolutive", not given a case label in my glosses) exists for various functions (subject of non-finite or nominal intransitives, object of transitives, object of postposition, complement of nouns), though a small number of postpositions and a subset of transitive verbs govern an accusative series which is distinct from the absolutive in the third person only (the verbs in question govern the accusative only when finite). Contrary to what happens in many other languages of the region, Mẽbêngôkre does not exhibit person hierarchy effects in its inflection – which is essentially tied to specific grammatical functions – , with a single exception: eccentric agreement with the subject in the case of a second person A and a third person P, in accusative-governing verbs. The following examples show this inflection in words of various categories.[2]

(1) a. (finite verb)

ga	*i-pumũ,*	*ba*	*a-pumũ,*	*ba-pumũ,*	*gu*	*omũ*
2nom	1-see.fin	1.nom	2-see.fin	1incl-see.fin	1incl.nom	3.see.fin

‘you see me, I see you, he/she/it sees us (incl.), we (incl.) see him/her/it’

b. (nominal predicate)

i-kanê,	*a-kanê,*	*ba-kanê,*	*kanê*
1-sick	2-sick	1incl-sick	3.sick

‘I’m sick, you’re sick, we (incl.) are sick, he/she/it is sick’

c. (adpositions)

i-mã,	*a-mã,*	*ba-mã,*	*ku-mã*
1-to	2-to	1incl-to	3acc-to

‘to me, to you, to us (incl.) to him/her/its’

d. (relational noun)

i-nã,	*a-nã,*	*ba-nã,*	*nã*
1-mother	2-mother	1incl-mother	3.mother

‘my mother, your mother, our (incl.) mother, his/her/its mother’

Arguably, the obligatoriness of person inflection on a lexical root reflects a deeper property, which cross-cuts the lexical categories, that I have called *relationality* in previous work (e.g., Salanova 2007 speaking about nouns; the notion is laid out systematically in Salanova & Nikulin in press). Relational roots have to be preceded either by person inflection (which is referential) or by a noun phrase, which I call the *complement*. In practice, this complement is often morphologically unexpressed, and the relationality of a root may only be seen in the rest of the paradigm and in the fact that anaphoric reference to some entity is always understood in the absence of an overt marker. The examples in (1) may be supplemented with the following, which show the complementarity between person indices and noun phrases:

[2]Example (1a) shows some of the morphophonology associated with third person inflection in some stems. For discussion, see Salanova (2011).

(2) a. *prõ pumũ, omũ*
3.wife see.FIN 3.see.FIN
'saw his wife, saw him/her'

b. *prõ mã, ku-mã*
3.wife to 3ACC-to
'to his wife, to him/her'

c. *tep kanê, kanê*
fish poison 3.poison
'fish poison, its poison'

Non-relational roots, on the other hand, may never be directly preceded by inflection or by a nominal complement, and there is no implicit reference to a participant in that function. Devices such as adpositions or derivational mechanisms allow for the expression of, e.g., the possessor of an alienably possessed noun.

Number is independent of person except in the first person inclusive. Particles for paucal and plural exist which are placed immediately before the bound person indices or immediately after a nominative pronoun. In the case of first person inclusive, the number particles are bound with the nominative pronoun, making multiple exponence of person obligatory whenever a number index modifies a bound person index:

(3) *ar i-nhõ kikre, gwaj ba-nhõ kikre*
PAUC 1-POSS house 1INCL.NOM.PAUC 1INCL-POSS house
'our (excl.) house, our (incl.) house'

The order of elements within the Mẽbêngôkre clause is fairly rigid, though there are specific places, discussed in §5, where this rigidity can be overcome. The following diagram (from Salanova 2007) is broadly true for declarative sentences expressing categorical judgments (see discussion of example (12)), and forms the basis of the planar structure developed below. For convenience, we have added the numbers of positions in this planar structure to our earlier template.

(4)

··· *left field* ···		········· *middle field* ·········				*right field*
Focus	Tense	Subject	Aspect	Objects	Predicate	Modifiers
1-2	3	4	5-8	9-12	13-16	17-22
djwỳ	ne	ba	arỳm	amim	àr	o=nhỹ
farinha	NFUT	1.NOM	already	self.for	3.roast.NFIN	PROG

"I'm already roasting *farinha* for myself."

This template is insufficient in a number of situations, all of which are characterized by a difficulty in distinguishing simple from complex structures. One common case of this is when noun phrases are quantified or modified. If this happens in the focus position, the complex noun phrases behave like any other noun phrase, (5a); however, if they appear in object position, (5b), a same subject conjunction (SS) or the homonymous nonfuture marker (usually restricted to appear in second position after a single constituent) appears between it and the verb, and the verb takes a referential object index, as if its complement was recovered anaphorically from an earlier mention.[3]

(5) a. *Tep amẽ=n ikjê=kêt ne ba ku-by.*
fish two=SS 3.partner=NEG NFUT 1.NOM 3ACC-grab.FIN
'I grabbed *three fish*.'

b. *Ba tep amẽ=n ikjê=kêt ne ku-by.*
1.NOM fish two=SS 3.partner=NEG SS/NFUT 3ACC-grab.FIN
'I grabbed three fish.'

The latter construction is sui generis. It has what is plausibly a sentential conjunction in the middle of it, but it would still make little sense to consider it as consisting of two conjoined sentences, since the first person nominative subject would be hanging, without any semantic role tying it to the first conjunct.

Another case where the template seems to break involves sentential modifiers. The post-verbal position is generally reserved for elements that govern the nonfinite or nominal form of the verb, something which is formally identical to subordinating it. There is a continuum between highly grammaticalized modifiers of this sort such as negation and cases where the construction is clearly biclausal. The following examples show a few points in the continuum. The subordinating element is in bold.

(6) a. *Arỳm krĩ mã i-tẽm* ***kadjy****.*
already village to 1-go.NFIN for
'I'm about to go to the village.'

b. *I-je 'ã akre* ***kadjy*** *ne me i-mã ku-ngã.*
1-ERG on 3.count for NFUT PL 1-to 3ACC-give.FIN
'They gave it to me so that I would count it.'

[3]Note that the number three is itself composed of two parts conjoined by a sentential conjunction: '[they are] two and [there is one with] no partner.'

(7) a. *Mỳj dja ba i-je arẽnh **o**?*
what FUT 1.NOM 1-ERG 3.say.NFIN with
'How should I tell it?'

b. *Ba arỳm arẽnh **o** nhỹ.*
1.NOM already 3.say.NFIN with sit.FIN
'I'm already telling it (sitting down).'

c. *Kàj bê àmra **o** ku-m kabẽn.*
loud at 3.cry with 3ACC-to 3.speak
'He spoke to him crying loudly.'

It might seem straightforward to say that only the (a) sentences in (6) and (7) involve grammaticalized modifiers, while all others should properly be called complex. However, the construction in (7b) has likely also been grammaticalized as a progressive, a construction where the postural verb is not interpreted literally. Other prima facie complex constructions seem grammaticalized to introduce semantic modifiers of the situation rather than new situations; in fact, there is no way of modifying duration in a clause, for example, other than what is seen in the following example, taken from the New Testament translation.

(8) *Ar tyk ja pumũnh o kumex 'ã akati amãnhkrut ne*
PAUC 3.dead this see.NFIN with much on day two and
ikjê=kêt ne 'ã mêdjija.
3.partner=NEG and on midday
'They watched over the dead for three and a half days'. Literally: 'there were [passed] three days and [it was already] midday on [the extent of] them looking over the dead ones.' (Apocalypse 11:9)

My decision in this regard is pragmatic rather than principled. In previous work (Salanova 2008), I have insisted that all such cases are usefully considered to be complex. For the purposes of this chapter, however, it is worth recognizing the fact that a small class of governing post-verbal elements occur significantly more often than others in prima facie simple clauses, and their order is relatively fixed. These elements include a handful of postpositions which do double duty as aspectual modifiers, posture verbs that function in main clauses as progressive auxiliaries, negation, and a few manner modifiers recruited from the class of relational nouns. In such cases, even though a complex structure could be argued for, I've opted to consider the elements as part of a single independent clause template.

The same point could be made with certain coordinated structures, of which the following is an example.

(9) *Ne kam ku-m kabẽn tẽn wadjà.*
ss then 3ACC-to 3.speak go.ss enter
'And he walked speaking to him as he entered.' Literally: 'talked to him and went and entered.' (Acts 10:27)

In this chapter, I treat each of the strings between same-subject conjunctions (ss) as separate clauses, even if their semantic cohesion might suggest otherwise. The matter needs to be investigated further, to determine in particular whether the choice of verbs that are coordinated in this way is free or has crystallized into a small number of fixed senses.

4 Mẽbêngôkre morphology, as traditionally understood

In the introduction I said that most morphology in Mẽbêngôkre could be classified as either (1) elements very tightly bound with the verb root, often semantically idiosyncratic, non-concatenative or not fully productive, or (2) optional elements that have some degree of freedom in their ordering, and that seem bound to their hosts only as a consequence of being prosodically deficient. My implicit approach in previous work was to consider only the first type as morphology. The elements in the second class could be called "clitics" or "particles", uninformative terms that I use here informally for elements that do not display any morphophonological interaction with their hosts, and display either some variability in prosodic phrasing (attaching alternatively to the right or to the left) or the possibility of appearing as free-standing elements.[4]

All morphology of the first type on Mẽbêngôkre verbs is prefixal save for finiteness.[5] In addition to person inflection, there are two families of valency-reducing prefixes that are fairly productive: an anticausative and an antipassive. All but one subclass of transitive verbs, those that assign accusative case, as well as some relational nouns, have a prefixal relationalizer or transitivity prefix. These may be seen in the following examples.

[4]The form of clitics when they stand free may differ slightly from their form when they are phrased with other material. The unstressed demonstrative *ja* becomes stressed *jã* 'this one', for instance, while the focus-associated particle *bit* 'only' becomes *ajbit*.

[5]On nouns, there are diminutive and augmentative (in Kayapó it is a free-standing root), as well as "honorific" and vocative suffixes used on kinship terms, all of which could be considered to belong in this class. The diminutive is exemplified in (10c).

(10) a. *i-bi-xa-djwỳ-rỳ*
1-antic-tr-put_down.pl-nfin
'us coming down'

b. *i-dju-ja-rẽ-nh*
1-antip-tr-tell-nfin
'me telling stories'

c. *i-ka-my-re*
1-rel-male-dim
'my little brother'

The cohesion of these affixes is clear enough for me to define a verbal word comprising them (the verb stem would be the verbal word without the person prefix; see the definition in §6.1). Note that none of these affixes is obligatory in general (they may be obligatory for a given root or class of roots), so that there are verb stems that consist only of a root: *rwỳ* 'go down (sg.)', *tẽ* 'go (sg.)', etc. This comes up again when discussing imperatives below.

There is some degree of semantic or morphological idiosyncrasy in all the affixes comprising the stem, and other than the finiteness suffix, their productivity is not high. The transitivity prefixes are borderline morphology, as they display a high level of lexical idiosyncrasy both in selection of hosts and in contribution to meaning, to the extent that in most cases it is impossible to separate them from the root. Despite this, they have been recognized as morphology in previous work; for discussion see Salanova (2014a), as well as de Oliveira (2005: 116–128) for the related language Apinajé. This is supported by a handful of sets of verbs that differ only in the prefix, as well as by a small number of cases where plural number is associated with the prefix.

Among the elements of the second type are several "clitics" in the informal sense proposed above. These fall into at least three different classes:

1. Noun-phrase internal modifiers, such as demonstratives, quantifiers, and particles like *bit* 'only', which may be free-standing or lean on the material to their left, with which they are invariably related morpho-syntactically (or, in the case of *bit*, via association with focus). These are slots 7 and 9 in the noun phrase template.

2. Postpositions, which, though normally related morpho-syntactically to the phrase on their left, may form an idiomatic unit with a verb to their right and phrase prosodically with it (in which case I consider them to be preverbs, slot 11 below). Postpositions may also appear to the right of the

non-finite form of a verb, either acting as a clausal modifier if the verb in question heads the matrix clause, or subordinating that verb to some other predicate (see discussion of examples (6)–(7)); this is slot 17 below.

3. Adverbial particles, which occupy specific positions in the clause (slots 3 and 6, and zone 5 below) and lean onto a host to their left. These normally do not form a morpho-syntactic constituent with their phrasal hosts, but rather are clause modifiers.

The most interesting of these is the second class: postpositions may phrase to their left with non-finite forms of verbs or with nouns, or to the right with verbs, but may be freestanding in certain circumstances. The following examples show these three possibilities.

(11) a. *ba kàx=o krã-'yr o=dja*
1.NOM knife=with 3.head-cut.NFIN with=stand
'I'm cutting it with the knife.'

b. *o ne ba krã-ta*
3.with NFUT 1.NOM 3.head-cut.FIN
'I cut it *with it*'

The behavior of adpositions is related to another gradient area of Mẽbêngôkre syntax, namely the distinction between arguments and adjuncts in the verb phrase, or, relatedly, the degree of idiomaticity of a sequence of adposition and verb. The interaction between these factors comes up again below, but a detailed discussion is beyond the scope of this chapter. For more information, see Salanova (2014b).

Aside from these morphological processes, compounding is rather important in Mẽbêngôkre, but since it is a phenomenon of the nominal domain it is discussed only briefly in this chapter, in §5.2. For the role of compounding in word formation, see Salanova & Nikulin (2020).

5 Mẽbêngôkre planar structure

The planar structure for independent clauses is provided in Table 1. A number of positions around the root are exclusive to verbs (e.g., valency-reducing prefixes, finiteness suffixes), but the template is essentially the same for matrix nominal predication, which is not discussed separately here.

Table 1: Verbal planar structure of Mẽbêngôkre

Pos.	Type	Elements	Forms
(1)	slot	polar interrogative particle	*djãm*, *djori*
(2)	slot	XP fronted for contrast	(open)
(3)	slot	tense/mood marker	*ne*, *dja*
(4)	slot	nominative subject NP or pronoun	(open)
(5)	zone	particles of varied semantics	*arỳm*, *on*, *'ỳr*, *tu*, *bit*, *kam*, *te*, *arek*, etc.
(6)	slot	subject paucal number	*ari*
(7)	slot	oblique subject NP or index	(open)
(8)	slot	oblique subject marker	*-te*/*-je*, *-mã*, *-bê*
(9)	zone	XP (adjuncts)	(open)
(10)	slot	direct object NP or index	(open)
(11)	slot	"preverb"	*o*, *mã*, *kam*, *'ã*, etc.
(12)	slot	subject person	*i-*, *a-*, *ba-*, 0-
(13)	slot	valency-reducing prefixes	*aj-*/*bi-*, *a-*/*djà-*/*dju-*
(14)	slot	transitivity prefixes	*ka-*, *nhi-*, *py-*, etc.
(15)	**slot**	**VERB ROOT**	**(open)**
(16)	slot	non-finiteness suffix	*-r*, *-nh*, *-m*, *-k*, *-x*
(17)	slot	P (governed by auxiliary)	*o*, *mã*, *mo* (< *mã* + *o*)
(18)	slot	subject person (on aux.)	*i-*, *a-*, *ba-*, 0-
(19)	slot	auxiliary root	*nhỹ*, *nõ*, *dja*, *mõ*, etc.
(20)	slot	non-finiteness suffix	*-r*, *-m*, etc.
(21)	zone	non-verbal governing modifier	*kêt*, *rã'ã*, *kadjy*, *mã*, *'ỳr*, *pro*, *kajgo*, etc.
(22)	slot	light manner predicates	*o*, *kute*
(23)	slot	nominal subordinate clause	(open)

Some freedom in ordering is allowed in three distinct areas of the clause: in the left field of the clause (zone 5), a number of particles with varied semantics (aspectual, conditional, frustrative, hearsay evidential, etc.) are ordered in a way that partly reflects their semantic scope; in the middle field (zone 9) various XP dependents of the predicate are ordered according to principles of selection (more object-like closer to the predicate, more adjunct-like farther from it); in the right field (zone 18) several modifiers that govern the predicate are ordered scopally. Slots 2 and 23 are for constituents that are information-structurally marked; while slot 2 is very often filled, slot 23 is used more rarely, and only for heavy constituents such as non-finite subordinate clauses, in which case it is not entirely clear that the construction doesn't involve the paratactic juxtaposition of two clauses rather than a single complex clause.

Several additional complications are avoided by my choice to cut sentences wherever a conjunction appears, as discussed in §3. Finally, there are a few adverbial particles that have a variable or an as yet undetermined position in the clause, such as the durative *ari*. These are also excluded from the template.

One final general remark regarding the template that I propose is that it is modelled primarily on statements that convey categorical judgments, that is, those that have a theme-rheme structure. Clauses where this is not the case exhibit orders that deviate from the proposed template, though not radically: the subject, normally in 4, might appear as far into the clause as the left edge of zone 9. In the following sentence expressing a thetic judgment, the subject appears after two particles from zone 5:[6]

(12) *arỳm* *amrẽ* *Kajtire* *tẽ*
5 5 4 15
already hither Kajtire go.FIN
'(It is already the case that) Kajtire is coming.'

5.1 Interactions among positions in verbal clauses

Two interactions between positions in the template should be pointed out. Both of them have to do with the effects that governing elements in slots 17, 19, and 21 have on the finiteness of verbal heads, and the effect that verbal finiteness has in turn on the expression of arguments. The fact that so much changes in the clause according to whether the lexical predicate is governed or ungoverned by an auxiliary raises the question of whether the finite word, be it a lexical verb or an auxiliary, shouldn't be considered the head of the clause, with the template rearranged accordingly. Our decision regarding this is based on the mostly practical considerations raised on page 520.

The first of the interactions may be summarized as follows: if there is an element in slot 21, then the auxiliary (if present) will have a non-finiteness suffix in slot 20. If an auxiliary is present in slot 19 or a non-verbal governing modifier is present in 21, then it will be the verb root that will have a non-finiteness suffix in slot 16.

The second interaction affects the presence of person indices. Verbs or auxiliaries that are non-finite differ from finite verbs and auxiliaries in the expression

[6]For the thetic vs. categorical distinction, see Kuroda (1972).

of their arguments. A non-finite auxiliary will have a person index in slot 18, while a finite one won't.[7] Slot 12 is filled in most nominal predicates and non-finite intransitive verbs, and with a few finite intransitive verbs such as *kato* 'to exit' and *nhire* 'to let go'. In transitive verbs, position 10 is filled regardless of finiteness, but a third-person index in this position is in complementary distribution with a full noun phrase.

My separation of position 10 from position 12 in the template hinges on the fact that the former permits a noun phrase while the latter may only be filled by a person index, which can be co-referential with a noun phrase in slot 4. If a verb governs an oblique object, there will be an element present in 11, and a subject person index will occupy position 12 under specific circumstances. A typical example is the following:

(13) *ba* *ku-m* *i-nhire*
4 10-11 12-15.16
1.NOM 3ACC-to 1-let_go.FIN
'I let him/her go, I dropped him/her off.'

The first object of a verb, whether direct or oblique, may be differentiated from other objects by a number of diagnostics. Its interpretation is limited to certain thematic roles, for instance, and if oblique, it obligatorily strands its adposition when fronted.

The analytic choice to separate positions 10 and 12 in the template has practical value in that it simplifies the presentation of the structure of the clause. Still, scholars that are familiar with Northern Jê languages might find this separation arbitrary, since the subject person indices in 12 are in most cases formally identical to the indices used for objects, and the two positions are indistinguishable in the case of regular transitive verbs due to the absence of an object-governing adposition or "preverb" in 11. One fairly cogent objection is that a few verbs governing oblique objects have "expletive" direct objects in the accusative case (I thank Andrey Nikulin for bringing this up):

(14) *ba* *pĩ=mã* *ku-ta*
4 9 10-15
1.NOM tree=to 3ACC-cut.FIN
'I'll fell the tree.'

[7]There are special cases: verbal auxiliaries appearing with stative main verbs, as well as the auxiliaries *pa* 'to complete', *oinore* 'to finish', and a few others, never take person inflection. This process is well understood albeit not fully described in my work, but discussing it here would take me too far afield.

Under the present approach, one would be forced to give the phrase *pĩ=mã* in (14) the status of an adjunct or second object at best, making it different from *ku-m* in (13), which is considered an oblique direct object. This would be quite counter-intuitive and arbitrary. Alternatively, we could consider *ku-* to be in slot 12. This is also a poor fit, as in all other cases the indices in this position are co-indexed with the subject.

Until we have a clear idea of the prevalence and proper analysis of verbs with expletive objects, however, I believe that the existence of a few verbs that behave as in (14) does not justify a change in the template. Regarding such cases, it is not clear to me whether the "expletive" direct object index has reference distinct from or identical to the oblique phrase, but analyses that would imply only a small adjustment to the template are possible for each of those situations. In the first case the construction would be an idiomatic expression with an implicit object, while in the second it could be described as involving differential object marking.

One further point raised by an anonymous reviewer has to do with the secondary exponence of finiteness in a handful of verbs that describe bodily functions, such as the following:

(15) a. *arỳm* *ne* *itu*
2 3 15.16
already NFUT urinate.FIN
'S/he urinated.'

b. *tu-ru* *kêt*
15-16 21
urinate-NFIN NEG
'S/he didn't urinate.'

The appearance of initial *i-* in the finite forms of these verbs can plausibly be related to the allomorphy of valency-reducing prefixes that is discussed in diagnostic [20]. However, in this case the element that is prefixed is meaningless, and should not be considered a morpheme occupying a slot. If additional information later forces me to assign it to a slot, the likely candidate would be slot 13.

Mutatis mutandis, this applies to a more abstract palatalizing prefix identified in Nikulin & Salanova (2019), which is responsible for some synchronically irregular finiteness alternations such as *kate* 'to shatter (FIN)' vs. *ka'êk* 'to shatter (NFIN)': the consonant alternation is never the sole exponent of finiteness, and hence does not need to be considered a morpheme separate from the nonfiniteness suffix.

Finiteness of the main predicate also affects the case of subjects, but this is a complex matter which I cannot address here (for discussion, see Salanova 2008, 2017a). Very broadly speaking, nominative subjects are found with finite verbs, while oblique subjects – a category that includes the ergative – are found with non-finite verbs. Different post-verbal modifiers complicate this picture by allowing nominative subjects to appear with non-finite main predicates. Further complications include the fact that a number of non-verbal predicates also require oblique subjects, that the ergative may optionally appear with active intransitive verbs if adjuncts intervene between it and the verb, and that a nominative pronoun can always be present in an independent clause, even if redundant.

5.2 The noun phrase template

The structure of noun phrases in Mẽbêngôkre is examined in two previous papers, Salanova (2017b, 2020), and is not addressed in detail here. I provide the positions of the nominal planar structure in summary form in Table 2 to allow a simple comparison with the clausal template.

Table 2: Nominal planar structure of Mẽbêngôkre

Pos.	Type	Elements	Forms
(1)	zone	Modifiers	*apỹnh*, PPs
(2)	slot	Complement NP	(open)
(3)	slot	Nominal relator	*ka-*, *nhi-*, *dju-*
(4)	**slot**	**Noun root**	**(open)**
(5)	zone	Governing modifier	*kaàk*, *kajgo*, *djwỳnh*, *mex*, *punu*, *ti*, etc.
(6)	slot	Dimunitive and related	*-re*, *-jê*, *-wa*, *-ti*
(7)	zone	Determiners and related	*ja*, *wã*, *'õ*, *kwỳ*, etc.
(8)	slot	Adposition or case	(small class)
(9)	slot	Focus-sensitive particles	*bit*

The elements that make up the noun phrase are less differentiated than the various elements that compose the clause. It is not clear whether elements in slot 5 should in fact be considered distinct from the root in slot 4. The relationship between these two positions is formally no different than that between two roots in a "compound" (i.e., between positions 4 and 2): the word on the right is a relational word, and takes the one to its left as its complement. For further discussion, see the two papers cited above. Like in the case of post-verbal elements in the clausal template, I have adopted a practical rather than a fully principled solution.

6 Constituency diagnostics

In this section, I describe all imaginable diagnostics for constituency applied to Mẽbêngôkre. By constituency diagnostic I refer to some generalization over the constructions of the language that identifies a subspan in the planar structure. In a first subsection I focus on diagnostics that are commonly applied cross-linguistically to identify words, such as non-interruptability, free occurrence, and so on, unfolded to capture various ways in which they can apply to the language. In the second subsection I discuss diagnostics that are typically used to identify larger constituents, such as pause and the domain of idiomatic interpretation. In the third subsection I discuss phonological and morpho-phonological processes with specific domains of application.

6.1 Morphosyntactic constituency

Among recurrent diagnostics for morpho-syntactic wordhood in descriptive studies are things such as interruptability and fixed order of elements, an identification that rides on a real or imagined contrast between syntactic and morphological principles of composition when it comes to their flexibility and productivity.

For this section, it is useful to define the *verb stem* as comprising slots 13-16. The stem functions as a unit for all the diagnostics in this section. In particular, given the fusional nature of the elements in slots 13, 14 and 15, I often do not show segmentation among them.

6.1.1 Ciscategorial selection (13-16; 8-16)

Mẽbêngôkre independent clauses may be headed by nouns, non-finite verbs, or finite verbs. A number of elements farther from the head of the predicate can occur with predicates of all categories, so it is interesting to ask which slots around the head are conditioned to appear according to the category of root. In fact, this criterion clearly identifies the verb stem as I have just defined it, comprising slots 13-16. Valency-reducing prefixes from slot 13 and non-finiteness markers from slot 16 are never found on nouns. A handful of nouns appear to have transitivity prefixes from slot 14 serving as nominal relationalizers, e.g., *ka-ngô* 'water or juice of…', from *ngô* 'water' (see also (10c)). However, contrary to the transitivizing prefixes, with appear in most transitive verbs, relationalizers appear

Table 3: Diagnostics applied to Mẽbêngôkre

Diagnostic	Description
[1]	Ciscategorial selection of slots (13-16)
[2]	Ciscategorial selection of elements (8-16)
[3]	Minimal free occurrence in imperatives (10-15)
[4]	Minimal free occurrence in declaratives (4-15)
[5]	Maximal free occurrence (3-21)
[6]	Recursive interruption (11-22)
[7]	Non-recursive interruption (11-16)
[8]	Permutation rigidly reflects scope (12-22)
[9]	No permutation permitted (12-15)
[10]	Maximal span repeated in coordination (4-22)
[11]	Minimal span repeated in coordination (10-15)
[12]	Maximal span repeated in subordination (5-15)
[13]	Minimal span repeated in subordination (10-15)
[14]	Pause (11-16)
[15]	Domain for idiomatic interpretation (9-21)
[16]	Fortition at juncture (13-15)
[17]	Dissimilation of homorganic rimes (15-16)
[18]	Aphaeresis of palatal if initial in domain (12-15)
[19]	Suppletion for number (13-15)
[20]	Allomorphy of valency-reducing prefixes (13-15)
[21]	Vowel syncope if non-initial in domain (12-15)
[22]	Largest span on which only one stress occurs (11-16)
[23]	Domain in which stress is final (11-16)
[24]	Echo vowel after domain-final /r/ (11-20)

haphazardly in nouns and never form paradigms with nouns containing other prefixes. I therefore consider them to be a distinct morphological category from verbal transitivizers.

There is a broader way to define ciscategorial selection if one focuses not on the presence of a slot but on the set of elements that a slot may contain relative to the category of the head of the predicate. This is similar but different from the control of allomorphs discussed as diagnostic [20], as it involves elements that are meaningful in isolation, i.e., different adpositions appearing in position 8 according to the subclass of predicate that governs them and to whether this predicate is finite or nonfinite.

In the application of the diagnostics, these two ways of defining ciscategorial selection are distinguished.

6.1.2 Free occurrence (10-15; 4-15; 3-21)

Free occurrence refers to the ability of a certain sequence of elements to stand as a complete utterance. As is natural to expect, there are variables that affect the definition of the free occurrence span, and this requires that the diagnostic be fractured. A first-order fracture distinguishes between minimal and maximal free occurrence. The minimal free occurrence is the shortest independent utterance that spans the verb root. Maximal free occurrence is the single span that extends to cover all elements in the clause that may not appear as free utterances.

The first version of the diagnostic in particular may be further fractured in a number of ways. Given what was said above regarding obligatoriness of inflection, it is to be expected that differences arise between transitive and intransitive verbs, and between finite and non-finite forms of each. Finite intransitive verbs can in principle stand on their own in imperatives, as in (16a), though in practice the additional presence of an adverbial or particle from slots 5 or 9 is more idiomatic, as in (16b). Unless derived, these verbs consist of just the root.

(16) a. *dja,* *tẽ,* *to*
15 15 15
stand.FIN go.FIN dance.FIN
'stand! go! dance!'

b. *kàjmã* *dja,* *'ỳrỳ* *tẽ,* *tẽ=n* *to*
9 15 9 15 15 15
upward stand.FIN up_to go.FIN go.FIN=and dance.FIN
'stand up! go up to it! go dance!'

Transitive verbs, on the other hand, do not forfeit the requirement for person inflection even in the imperative.[8] The span involved would thus be 10-15. Like with transitive verbs, the presence of adverbials or particles is more idiomatic, but not an absolute requirement:

(17) *(on)* *krẽ,* *('ỳr)* *o=tẽ,* *a-ma*
5 10.15 9 10.11=15 10-15
now 3.eat.FIN up_to with=go.FIN 2>3-hear.FIN
'eat it! take it there! listen to it!

[8]Because of a morphological idiosyncrasy of the third person, the object index is zero with some verbs, but is overt with others. See discussion on page 517.

I take the transitive construction to be representative of the minimal free occurrence span with imperatives (diagnostic [3]). With declaratives (diagnostic [4]), a subject normally has to be present. When sentences are coordinated, third-person subjects are frequently omitted. In free-standing utterances omission of an overt subject outside of coordinated constructions is not normally idiomatic but does occur in the third person; that these few occurrences are instances of a morphological zero rather than of the absence of the position is suggested by the obligatoriness of the number particles in the subject-modifying position 6 if reference is plural, as well as by its anaphoricity, already mentioned in connection with third person indices.

Maximal free occurrence (diagnostic [5]) extends across a fairly large span of the sentence. Many post-verbal elements cannot be used as free forms and neither can tense markers (slot 3) or particles in slots 5-6. Regarding these left-peripheral elements, one could more insightfully say that there are two domains for bound elements in the middle field of the Mẽbêngôkre clause, one around positions 3-6, the other centered on position 15, and that a number of free-standing elements can appear elsewhere. For post-verbal elements, their bound status depends as much on prosodic and semantic properties as on the specific position they occupy. Elements in position 17 are always bound, while those in 19 are generally free, as they are identical to lexical verbs (in turn, positions 18 and 20 are bound to them); position 21 contains both free and bound elements: negation *kêt*, for instance, constitutes a complete utterance on its own, whereas prospective *mã* is always bound:

(18) a. *ba* *kam* *ku-m* *arẽ-nh* *kêt*
4 5 9 10.15-16 21
1.NOM then 3ACC-to 3.say-NFIN NEG
'So I didn't tell him/her about it/her/him.'

b. *kêt*
21
NEG
'No; there isn't any.'

c. *ku-te* *ku-m* *arẽ-nh* *mã*
7-8 9 10.15-16 21
3ACC-ERG 3ACC-to 3.say-NFIN PROSP
'S/he is about to tell it to him/her.'

d. # *mã*
21
PROSP

6.1.3 Non-interruptability (11-22; 11-16)

The non-interruptability diagnostic identifies the span overlapping the verb stem that cannot be interrupted by free forms. It is fractured into recursive [6] and non-recursive [7] interruption, i.e., spans that may be interrupted by a single free form and by multiple free forms, respectively. In Mẽbêngôkre, these spans both begin in position 11 and extend to position 16 in the case of non-recursive interruption and to the end of the clause in the case of recursive interruption.

The element that may interrupt the span between the lexical verb and an auxiliary is either a manner modifier which syntactically becomes the main predicate, or the element *ari* 'constantly', which does not govern the preceding element but rather modifies the auxiliary that governs the verb. Examples of each type of interrupting element are as follows:

(19) *Ta ne ami-jo mỳja ma-ri* ***mex*** *o=ba.*
2 3 9 10 15-16 – 17=19
3EMPH NFUT self-with thing know-NFIN well with=3.live
'*He* kept learning things properly for himself.'

(20) *Nã bãm ami-wỳr kam ama-k* ***ar*** *o=i-ba.*
3 4.5 9 11 15-16 – 17=18-19
PRS 1.NOM.PRS self-up_to 3.on wait-NFIN constantly with=1-live
'I keep waiting for him/her to come to me.' (1 Corinthians 16:11)

One might expect that, at least in the case of manner modifiers, wherever simple interruption may occur, recursive interruption may as well. However, recursion of modifiers is not generally permitted in the language (this point may also be seen in the case of modification within a noun phrase, discussed briefly above). Multiple modification requires coordination, which by my definition establishes the boundary of a new planar structure. This leaves as the only recursive device interrupting a span the adjunction of modifiers in position 9:

(21) *Me jã ne me arỳm* ***kadjy ku-m*** *arẽ-nh o=dja.*
2 3 4 5 9 9 12.15-16 17=19
PL this NFUT PL already for 3ACC-to 3.say-NFIN with=3.stand.FIN
'And these ones were talking to him for that purpose.'

6.1.4 Non-permutability (12-22; 12-15)

The order of elements in the Mẽbêngôkre clause is overall fairly rigid, but permutation is possible in several zones, in addition to the possibility of movement to the clause-initial position 2. The former possibility is clear in the particles of zone 5 and the phrases of zone 9, where ordering follows criteria of semantic scope or relatedness to the predicate. Fronting to clause-initial position is also a possibility for many particles found in slot 5, in addition to phrases in 4, 9 and 10:

(22) a. *Arỳm ne ba ar a-mã i-kabẽn jarẽ.*
2 (5) 3 4 9 9 10 15
already NFUT 1.NOM PAUC 2-to 1-speech say.FIN
'I've *already* told you my speech.'

b. *I-kabẽn ne ba arỳm ar a-mã arẽ.*
2 (10) 3 4 5 9 9 10.15
1-speech NFUT 1.NOM already PAUC 2-to 3.say.FIN
'I've already told you *my speech*.'

The left edge of the span identified by the non-permutability diagnostic is thus clearly after 10. The right edge is harder to identify.

Prima facie it might appear that the post-verbal modifiers can front to 2, as in (23b), as long as they are not finite auxiliaries. However, this is an epiphenomenon created by the homonymy between the post-verbal modifiers and adpositions, which may constitute a phrase with a morphologically null complement and are thus mobile. Elements like *kadjy* are always interpreted as adpositions ('for the purpose of NP') when fronted as in (23b), never as verbal modifiers ('supposed to V').

Claiming that what one sees in (24) does not involve the fronting of a manner modifier requires subtler argumentation, but in my view is equally justified: the two sentences are simply built differently, not related by movement, even if the meaning difference in this case is less obvious. The difference in construction can be seen in the fact that the sentence in question is finite (even if the verb does not have the morphology to show it). If *mex* were a governor of the verb, this would not be possible. It can also be detected in meaning, which in (24b) points to *mex* having been displaced from the object position.

(23) a. *I-je ku-m ã-rã kadjy.*
7-8 9 10.15-16 21
1-ERG 3ACC-to 3.give-NFIN PROSP
'I'm supposed to give it to him.'

b. *Kadjy ne i-je ku-m ã-rã.*
2 (21) 3 7-8 9 10.15-16
for NFUT 1-ERG 3ACC-to 3.give-NFIN
#'I'm *supposed* to give it to him.' (only: 'What I gave him is for that purpose.')

(24) a.

I-je	*ipêx*	*mex.*
7-8	10.15-16	21
1-ERG	3.make.NFIN	good

'I made it well.'

b.

Mex	*ne*	*ba*	*ipêx.*
2	3	4	10.15
good	NFUT	1.NOM	3.make

#'I made it *well.*' (only: 'I made a good one.')

Even if such fronting is not possible with the elements in slots 17-22, there are a few cases of permutation in situ which define a span that does not extend to the end of the clause. Auxiliaries may exceptionally appear after adpositional aspectual modifiers, as in example (25), from Romans 7:19, and in (26):

(25)

Te	*i-mã*	*i-jaxwe*	*kĩnh*	*kêt*	*mã*	*o=i-ba.*
(5)	7-8	10	15	21	21	17=18-19
in_vain	1-to	1-evil	like	not	PROSP	with=1-live

'I do the evil that I don't like.'

(26)

Me	*arek*	*a-tykdjà*	*kêt*	*o=a-krĩ*	*ngrire.*
4	5	12-15	21	17=18-19	–
PL	still	2-fatigue	NEG	with=2-sit.PL	small

'Stay and rest (catch your breath) a little bit.'

The interpretation of (25) is not fully clear to me. It is possible that the span beginning with *i-mã* (7-8) and ending with *mã* (the second 21) functions as an adjoined subordinate clause, and that *o=i-ba* doesn't govern it but instead governs a morphologically null third person pronoun that co-refers with *i-jaxwe*. In the case of (26), the structure is straightforward, but the sentence has the disadvantage of having a nominal predicate (*tykdjà*), and of *tykdjà kêt* being an idiomatic expression of sorts. It may be seen, thus, that clear examples of permutation of post-verbal elements are rather hard to find. Still, the nature of these elements is such that permutation should be possible, and might be rare because of scope considerations: prospective scoping over progressive is conceivable, while the opposite is less so, for instance.

Given this, the qualitative distinction between the rigidly ordered morphemes of the verb stem and the freer though only marginally mobile elements that appear after the verb is captured by the two subcases into which the non-permutability diagnostic is fractured: [8] permutation is permitted but transparently reflects scope, and [9] permutation is not permitted at all.

6.1.5 Subspan repetition (4-22; 10-15; 5-15)

When clauses are coordinated or subordinated, part of the content of one of the clauses will typically be elided. The diagnostic of subspan repetition refers to the subspan of the clause that may appear repeated in coordination or in a non-finite dependent clause. This diagnostic is fractured according to each of these cases. In the case of coordinated structures, the diagnostic fractures further into [10] maximal subspan repeated in a coordinated structure involving the verb, and [11] minimal subspan repeated in a coordinated structure involving the verb. In the case of constructions involving subordination, the diagnostic is fractured between [12] the maximal span of elements that may occur in a subordinate clause, and [13] the subset of these that need to be present in any subordinate construction.

The application of these diagnostics is relatively straightforward. The following examples illustrate maximal and minimal examples in coordinated structures:

(27) a. *Dja ba a-m arẽ ga arỳm i-kabẽn ma.*
3 4 9 10.15 4 5 10 15
FUT 1.NOM 2-to 3.say.FIN 2.NOM already 1-speech hear.FIN
'I'll say it and you'll hear my words.'

b. *Dja ba mã tẽ=n abym ar a-wỳr tẽ=n bôx.*
3 4 5 15 5 9 15 15
FUT 1.NOM away go.FIN=SS back PAUC 2-up_to go.FIN=and arrive
'I'll go away and return to you and arrive.'

As can be seen with the third conjunct of (27b), the conjunct can be as small as just the verb stem. On the other hand, if subjects in the conjoined clause are different, the conjunct will necessarily extend to the left all the way to the subject position, 4, as seen in (27a).[9] The second conjunct of (27b) represents an intermediate situation with identical subjects.

Subordinate clauses in general, since they can only be non-finite, have a more limited template which excludes the focus position and the position for nominative subjects. In example (28a), that template is maximally filled. Minimally, it must contain a verb stem, as in (28b).

[9] If the nominative subject is a speech-act participant, the conjunction is unexpressed. For third person subjects, the conjunction may be the same-subject conjunction *ne*, or the different-subject conjunction *nhym*. This raises the question of whether speech-act participant pronouns encompass the conjunction, as proposed by Nonato (2014) for a related language. For reasons of space, we cannot address here the consequences of this analytical step.

(28) a. *Ga* *[ku-te* *ajte* *akubyn* *me* *ba-wỳr* *ano-ro=ja]*
4 7-8 5 5 9 10.15-16
2.NOM 3ACC-ERG again back PL 1INCL-up_to 3.send-NFIN=this
pumũ.
15
see.FIN
'You see that he has sent him back to us.' (Luke 23:15)

b. *Ne* *kam* *[uma=je]* *prõt.*
5 10.15 15
and then 3.fear=because 3.run
'And then s/he ran because of fear.'

6.2 Syntactic and semantic criteria (11-16; 9-21)

Pause is often used to diagnose morpho-syntactic domains. Here it is defined as the smallest span around the verb that can be delimited by pauses (diagnostic [14]); with that definition it defines the same span as non-recursive interruption (diagnostic [7]) and a couple of phonological diagnostics.

Another possible diagnostic for morpho-syntactic domains larger than the verb stem is based on the span of idiomatic interpretation (diagnostic [15]). The following are examples of idiomatic expressions in Mẽbêngôkre extending over various positions of the planar structure:

(29) a. *ba* *arỳm* *i-**tĩn*** ***prãm***
4 5 10 15
1NOM already 1-life want
'I was afraid.' (lit., 'I wanted my life.')

b. *arỳm* *ne* *me* ***bõ-m*** *ku-**mẽ***
5 3 4 9 10-15
already NFUT PL grass-to 3ACC-throw.FIN
'They expelled him.' (lit., 'They threw him to the grass.')

c. *ba* ***pi'ôk*** ***jarẽ-nh*** ***o=dja***
4 10 15-16 17=19
1NOM paper say-NFIN with=stand.FIN
'I'm lecturing.' (lit., 'I'm reading standing up.')

In the case of (29a), one could say that positions 10 and 15 are parts of the idiom; in (29b), 9 and 15 are part of the idiom as well; in (29c), somewhat more tenuously, 19 may be argued to form an idiom with 15, since with a different auxiliary the interpretation is not of lecturing but rather of studying or reading for one's own sake.

A minimal counterpart for this diagnostic could also be defined, but yields less relevant results: only positions 14 and 15 combine to yield meaning in a systematically non-compositional way.

6.3 Phonological and morpho-phonological domains

The aim of this section is the identification of spans required by a number of phonological and morpho-phonological processes around the verbal base in Mẽbêngôkre. Morpho-phonology occurs in specific morpheme junctures, and is of limited relevance to define domains given the small number of morphemes that are affected. Still, a number of diagnostics may be defined on the basis of morpho-phonological processes that apply in certain spans but not elsewhere, and on the basis of allomorph selection. Among the former are [16] strengthening of palatals in certain environments (13-15), [17] dissimilation of high vowels next to homorganic codas (15-16), [18] dropping of certain consonants next to a person index and other allomorphic processes affecting vowel- or glottal stop-initial stems (12-15), [21] dropping of high back vowels in a stem conditioned by prefixation (12-15), and [19] suppletion for number (13-15). Among diagnostics based on control of allomorphs, I identified [20] allomorphy of valency-reducing prefixes based on finiteness (13-15). Not all of these diagnostics need to be discussed.

Diagnostic [16] is based on a fortition process that applies to certain coronal continuants in particular environments. The following distinct instances have been identified:

1. Fortition of /ɾ/ into /t/ or /n/ in the diminutive suffix *-re* when attached to a stem that ends in a noncontinuant coronal consonant. Examples include *kẽn-ne* 'small stone', *amàt-te* 'small piranha', *kwên-ne* 'small bird', *tỳx-te* 'pretty strong'.

2. Fortition of /j/ into /tʃ/ (orthographic *x*) in the honorific suffix *-jê* used in kinship terms, in contexts similar to the preceding process.

3. In Xikrin, /ɾ/ is fortitioned to /t/ or /n/ before a consonant within a certain domain which includes stems in compounds and some extra dependent categories: *par-kà* 'shoe' → [patˈkʌ], *bàr-prà* 'charcoal' → [bʌtˈpɾʌ], *ar ga* 'you few' → [anˈga] (though in this case [an] is maintained in domain-final position, while [aɾ] is only found before vowels; see diagnostic [24]).

4. The morpho-phonological fortition of /j/ in verbs that receive the anti-causative prefixes *aj-* and *bi-*. Examples of this in the lexicon are few, but the rule applies consistently: /bi-jabjeɾ/ 'to trickle' → [bitʃaˈbjeɾe], /bi-jaeɾ/ 'to play' → [bitʃaˈeɾe]. With the prefix *aj-*, employed with finite verb forms, there is some irregularity: /aj-jabij/ 'to trickle' → [atʃiˈbija], /aj-jae/ 'to play' → [aˈtʃe].

The applicability of this diagnostic around the verb is rather limited, since most environments for fortition occur in the nominal domain, but it does define a span that extends to the right from slot 20 to the left of the verb root, and, if one accepts the following data from a speech style called "angry speech", where *-re* fails to fortition, excludes post-verbal modifiers in position 21:

(30) a. *Ba on me'õ bũnh=re.*
1NOM now someone kill=DIM
'I'm going to kill (< *bĩ*) someone.'

b. *Ba on mỳja krõnh=re.*
1NOM now eat=DIM
'I'm going to eat (< *krẽ*) something.'

Diagnostics [18] and [21] refer to a family of stem changes, some of which are clearly morphologically triggered, while others likely rely on morpho-phonological domains. Certain stem-initial consonants on verbs and other lexemes get deleted when initial in a relational stem whose complement is not overt, while in almost exactly opposite circumstances a high back vowel on the initial syllable of the stem is dropped. The following data exemplify this.

(31) a. *ngô jadjà*
water put_in.FIN
'to fetch water'

b. *adjà*
3.put_in.FIN
'to put it in'

(32) a. *kà kdjô*
skin peel.FIN
'to skin' (Xikrin pronunciation)

b. *kudjô*
3.peel.FIN
'to skin it'

Elsewhere (Salanova 2011) I argued that the prima facie morpho-phonological process in (31) is not in fact domain-dependent but rather is the non-concatenative exponence of third person inflection. This is reflected in my glosses. The diagnostic is considered not to apply in such cases. The process in (32), on the other hand, does define a domain, differently in the Xikrin dialect (where it identifies span 10-15) than in the Kayapó dialect (where it identifies the same span as (31)).

The relevance of this diagnostic is likely greater for homologous morpho-phonological processes in closely-related languages (such as the realization Timbira prenasalized consonants, discussed in Salanova 2011), where proclitic elements that are not directly governed by the element that follows affect the application of the rule.

A strictly morphological diagnostic may be defined with reference to the exponence of number. Diagnostic [19] defines the maximal span around the verb root over which suppletion for number may apply. Such "suppletion for number" in Mẽbêngôkre is not clearly a reflex of a productive morphological process. Though a number of verbs exist that oppose a singular/actional form and a plura(ctiona)l form and a handful of these encode the opposition by means of non-suppletive morphology (mainly by substitution of the transitivity prefix), the distinction does not pervade the verbal lexicon of the language, and might be better characterized as relating pairs of lexically distinct verbs. If the distinction is considered morphological, then there is a clear maximum span for what may be suppleted.

Take the two verbs used for the plural and singular form of 'descend' or 'be born', respectively *bixadjwỳr* and *rwỳk*. The singular form suppletes for a plural form that includes transitivity prefixes and an anticausative prefix. The stem composed by *ja-* and *djwỳ-r* independently means 'to lay down (plural)'.

(33)

13	14	15	16
bi-	*ja-*	*djwỳ*	*-r*
		rwỳ	*-k*

In the case of all pairs of postural verbs, the plural form is a nominal predicate, a category which lacks a finiteness distinction. The following example is from the singular and plural verbs 'to sit':

(34)

15	16
nhỹ	*-r*
krĩ	

I consider this suppletion for number to be (residual) morphology based on the importance of the number distinction in other languages of the family, and identify a morphological span based on it. If suppletion is instead viewed as a matter of choice between two distinct lexical items, diagnostic [19] becomes a replacement test of sorts, where complex verbal bases are replaced by simple ones, again underscoring the validity of this intuitive span.

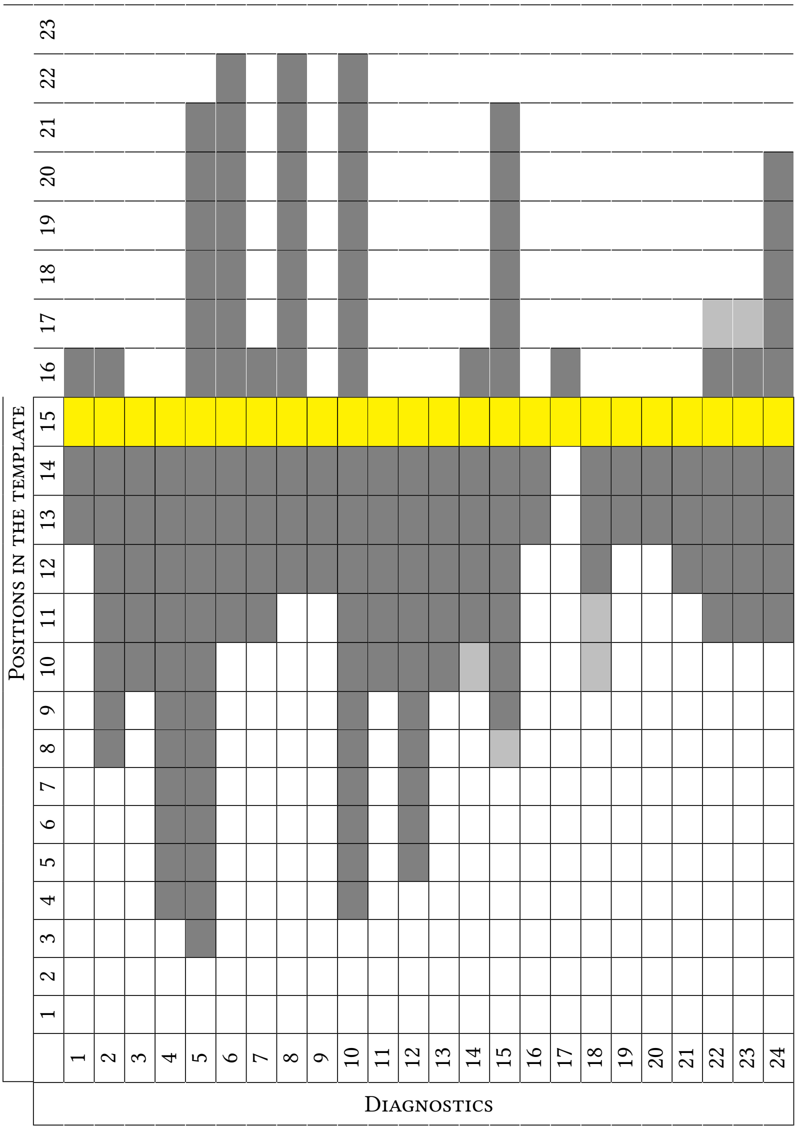
The morpho-phonological processes that I have discussed so far in this section could be described as lexical and structure-preserving. Further domains could be identified with reference to post-lexical or structure-filling processes, though I know of few such processes that apply over spans longer than a single syllable. Stress assignment is one, and I have defined diagnostics based on stress in the following way: diagnostic [22] identifies the largest span on which only one primary stress occurs (11-16), diagnostic [23] identifies the domain on which the position of stress is calculated (11-16; stress is final in this domain).

One last phonological process that is relevant for identification of domains is vowel epenthesis. Epenthesis is claimed to happen domain-finally after all coda segments in Stout & Thomson (1974), but in our own data this is only consistently the case after stem-final /r/ if final in a domain (11-20), [24]. If medial in the domain, /r/ will obligatorily resyllabify if followed by a vowel, without any epenthesis occurring; epenthesis still applies medially if /r/ is followed by a consonant in the Kayapó dialect of Mẽbêngôkre, though in the Xikrin dialect it strengthens to a dental stop with the same voicing and nasality features as the following consonant. A process of simplification of other consonant sequences (*mex jarẽ* 'praise', lit. 'say good' → [mɛtʃaˈɾẽ]) likely applies in the same domain, but I lack precise data to confirm this.

7 Conclusion

Table 4 summarizes the results of applying the diagnostics described above to the planar structure. As can be seen in the table, there is a rather strong convergence of diagnostics that identify a span going from position 12 (or 10, or 11) to position 15. That position 16 is not included might be an artifact of the impossibility of applying many of the diagnostics to that position, filled by a lone consonant, or by my privative definition of non-finiteness, when in reality all verbal predicates should be classified as either finite or non-finite. This span is a good candidate for the verbal word in Mẽbêngôkre, and approximately coincides with the *verb stem* that I had implicitly defined in previous work and in my conventions for transcription. The indeterminacy of the left edge of this span is a matter that was discussed briefly above: here, grouping seems to be less a matter of wordhood or constituency, but of semantic affinity or selection. An orthogonal set of diagnostics could be applied (and in fact were applied in the preparation of Salanova 2017c, even if not included in that publication) to test the affinity among peripheral elements and particular verbs.

Table 4: Application of the diagnostics to the verbal planar structure



Abbreviations

ACC	accusative	NOM	nominative
ANTIC	anticausative	PAUC	paucal
ANTIP	antipassive	POSS	possessive
EMPH	emphasis	PROG	progressive
FIN	finite	PROSP	prospective
FUT	future	PRS	present
INCL	inclusive	SS	same-subject conjunction
NFIN	non-finite		
NFUT	non-future		

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Chapter 13

Graded constituency in the Araona (Takana) verb complex

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This paper provides a description of the verb complex in Araona. There are three layers of structure that show relatively high convergence of logically distinct constituency tests or phonological domains. It is unclear which of these layers should be regarded as the "word", thus making it unclear whether the language should be regarded as isolating or polysynthetic (or something in between). The results of applying constituency tests following the planar-fractal method suggest a much more graded and complex situation than has been described for Takanan languages thus far.

1 Introduction

This chapter provides a description of the verb complex of Araona, an endangered Takanan language, spoken in the Amazonian part of the department of La Paz, Bolivia. I provide a description of the internal constituency of Araona's verb complex by means of the methodology proposed in Tallman (2021b), the planar-fractal method.

The results of this study show some support for the notion of "word" used in Takanan studies insofar as convergences in constituency variables are assumed to be markers of candidate word constituents. However, based on the results there are actually three possible word candidates; (i) one which contains just the verb root; (ii) one which corresponds roughly to the "word" used in other descriptions; (iii) one which includes the entire predicate excluding the object NP.

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Section §2 provides a brief background on the Araona speech community, the fieldwork context and the data for this chapter. Section §3 provides a description of the verbal planar structure. Section §4 discusses free occurrence tests and morphosyntactic tests. Section §5 discusses phonological domains. Some of the phonological domains could be considered morphosyntactic, an issue which I also discuss. A final section (§6) summarizes the results and contextualizes them with respect to the general Takanan literature.

2 Araona language, speakers and fieldwork

2.1 Speakers and fieldwork

Araona is of the Takanik branch of the Takanan language family. It is thus most closely related to Tacana and Reyesano (also known as Maropa) out of the Takanan languages (Girard 1971). Araona is spoken in 5 communities on the Manupari (literally ‘first river’) river (Palma Sola, Barero, Puerto Araona, Peñal, Baranco) and 3 communities of the Manurimi (literally ‘second river’) river (Chacra, Los Angeles, Pampa Alegre), with a total of approximately 150 speakers. The rivers are located in Iturralde province in the department of La Paz, most accessible by docking points that start from rivers in the department of Pando (via Sena or Cobija). All adult Araona speak the language fluently. Based on my own observations in the field and commentary from the Araona themselves, there is some variation in the fluency of younger generation of speakers. Some children on the Manurimi river seem to only have passive knowledge of the language, but the language is still being learnt by children on the Manupari river.

Data were gathered during three trips to Bolivia in 2016 (three months), 2019 (six months), and 2022 (4 months). Additional data have been gathered through correspondence over WhatsApp voice recordings starting in July of 2019 while I was in Germany (see Neely (to appear) for a description of methodology and workflow of online fieldwork). All data gathered from WhatsApp were rechecked with Araona speakers in person in Bolivia in 2022. Previous work on the language was done by Summer Institute of Linguistics (SIL) missionaries Donald and Mary Pitman with a few short and sketchy analyses (Pitman & Pitman 1976, Pitman 1980, Pitman 1981, Pitman & Pitman 1970). SIL publications on the language consist mostly of translations of biblical hymns and evangelical christian myths into the language as the SIL missionaries were mainly concerned with evangelizing the Araona.[1] I do not have access to any audio recordings of the SIL missionaries if these exist and thus I will rely little on data from the missionaries. Hebe González published an important phonological sketch of the language (González 1997). Emkow published a dissertation length grammar of Araona (Emkow 2006, 2019), however, none of the texts on which this dissertation is based are available.

The current chapter is written in the context of an ongoing documentation project of the Araona language, funded primarily by the Endangered Language Documentation Fund, and initially by Labex ASLAN (Université de Lyon, Advanced Studies on Language Complexity). Fieldwork was conducted in the communities of Chacra, Los Angeles, Pampa Alegre, Barero and Puerto Araona. Some fieldwork sessions were also done in the towns of Rampla and Sena (department of Pano) and Riberalta (department of Beni, where the Araona frequent for political, economic and medical reasons). The documentation project currently contains about 17 hours of transcribed and translated texts (Tallman 2021a). This corresponds to about 10,000 transcribed, translated and annotated sentences of naturalistic speech. There are some short texts from the SIL missionaries which total about 600 sentences (Pitman & Pitman 1980). I do not make extensive use of these texts, because I do not have access to corresponding recordings to verify the accuracy of the transcriptions, particularly with reference to the pitch accent patterns, which are important for the current study. While the SIL missionaries did mark "stress" patterns, it is not always clear what the physical meaning is of their accentual markings.

Of potential relevance to linguistic studies on Araona is that the Araona were traditionally split into moeities, one called the Araona (/aɭaona/) the other called the Cabiña (/kambiɲa/). Preferential marriage practices of the Araona were such that an Araona was always supposed to marry a Cabiña, a practice which has eroded since there are now few Cabiña left. The Araona frequently suggest that the Cabiña spoke a different variety of Araona from them, or perhaps a different language all together. Younger speakers such as Oscar Matawa do not note a significant difference between the way they talk and the contemporary Cabiña. At this point our understanding of the Araona language is not detailed enough to be able to pinpoint social variables that might be conditioning speaker variation. I limit myself to pointing out speaker variation where it exists.

[1]Note that the Araona themselves report violent confrontations with the missionaries related to the missionaries' attempts to purge traditional beliefs and practices from the their society (Tallman 2021a). Where evangelization efforts have been more successful (on the Manurimi) there has also been a decline in linguistic vitality, as culturally relevant discourse practices have necessarily declined.

2.2 Araona language and data presentation

Araona has four vowels (/i, e, a, o/) and 20 consonants (/p, t, k, kʷ, b, d, ts, tʃ, dʒ, s, ç, z, w, l, m, n, ɲ, h, j, ʔ/). In what follows, I generally use the Araona practical orthography. In some cases I will also refer to a more narrow phonetic transcription where the IPA will be used. In the partially Spanish based practical orthography /ç/ = <sh>; /ɲ/ = <y>; /h/ = <j>; /tʃ/ = <ch>; /dʒ/ = <dy>. In the practical orthography the glottal stop is (often) represented by a space even if this breaks up a single morpheme (e.g. ni o 'tapir'). I will use /ʔ/ for the glottal stop rather than following the practical orthography so that the Leipzig glossing rules can be followed. <ni o> will thus be written as /niʔo/ in this study. Otherwise I follow the practical orthography except for when it is useful to have a surface transcription. The phoneme /l/ appears to be realized as [ɾ] or [ɭ], depending on the speaker, but the question requires future research.

In general, accent in Araona is predictable, falling on the second syllable of its domain of application by default (Pitman & Pitman 1976). However, as will be described below, the placement of the pitch accent depends on its intonational context. There are also some phonological and morphosyntactic environments where the pitch accent "shifts" to the first syllable.

Araona displays an ergative case marking system, realized on full NPs and in pronouns. NPs and pronouns display free constituent order in the sense that the order of A, S, or P can occur in any order in relation to the verb. However, dependent clauses with verbal predicates are always verb final (Emkow 2006, 2019)

The verbal word in Araona is described as being fairly complex (Pitman 1980) or "polysynthetic" (Emkow 2019), as it is with other Takanan languages (Guillaume forthcoming). The verb complex expresses a number of modal, expressive, tense, and various aspectual distinctions. As with other Takanan languages (Guillaume forthcoming), Araona is described as expressing a host of "lexically heavy" categories in its verbal word: associated motion, associated posture, temporal distance, time of day modifications, and manner semantics. The expression of these categories are typically described as "morphological", but many could be seen as straddling the boundaries between morphology and syntax in interesting ways, since some of the markers are free forms and display various degrees of syntax-like variable ordering (variable ordering without conditioned scope). However, I should point out that this chapter does not provide a complete inventory and description of all the verbal modifiers, which would require a grammar length description. Rather I focus on those that are well represented in the current corpus. Because of this the analysis provided here should be regarded as preliminary.

Throughout this chapter all sentences will be marked with respect to whether they are from naturalistic speech, provided with an TXT code, whether they are from elicitation (ELIC). Sentences from elicitation can be divided into those where a speaker repeats a sentence offered to them and provides a grammaticality judgment (ELIC:ARA>SP), those translated from Spanish (ELIC:SP>ARA), those volunteered by the speaker (ELIC:ARA). The Spanish translation corresponds to the free translation provided by an Araona speaker or by me (when the example is the result of a Spanish to Araona translation) and the English corresponds closer to my interpretation. Following common practice, "*" is marked on a sentence deemed unacceptable, "?" for a sentence where the speaker is unsure. Where appropriate, examples from naturalistic speech will be given. I provide examples from elicitation for expositional reasons and/or in cases where the corpus is not sufficient to make precise statements about certain syntagmatic facts of relevance.

3 Verbal planar structure

The verbal planar structure for Araona is provided in Table 1. For the most part I will motivate the details of the planar structure *in tandem* with a discussion of the results of the constituency variables. Below I provide some introductory comments on the verbal planar structure in Araona. While the verbal planar structures displays some overlap with the verb template provided in Pitman's description (Pitman 1980: 108), a few extra positions and elements need to be added that the latter seems to consider outside of the verbal word. Positions where the inventory is relatively large are not filled out with any forms, but rather "...". Instead tables are given with the relevant inventory of the most common and well understood morphemes in the discussion below. Note that NP stands for "noun phrase" as usual, PP stands for "postpositional phrase" and S stands for "Sentence" wherein another verbal planar structure can be inserted. There are no distributional differences between NPs of different grammatical roles. Araona grammatical roles are case marked. Case markers are not represented in the verbal planar structure.

The orthographic word provided in Pitman (1980: 108) and Emkow (2019) corresponds to the 4–15 span.[2]. The 4–15 span also turns out to be the best verbal word candidate, as we will see. Pitman provides a template-like description of the 'relative position of the verbal radicals and affixes' (my translation)[3], which

[2]Note that Pitman is inconsistent in this regard, as *isha* is sometimes represented as a separate word (Pitman 1980: 38).

[3]"Posición relativa del radical y afijos verbales" (Pitman 1980: 28)

Table 1: Verbal planar structure of Araona

Pos.	Type	Elements	Forms
(1)	slot	XP{NP, PP, S}, adverbials	...
(2)	zone	“P2”	...
(3)	zone	XP{NP, PP,S}, adverbials	
(4)	slot	“prefix”	...
(5)	slot	noun	
(6)	slot	core verb root	
(7)	zone	motion, time of day, aspectual, manner, root	*-pe*, ...
(8)	slot	affectionate, small	*-shodi*, *-limi*
(9)	slot	with difficulty, almost	*-sa(wa)*
(10)	slot	interactional	*-ti*
(11)	slot	causative, completive	*-eme*, *-pe*
(12)	slot	3A	*-ta*, *-me*
(13)	slot	finality marker	*-ibo -iba*
(14)	slot	tense, aspect, posture, negation, wandering, clause-linkage	...
(15)	slot	limitative, again	*-we, -isha*
(16)	slot	auxiliary	
(17)	slot	connector	*tsio*, *po*
(18)	zone	XP{NP, PP, Adv}	

the planar structure in Table 1 builds on. Pitman's template is provided in Table 2. The positions of the planar structure that correspond to Pitman's template are added underneath.

Table 2: Pitman's analysis of Araona

Edge 1a	Root	Root	Aspect suffixes	Margin 2	Margin 3	Edge 1b
Prefix	Noun	Verb	Time, Manner, Locative, Attitude	Voice, *-ti, -ta*	*-ibo*	Tense, Mode
4	5	6	7–9	10, 12	13	14

There are four main differences between the verbal planar structure and Pitman's analysis; (i) The planar structure contains positions outside the missionary imposed "word" which are 1–3 and 16–18; (ii) the position for "aspectual suffixes" is split into three positions 7–9 to capture fixed ordering, not originally captured by Pitman; (iii) an extra position is added to capture the distribution of the causative *-eme* and the completive *-pe* in relation to *-ti* 'interactional' and *-ta* 'third person A, third person plural A/S'; (iv) position 15 is added to capture the relative position of *-isha* and *-we*.

First, we consider the positions from 1–3 and 18. As stated in §1, Araona has 'free' constituent order in the sense that NPs occupying different grammatical relations can occur in any order with respect to each other and with respect to the verb (position 6). The variable ordering of NPs is derived from the verbal planar structure by virtue of positions 3 and 18. Positions 3 and 18 are zones flanking the verb that allow NPs inside of them of any grammatical relation. Position 1 is reserved for constituent interrogatives, focused NPs and coordinated/subordinated clauses (technically "subspan repetitions"). The position 1 (as distinct from position 3) is motivated by the presence of a group of Wackernagel-like (or "P2" for position 2) morphemes (*tso* 'prior event, anterior', *sha* 'dubitative, interrogative', *tokwe* 'dubitative' and *pa* 'reportative') that occur after the first NP, clause, or adverbial as in 1, but not after the second or third NP as illustrated by the ungrammaticality of 2 (where *=tokwe=pa* occurs after the A and R arguments).[4].

(1) *pona* *tsidi-a* ***tokwe*** ***pa*** *wada* *todi-lipi* *laba* *ti* *-ta*
1 - 2 - 3 - - 6 -12
woman little-ERG **EPIS** **REP** 3SG:GEN child-DIM cracker give -3A
-iki
-14
-RECP:PST
'(I believe and it is said that) the small woman gave a cracker to her child.'
Sp. 'Creo y se dice que una mujercita dió arepa a su hijo' (ELIC: ARA > SP)

(2) **pona* *tsidi-a* *wada* *todi-lipi* ***tokwe*** ***pa*** *laba* *ti* *-ta*
1 - 3 - 2 - 3 6 -12
woman little-ERG 3SG:GEN child-DIM **EPIS** **REP** cracker give -3A
-iki
-14
-RECP:PST
'(I believe and it is said that) the small woman gave a cracker to her child.'
Sp. 'Creo y se dice que una mujercita dió arepa a su hijo.' (ELIC: ARA > SP)

[4]See (Guillaume 2016) for a similar category of Wackernagel particles in Tacana.

As stated above, the P2 morphemes occur after position 1. Position 1 can be a single NP, but does not have to be filled. This is why I refer to these morphemes as 'Wackernagel-*like*'. For instance, position 1 can be empty as in (3) and (3b).

(3) a.

pa	*tso*	*naeda*	*ba*	*-odi*
2	2	3	6	-14
REP	ANT	3.PL	see	-FREQ

'It is said that they were looking.'
Sp. 'Dice que ellas buscan.' (TXT 1138:0047)

b.

tso	*pa*	*ena-metse*	*mo*	*abeta*	*a*	*-ta*	*-iki*
2	-	3	-	-	6	-12	-14
ANT	REP	water-with	FOC	do-twice	a-3A/PL		

'They were already baptized twice (lit. they already gave him with water).'
Sp. 'Ya hizo la muestra con agua dos veces.' (TXT 1549:307)

Constituent interrogatives seem to obligatorily appear in position 1 as *jico* 'where' in (4).

(4)

jico	*tso*	*pa*	*neti*	*bewewe*
1	2	2	6	18
where	2	-	stand/live	now

'Where do they live now?'
Sp. '¿Donde viven ahora?' (TXT 1549:267)

The position 1 element can also be an entire clause as shown from the examples in (5a) and (5b). The P2 morphemes and their glosses are listed in Table 3.

(5) a.

awada	*piye*	*-ti*	*-wiki*	*tso*	*tsa*	*-tseiye*	*-sa*
3	6	-7	-9	17	6	-7	-7
tapir	shoot	-go.there	-going:P	PRIOR	look.for	-all.day	-FRUST

-ja
-14
-RECP:PST

'After shooting the tapir (which then escaped), I looked for him all day in vain.' / Sp. 'Después de balear el anta, lo busqué casi todo el día en vano.' (Pitman 1980: 52)

b. *paicho* *najo* *kwaiya* *-ti* *-(i)bo* *tso* *kwae* *-ti*
3 / 6 -7 -13 2 6 -7
carayana beside arrive -go.there -RELEV PRIOR -INTRC -FINAL
-(i)bo *-me* *e-* *a* *-pa*
-13 -15 4- 6 -17
explain -there E- AUX REP
'They arrived among the carayana, and then conversed with them.'
Sp. 'Llegaron, no sé donde, ande los carayanas, y conversaron.' (TXT 1817:0391)

Table 3: P2 morphemes in Araona

Position	Gloss	Free translation	Morphemes
	so	'so' | Sp. 'entonces'	*po*
	because	'because' | Sp. 'porque'	*pojo*
	anterior	'already' | Sp. 'ya'	*tso*
2	reportative	'it is said ...' | Sp. 'dice que ...'	*pa*
	epistemic	'I believe ...' / Sp. 'creo que ...'	*tokwe*
	like.so	'in this way' / Sp. 'así' ...	*dipa*
	conjectural	'is it true that ...' / Sp. 'será que' ...	*sha*

I have found no ordering restrictions between the P2 morphemes themselves, although there is a strong tendency for the order *tso + pa* 'anterior + reportative' to indicate that the sentence has an interrogative force. Data from natural speech show no clear ordering constraints between pairs of P2 elements - given two P2 elements, I have found both orders for all pairs. For instance both the orders *tso dipa* and *dipa tso* are attested, both the orders *tokwe pa* and *pa tokwe* are attested etc., illustrated in examples (6a)-(6d). Assessing more complex ordering restrictions or constraints (e.g. between three P2 elements) remains an issue for future research.

(6) a. *kwipa* *po* *tso* *dipa* *jazeze* *shoe* *dipa-kata* *kwada*
1 2 2 2 3 - - 3
how that ANT like.so parrot hear.from.far like.so- AUG
pa-ba-neti *tsawa-neti*
4- 6 -14 6 -14
1PL POST- see -stand spy -stand
'How far one can hear the parrot from far away, let's go up and look there, lets go to spy on it.'

Sp. 'Porque harto se escucha gritando el loro, vamos a (subir) para mirar para allá , vamos (arriba) para espiar.' (TXT 0047:0091)

b. *dipa tso jana ti -me -sa e -a*
2 - 3 6 -11 -7 4- 6
like.this ANT food give -CAUS -FRUST E -AUX
'One has to share the food'
Sp. 'Hay que repartir toda la comida.' (TXT 0035:0031)

c. *aise tokwe pa e-di-a*
1 2 - 4–6
someone EPIS REP E-eat-E
'I think someone ate it already.'
Sp. 'Creo que ya comió alguién.' (TXT 1109:0029)

d. *pa tokwe ba-sa-sha Jojo.esi*
3 - 6–7–14 18
REP EPIS see-FRUST-DIST:PST Tata_Mayari
'I think it is said that Tata Mayari was the first to see it.'
Sp. 'El Jojo esi él fue primero a mirar creo.' (TXT 1535:0405)

The prefix slot of position 4 is the same as that identified by Pitman. It corresponds to Edge 1a in Pitman's description (see §3). Table 4 provides the elements of Araona's prefix slot. As we will see, two of the elements of the prefix slot are actually pieces of circumfixes: *pi-* 'negative' and *ja-* 'interactional'. The formative *e-* can also be regarded as a prefixal component of a number of markers realized in positions 6, 7 and 14. The analysis of *e-* in Araona is somewhat complicated by phonological issues, however. It is described as 'empty' (glossed as E-) because I have not honed in on a convincing morphemic analysis (consistent, non-contradictory gloss) for the formative, perhaps because there is none (i.e. it has the status of a morphome). The prefix *e-* is discussed in more detail in §5.3 and in Tallman & Gallinate (Accepted).

Position 5 is filled out by incorporated nouns. The incorporated noun roots do not come with additional modifiers when they occur in this position. Position 5 corresponds roughly to the first of Pitman's root position. The noun roots that can incorporate refer to elements that are typically conceptualized as bearing a part-whole relation to another participant expressed in the clause. For instance, the nouns *(e)sha* 'leaf (tree)' and *háha* 'fruit (of a tree/plant)' refer to parts of trees (see Vuillermet 2014 for an analysis of analogous phenomena in Ese Ejja). Noun incorporation involves no reduction of transitivity, and the noun bears a possessed relationship with a P argument (Emkow 2019: 117). Illustrative examples are provided in (7a) and (7b).

Table 4: The prefix slot

Position	Gloss	Morpheme
	Empty	*e-*
	Negative	*pi-...-ma*
	Interactional	*ja-...-ti*
	Slowly	*tsi-*
4	Posterior	*pa-*
	Interrogative	*ke-*
	In vain	*noma-*
	Apart	*shoma-*
	Still	*sho-*

(7) a.

wakwala-ja	*wada*	*anodi*	***shoa***	*ʔiji*	*-(i)ki*	*(e-shoa 'head')*
3	-	-	5	6	14	
woman-ERG	3:SG:GEN	daughter	**hair**	tie	-RECP:PST	

'The mother tied the hair of her daughter'

Sp. 'La mama amarró el cabello de su hija.' (ELIC: ARA > SP)

b.

yama	*akwi-limi*	*pa-*	***sha***	*ʔiji*	*(e-sha 'branch')*
3	-	4	5	6	
1SG:ERG	tree-DIM	POST-	**branch**	tie	

'I am going to tie up a leaf / some leaves from a small tree.'

Sp. 'Yo voy a amarrar una hoja de un arbol pequeño.' (ELIC: ARA > SP)

Pitman provides a list of aspectual morphemes and does not make any claims about their relative ordering. The planar structure splits his position for aspectual suffixes into a zone for adverbial suffixes (position 7), a slot for the expressive suffixes *-shodi* and *-limi* (position 8), and a slot for the frustrative *-sawa* (position 9). Position 7 is a zone because morphemes of this position can variably order with each other without variably ordering with morphemes of adjacent positions. The most frequent morphemes of this position are presented in Table 5. The *Root* is also listed in this position, an issue I will discuss in more detail in §4.3 on non-permutability. The variable ordering is illustrated in (8) and (9). However, there are few examples in naturalistic speech where there is more than one adverbial suffix.

Table 5: The adverbial suffix zone

Position	Categories	Morphemes
	Motion	*-shawiya* 'do and go', *-shana* 'going', *-jajo* 'arrive and do'
		-shao 'come and do', *-yoa* 'wandering', *-wiki* 'going P'
	Time of day	*-sisa* 'at night', *-wena* 'in morning/dawn'
7		*-tseiye* 'during day', *-niapona* 'at dusk'
	Aspectual	*-jaena* start', *-weya* 'finish'
		-sa 'in vain', *-pe* 'completely, all of P'
	Manner	*-pasi* short period of time', *-titi* 'slowly'

(8)

loe	*-shawiya*	*-sisa*	*-ta*	*/loe*	*-sisa*	*-shawiya*	*-ta*
6	-7	-7	-12	/6	-7	-7	12
put	-do&go	-at.night	-3A/3PL	/put	-at.night	-do&go	-3A/3PL

'After digging the hole all/at night, s/he went.' /Sp. 'Después de cavar toda la noche, se fue.' (ELIC: ARA > SP)

(9)

tsaba	*-tseiye*	*-wiki*	*/tsaba*	*-wiki*	*-tseiye*
6	-7	-7	/6	-7	-7
hear	-all.day	-going:P	/hear	-going:P	-all.day

'Always listening everyday to something going.' /Sp. 'Siempre escucha todo el dia.' (ELIC: ARA > SP)

After position 7, positions 8 and 9 are for expressives *-limi* 'affective' and *-shodi* 'in pain' and the frustrative/counterfactual morpheme *-sawa* respectively. These positions are necessary because expressives always occur after motion and time of day suffixes as in (10).[5]

(10)

po	*dipa*	*a*	*-ta*	*-iki*	*-we*	*po*	***-sisa***	***-shodi***
2	2	6	-12	-14	-15	6	-7	-8
so	this.way	do	-3A/3PL	-RECP:PST	-LIMIT	AUX:INTR	**-at.night**	**-EMOT**

[5]Pitman (1980) contains an apparent counterexample with *jodo banalimititia* 'He went a short distance to see for a little bit' / Sp. 'fue poca distance para ver un rato', where *-limi* is an expressive and *-titi* is an adverbial suffix expressing 'slowly'. I do not yet have enough examples of the suffix *-titi* in my corpus to clearly position this morpheme in the planar structure. I simply note that my consultants reject this sentence (I have not been able to re-elicit it successfully).

po *-tseiye*
6 -7
AUX:INTR -during.day
'And so in this way (because of this), the poor one spent the whole night and the whole day (up the tree with the jasibakwa).' / Sp. 'y asi ese rato no mas de noche el pobre y todo el dia tambien' (TXT 2698:0381)

That expressives must occur after the adverbial suffixes is illustrated in the examples in (11) and (12) below.

(11) *kwe -shana -limi -ta* *(*kwe-limi-shana-ta)*
6 -7 -8 -12
cut -going -DIM -3A/3PL (*cut-DIM-going:S/A-3A)
'Cutting small things (bushes) on the way.' / Sp. 'Cortando cosas pequeñas de ida.' (ELIC: ARA > SP, Chanito Matawa)

(12) *piso -shana -shodi -ta* *(*piso-shodi-shana-ta)*
6 -7 -8 -12
untie -going -EMOT -3A/3PL (*untie-AFF-going-3A/3PL)
'On the go s/he untied him/her as a favor.' / Sp. 'Le dió un favor desatandole.' (ELIC: ARA > SP)

Similarly, associated motion morphemes must occur before the frustrative -*sawa* 'with effort' as in (13).

(13) *loe -shawiya -sawa -ta* */ (*loe-sawa-shawiya-ta)*
6 7 -9 -12
dig.up -do&go -FRUST -3A/3PL / (*dig.up-with.difficulty-do&go-3A/3PL)
'S/he dug it out with difficulty before going.' / Sp. 'Le cavó cansandose antes de ir.' (ELIC: ARA > SP)

When *-sawa* 'with difficulty' occurs, it must occur after the expressives as illustrated in (14).

(14) *di -shodi -sawa* */ *(di-sawa-shodi)*
6 -8 -9
eat -pity -CNTRFCT / *(eat-CNTRFCT-pity)
'Poor him had wanted to eat.'
Sp. 'El pobre tenía ganas de comer.' (ELIC: ARA > SP)

None of the time of day suffixes nor any of the expressives can occur after the suffixal piece of the interactional marker *ja-…-**ti*** (of position 10). All motion suffixes must appear before the interactional marker as well, except for the morpheme *-yoa*, which can appear in position 7 or 14.

The causative can also be variably ordered with the interactional marker *-ti.* In order to capture the possibility that the causative suffix appears after the interactional *ja-…-ti*, another position for the causative suffix must be added in position 11. The positional variability of *-me* is illustrated in (15).

(15)

ja-	*bailia*	***-me***	***-ti***	/ *ja-*	*bailia*	***-ti***	***-me***
4-	6	-7	-10	/ 4-	6	-10	-11
INTRC-	greet	**-CAUS**	**-INTRC**	/ INTRC-	greet	**-INTRC**	**-CAUS**

'Teach to greet someone.' / Sp. 'Enseñar a alguién a saludar.' (ELIC: ARA > SP)

In contrast, the causative *-eme* cannot variably order with the third person {A} subject marker *-ta.*[6] Table 6 contains the suffixes that occur in position 14. I add position 15 because *-isha* and *-we* can appear after morphemes, filling out position 14.

Table 6: The posture/tense suffix slot

Position	Categories	Morphemes
14	Temporal distance	*-iki* 'recent past 1', *-ja* 'recent past 2'
		-asha 'distant past', *-isa* 'remote past'
	Posture/Aspect	*-ja* 'lying' *-ani* 'sitting'
		-bade 'hanging', *-neti* 'standing'
	Negation	*-ma* 'negative'
	Motion	*-yoa* 'wandering'
	Modal/Mood	*-toa* 'possibility', *-tame* 'counterfactual'
		-ke 'imperative'

4 Morphosyntactic domains

This section provides an overview of morphosyntactic domains in Araona. Section §4.1 deals with results and fractures of free occurrence. Section §4.3 is con-

[6] The positions 12, 13, and 14 are the same as those of Pitman's (1980) *Edge 2*, *Edge 3* and *Edge 1b* respectively, except that the interactional is not in position 12.

cerned with domains of non-permutability. Section §4.2 is concerned with domains of non-interruptability. Section §4.4 is concerned with domains of ciscategorial selection. Section §4.5 is concerned with domains related to deviations from biuniqueness. §4.6 is concerned with recursion based constituency tests.

4.1 Free occurrence (6–6, 4–17)

The free occurrence variable must be fractured into two subtypes: the minimal and maximal domain. The minimal free occurrence domain refers to the smallest subspan overlapping the verb that can function as an (elliptical) utterance. In Araona, a bare verb root can occur by itself without modification (Pitman & Pitman 1976). It is the only obligatory element (by definition) of a verbal predicate construction.

For instance, the following sentence was uttered by Marta Matawa after a pot of chicha had fallen in her kitchen while we were recording. The verb *olo* 'fall' appears with no morphosyntactic elaboration. The minimal free occurrence domain is the 6–6 span.

(16) *olo*
6
fall
'It fell.'
Sp. 'Se cayó abajo.' (TXT 1081:0082, Marta Matawa)

The Maximal free occurrence domain identifies the 4–17 span. This identifies the largest span overlapping the verb core which is a single free form. This is illustrated in (17). The morpheme *nai* 'rain' can be omitted and the sentence is grammatical. As far as I have been able to discern the morpheme *tsio* 'when' is bound: it cannot occur as an elliptical utterance.[7]

(17) *(nai) pi- olo -ma tsio*
(3) 4- 6 -14 17
(rain) NEG- fall -NEG when
'When it (rain) does not fall (one cannot harvest).' / Sp. 'Y cuando la lluvia no se cae.' (TXT 1139:10)

Elements outside of the 4–17 are free or else cannot surface without another free element.

[7] While the form is often translated as 'when' (Sp. 'cuando') I have never heard it being used as an elliptical question 'when', but only in the context of a larger utterance even if it is separated by a pause.

4.2 Non-interruptability (6–6,4–17)

The NON-INTERRUPTION VARIABLE refers to a domain whose elements cannot be interrupted by element *I*. The variable is fractured according to which interrupting element *I* we choose to consider.

The first fracture specifies *I* as a combination of free forms. In Araona nouns and adjectives are both free forms. When they combine to form a noun phrase, they fit the criterion for *I* where *I* is a combination of free forms. The non-interruptability by free form combinations is the 4–16 subspan. While there are numerous free elements that can interrupt the 4–16 span, there are no combinations of free forms that can. Noun phrases cannot interrupt any part of this span. In an auxiliary verb construction, the auxiliary has to be adjacent to the verb complex in the sense that it cannot be interrupted by an NP. This is illustrated by the examples in (18) and (19).

(18)

dea	*esi-po*	*oto*	*e-po*
3	-	6	16
man	old-REL/NMLZ	cough	E-AUX.INTR

'The old man coughed.' / Sp. 'El hombre viejo tosió.' (ELIC: ARA > SP)

(19)

**oto*	*dea*	*esi-po*	*e-po*
6	-	-	16
cough	man	old-REL/NMLZ	E-AUX:INTR

Intended: 'The old man coughed.' / Sp. 'El hombre viejo tosió.' (ELIC: ARA > SP)

I have no obvious cases of NPs interrupting verbs and auxiliaries in my corpus. Furthermore, no examples of full NPs interrupting verb auxiliary combinations appear in any other published source as far as I am aware (Pitman 1980, Emkow 2019).[8]

The second version of the test would be NON-INTERRUPTION BY A SINGLE FREE FORM. This variable identifies a 6–6 span. Position 5 is fitted out by noun roots, which are free in Araona.

4.3 Non-permutability (6–6, 4–6)

Non-permutability is based on the often made claim that word or phrase constituents do not display variable ordering - their elements cannot permute. There

[8] Note that Emkow (2019: 88) considers the combination of the main verb with an auxiliary as a grammatical word in Araona. Unfortunately she does not explain why she thinks this, but non-interruptability could be rallied to support this claim.

are two interpretations present in the literature of this claim. One could be called "strict" – no variable ordering is allowed in any circumstances (Dixon & Aikhenvald 2002). Another could be called "flexible" – elements are in a fixed order or they can be variably ordered but with an obligatory scope difference (Anderson 2005).

In Araona, a further complication arises because of noun incorporation. The question is whether we should consider an incorporated noun root in position 5 to be an instance of a head noun from a noun phrase from positions 1, 3, 18 or a distinct morpheme. To appreciate the problem consider the following sentences, which both have the same meaning. At face value one might argue that the noun *wátsi* 'foot' can permute with prefixes of position 4.

(20)	*pi-*	*watsi-*	*iji*	*-ma*	/ *watsi*	*pi-*	*iji*	*-ma*
	4-	5	6	-14	/ 3	4-	6	-14
	NEG-	foot	tie	-NEG	/ foot	NEG-	tie	-NEG

'One cannot tie its foot.' / Sp. 'No debe amarrar su pie.'

However it is not clear whether an incorporated noun of position 5 should be treated as the same noun which heads a full noun phrase occupying positions 1, 3 or 18, or whether it should be treated as a lexically and diachronically related element. Theoretical models of noun incorporation are likewise split on the issue. Syntactic approaches tend to assume identity (Baker 1988, Sadock 1991), whereas lexicalist approaches tend not to (Rosen 1989, Anderson 2005). In a lexicalist approach *wátsi* 'foot' might not be viewed as permuting with *pi-* 'negation', because the incorporated *wátsi* 'foot' is a different sort of element from the *wátsi* 'foot' of the non-incorporated example – the similarity between the forms being a fact about diachrony. A syntactic approach might assume that *wátsi* does 'permute' with *pi-* 'negative' – a noun root can fit out more than one structural position.

The problem is that this is not an all or none issue. In Araona, the reason to assume that incorporated and unincorporated *wátsi* 'foot' are the same elements in different positions is that incorporated and unincorporated forms are the same phonologically. As far I have been able to discern the range of senses of the incorporated and unincorporated nouns are also the same, thus providing apparent evidence for a syntactic approach. On the other hand, incorporated nouns cannot fit out position 5 with any accompanying modifiers. Incorporated nouns appear to not be referential compared to unincorporated counterparts (Tallman & Grossman 2022), and the set of incorporable nouns is a closed class. The methodology employed here reports results from both analyses. More technically, we "fracture" according to analysis according to the logic of "full reporting".

On the assumption that incorporated nouns are distinct elements from non-incorporated variants, the strict non-permutability domain is 4–6. Otherwise the strict non-permutability domain is 6–6, i.e. there would be no fixedness in the verb complex.

4.4 Ciscategorial selection (6–13, 4–15, 1–17)

The CISCATEGORIAL SELECTION VARIABLE refers to domains identified by spans of ciscategorial elements, elements which are specific to the part of speech class of a specific planar template. Ciscategorial selection captures the idea that affixes are more selective than other elements.

Noun roots are transcategorial. They can combine with other nouns in noun-noun combinations as in the forms in (21).

(21)
a. *zotó-wi* 'jaguar nose' (*zoto* 'jaguar'; *éwi* 'nose')
b. *zotó-tsoa* 'jaguar bone' (zoto 'jaguar'; etsoa 'bone')
c. *tsokwé-kwe* 'toucan beak' (tsokwe 'toucan'; ekwe 'beak')
d. *babá-tae* 'Shaman house' (baba 'God'; etae 'house')
e. *tseiyé-na* 'long river' (tseiye 'day'; ena 'agua')
f. *akwí-ça* 'tree branch' (akwi 'tree'; eça 'branch')
g. *çoa-íya* 'hair (on head)' (eçoa 'head'; eiya 'hair, leaf')
h. *toá-na* 'tear' (etoa 'eye'; ena 'water')
i. *mé-shokwe* 'thumb' (eme 'hand'; shokwe 'stump')
j. *zikí-tsoa* 'sternum' (ziki 'chest'; etsoa 'bone') (reelicited from Pitman 1980: 223)

The morpheme *-odi* 'always, only, repeatedly, just' is transcategorial. It can combine with verbs as in (22a) and with nouns as in (22b) and (22c).

(22)
a.

araona	*dea*	*kana*	*ja*	*da*	*kabiña*	*pona*	*kana*	*jemi*	***-odi***
1	-	-	-	3	-	-	-	6	-14
Araona	man	PL	ERG	that	cabiña	woman	PL	grab/marry	**-always**

'The Araona men always married the Cabiña women.' / Sp. 'Los hombres araonas juntaban siempre con las mujeres cabiñas.' (TXT 0700:0112)

b.

kwama	*mimi*	*metse*	***-odi***	*pewe*
1PL:GEN	speech	with	**only**	completely

'Only our language.' / Sp. 'Puro nuestro idioma no más.' (TXT 1739:0007)

c. *wada* ***-odi*** *elo* *-ta -neti*
3 - 6- 12 -14
3SG:ERG **only** catch-3A-stand
'He was the only one that was fishing.' / Sp. 'era la unica que está acabando pescado.' (TXT 0067:0009)

The ciscategorial variable in Araona has three interpretations. The MINIMAL CISCATEGORIAL DOMAIN identifies a subspan overlapping the verb core which contains positions which can only contain ciscategorial elements: the latter domain is the 6–14 subspan. All of the elements within this domain are verb ciscategorial. The noun root in position 5 and the element *-odi* 'always, only, repeatedly' of position 14 are plausibly transcategorial.

There is a narrow and broad way of defining a verb-ciscategorial element. On the narrow definition, a verb-ciscategorial element can only surface if the verb core is filled out. On the broad definition of ciscategorial an element is verb-ciscategorial if it cannot combine with any *other* lexical part of speech classes except the verb. The broad definition allows such ciscategorial elements to appear in nonverbal predicate construction. The maximal ciscategorial domain can be fractured according to the narrow versus broad interpretations of ciscategoriality.

The NARROW MAXIMAL CISCATEGORIAL SELECTION DOMAIN identifies the 4–15 subspan. All position 4 prefixes are verb ciscategorial. Position 15 contains at least one ciscategorial element *-lelajai* 'habitually', which is not attested in combination with nouns. While transcategorial elements can fill out position 15, the maximal domain is defined based on the presence of ciscategorial elements in positions rather than the total absence of transcategorial elements across its span.

The BROAD MAXIMAL CISCATEGORIAL SELECTION DOMAIN identifies the 1–17 span (the whole verbal planar structure). If elements are ciscategorial just because they do not combine with nouns or adjectives, then we would include position 1 adverbials and the connector *tsio* 'while'. Notice these elements can occur in utterances where a verb is not present, in nonverbal predicate constructions, as in examples (23a) and (23b).

(23) a. *ajalili ado-eje* ***tsio*** *...*
large macho **when** ...
'When I was fat and large.' / Sp. 'Cuando yo estaba gordo y macho.' (TXT 1535:521)

b. ***kwipá tso pa*** *eshai kana*
when ANT REP spirit PL
'How were the spirits?' / Sp. 'Como eran los duendes?' (TXT 0049:0001)

4.5 Extended exponence (4–10, 4–14)

For many morphologists deviations from biuniqueness signal morphological relations (Tallman & Epps 2020 for review and criticism). Across Takanan languages a number of verbal markers are realized with extended exponents or circumfixes (Guillaume forthcoming, see also Harris (2017) for typological overview and relevant terminology). I will assume that the positions fitted out by extended exponence correspond to the boundaries of various extended exponent domains in Araona (Tallman 2021b). This section discusses two categories which are expressed through extended exponents, specifically circumfixes: (i) the interaction marker *ha-...-ti* and (ii) the negative marker *pi-...-ma*. The posture suffixes could also be argued to be extended exponents in Araona, because they come with a prefix *e-* obligatorily.[9] However, a description of the distribution of the prefix *e-* requires consideration of phonological issues. For this and other reasons I will leave a discussion of the morphosyntax and/or phonology of posture suffixes to §5.3.[10]

The interactional marker displays extended exponence with a prefixal piece *ha-* and a suffixal piece *-ti*. Under certain circumstances the prefixal piece can be drop, but these circumstances are not yet well understood. The most common functions of the marker are as reciprocal as in (25) or as a middle or middle-like meaning as in (24). The prefixal part of the interactional marker *ha- ... -ti(me)* occurs in position 4. The suffixal piece *-ti* 'interactional' (24). One can see from this example that the suffixal piece comes after the adverbial suffix zone.

(24)

wada	*beipa*	*ja-*	*ba*	*-weiya*	*-ti*	*-me*	*-tso*	...	*kwichai*
1	3	4	6	-7	-10	-11	14	...	
3SG	not.know	INTRC-	feel	-end	-INTRC	-CAUS	-PRIOR	...	spirit

jo-batae

this-like

'She went unconscious because of the spirit / It made her go unconscious,

[9] Strictly speaking this is not true. The prefix only surfaces when the right-adjacent element (a noun or verb root) is vowel initial. When the element which is right-adjacent to the noun/verb, a L+H* accent appears on the first syllable. This has been analyzed as a case where the prefix *e-* 'drops' after the L+H* accent has been assigned (Pitman & Pitman 1976, Pitman 1980).

[10] This is not the same ass saying that the distribution of *e-* is purely phonological.

it was a spirit like this one (that did it).' / Sp. 'Ella, no sé como, se puso inconsciente, y era espiritu así como eso.' (TXT 0049:0148)

One can see from Example (25) that the suffixal piece comes before the finality marker.

(25)

ma	*ja-*	*meya*	*meya*	*-ti*	*-ibo*	*pochi*	*yama*	*dia*
1	4-	6	6	-10	-13	-	-	-
that	INTRC	leave	leave	-INTRC	FINAL	this	1.SG:ERG	like.so

a-ja-ba-ja
-
say-DUR-VIS-PST

'They (the young couples) are always leaving other, that's why I said it like this.' / Sp. 'Lo que están entre sí están dejandose (las parejas) yo dije.' (TXT 1447:0047)

The alternative order (*-ibo-ti*) is judged ungrammatical by speakers of the language. Morphemes of position 8/9 do not co-occur with *ja....ti(me)* in naturalistic speech, but the combination is easily elicitable. The following data show that the interactional marker occurs after the emotive *-shodi* and the frustrative *-sawa*. The reverse order is not permitted. This is illustrated in (26a)-(26d).

(26) a.

ja-	*zamojo*	*-shodi*	*-ti*	*(*jazamojotishodi)*
4-	6	-8	-10	
INTRC-	hug	-EMOT	-INTRC	

'They hug each other (with emotional pain).' / Sp. 'Ellos se abrazan de despedida.' (ELIC, ARA>SP)

b.

ja-	*zamojo*	*-sawa*	*-ti*	*(*jazamojotisawa)*
4-	6-	9-	10	
INTRC-	hug	-FRUST	-INTRC	

'They almost hug each other.' / Sp. 'Ellos casi se abrazan.' (ELIC, ARA > ESP)

c.

ja-	*ba*	*-weiya*	*-shodi*	*-ti*	*(*jabaweiyatishodi)*
4-	6	-7	-8	-10	
INTRC-	see/feel	-stop	-EMOT	-INTRC	

'S/he (the poor one) lost all feeling.' / Sp. 'Casi está por morirse el pobre.' (ELIC, ARA > ESP)

d. *ja-* *ba-* *weiya-* *sawa-* *ti* (**jabaweiyatisawa)*
4- 6 -7 -9 -10
INTRC- see/feel -stop -FRUST -INTRC
'S/he almost lost all feeling.' / Sp. 'Estaba borracho, casi no sintió nada.' (ELIC, ARA > ESP)

The negative marker *pi- … -(m)a* is also realized as a circumfix. The left edge is position 4 because this is the position occupied by the prefixal piece *pi-*. The right edge of the domain of negative exponence is more difficult to determine. The suffixal piece clearly appears before the interactional suffixal piece *-ti* as illustrated in example (27).[11]

(27) *Baiwipi Nali-nae amigo batawe pojo mo pi- meya* ***-ti*** ***-ma***
- - - - 2 - 4 6 -10 -14
Baipiwi Nali-with friend like SO FOC NEG leave **-INTRC** **-NEG**
'Baipiwi and Nali were like friends, that it why they never left one another.' / Sp. 'Baipiwi y Nali era amigos andaba juntos, por eso no se larga.' (TXT 0056:0149)

The suffixal piece of the negative marker also occurs after the finality marker *-ibo*, as illustrated in (28).

(28) *dos mil veinte pewe pa e- izoa -ta -ni ba -asha dos*
1 - - 2 2 4- 6 -12 -14 6 -14 1
two thousand twenty no.more REP E- wait -3.A/3.PL -sit see -DIST:PST two
mil tsio pi- po -be -ibo -ma po -tso
2 4- 6 -6 -13 -14 6 -14
thousand when NEG- go -come -FINAL -NEG AUX:INTR -PRIOR …
'We will wait until 2020, he never came in 2000.' / Sp. 'Vamos a esperar a 2020, y no venía en 2000.' (TXT 1549:0314)

I have posited that the suffixal piece of the negative marker is *-ma* and that it is in position 14. This is because it displays mutual exclusivity with all other morphemes from this position in the same verb complex, including posture suffixes and tense markers (see §3 for more details). The negative marker *-ma* does not co-occur with the marker *isha* 'again' in my corpus, of position 15. But it does

[11]One might think that the *-ti* in this case is the AM marker *-ti* 'do and go'. Note that speakers consider *pi-meya-ti-ma* to be the negative version of the reciprocal construction *ja-meya-ti* INTRC-leave-INTRC 'leave each other' and ascribe it the same meaning that does not involve motion.

co-occur with the morpheme of *-we* 'still' of the same position as in (29). Thus we can infer that the negative marker is not in position 15.

(29) *da-batae bamewe pi- a -ma -we*
1 6 4- 6 -14 -15
this-similar now NEG- a -NEG -still
'We will wait until 2020, he never came in 2000.' / Sp. 'Como por ejemplo, ellos no sabian.' (TXT 1737:0150)

Note that the negative marker can co-occur with morphemes of position 14 as long as these are not within the same verb complex. A verb can host one morpheme of position 14 and an auxiliary can host another. Thus (30a) is ungrammatical but (30b) is accepted.

(30) a. **pi- dyi -ma -odi*
4 6 -14 -
NEG- eat -NEG -FREQ
'He never eats.' / Sp. 'Siempre no come.'

b. *pi- dyi -ma a -odi*
4 6 -14 6 -14
NEG- eat -NEG AUX:TR -FREQ
'He never eats.' / Sp. 'Siempre no come.'

Thus, the domain of interactional exponence is 4–10 and the domain of negative exponence is 4–14.

4.6 Subspan repetition

Subspan repetition refers to constructions or structures that can be analyzed as repeating spans of structure of the verbal planar structure. We could also call these "recursion-based diagnostics" as long as by recursion we mean self-similar iteration or self-similar embedding (the difference is not important for constituency in my view). A SUBSPAN REPETITION VARIABLE renders some recursion based diagnostic into a test result or domain with respect to the planar-fractal method.

There are four recursive structures in Araona that can be formulated into variables in this fashion; (i) auxiliary verb constructions; (ii) clause linkage via *tso* 'prior' or *tsio* 'while'. Another could be formulated with the clause linker / relativizer *po*, however, I do not yet have enough data to determine the relevant facts in this case. We could also consider cases of nominalization with the suffix *-hi* as relevant, but I do not yet have enough data to assess such cases.

4.6.1 Auxiliary verb construction (6–6, 4–15)

The auxiliary verb fills out position 16 in the verbal planar structure. It repeats certain positions of the verbal complex as a whole which overlap the verb core, which is why it is placed in a single position. As the structure of the auxiliary verb can be Auxiliary morphemes (*po* ‘do’ and *a* ‘do’) can also fill out the verb core position of the main verb. Pitman (1980: 71) describes two types of auxiliary verbs. The verb *a* ‘do, say, (transitive)’ and the verb *po* ‘do, be (at), say, go (intransitive).’[12]

The auxiliary can be used to accommodate more than one marker of the same slot in the verb complex. For instance, the prefixal piece of the negative *pi-* and the prefixal piece of the interactional *ha-* cannot co-occur in the verb complex as they occupy a single slot. They can appear together in the verb complex if an auxiliary is present, because one can fill out the prefixal slot of the auxiliary. The combination of negative and interactional marking is illustrated in (31a) and (31b) below. These sentences have the same meaning.

(31) a.

pi-	*ti*	*-a*	*-ma*	*ja-*	*ʔ-*	*a*	*-ti*
4-	6	-	-14	4-	-	6	-10
NEG-	give	-E	-NEG	INTRC-	E-	AUX:TR	-INTRC

‘to not share/ give together’
Sp. ‘no dar juntos, no compartir’ (ELIC: ARA > ESP)

b.

ja-	*ti*	*-a*	*-ti*	*pi-*	*a*	*-ma*
4-	6	-	-10	4-	6	-14
INTRC-	gave	-E	-INTRC	NEG-	AUX:TR	-NEG

‘to not share/ give together’
Sp. ‘no dar juntos, no compartir’ (ELIC: ARA > ESP)

In an auxiliary verb construction the morpheme *-ta* ‘third person A, third person plural’ can appear with the main verb as in (32a) or the auxiliary verb as in (32b).

(32) a.

ema	*nio-wa*	*tsoi*	*-ta*	*pi-*	*a*	*-ma*
1	3	6	-12	4	6	-14
1SG:ABS	dog-ERG	bite	-3A	NEG	AUX:TR	-NEG

‘The dog didn’t bite me.’
Sp. ‘El perro no me mordió.’ (ELIC, ARA > ESP)

[12] According to (Pitman 1980), his *Edge 2*, *Edge 3* and *Edge 1b* suffixes can occur on auxiliaries. These correspond to position 4, position 10, position 12, and position 14.

b. *ema* *nio-wa* *pi-* *tsoi* *-ma* *a* *-ta*
1 3 4- 6 -14 6 -12
1SG:ABS dog-ERG NEG- bite -NEG AUX:TR -3A
'The dog didn't bite me.'
Sp. 'El perro no me mordió.' (ELIC, ARA > ESP)

According to Pitman "few other of the verbal suffixes attach to the auxiliaries" (Pitman 1980: 71), apart from those morphemes of positions 4, 10, 12 and 14. Pitman does not give a specific example of which verbal suffixes cannot appear on the auxiliary. Time of day suffixes (position 7) *can* appear on the auxiliary. Position 15 markers can also appear on the auxiliary. These facts are illustrated from (33) and (34) respectively, both sentences from Pitman's sketch. I re-elicited these forms to corroborate Pitman's data.

(33) *wada* *ema* *tawi* *-zowi* *a* *-sisa* *-ta*
1 3 6 -7 6 -7 -12
3SG:ERG 1SG:ABS dream -interrupt AUX:TR -at.night -3A
'He interfered with my sleep at night.' / Sp. 'él interfió con mi sueño durante la noche.' (Pitman 1980: 41)

(34) *zia* *shoma-* *a* *-me* *a-lelajai*
3 4- 6 -14 6 14
maiz apart- do -CAUS AUX:TR -HAB
'By custom we prepare the maiz seperately' / Sp. 'Por costumbre preparamos el maíz aparte.' (Pitman 1980: 31)

I have not been able to corroborate Pitman's claim regarding restrictions on the appearance of verbal suffixes on auxiliaries. Pitman provides no more details except to state that some restrictions exist. Auxiliaries cannot take NP arguments distinct from the main verb, nor any of the Wackernagel-like morphemes of position 2.

The MAXIMAL AUXILIARY SUBSPAN REPETITION DOMAIN corresponds to the largest span that can be filled out by the auxiliary. This domain identifies a 4–15 span with the auxiliary construction.

The MINIMAL AUXILIARY SUBSPAN REPETITION DOMAIN is the subspan of structure containing positions whose elements cannot display wide scope over the main verb and the auxiliary in the auxiliary verb construction. There are no elements that satisfy this condition in Araona, and, thus, the domain identifies a 6–6 span. There are no morphemes that *do not* scope over the auxiliary and the verb when they occur on either one of them. In fact, there are no attested cases of a morpheme that can appear on both the main verb and the auxiliary at the same time, and switching a morpheme position from the main verb to the auxiliary or *vice versa* makes no difference to the meaning of an expression. Illustrative examples are provided in (35a) and (35b) below with the interrogative prefix *ke-*. I have not been able to find any cases where varying the position of a suffix with respect to whether its in the main versus auxiliary verb conditions a difference in meaning.

(35) a. *midya* ***ke-*** *oto e- po*
3 4- 6 4- 6
2sg **inter-** cough E- aux:intr
'Had you been coughing?' / Sp. '¿Estabas tosiendo antes?'

b. *midya e- oto* ***ke-*** *po*
3 4- 6 4- 6
2sg E- cough **inter-** aux:intr
'Had you been coughing?' / Sp. '¿Estabas tosiendo antes?'

4.6.2 *-tso*-marked clause combination (4–14,1–17)

The marker *tso* appears in position of 14 of a verb complex expressing an event immediately prior to the event expressed by the following main clause. These clauses can share the same subject as in (36a) and (36b).

(36) a. *jae lale -tso jelo -ta -iki*
3 6 - 6 -12 -14
fish roast -prior:compl eat -3a -recp:pst
'After roasting the fish, he ate all of it.'
Sp. 'Después de asar el pescado, lo comió todo.' (Pitman 1980: 102)

b. *awada piye -ti -wiki -tso tsa -tseiye -sa -ja*
3 6 -9 -7 - 6 -7 -8 -14
tapir shoot -go&do -going:P –prior:compl look.for -all.day -frust -recp:pst
'After shooting the tapir, he looked all day for it in vain.'
Sp. 'Después de balear el anta, lo busqué casi todo el día en vano.' (Pitman 1980: 52)

The Maximal *tso*-marked subspan repetition domain is the 1–17 span. This domain refers to the size of the *tso*-clause as judged by the positions that can be filled out in this clause independently from the main clause. I will give a brief justification of the maximal domain, before discussing the minimal one.

Pitman claims that clauses marked off with *-tso* 'prior, anterior' *must* have the same subjects (Pitman 1980) as the following main clause, as in (36a) and (36b). However there appear to be exceptions to this as in the sentences in (37a) and (37b) from naturalistic speech. It is also not hard to elicit a sentence where the A argument of the *tso* marked clause is coreferential with the P of the main clause as in (38).

(37) a. *didia -tso aleokata ... po -ana -odi kwizi-sawa-po daesha*
6 - 18 .... 6 -6 -15 18 -
eat -prior:A/S quickly ... do -leave -freq fart-frust-nmlz like.so
'Every time he eats quickly farts come out, that's how it is.' / Sp. 'Cada vez que come rápido no más salen los pedos así es.' (TXT 0098:0098)

b. *palma.sola me- jemi -isha -tso-dada zai -ki*
3 4- 6 -15 - 6 -7
Palma.sola hand- grab -again -prior:compl-only be.angry -come
-(i)bo ba-(a)sha naeda
13 16 18
-pfv aux:vis-dist:pst 3pl
'When we took Palma Sola and lower again, then they (the carayana) got angry.' / Sp. 'Cuando agarramos palma sola y más abajo de nuevo, de allí ellos se enojaron.' (TXT 1739:0077)

(38) *yama zoto pisa -wiki -tso shipa wada ema tsoi*
1 3 6 7 - 1 3 - 6
1sg:erg jaguar shoot -going:P -prior:compl more 3sg:erg 1sg:abs bite
-ta
-12
-3a
'When I shot the jaguar, it bit me afterwards.' / Sp. 'Cuando yo chumbié al tigre, él después me mordió.' (ELIC: ESP > ARA)

Example (38) shows that both clauses have a position 3 available to them and that each can have their own core arguments (they "project" these positions independent of the main clause). The *tso*-marked clause and the main clause can each project position 1 and the Wackernagel-like position 2. This is illustrated in (39).

(39) *jae (pa) tso lale -pe -tso ... bisha tokwe pa kwawea di*
1 (2) 2 6 -11 - ... 1 2 2 3 6
fish REP ANT roast -COMPL -PRIOR:COMPL ... again EPIS REP yuca eat
-ta
-12
-3A
'First, he roasted all of the fish and then he ate yuca.' / Sp. 'Primero asó todo el pescado, y después comió yuca.' (ELIC: ESP > ARA)

Both verb complexes can have position 4 and 14 filled out as in the example in (40), where both clauses are marked with negation.

(40) *dea-ja kwawea pi- kwawi -ma a -tso pi- jelo*
1 3 4- 6 -14 -16 - 4- 6
man-ERG yuca NEG- roast -NEG AUX:TR -PRIOR:COMPL NEG- devour
-ma
-14
-NEG
'The man didn't roast the yuca and didn't eat it.' / Sp. 'El hombre ni asó la yuca, y ni comió (*el hombre ni asó, ni comió la yuca).' (ESP > ARA)

The minimal domain refers to the span of structure whose elements cannot display wide-scope in over both verbal complexes. NPs can always scope over both clauses as in (36a) and (36b). The markers of position 2 can scope over both of the clauses which is illustrated in (39). The sentence means the same regardless of whether *pa* 'reportative' is removed or not in the *tso*-marked clause. Position 4 and position 14 elements cannot scope over both clauses as illustrated in (41).

(41) *dea-ja kwawea kwawi -tso pi- jelo -ma*
1 3 6 - 4- 6 -14
man-ERG yuca roast -PRIOR:COMPL NEG- devour -NEG
'The man roasted the yuca, but didn't eat it (*the man neither roasted nor ate the yuca).' / Sp. 'El hombre asó, pero no comió la yuca.'
*'El hombre ni asó, ni comió la yuca').' (ESP > ARA)

Elements between the negative circumfix cannot scope over the verb conjoined complexes. For instance, *-tseiye* 'all day' cannot scope over both clauses in (36b). The time of day marker only scopes locally. With a few marginal exceptions, elements from 4–14 cannot scope over two clauses combined with *tso*. The MINIMAL *TSO*-MARKED SUBSPAN REPETITION variable thus identifies the 4–14 span.

Because I have found no convincing evidence that elements from position 4 through 14 can scope over two clauses marked by *tso* or *tsio*, the minimal domain is 4–14. The maximal domain is 1–17. This includes all positions except the position for post-verbal NPs, position 18. As stated in §3, arguments cannot occur post-verbally in dependent clauses, i.e. those marked by *tso* or *tsio*. The maximal domain of subspan repetition is therefore 1–17.

5 Phonological domains

This section is concerned with domains that can be identified based on the (non)-application of phonological processes. Section §5.1 is concerned with pitch-accent assignment domains. §5.2 is concerned with domains of vowel coalescence. Leading off from the discussion of morphosyntax, §5.3 is concerned with domains that can be identified based on the distribution of the dummy prefix *e-*. In these sections I will also include an extra line for phonetic transcription in order to be able to more easily describe the results of phonological processes.

5.1 Pitch-accent domains (6–11, 4–17)

Araona has (at least) four tones; LH*, H%, L% and (L)HL%. None of these tones are contrastive. They can all be regarded as "post-lexical" (Ladd 2008). The notation and terminology here follows Pierrehumbert & Beckman (1986) and Gussenhoven & Bruce (1999). The "%" refers to an intonational tone docked to the edge of an utterance, the "*" refers to the fact that a tone docks to a stressed syllable. The L+H* pitch-accent is docked to the second syllable of a span of structure whose left edge is 4. Usually, the L is realized on the first syllable and the H on the second. I will refer to this rule as the *pitch-accent rule*. It is illustrated in example (42), the pitch track for the sentence is presented in Figure 1. All elements in the noun phrase, except a few suffixes receive an L+H* on their second syllable. An illustrative example is presented in (43), for which a pitch track is provided in Figure 2. In each of these examples the intonational marker L% is docked to the final syllable of the utterance phrase.[13]

[13]Pitman & Pitman (1976) and Pitman (1980) describe a default "stress" rule that places stress on the second syllable in Araona, agreeing with my L+H* superficially. However, we do not agree on the exceptions. While it might be possible to partially reconstruct the missionaries' analysis into something meaningful, their comments on how one should go about identifying stress and the fact that they left no accessible recordings makes it impossible for future researchers to corroborate or test any of their claims. They explicitly state that pitch is not necessarily involved, but their comments about the phonetic interpretation of "stress" are too vague to engage with scientifically (Pitman & Pitman 1976: 10).

(42) [sipó pisáiki ↓]
sipo *pisa* *-iki*
3 6 -14
squirrel kill -RECP:PST
'S/he killed a squirrel.' / Sp. 'Mató una ardilla recién.' (ELIC)

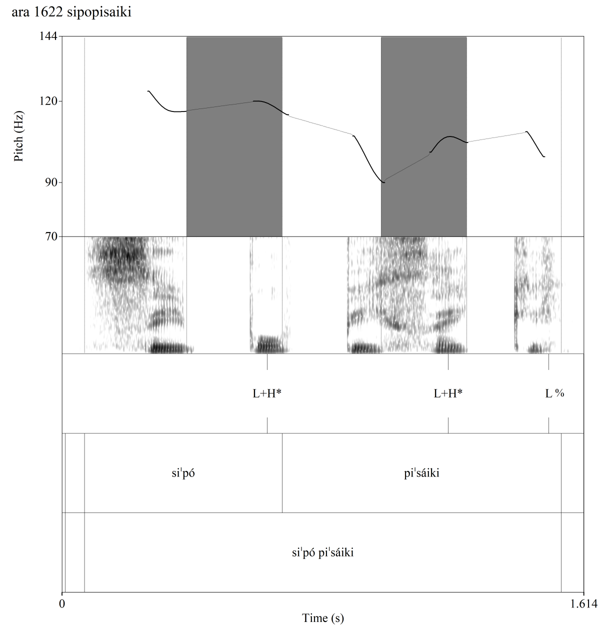

Figure 1: Pitch track for the sentence *sipo pisaiki*

(43) [jamá $^{\text{n}}$datí kwa$^{\text{n}}$déwaha ↓]
yama *dati* *kwadewa* *-ja*
1 3 6 -14
1SG:ERG tortoise chase -RECP:PST
'I chased the tortoise.' / Sp. 'Yo correteé a la peta.' (ELIC)

The prefix is counted as part of the domain of pitch accent assignment. If a prefix occurs (position 4), the pitch accent will occur on the first syllable of the verb root (assuming there is no incorporated noun). This fact is illustrated with the example in (44) with its corresponding pitch track in 3.

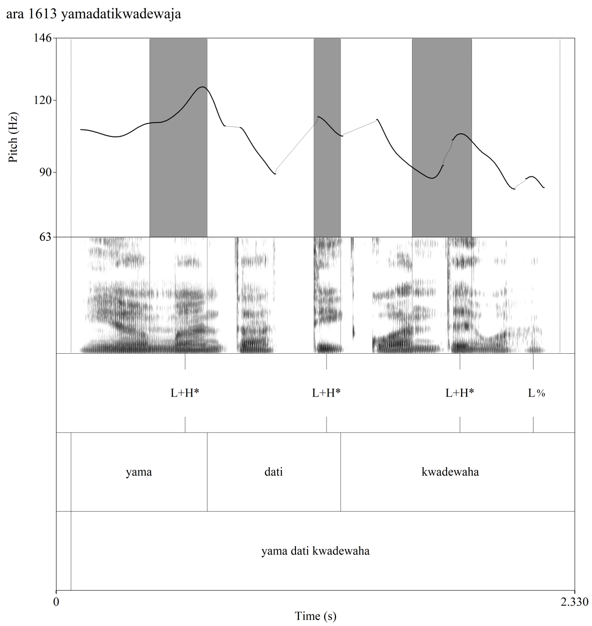

Figure 2: Pitch track of the sentence *yama dati kwadewaja*

(44) [wàlípa pìbábama tsio ↑↓]
walipa pi- baba -ma tsio
3 4 6 14 17
chicken NEG- know -NEG still/when
'When we still didn't know about chickens'
Sp. 'Cuando todavía no conociamos el gallo.' (TXT 1535:0306)

Thus the left edge of the LH* DOMAIN is position 4. The right edge of the domain corresponds to a position prior to the next possible LH* pitch, where the pitch assignment rule restarts. Note that the L+H* pitch accent *can* occur on position 14 morphemes. For instance, the H* will dock to the first syllable of -*lelajai* 'habitual' in *po-lelajai* producing /po.lé.la.hai/. This shows that elements of 14 are in the domain. It is somewhat less clear whether elements of position 15 should be included in the LH* DOMAIN. The morpheme -*we* 'still' is only in this position because it can collocate with a negative marker -*ma* as in (29). The morpheme *ishá* 'again' occurs with a L+H* docked to the second syllable. If the rest of the verb complex is minimally bisyllabic, then the verb complex will contain two L+H* tones; *ishá* 'again' will be realized with two L+H* pitch independent of that from the host. This can be seen from comparing the examples such as *iji-isha*

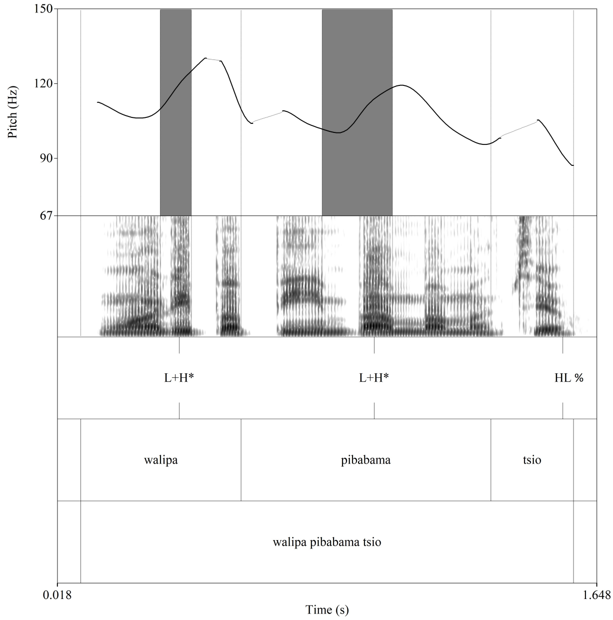

Figure 3: Pitch track of the sentence *walipa pibabama tsio*

‘tie-again’ and *po-isha* ‘do-again’, tokens of these examples appear in Figures 4 and 5.

(45) [ihí içá ↓]
iji ishá
6 15
tie again
‘S/he tied again.’
Sp. ‘Amarró otra vez.’ (ELIC)

(46) po içá ↓
po isha
6 15
do again
‘S/he did it/so again.’
Sp. ‘Hizo otra vez.’ (ELIC)

The maximal LH* domain thus contains position 15.

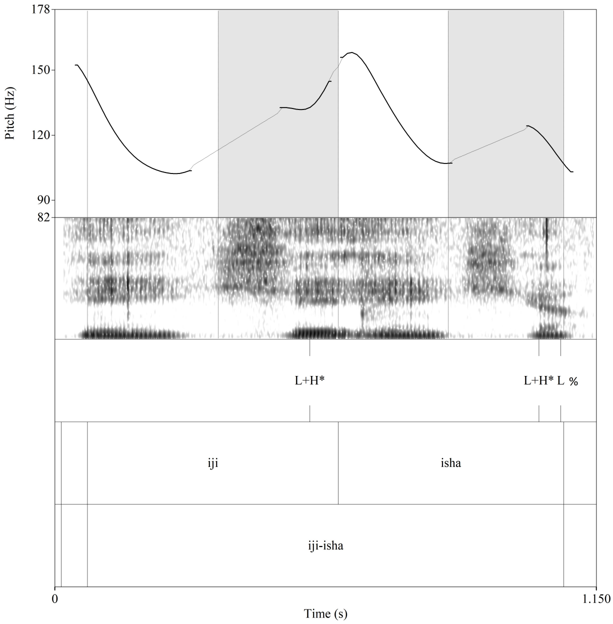

Figure 4: Pitch track for the sentence *iji-isha*

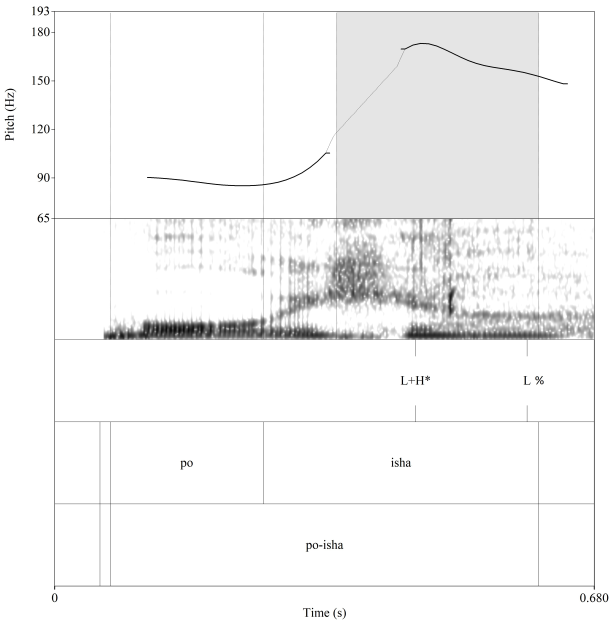

Figure 5: Pitch track for the sentence *po-isha*

The marker *tsio* of position 17 also does not seem to receive its own pitch accent as in (44). After this position we have full noun phrases, and thus, the L+H* pitch rule necessarily restarts. The MAXIMAL LH* DOMAIN is thus 4–17.

The minimal domain corresponds to the span of structure overlapping the verb core where one could never find another L+H*. The left edge of this domain would be 6. The reason is that position 5 can be occupied by a noun which takes its own L+H*, independent of the verb. This is illustrated in Example (47) and the corresponding pitch track provided in Figure 6.

(47) pi watsí ihí ma ↓

pi	*watsi*	*iji*	*ma*
4	5	6	-14
NEG-	foot	tie	-NEG

'S/he didn't tie the foot.' / Sp. 'No amarró la pie.' (ELIC)

Thus position 5 cannot be in the MINIMAL LH DOMAIN. The right edge of the minimal domain can be determined by finding the position to the right of the verb core, closest to the verb core, where an element can be found that has an L+H* independent of the L+H* that occurs due to the presence of the verb (i.e. that occurs because of the LH domain projected from the verb). This is position 12, which contains the marker *-ta* which can take its own L+H* independent of that associated with the verb core. An example can be found in (48) illustrated with the pitch track in Figure 7. We can see that the verb form has two L+H* pitch accents.[14]

(48) [çáma tá ibo yoa ↓]

(e-)	*shama*	*-ta*	*-ibo*	*-yoa*
4	6	-12	-13	-14
E	see	-3A/3PL	-FINAL	-wandering

'S/he went visiting them.'
Sp. 'Ellos se fueron visitando.' (ELIC)

The reader will have noticed in the examples above that the height reached by the H component of the pitch accents is different when there is more than one L+H* present in the same example. In each case the first pitch accent reaches a higher peak than the second. One might argue that the examples in (47) and (48) contain one *main* pitch accent and that another domain should be posited to

[14]Note that in the following example, a pitch accent occurs on the first syllable. This is because of a rule in Araona that deletes the prefix *e-*. The issue is discussed in §5.3.

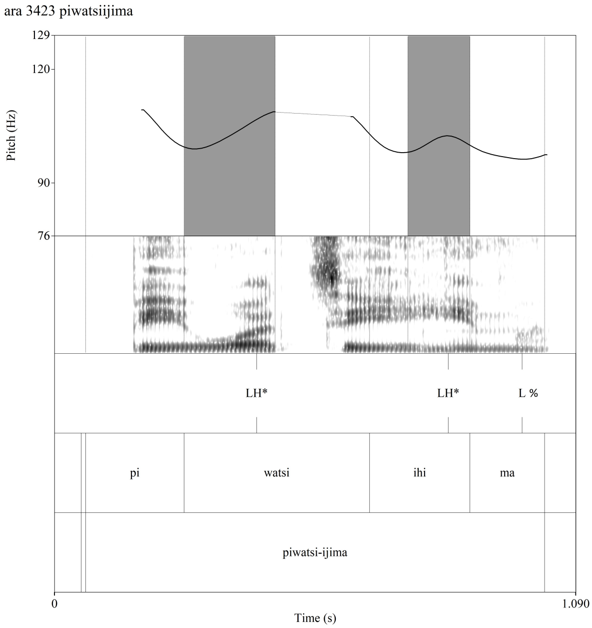

Figure 6: Pitch track for the sentence *pi-watsi-iji-ma*

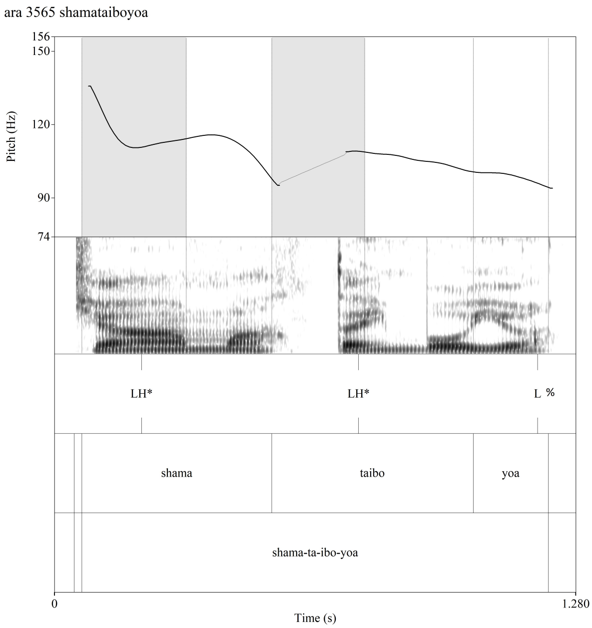

Figure 7: Pitch track for the sentence *e-shama-ta-ibo-yoa*

account for the position of the second. Or similarly, perhaps the first pitch accent corresponds to "primary stress" and the second one to "secondary stress" and that the domain should be formulated only in terms of primary stress (Emkow 2006). These are reasonable criticisms which I do not have space to fully test at this point. The reason I consider these cases to have multiple L+H* tones of the same type is that the difference in pitch height can understood as resulting from a declination throughout the utterance, which from the utterances I have observed produces the same effect throughout the whole sentence. I consider this to be the most reasonable hypothesis at this point given the ubiquity of declination cross-linguistically (Ladd 2008), but future research may require us to posit different types of pitch accent with different relative heights (in terms of F0), perhaps requiring an accentual domain larger than the LH DOMAIN.

This section has also presented a simplified view of L+H* accent assignment in Araona. The assignment rule also interacts with utterance level intonational markers such as L% (Tallman & Gallinate Accepted). This issue was not discussed because it is not important for stating the domain of application of the LH* rule.

5.2 Vowel syncope/synaeresis domains (6–6, 6–14)

When two vowels occur adjacent to one another at a position juncture there are three possibilities in Araona; (i) deletion: one of the vowels deletes; (ii) synaeresis: a diphthong or phonetic long vowel is created; (iii) an insertion of a glottal stop between the vowels. All three of these processes apply depending on the juncture.

Table 7 summarizes the vowel deletions or diphthonigizations that occur in Araona. Only five morphemes are involved in such deletion or diphthongization operations; *-eme* (position 'causative'; *-ibo* 'perfective'; *-iki* 'recent past'; *-asha* 'distant past'; *-ani* 'sit'.

Table 7: Vowel combinations (deletions and combinations)

	_i (-ibo, -iba -iki)	_e (-eme)	_a (-asha)	_a (ani)
i_	**i**	i	ia	ia~a
e_	ei	**e**	ea	ea~a
o_	oi	oe	oa	oa~o
a_	ai	ae	**a**	aa~a

The main generalization that emerges from the combinations is that when two identical vowel phonemes occur at a juncture, one deletes. Additionally /ie/

is disallowed. The morpheme *-ibo~iba* ‘finally’ occurs in position 13. The deletion rule can be seen as operative when these are adjacent to verb roots of position 6, as in the example *nawi-ibo* swim-FINAL →[nawí^{m}bo]. Vowel deletion can be seen as operative where *shodi* ‘emotive’ (position 8) is left-adjacent to *-ibo~-iba* as in *di-shodi-ibo* ‘eat-EMOT-FINAL →[^{n}diçó^{n}di^{m}bo]. Vowel deletion can be seen as operative when *-ti* of position 10 is left-adjacent to *ibo~iba* as in *ja-zamojo-ti-ibo* ‘INTRC-hug-INTRC-FINAL’ →[hazámohoti^{m}bo].

Similarly the morpheme *-iki* ‘recent past’ participates in this vowel deletion rule when it combines with any of the same morphemes described above. The morpheme *-eme* ‘causative’ which I have placed in position 7 and 11 can be seen as realized as *-me* whenever it is right-adjacent to any morpheme which ends in /e/. For instance, *kwe-eme* ‘cut-CAUS’ is realized as [kwéme]. The /e/ is also lost if the morpheme is right-adjacent to /i/. For instance, *ja-ba-ti-eme* ‘INTRC-see-INTRC-CAUS is realized as [ha^{m}bátime]. Finally, both *-ani* ‘sitting, future’ and *-asha* ’distant past’ of position 14 lose their first phoneme when they are right-adjacent to a morpheme with /a/. In the case of *-asha* ‘distant past’ the reduction is obligatorily, as in ba-asha ‘see-DIST:PST’ →[^{m}báça].

I will assume that there is a general vowel deletion rule operative across these cases that is responsible for the allomorphy that we find with the suffixes: $V_i\#V_i \rightarrow V_i$ where # is a juncture between positions 6–14. The rule should read a follows: if two vowels adjacent to one another are of the same quality, delete one of them.

Outside of the 6–14 span, glottal stops are inserted between vowels flanking a juncture between positions.[15] For instance, the *i* of *isha* ‘again’ is not subjected to the vowel deletion process ever, as illustrated in (49) below.

(49) [i.hí.ʔi.ça ↓]
iji -isha
6 -15
tie -again
‘Tie again.’ / Sp. ‘Amarrar otra vez.’ (ARA > SP)

The left boundary of this domain is 6. When an element from positions of the span 1–5 occurs with a final vowel adjacent to the first vowel of the verb core (position 6 a glottal stop is inserted as illustrated in (50a) and (50b) below.

[15] For most speakers of Araona ‘glottal stops’ are realized as creaky voice rather than a complete closure in the vocal tract (Gordon & Ladefoged 2001, Garellek 2013), but the phonetic realization of glottal stops across Araona speakers requires more research.

The vowels have to be of the same quality otherwise the rule applies differently according to the prefix.[16]

(50) a. [wa.tsí.ʔi.hí ↓]
watsi iji
5 6
foot tie
'Foot-tie.' / Sp. 'Amarrar pie.' (ARA > SP)

b. [pi.ʔí.hi.ma]
pi- iji -ma
4- 6 -14
NEG- tie -NEG
'S/he does not tie it.' / Sp. 'El/ella no lo amarra.' (ARA > SP)

The MINIMAL $V_i\#V_i \rightarrow V_i/V_j\#V_i \rightarrow V_jV_i$ DOMAIN refers to the span overlapping the verb core that contains only positive evidence for the vowel deletion rule.[17] This identifies the 6–6 span. We have no evidence for the application of vowel deletion in position 7 either way.

The MAXIMAL ${}_i\#V_i \rightarrow V_i/V_j\#V_i \rightarrow V_jV_i$ DOMAIN refers to the span overlapping the verb core where we have no negative evidence against its application. For the maximal domain we assume that the process is applying "vacuously" across junctures where its phonological preconditions are never met. This domain identifies a 6–14 span, because outside this structure we can find junctures flanking vowels, which introduce a glottal stop to block the adjacent vowels.

5.3 E-selection / initial L+H* domain (4–15)

This section identifies the domains for the phonological and/or morphosyntactic rules that account for the distribution of the prefix *e-*. The analogous and cognate morph of other Takanan languages is described as an inflectional prefix, whose distribution is determined by the presence or absence of other inflectional morphemes (Vuillermet 2012, Guillaume 2008, forthcoming). In this section I describe the prefix *e-* in terms of insertion rules that make reference to the presence or

[16] The prefixes seem vary in terms of how the rule of glottal insertion operates. For instance, the posterior/future *pa-* and the intensifier *tsi-* will always come with a glottal stop if it is right-adjacent to a vowel. The interactional marker *ja-* and the negative *pi-* will only insert a glottal stop if the vowel has the same quality. The prefix *e-* never occurs with a glottal stop to its right, but this can be attributed to the fact that there are no verb roots that begin with /e/ in Araona.

[17] Note that the disjunctive rule that I have stated has one exception. A combination /ie/ is realized as /i/ as in *nawi-me* 'bathe-CAUS.

absence of certain suffixes and phonological context. The two styles of analysis are not incompatible in general: Araona *e-* could be described as an inflectional prefix whose distribution is partially phonologically determined.[18]

When the prefix *e-* appears on verbs in Araona it has been described as coding a specific meaning (Emkow 2006, 2019, Pitman & Pitman 1976, Pitman 1980). The two authors who have written on the topic (myself excluded) do not have consistent glosses of the morpheme. Emkow glosses the morph 'declarative' in Emkow (2006: 114, 123) and Emkow (2019: 356, 365), as 'directional' in Emkow (2006: 106) and Emkow (2019: 272), and 'resultative' in Emkow (2019: 209) and as a second person singular absolutive marker in Emkow (2019: 318). Unfortunately, Emkow does not provide any evidence for these glosses (and see Tallman & Gallinate Accepted for specific counterexamples to each of them).

Pitman & Pitman (1976) and Pitman (1980) provide the gloss 'affirmative' (Sp. 'affirmativo'). They never define this term. Pitman (1980) claims that *e-* also marks 'narrative past', a notion which is never defined nor defended (there are many verbs in the past in narratives that do not occur with the prefix, so it is unclear what the empirical force of the claim is, cf. Tallman 2021a). Pitman & Pitman (1976: 16) state "the full significance of presence and absence of this prefix in relation to the discourse structure of Araona has not yet to be determined". The statement might be misleading because it implies that some clarification of the 'significance' of the morph had been given, where none had been and never has in any of the missionaries' sources to my knowledge.

I have not found any specific meaning for the prefix *e-*. It is possible that future research will uncover a meaning for it, but no one has presented any convincing evidence thus far. I do not understand what the purpose is (unless it is obfuscation of one's current state of knowledge) in proposing a gloss for a morph, which cannot be verified – I therefore, gloss the prefix *e-* as E-. What is clear, however, is that there are specific morphosyntactic and phonological environments where *e-* must occur, cannot occur and *can* occur optionally. These morphosyntactic and phonological contexts can be translated into spans of structure. It is less clear whether these span results should be regarded as phonological or morphosyntactic domains.

[18] I do not understand what the benefit of a using the concept of "inflection" is in any Takanan language, which is why I avoid the term. I have two reasons for this: (i) the notion of inflection is applied to an arbitrary set of morphemes in the languages that do not share any jointly sufficient and necessary properties; (ii) the one criterion that is brought up for identifying inflection is "obligatoriness" (Guillaume 2008: 179–181), but the definition of the word "obligatory" has to change in order to fit the Takanan data, as so-called "obligatory" slots need not be filled in naturalistic speech.

So much for the semantics/pragmatics of *e-*. The (morpho)phonology of *e-* provides a problem which I regard as expositional that needs to be addressed. In Araona there are a number of contexts where the pitch accent rule described in 5.1 is violated and the L+H* appears on the first syllable. In the same contexts for L+H* appears on the first syllable, the prefix *e-* would appear if it were not for the verb root being consonant initial. A proposal to make irregularity in the stress rules disappear seems motivated from the coincidence. One can assume that there is an underlying *e-* wherever L+H* occurs on the first syllable on the surface, it is actually the result of docking to the second syllable on an 'underlying form' followed by the subsequent deletion of the prefix (the first syllable) *e-*. The default L+H* rule applies before a *e-* deletion rule. On this analysis, Araona's pitch accent rule is perfectly regular (Pitman & Pitman 1976). Pitman & Pitman (1976) further justify the rule on the grounds that the *e-* in such cases can be found in cognate forms in other Takanan languages (e.g. *pona* 'woman' is *e-púna* in Maropa, Tacana, and Cavineña and *e-póna* in Ese Ejja).

The way the analysis works for verbs is illustrated below in example (51). First the 'underlying form' *e-tawi-ani* receives pitch accent assignment on the second syllable; /e-táwi-ani/. Then the prefix deletes because it is before a consonant: /táwi-ani/. The LH* accent rule is thus not violated. The L+H* of the first syllable can be realized as a relatively higher pitch or as a rising pitch as in Figure 7. The ordering of the rules is represented as proceeding from bottom to top starting with the underlying morphemic analysis.

(51) [táwi ani ↓]
Delete *e-* before C: ~~e-~~ táwi -ani
LH* assignment: e- táwi -ani
e- tawi -ani
E- sleep -sitting
'S/he is sleeping' / Sp. 'Está durmiendo.'

Independent evidence for the underlying *e-* in such cases comes from the fact that when we replace *tawi* 'sleep' with a vowel initial verb, the prefix *e-* is realized (not deleted) as in the example in (52) below.

(52) [eoló ani ↓]
Delete *e-* before C: e- oló -ani
LH* assignment: e- oló -ani
e- olo -ani
E- fall -sitting
'S/he/it is falling (in a sitting position.' / Sp. 'Está cayendo de sentado.'

One could posit an underlying *e-* with rule ordering or one could simply state that posture suffixes require a *e-* prefix or a L+H* on the first syllable in case the verb is consonant initial.[19] For the purposes of the description presented here, it does not matter which one of these alternatives is chosen. The important point is that there are domains that condition the appearance or suppression of the *e-* prefix and that the presence of the prefix can also be cued by an initial LH* pitch accent in certain phonological environments.

5.3.1 E-#L+H conditioning suffixes

The presence or absence of the prefix *e-* is conditioned by which suffixes occur after the verb complex up to position 17. They can divided into three types with respect to how they interact with *e-*.

(53) a. *E*-selecting suffixes: They require the presence of the prefix *e-*, if the verb is vowel initial, otherwise they shift the pitch accent to the first syllable in the 4–17.
 b. *E*-suppressing suffixes: They ban the presence of the prefix *e-*.
 c. *E*-neutral suffixes: They are neutral with respect to the prefix *e-*. The prefix could appear or not.

An example of an *e*-selecting suffix is the posture suffix *-ani* ‘sitting’, illustrated in (52). Removing the prefix in this example is deemed ungrammatical by speakers; *olo-ani* ‘fall-sit’ is rejected. Another example from naturalistic speech is provided in (54) with the verb *otso* ‘burn, blossom’ and the *e*-selecting posture suffix *-neti. otsoneti* is not grammatical.

(54) wéi^{m}ba po mo ^{m}boisí eotsóneti ^{m}bá^{n}di ↓

we	*-iba*	*po*	*mo*	*boisi*	*e-*	*otso*	*-neti*	*badi*
bloom	-FINAL	REL	FOC	mapajo	E-	blossom	-standing	moon/month

‘The month where the mapajo bloomed mapajo leaves blossom (June).’ /
Sp. ‘En la mes cuando retoña las hojas de mapajo.’ (TXT 1535:0008)

If the verb is consonant initial there will be a L+H* tone on the first syllable if there is a *e*-selecting suffix in the verb complex. This is illustrated with *didiani*

[19] The rule is not quite this simple because *e-* can surface before a consonant if the verb root is monosyllabic with a certain set of suffixes. Posture suffixes on the other hand always disallow *e-* before a consonant initial verb. This is explained below.

as in (55), which contains the *e*-selecting suffix *-ani*. That the L+H* pitch accent has shifted to the first syllable can be observed from Figure 8.[20]

(55) [tsekwá esía dídianí poᵐbíshahaha ↓]
tsekwa esi-a di-di-ani pobishajaja
vagina old-ERG E-eat-eat-sitting already
'The God of harvest (lit. old vagina) is already eating the offerings.' /
Sp.'El Dios (la vagina vieja) ya está comiendo.' (TXT 0603:0228)

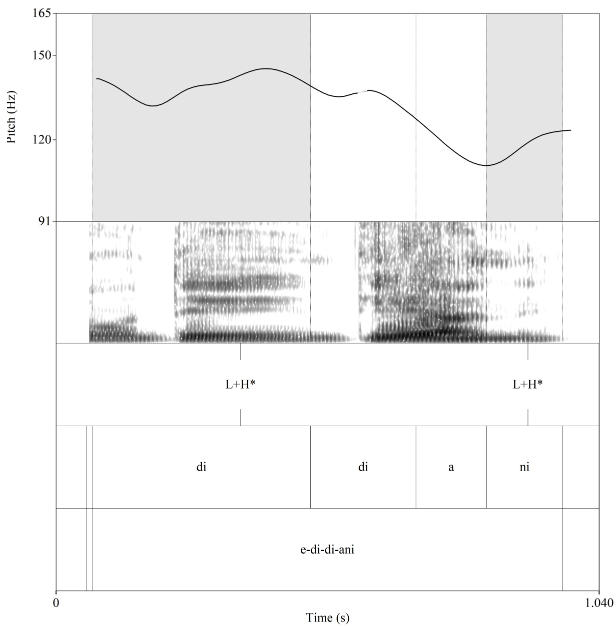

Figure 8: Pitch track for the sentence *e-di-di-ani*

E-banning suffixes do not allow the position 4 *e*- to surface. The L+H* pitch accent always will occur on the second syllable in the presence of *e*-suppressing suffixes, following the default rule. An example of an *e*-suppressing suffix is *-tso* 'prior, anterior' of position 17.

[20]Note that this verb form also has a pitch accent on the final syllable as well. Final TAME markers and posture suffixes receive their own pitch accent sentence internally - in isolation their final pitch accent is blocked from appearing because of the intonation level tones. I do not yet know whether the L+H* pitch accents always occur with such forms.

(56) [^{m}ba^{m}bátaezo anítso pa ↓... ^{m}ba^{m}ba kwéleani pa ↓]
babá-tae-zo *aní -tso* *pa* *... baba* *(e)- kwéle*
god/spirit-house-SPAT sit -PRIOR REP ... god/spirit (E)- perform.ritual
-ani *pa*
-sitting
'Inside the God house, he was doing a ritual.' / Sp.'Adentro del templo sagrado, estaba sentado. Estaba haciendo ritual.' (TXT 1549:0456-0457)

If the verb root is consonant initial the L+H* accent will always fall on the second syllable as in (57). Figure 9 contains the form *mimi-tso* extracted from the example in (57), showing the L+H* realized on the second syllable.

(57) [pónae má ^{n}do báti mimítso ... anátiaça ↓]
po-nae *yama* *do* *ba-nati* *(e-)mimi-tso*
that-with 1SG:ERG that see-go&do (E-)speak-PRIOR
a-nati-asha
do/say-go&do-DIST:PST
'I went with them to see and converse, I went and said (something).' / Sp.'Con ellos yo fui a visitar y conversé.' (TXT 0049:0227)

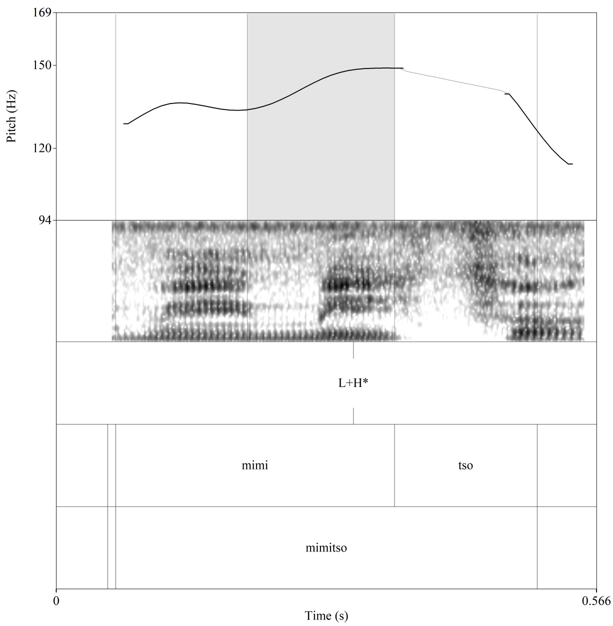

Figure 9: Pitch track for the verb form *mimi-tso*

Finally, there are *e*-neutral suffixes. In the context of such suffixes the appearance of *e-* is optional. For instance the suffix *-ibo* 'finally' is neutral with respect to whether the verb root receives a prefix *e-* or not, as illustrated with the examples in (58a) and (58b).

(58) a. [ihíbo ↓]
iji-ibo
tie-FINAL
'He finally tied it (at last he tied it).' / Sp. 'Por fin, lo amarró.'

b. [eihíbo ↓]
e-iji-ibo
E-tie-FINAL
'He finally tied it (at last he tied it).' / Sp. 'Por fin, lo amarró.'

For verb roots that are not monosyllabic *e-* is also always optional. Thus, the verb root *iboeta* 'forget' can be realized as *eiboeta* or *iboeta* when there are no other suffixes. The same is true of the initial L+H* shift. The verb *hododo* 'run' can be realized as *hó^{n}do^{n}do* or *ho^{n}dó^{n}do*.[21]

In Araona, *e*-selecting, *e*-suppressing and *e*-neutral suffixes can appear in the same verb complex. When an *e*-neutral suffix co-occurs with an *e*-suppressing or an *e*-selecting suffix, the *e*-neutral suffix is 'overruled' by the selectional requirements of the others. For instance, if the *e*-suppressing morpheme *-tso* appears with the *e*-neutral morpheme *-ibo*, *e-* is suppressed, rather than being optional. If the *e*-selecting morpheme *-ani* co-occurs with the *e*-neutral morpheme *-ibo*, the prefix *e-* must occur. The basic pattern is illustrated in (59a) and (59b).

(59) a. [eihíboani ↓] (*ihiboani)
e-iji-ibo
E-tie-FINAL
'He is finally tying it (at last he is tying iṯ while seated).' / Sp. 'Por fin, lo está amarrando.'

b. [ihibotso ↓] (*eihiboani)
iji-ibo-tso
E-tie-FINAL-ANT
'When he finally tied it.' / Sp. 'Cuando por fin amarró.'

That the *e*-suppressing and *e*-selecting morphemes take precedence regardless of the relative syntagmatic order of the suffixes can be seen from the following

[21] Pitman & Pitman (1976) also noted that that 'stress' could vary on bare verbs.

example. The morpheme *-ta* is *e*-suppressing and occurs before the morpheme *-ibo*. If these morphemes co-occur, then the *e-* (or initial L+H*) is suppressed following the priorities of the morpheme *-ta*. For example, the initial L+H* falls on the second syllable in the example in (60).

(60) [pa tikwáijatai^m^bo édia ↓]
pa ti-kwaiya-ta-ibo e-di-a
REP give-arrive-3A/3PL-FINAL E-eat-E
'When hee arrived he finally gave it (the heart of the peccary) to him (his brother) and he ate it (and his brother transformed into a peccary).' / Sp. 'Cuando llegó lo dió, y lo comió.' (TXT 2698:0565)

The *e*-suppressing suffixes are as follows: (i) *ta* 'third person singular A, or third person plural S/A; (ii) *-iki* 'recent past'; *(h)a* 'recent past II'; *aça* 'distant past'; *-tso* 'prior, anterior'; *-ke* 'imperative'; *-lelahai* 'habitual'; *ʔodi* 'frequentive'. All of these morphemes occur in position 14, except *-ta*, which occurs in position 12.

When an *e*-suppressing and an *e*-selecting suffix occur together, the *e*-selecting suffix wins out. An example of this is illustrated in (61). While *-ta* is *e*-suppressing, as can be seen from *ti-kwaiya-ta-ibo* in (60), the *e*-selecting morpheme *-ani* 'sitting, progressive' is also present. The result is that *e-* surfaces as in *e-olo-eme-ta-ibo-ani* 'drop something down once and for all', overruling the *e*-suppressing properties of *-ta*, which is an *e*-suppressing morpheme.

(61) [^m^bo^m^bá pá eoloemétai^m^boani jidyo ló Ángele kwi amohídʒakweshodi do aníme ^n^dipa kana tsio ema páitʃoa apétai^m^ba ↓]
boba pa ***e-olo-eme-ta-ibo-ani*** *jidyo lo Angele kwi*
bomb REP E-drop-CAUS-3A/3PL-FINAL-standing here Los Angeles so
a-moiji-dya-kwe-shodi po dipa do ani-me kana
ADJ-dangerous-INTENS-AUG-EMOT REL in.this.way that sit-there 3PL
tsio ema paichoa a-pe-ta-iba
when 1SG carai-ERG say-COMPL-3A/3PL-FINAL:PST
'They are going to throw bombs here on Los Angeles it is said, so it is dangerous, very dangerous (it gives me pain), while others just stay there (stay in one spot, they are not worried), a carai (non-indigenous bolivian) told me everything.' / Sp. 'Va a largar bombas aqui a los Angeles, como es muy peligroso pero otros están tranquilos un carai me contó todo.' TXT 1882:0060

Thus the rule for predicting *e-* or initial L+H* shift follows a hierarchy; *e*-selecting > *e*-suppressing > *e*-neutral. This should be read as the suffix to the left of the hierarchy wins out in terms of the appearance of absence of *e-*.[22]

If we assume that we can identify a domain of *e*-selection based on which elements participate in predicting the absence or presence of *e-*, the domain would cover a 4–14 span. The whole process restarts at the auxiliary – a suffix on an auxiliary does not have any determining role in predicting whether *e-* appears on the main verb. The prefix is included because the presence of a prefix always blocks *e-* from occurring.

5.3.2 "Surface" e-deletion domain (4–6)

The deletion of *e-* resulting in a L+H* on the surface is determined by the phonological structure of elements in positions 5 and 6. For *e-* to delete it must appear before a consonant and the span from 5–6 must contain at least two consonants. The prefix *e-* will always delete on the surface before verb roots such *tsaba* 'hear', *zewi* 'write', *lokwakwa* 'boil' or *hododo* 'run', because they begin with a consonant and contain at least two consonants. If there is a noun root which is consonant-initial, the *e-* will always delete as well; e.g. *e-nala-seo* 'cut throat' is realized as [nálaseo]. The *e-* deletion rule identifies a domain from 4–6.

5.3.3 E-minimality domain (4–15)

If there is only a single consonant in the positions 5–6, which can only occur if position 5 for incorporated nouns is empty, then *e- must* surface. It does not matter in this case where we say that *e-* is present underlyingly, or whether we claim that *e-* only appears on the surface. The point is that there is a constraint on the suppression of *e-* that is not predicted by the presence of *e*-suppressing suffixes, but **only** predicted by the phonological content of right-adjacent material in 5 and 6. The examples in (62a–62f) illustrate the constraint against monosyllabic forms.

(62) a. ékwe ↓(*kwe)
e-kwe
(E-)cut
'S/he cut it.'

[22] We could also state that when *e*-selecting suffixes and *e*-suppressing suffixes are in competition, the *e*-selecting or *e*-suppressing suffix furthest to the right wins out. It just so happens to be the case that there are no cases, as far as I know, where an *e*-suppressing suffix can follow an *e*-selecting suffix. The only *e*-selecting suffixes are posture verb suffixes, which are either in the same slot as or occur after all *e*-suppressing suffixes.

b. ékwae ↓(*kwae)
e-kwae
(E-)explain
'S/he explained.'

c. étsoi ↓
e-tsoi
(E-)bite
'S/he bit it.'

d. épa ↓
e-pa
(E-)cry
'S/he cried.'

e. épo ↓
e-po
(E-)do
'S/he did it/went.'

f. ewi ↓
e-wi
(E-)urinate
'S/he urinated.'

Note that as soon as a suffix is added to such forms, the *e-* is either banned from appearing or **can** delete. But when suppressing the *e-* would result in a monosyllabic root, *e-* must appear. All speakers reject *pa* as a free form for 'cry', for example. There are two exceptions to this rule: the verbs *ti* 'give' and *di* 'eat' can occur as isolated forms.

In Cavineña, the suffix *-u* is inserted on monosyllabic verbs with no other morphology. Guillaume (2008: 41) attributes the insertion rule to a minimality condition that forces phonological words to be bisyllabic. In Araona, the verb root *do* 'carry, manage, drive' similarly receives the epenthetic 'suffix' *-ho* to avoid being a monosyllabic form. Or stated alternatively – there are two forms of *do*, one which requires additional morphological material to surface and another one (*doho*) which can surface without it. The form *do* is ungrammatical without extra suffixes from positions 4 to 15. Instead *doho* must be used. No other morphemes display this specific (Cavineña-like) rule of *-ho* insertion. However, note the distribution of *do* vs. *doho* is identical to that of the alternation of *kwe* vs. *ekwe*. One might plausibly claim that Araona uses *e-* to avoid subminimal verbs just as

Cavineña uses *-u*. One difference is that there are two exceptions in Araona (*ti* 'give' and *di* 'eat') and *do* 'carry', which has a long form so that the *e-do* is not necessary (and, in fact, is considered ungrammatical). Minimality is rarely an all or nothing process, however, so this does not count as an argument against minimality conditioning the presence of *e-* (Garrett 1999: 69-70).

Another hypothesis might attribute the obligatory *e-* in the cases above to the idea that *e-* is an inflectional element. Since inflection is obligatory, *e-* is inserted for the purposes of making a complete 'word' (Guillaume 2008, forthcoming). The problem with this view is that it does not explain why *e-* does not obligatorily surface on verbs such as *iji* 'tie', *olo* 'drop' and *iboeta* 'forget'. Speakers accept these forms in isolation and they appear in isolation in naturalistic speech. But if *e-* appears as a matter of making a "complete" word, it should surface on these forms. Even so, claiming that *e-* is an inflectional prefix is not mutually inconsistent with the idea that the element also bears a phonological function. A similar case appears in Bantu languages. Morphs which have no clear meaning but are co-opted for phonological purposes are described in Bantu languages as "stabilizers" (Gowlett 2007), and these morphs often seem to fill out positions considered to be 'inflectional'. One can claim that *e-* is an inflectional element, but to capture its distribution we would still need to say that it is an inflectional prefix that's distribution is partially conditioned by minimality. There is no contradiction in this claim unless one believes that language subsystems are necessarily self-contained and only interact via highly constrained interfaces without the possibility of bleeding into one another.

There are more details worth mentioning in relation to *e-* on monosyllabic forms. If the verb root or the incorporated noun and verb root contain more than one consonant then *e-* must delete. If the verb root is monosyllabic and any *e*-neutral elements from positions 7 through 15 are present, then *e-* deletion is optional (as it is for vowel initial forms).

(63) a. [pá.ça.na ↓] ~[epá.ça.na ↓] ~[pa.çá.na ↓]
(e-) pa -shana
(4-) 6 -7
(E-) cry -going
'I/you cry while going.' (ARA > ESP, 2021-09-03)

b. [kwé.si.sa ↓] ~[kwé.si.sa ↓] ~[kwe.sí.sa ↓]
(e-) kwe -sisa
(4-) 6 -7
(E-) cut -at.night
'I/you cut it at night.' (ARA > ESP, 2021-09-03)

The minimality domain extends to elements of position 15 on the right side as illustrated in the example in (64a). Note that this form does not obligatorily suppress *e-* as illustrated in (64b).

(64) a. iɲáke aʔíça açéwe ↓
iya-ke a-isha ashewe
grab-IMP do-FREQ still
'Grab it and keep doing so (holding the rope).' / Sp. 'Agarra pues! todavía no lo largue!' (TXT 1442:0012)

b. pomoke kwitʃi ⁿda tsakata eaʔiça ᵐbaçilio wanaʔiça ↓
pomoke kwichi da tsa-kata e-a-isha ba-shili-o
This.way so this hard/difficult-AUG E-do-FREQ VIS-DEPREC-LIMIT
wana-isha
go-FREQ
'First they did it (delimiting the territory) in the harsh way, after that they did it again, and he did it again dammit, and went again (to the government in order to advocate for a territory).' / Sp. 'Primero hizo grave una cosa, asi hizo pues.' (TXT 1739:0216)

The minimality domain is the domain where if no affixes are present in this domain *e-* must insert on monosyllabic forms or if a *e*-neutral affix is present it does not need to block the insertion of *e-* monosyllabic forms. The domain is 4–15.

6 Summary and discussion

This section provides a brief summary and discussion of the results of applying the constituency/wordhood tests over the available Araona data. I will start with the phonological domains and then move to the morphosyntactic ones.

There are at least two main difficulties in assessing the issue of phonological vs. morphosyntactic wordhood in Araona. The first is that approximately a third of the domains that we have identified are actually "indeterminate" with regards to whether they should be considered phonological or morphosyntactic domains. There are a few reasons to classify a domain as indeterminate with respect to the morphosyntax-phonology division. The identification of the domain could involve the combination of phonological and morphosyntactic considerations. All domains that fall under the category of deviations from biuniqueness are accordingly indeterminate. Thus, extended exponence in Araona, which identifies three domains (Sections 4.5 and 5.3) are indeterminate. It could also be that the available linguistic literature provides competing phonological and syntactic accounts of the phenomena which is responsible for defining the domain. This is true of all minimal subspan repetition domains, since these could be accounted for as conditions on ellipsis, which may be thought of as an operation that makes reference to phonological structure (Szczegielniak 2018). Free occurrence is also classified as indeterminate as authors vary in terms of whether they consider it a morphosyntactic test (Haspelmath 2011) or a phonological one (Zingler 2020).

When we are assessing convergence in phonological versus morphosyntactic domains, it matters whether we classify such domains as phonological or morphosyntactic.

The second problem in assessing how domain convergence relates to phonological and morphosyntactic wordhood in Araona is that there are competing converging domains in the language. If wordhood is marked off by high convergences, then its not clear which of these converging domains to choose as the word.

The purely phonological domains, displayed in Figure 10, show no span convergences, but do show convergences around the left and right edges. If the phonological domains are combined with indeterminate domains, then there is perhaps a domain of convergence on the 4–14 span. This depends on us assuming that the extended exponence and minimal subspan repetition are phonological diagnostics. A convergence strip plot which combines phonological and indeterminate domains is provided in Figure 11.

The pitch accent domain does not converge with any other domains. A methodological point is in order here. In the literature on Araona, syllabification rules are described as operating within the phonological word – one could infer from the discussions that syllabification is supposed to align with “stress” assignment. However, I have left syllabification out. The reason is that there is no known empirical consequence of syllabification except that some account of how adjacent vowels combine to make docking points for L+H* is necessary to account for where L+H* lands. For instance, in the form *e-ilo-wiki* ‘E-send-going:P’ one must state that /ei/ forms a syllable in order to capture the fact that L+H* lands on the second syllable. However, syllabification is not domain independent of L+H* assignment because it has no independent empirical effect from what I can observe. We are interested in identifying logically independent domains and syllabification in Araona does not have this status. Rather it is an analytic or expositional tool that helps describe the rule of L+H* assignment more succinctly. Future research might find that there are independent effects of syllabification in Araona, which could change the picture presented here. I suspect that phonetic

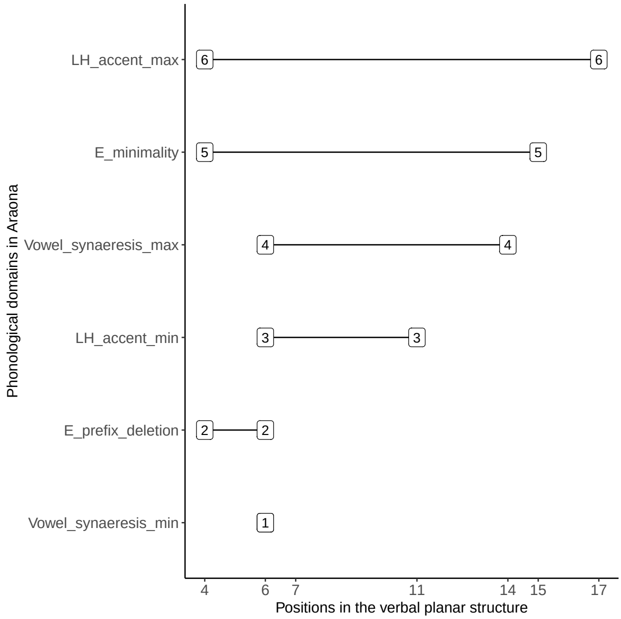

Figure 10: Phonological domains in Araona

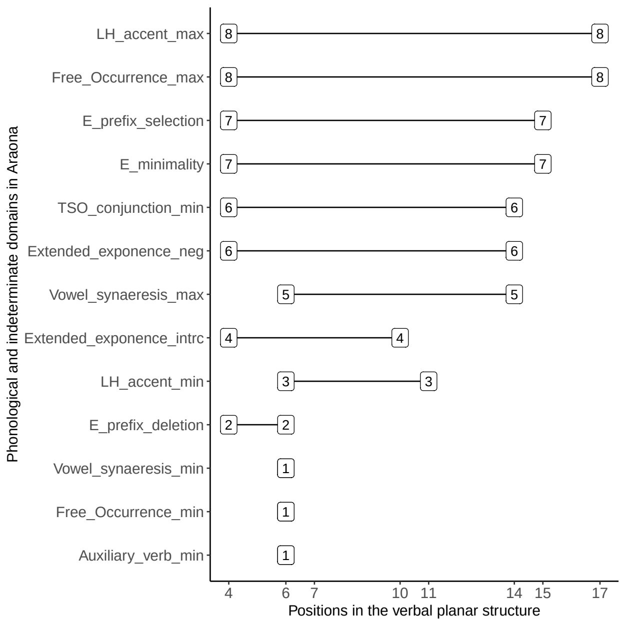

Figure 11: Phonological and indeterminate domains in Araona

studies will be necessary to determine whether syllabification domains can really be regarded as independent from L+H* assignment (Fougeron 1999).

We also observed in §5.1 that the L+H* tones hit different heights. Not all instances of L+H* have the same phonetic realization. I attributed this to an automatic declination process in the language, not to some rule of downstep operating over a higher prosodic domain. Since I view automatic downstep as a product of pausing, and I am currently skeptical that pausing could be or should be coded in the planar-fractal method, these processes have not resulted in another domain. Future research might reveal that there is something like a phonological phrase in the language that results in different pitch heights associated with the peaks of L+H pitch accents. We might also figure out a way of coding pausing in the planar-fractal method.

If one considers "pure" morphosyntactic domains (i.e. those that would normally not be considered phonological), then there are two convergences in Araona as illustrated by the strip plot in Figure 12. Most constituency tests identified in the literature are vague with respect to which level they identify, but this is likely not the case with maximal subspan repetition domains. In the maximal subspan repetition domain for clause combination with *tso* and the maximal ciscategorial selection domain simply identify full clauses (the 1–17 span contains full NPs). The only other convergence is at position 6 in Araona. We would be forced to conclude based on these results that Araona is basically an isolating language, if "indeterminate" tests were not rallied.

The strip plot in Figure 13 displays morphosyntactic and indeterminate domains together. In this case the 4–14 span comes out as a possible wordhood candidate, but the smaller 6–6 span comes out somewhat stronger.

A pooling of the results is displayed in Figure 14. The overall picture is that there are three important layers/constituents below the sentence; (i) a small "stem" constituent that consists of just the verb core; (ii) a larger constituent which corresponds to the word in previous work on Araona that spans from "inflectional" prefixes to "inflectional" tense, aspect and posture morphemes; (iii) a post-word like constituent which contains the auxiliary and some clause-linkage morphemes.

When we ignore span convergence, as perhaps we should, and simply look at edges we find that the strongest structural edges in Araona are 4 on the left edge and 6 on the right edge.

Still the situation is much more complex and the facts of constituency appear to be much richer than what is typically described for Takanan languages, even if the results are vaguely in agreement with current descriptions. Guided by "Basic

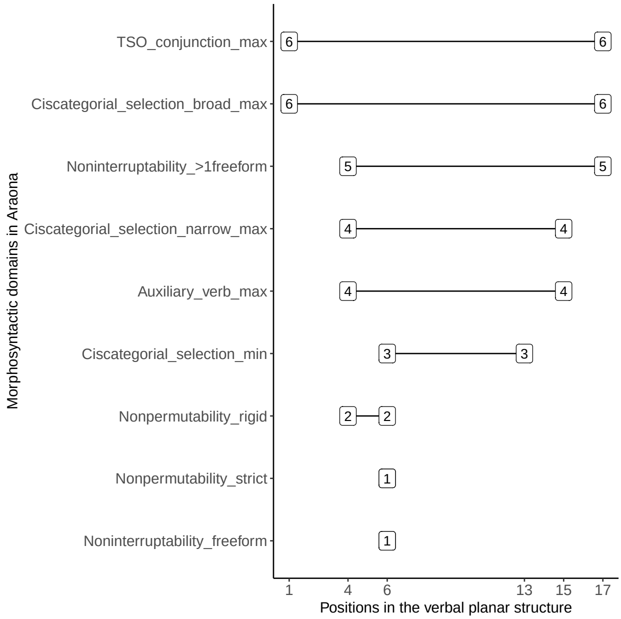

Figure 12: Pure morphosyntactic domains in Araona

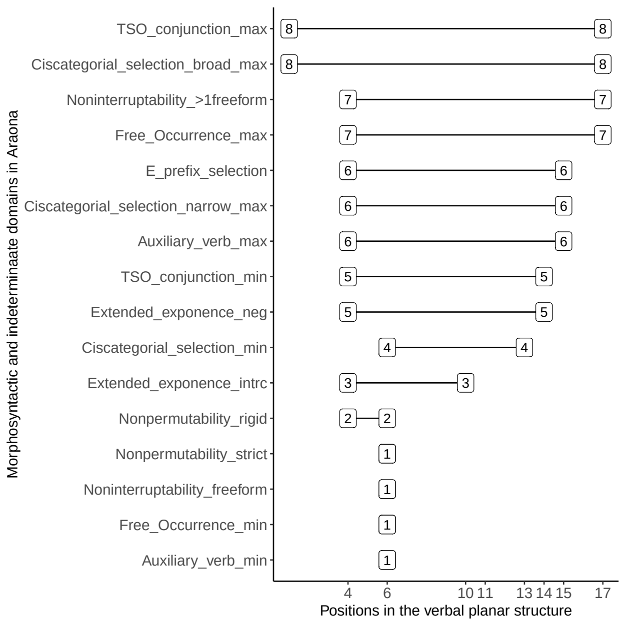

Figure 13: Morphosyntactic and indeterminate domains in Araona

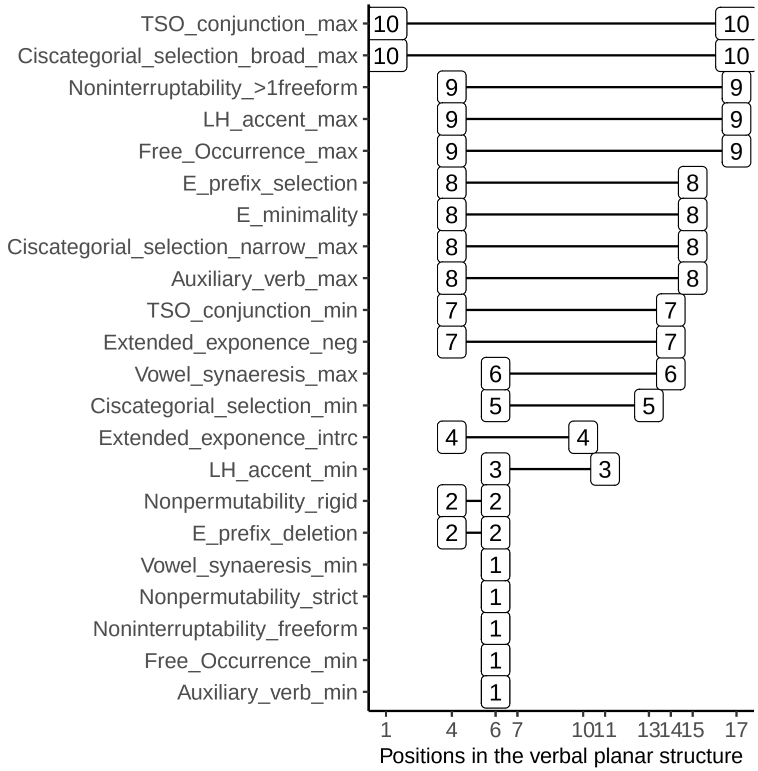

Figure 14: Domains in Araona (morphosyntax, phonology and indeterminacy pooled)

Linguistic Theory" (BLT), which assumes the universality (and the universal comparability) of phonological and morphosyntactic words, modern descriptions of Takanan languages tend to assume without argumentation that phonological domains align around a discrete and abstract "phonological word" (Guillaume 2008, Vuillermet 2012, Emkow 2019). Guillaume (2008) does not consider the possibility that minimality effects and phonological phrasing in Cavineña might not refer to the same domains of structure. The morphosyntactic word may "misalign", but internally it is a consistent structure. A division between words and phrases (phonological and morphosyntactic) is made, but the potential for identifying intermediate domains or the possibility that divergences between available diagnostics might not align is not considered. However, the patterning of observable phonological domains at any given point plausibly reflects smaller piecemeal changes at specific junctures of structure. What we observe may not be sculpted

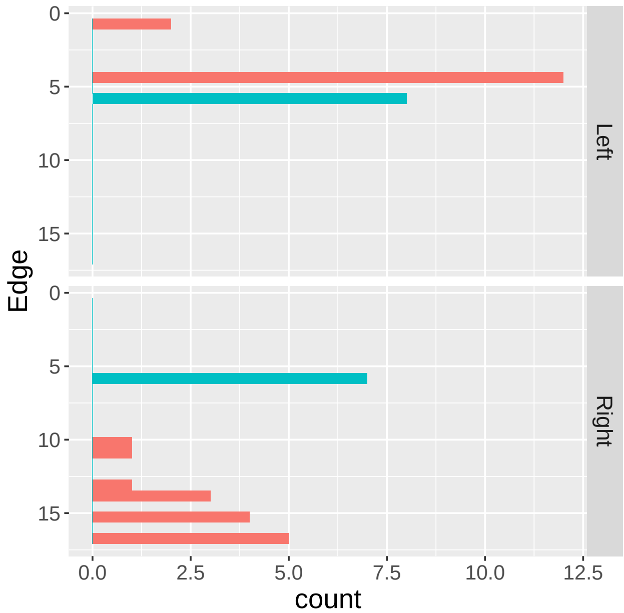

Figure 15: Edges of the constituency test results in Araona

out of universal abstract "phonological words". I suspect that descriptions in the service of finding support for the formal categories presupposed in BLT misrepresent the degree to which constituency in Takanan languages is a gradient and indeterminate phenomena (Bybee 2001, 2010). I would suggest that the fact that more fined grained descriptions that seek to find convergences only do so sometimes, suggests that language specific history might be playing a more determinative role (Blevins 2004), than the abstract constituent structures assumed in BLT.

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Abbreviations

A	agent	FOC	focus
ABS	absolutive	FREQ	frequentive
ADJ	adjective	FRUST	frustrative
AFF	affective	INTENS	intensifier
ANT	anterior	INTER	interrogative
AUG	augmentative	INTR	intransitive
CNTRFCT	counterfactual	INTRC	interactional
COMPL	completive	LIMIT	limitative
DEPREC	depreciative	P	patient
DIST	distal	PFV	perfective
DUR	durative	POST	posterior
E	e	REL	relative
EMOT	emotive	RELEV	relevance
EPIS	epistemic	SPAT	spatial
ERG	ergative	TR	transitive
FINAL	final	VIS	visual

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Chapter 14

Word structure and constituency in Uma Piwra South Bolivian Quechua

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This chapter provides a description of word structure in Uma Piwra South Bolivian Quechua, a variety of Quechua spoken by monolinguals in rural Bolivia. We show that the language displays a mostly fixed ordering of suffixes and clitics. Cases where variable ordering does occur appear to not be associated with a scope difference. We apply the word/phrase constituency tests to Uma Piwra South Bolivian Quechua (SBQ) and show that the traditional notion of the word has some general support when constituency tests are aggregated.

1 Introduction

This chapter provides a description of word and constituency structure in South Bolivian Quechua (SBQ) as spoken by monolingual elders in the rural town of Uma Piwra. The analysis is based on 50 hours of naturalistic speech and native speaker judgements. Data were gathered in a monolingual context by one of the coauthors who is a native speaker of South Bolivian Quechua. The first section describes the planar structure of the verb complex in SBQ, discussing cases where the analysis diverges from previous work on the language. The second section focuses on morphosyntactic domains and the third section describes phonological domains. The concluding section summarizes the results in relation to the word bisection thesis and contextualizes them in terms of discussions around the distinction between lexicalist versus syntactic approaches to Quechua morphology (Weber 1983, Muysken 1981).

Gladys Camacho Rios & Adam J. R. Tallman. 2024. Word structure and constituency in Uma Piwra South Bolivian Quechua. In Adam J.R. Tallman, Sandra Auderset & Hiroto Uchihara (eds.), *Constituency and convergence in the Americas*, 603–646. Berlin: Language Science Press. DOI: 10.5281/zenodo.13208566

2 The language and its speakers

South Bolivian Quechua (SBQ) has around 1,610,000 speakers. It is spoken in the urban and rural areas or local towns of the departments of Cochabamba, Chuquisaca, Oruro and Potosí (Plaza Martinez 2009). Urban areas are Spanish-dominant and most people in these areas only speak Spanish. Most Quechua-Spanish bilinguals living in urban contexts learned Quechua from their monolingual parents who have migrated from a rural area in their childhood or youth. Rural area towns or local towns are located at a further distance from the urban areas. People in these towns are Quechua-dominant, and in most cases monolingual. In the town of Uma Piwra, there are eight families and just 17 people in total. This town is inhabited almost entirely by elders because of out-of-town migration by the youth. People use Quechua to communicate in their everyday life. People in this town mostly do agricultural work such as the cultivation of different legumes.

Data for this chapter were collected with ten monolingual speakers in Uma Piwra. All of them are above 70 years old. The analysis is supported with 50 hours of spontaneous conversations collected in daily conversations. One of the authors collected the data in audio and video formats. The analysis is also supported with 60 hours of elicitation.

3 Verbal planar structure

The verbal planar structure is provided in Table 1. The orthographic verbal word, practiced by literate Quechua speakers, runs over the 12-26 span of the verbal planar structure.

A distinction between affixes (marked with "-") and clitics (marked with "=") is represented orthographically for expositional reasons. We follow most of the literature on Quechuan languages in this regard, but attach no theoretical significance to the distinction. In the verbal domain, the definition of an affix is a morph which is bound and occurs between the verb core of position 12 and its inflectional suffix of position 26. Clitics are any bound morpheme that does not follow this definition. Affixes and clitics are bound in the sense of not being able to stand alone as an elliptical utterance (i.e. they cannot be free forms). Roots in the nominal domain are free forms. Notice that the clitics are represented twice in the verb structure on each side of the verb. This reflects the fact that SBQ clitics can occur before or after the verb. In the planar fractal method we fix the core in position.[1]

Table 1: Verbal planar structure of South Bolivian Quechua

Pos.	Type	Elements	Forms
(1)	zone	NP, PP, S	
(2)	slot	already	*=ña*
(3)	slot	already	*=raq*
(4)	slot	certainly	*=puni*
(5)	slot	adverbial, coord.	*=taq*
(6)	slot	uncertainty	*=sina*
(7)	slot	also	*=pis*
(8)	slot	top., neg., dub., assert.	*=chu, =chus, =chá, =pis*
(9)	slot	interrogative	*=ri, , =rí*
(10)	slot	topic marker	*=qa*
(11)	zone	NP, PP, S	
(12)	slot	**verb core**	
(13)	slot	derivational suffixes and clusters	
(14)	slot	inceptive	*-ri*
(15)	slot	reciprocal	*-na*
(16)	zone	adverbial, assistive	*-rqu,-rpa,-ysi*
(17)	slot	affective	*-ri*
(18)	slot	causative, passive	*-chi, -chiku*
(19)	slot	reflexive, motion, adverbial	*-ku,-mu,-pu, -kampu,-kapu,-mpu*
(20)	slot	proximal future	*-naya*
(21)	slot	progressive	*-sha*
(22)	slot	limitative	*-lla*
(23)	slot	1.OBJ	*-wa*
(24)	slot	when	*-qti*
(25)	zone	TAME, second person	*-rqa,-sqa,-na, -su,-sa*
(26)	slot	A/S person	*-ni, -yki,-nki,-n*

[1]To avoid confusion we point out here that representing the clitics twice does not reflect a view by which clitics start out in a base position and move either before or after a stationary verb. The verb core is fixed to be stationary in the planar structure in order to code constituency test results consistently in relation to edges.

(27)	slot	future:3.OBJ	*-q(a)*
(28)	slot	person	*-n*
(29)	slot	plural	*-chik*, *-yku*, *-ku*
(30)	slot	limitative	*-lla*
(31)	zone	NP, PP, S	
(32)	slot	already	*=ña*
(33)	slot	already	*=raq*
(34)	slot	certainly	*=puni*
(35)	slot	adverbial, coord.	*=taq*
(36)	slot	uncertainty	*=sina*
(37)	slot	also	*=pis*
(38)	slot	top., neg., dub., assert.	*=chu, =chus, =chá*
(39)	slot	interrogative	*=ri, =rí*
(40)	slot	topic marker	*=qa*
(41)	slot	regretative	*karqa, kaq*
(42)	zone	NP, PP, S	

The structure provided above requires some commentary in light of previous descriptions of SBQ morphology. Some previous analyses described SBQ as displaying a type of "layered" structure in its verb with a some degree of variable suffix ordering whereby suffix order necessarily covaries with a difference in scope (Muysken 1981, van der Kerke 1996).[2] However, data gathered from spontaneous speech and rechecked with native speakers suggest that these analyses assigned flexible syntax-like ordering to suffixes in SBQ where there is none. First, variable ordering of affixes is much more limited in SBQ than is implied by Muysken (1981) and van der Kerke (1996). For instance, the suffix *-chi* 'causative' always precedes the suffix *-pu* 'benefactive' as in (1). The suffix *-ri* 'nicely' always precedes *-chi* 'causative' as in (2). This is in contrast to previous literature which suggests that the causative morpheme can be variably ordered with most of the suffixes of the language.

(1)

	yaku	*-ta*	*chura*	*-chi*	*-pu*	*-n*	*-ku*	*ni*	*-n*	*-ku*
v:	11	-	12	-18	-19	-26	-29	12	-26	-29
	water	-ACC	install	-CAUS	-BEN	-3	-PL	say	-3	-PL

'People say they (the governors) made (the water installers) to install water on (Juan de la Cruz's) behalf.'

Sp. 'Dicen que se lo hicieron instalar agua (para Juan de la Cruz).'

[2]Adelaar & Muysken (2004: 209) state: "The order in which suffixes occur in a verb form is essentially fixed, although more than one option may be available in some parts of the suffix inventory", but do not elaborate on which suffixes they are referring to.

(2)

	caballiyu	*-ri*	*-spa*	*apa*	*-ri*	*-chi*	*-ku*	*-n*	*eh*
v:	12	-9	-25	12	-9	-18	-19	-26	
	ride	-nicely	-GERUND	carry	-nicely	-CAUS	-REFL	-3.SG	eh

'It (the fox) makes it (the ship) to carry it (the fox) while nicely riding on it (the ship)'.
Sp. '(El zorro) Se hace llevar cabalgando (sobre la oveja) pues.'

Variable ordering occurs in two areas of the verb complex in SBQ. The suffixes *-rqu* 'nimbly, affective' and *-rpa* 'suddenly' variably order with respect to *-ysi* 'assistive'. The verbal planar structure captures this variable ordering by having a zone for position 16 containing these three elements. Examples illustrating the variable ordering of morphemes in this position are provided in (3) and (4).

(3)

	kuntan	*t'iqpa*	***-rpa***	***-ysi***	*-lla*	*-sa*	*-yki*	*ni*	*-spa*
v:	11	12	-16	-16	-22	-25	-26	12	-25
	soon	peel	**-suddenly**	**-ASSIST**	-only	-2.OBJ	-1.SG	say	-GERUND

'I will soon help you to peel out (the dry corn) saying...'
Sp. 'Enseguida te ayudaré no más a pelar (el maíz) diciendo...'

(4)

	Q'ala	*uña*	*pili*	*-situ*	*-sni*	*-y*	*-ta*	*uqu*	***-ysi***	***-rpa***	*-nku*
v:	1	[11	-	-	-	-	-]	12	-16	-16	-26
	entirely	little	duck	-AFF	-PL	-1SG.POSS	-ACC	devour	**-ASSIST**	**-suddenly**	-3PL

'They (wild birds) will help to devour my little duck's (food).'
Sp. 'Los pájaros le ayudan a terminar de comer la comida de mis patitos.'

There is also variable ordering in position 25 of the verb complex. The second person and future markers *-su* and *-sa* display variable ordering with the marker *-rqa* and *-sqa*. These variable orderings are not associated with a difference in scope, contradicting previous literature, a point which we elaborate on in §4.3 on non-permutability domains.

Secondly, previous analyses overgeneralize and imply or state that all SBQ suffixes were fully productive in the sense that they could combine with all verb roots. Some suffixes display this property, but others appear to be "lexicalized" in the sense that they should be treated as listemes with the verb roots they can combine with. Suffixes in position 13 in the verb complex are not productive as they are restricted to specific verb roots. We will refer to such suffixes as "lexicalized" in what follows.

Not recognizing the distinction between lexicalized suffixes and other suffixes leads to a different descriptive claim concerning which suffixes in SBQ can variably order. Without taking into account the relative productivity of formatives in relation to their syntagmatic distribution, we could conclude that many suffixes freely permute with one another in the SBQ verb complex. For instance, many of the examples with variable ordering presented in previous literature are provided with the causative *-chi*. However, this can be plausibly attributed to an analysis that posits a "lexicalized" (unproductive, root-suffix listeme) *-chi* of position 13 and a productive *-chi* of position 18.[3] Evidence for this analysis comes from the fact that the doubling of *-chi* 'causative' can only be achieved on a handful of roots and in such cases the first *-chi* is always directly right-adjacent to the verb root. The examples in (5) illustrate the basic point that *-chi* 'causative' doubling is not productive in the language. Furthermore, in many cases where a surface repetition of *-chi* is found the root cannot occur independently from the causative suffix.

(5) a. *wan-chi-chi* *(*wan cannot occur as a root independent of -chi)*
die?-CAUS-CAUS
'make someone kill'

b. *riku-chi-chi*
see-CAUS-CAUS
'(make) someone show'

Surface repetition of *-chi* 'causative' occurs when a root with a lexicalized formative *-chi* 'causative' of position 13 is combined with the productive *-chi* of position 18 as illustrated in (6). Note that a lexicalized *-chi* can never be interrupted by another suffix.

(6) *ataque -s -wan qu -chi -chi -ku -nku wakin =qa*
v: 11 - - 12 -13 -18 -19 -26 31 38
ataque -PL -COM give -CAUS -REFL -3:PL other =TOP
'Others (cry so much) that they cause an attack on their own bodies.'
Sp. 'Otros (lloran tanto) hasta que el llanto excesivo les cause ataque a si mismos.'

[3] Note again that the planar structure tells us nothing about the relative productivity of the elements which occur in its positions. If we want to capture degrees of productivity we establish a constituency variable that refers to spans of structure where productivity breaks down according to some cross-linguistically applicable definition of productivity.

In our view, apparent examples of variable ordering surface because verbs such as *qu* 'give' and *riku* 'see' can appear with *-chi* in two positions. However, this variable ordering is marginal. Most verbs only allow *-chi* 'causative' to appear in position 18, where the morpheme occurs productively. Note also that *qu-* is not strictly a *morpheme* in the sense that it is a form with an identifiable meaning independent of its context. The root *qu-* only acquires meaning through combination with the formative *-chi*, and the unproductive *-chi* in this context must be listed with this verb root.

Note that the morpheme *-chi* 'causative' cannot be variably ordered with reflexive, motion or adverbial suffixes of position 19. This point is illustrated with the ungrammatical sentences in (7) and (8).

(7) *t'anta -ta urqhu* ***-chi -ku*** *-ni / *t'anta-ta urqhu* ***-ku -chi***
v: 1 - 12 -18 -19 -26 / 1- 12 -19 -18
bread -ACC take.out -CAUS -REFL -1:SG / bread-ACC take.out -REFL -CAUS
-ni
-26
-1:SG
'I made someone take out the bread (out of the oven) by himself.'
Sp. 'Hice sacar pan para mi.'

(8) *waka -ta mi -chi* ***-chi -mu*** *-n / *waka -ta mi -chi*
v: 11 - 12 -13 -18 -19 26
cow -ACC graze -CAUS -CAUS -go&do -3:SG / cow -ACC graze -CAUS
-mu -chi *-n*

-go&do -CAUS -3:SG
'She made someone go and graze the cow.'
Sp. 'Ella hizo patear la vaca (con alguien más).'

Furthermore, based on the data available to us from Uma Piwra some of the apparent examples of variable affix ordering presented in Muysken (1986: 636) are based on glossings for which we cannot find clear evidential support. For instance, there are (at least) two *-na* suffixes. The position 15 *-na* is a reciprocal and the position 25 *-na* is a modal obligatative suffix that must co-occur with the auxiliary *karqa*.

Muysken's translation of some examples with *-na* suggest that there is variable ordering between *-chi* 'causative' and *-na* 'reciprocal'. Evidence for the variable ordering disappears when we provide what we consider to be more accurate translations for the relevant sentences coupled with empirical motivated glosses of the suffixes in question.[4] We provide the relevant example below with Muysken's translation beside our own. When *-chi* 'causative' occurs before *-na*, the latter formative provides a modal meaning, whereas when *-chi* 'causative' occurs after *-na* the formative has the reciprocal meaning. Contrary to what is implied by Muysken (1986: 634), we have not been able to corroborate the claim that a post *-chi* 'causative' *-na* is grammatical without the modal auxiliary *karqa* 'regretative'.

(9)

	riku	*-chi*	*-na*	*-nku*	*karqa*	/ **riku-chi-na-nku*
v:	12	-18	-25	-26	41	
	see	-CAUS	-OBLIG	-3.PL	REGRET	

'What a shame that they seem to have shown (it) to (someone)'.
Sp. 'Era que le muestren (algo) a (él,ella o a ellos, ellas).'
Muysken (1986: 636): *'they make each other see (something).' (based on *-na* 'reciprocal')

(10)

	riku	*-na*	*-chi*	*-nku*
v:	12	-15	-18	-26
	see	-RECP	-CAUS	-3.PL

'They make (them) see each other.' (Muysken 1989: 44)

According to the analysis adopted here, SBQ has a number of "lexicalized" suffix clusters (see Adelaar & Muysken 2004: 208–209 for preliminary commentary on this phenomenon in Quechuan languages). A lexicalized suffix cluster refers to a string of formatives that always occur adjacent to one another, but where the meaning of the whole is not clearly discernible from its parts. Historically, the formatives were likely different morphemes. However, synchronically, breaking apart such clusters in one's morphemic analysis results in an unmotivated complexification of the structure of the verb complex (see de Reuse 1994 for similar phenomena in Siberian Yupik Eskimo).

Lexicalized suffix clusters do not occupy individual positions but rather replace entire spans of positions. Some of the better understood suffix clusters are listed in Table 2. These suffixes are analyzed as replacing spans based on distributional facts. A 13-20 span replacing suffix such as *-yamu* 'do on purpose' cannot co-occur with any morphemes from positions 13 to 20.

[4]We hasten to add here that Muysken was probably describing a different dialect of SBQ and that the translations he provided were more appropriate for the dialect he described. We do not know enough about variation in Bolivian Quechua at this point to know for sure. This caveat should be applied to all cases where we present an analysis which diverges from Muysken's.

Table 2: Suffix clusters Uma Piwra South Bolivian Quechua

Form	Meaning	Replaces span
-yamu	'on purpose'	13-20
-yapu	'completely and irreversible'	13-20
-rqamu	'rapidily and diligently'	14-20
-rqapu	'do diligently on someone's behalf'	13-20
-kamu	'do to st.possessed and go'	19-20
-kampu	'do and move for safety'	19-20
-kapu	'entirely'	19-20
-rqakamu	'do diligently'	13-20
-yarpa	'without waiting, thinking'	13-17
-rpaya	'to do V with force on plural P'	13-17

There are no suffix-suffix clusters that can co-occur with the root-adjacent suffix *-chi* 'causative'. It is for this reason that the lexicalized *-chi* 'causative' is in position 13 with the suffix-suffix clusters.

With regard to lexicalized suffix-suffix combinations, Muysken considers and dismisses the possibility that certain *-ku*-suffix combinations might be lexicalized and better treated as units (Muysken 1981: 298). Muysken's discussion is partially relevant to the analysis presented here because we do analyze some candidate *-ku*-suffix combinations as lexicalized clusters of formatives (particularly those in position 19). For Muysken, our morphemes *-kamu* 'do and go', *-kampu* 'do and go' and *-kapu* 'entirely' might be analyzed as underlyingly *-ku-mu*, *-ku-mpu* and *-ku-pu*, respectively, subject to a vowel dissimilation rule (/a/ ⟶ /u/ prior to the phoneme /u/). Muysken considers the lexicalization analysis "highly implausible" because the formative *-ku* reoccurs with different suffixes.

In his lexicalist analysis of Quechua word structure, Muysken (1981: 297–298) argues against treating certain formative combinations as lexicalized combinations. With respect to root-suffix lexicalized forms, Muysken argues that there is no independent evidence for such an analysis, except for a single case of root contraction (*wañu-chi* 'die-CAUS' ⟶ *wañu-chi*).

Regarding Muysken's assumption that strings of *-ka*C(C)u are, in fact, *-ku*-suffixes, where *-ku* is subject to a dissimilation rule, Muysken notes that *-ku* reoccurs with several other suffixes. We have struggled to understand the appeal of Muysken's argument for three reasons. First, the formative *-ku* does *not* occur in such cases without the stipulation of the dissimilation rule, which has no motivation anywhere else in the grammar, rendering the argument circular. Secondly, the instances of *-ka*/*-ku* in such combination do not have the same meaning as *-ku* in other contexts. The suffix *-ku* of position 19 adds a reflexive meaning, and the suffix *-ku* of position 29 adds a plural meaning. Neither of these meanings is easily discernible with the *-ka* in the context of *-kamu* 'do and go (volitional A/S)', *-kampu* 'do and go' and *-kapu* 'entirely'. Finally, it is unclear why the re-occurring presence of a formative should be surprising if Quechua is subject to processes of grammaticalization and lexicalization as any other language (see de Reuse 1994).

As to Muysken's dismissal of root-*chi* lexicalizations, he does not mention the distributional difference between lexicalized *-chi* and productive *-chi*, nor the fact that the roots to which the candidate lexicalized form combines often do not have independent meanings. Furthermore, Muysken admits that his analysis overgenerates as it predicts that one should always be able to double (or repeat *ad infinitum) -chi* in a verb complex. He does not account for why *-chi* cannot repeat consistently, but shrugs off the problem with a promissory statement that some unknown semantic theory will be able to capture the distributional facts in the future: "The overgeneration strategy followed here will have to find support when a more precise theory of semantic interpretation for causatives is sketched; we will return to it then" (Muysken 1981: 297). He never sketches such a theory. Muysken is, however, correct that lexicalized *-chi* and productive *-chi* impart the same (or highly comparable) meanings and display the same form. With regards to *-chi*, therefore, we will assume that *-chi* could be treated as one morpheme or two and fracture relevant constituency variables accordingly (see §4.3).

Positions 23 through 29 are filled out by obligatory inflectional markers that mark number and person of the subject and/or object and a tense distinction. The most basic tense distinction is future versus non-future. The presentation below is limited to describing the patterns that we find and discussing the relative position of the formatives in positions of the verbal template dedicated to 'inflection' and to describe deviations from biuniqueness along the 23-29 span. Our main goal is to show how the inflectional paradigm is fit out in the verbal planar structure in Uma Piwra Quechua, not (necessarily) to provide a novel analysis of person/number inflection.

The intransitive verb paradigm for past/present and future tense is provided below in Table 3.

For transitive clauses with a third person object, the verbal suffixes are the same as they are for the intransitive clauses provided in Table 3. The paradigm shows that future marking in SBQ is marked by a few different formatives de-

Table 3: Intransitive suffixes in SBQ / Transitive suffixes with third person P arguments

S(/A>P)	Past/Present	Future
1SG(→3)	*-ni*	*-sa-q*
2SG(→3)	*-nki*	*-nki*
3SG(→3)	*-n*	*-n-qa*
1PL.incl(→3)	*-n-chik*	*-su-n-chik*
1PL.excl(→3)	*-yku*	*-sa-yku*
2PL(→3)	*-nki-chik*	*-nki-chik*
3PL(→3)	*-n-ku*	*-n-qa-n-ku*

pending on the person; *-sa* and *-su* in position 25, and *-q* and *-qa* of position 27 could be regarded as future markers in some sense.

The first person object marker is *-wa*, which fits out position 23 of the verb complex. When the first person object is singular, there are no additional complications in the paradigm as illustrated in Table 4.

Table 4: Transitive suffixes, first person singular P

S(/A>P)	Past/Pres.	Future
1SG→1SG	*-ku-ni*	*-ku-saq*
2SG→1SG	*-wa-nki*	*-wa-nki*
3SG→1SG	*-wa-n*	*-wa-n-qa*
1PL.incl→1SG	-	-
1PL.excl→1SG	-	-
2PL→1SG	*-wa-nki-chik*	*-wa-nki-chik*
3PL→1SG	*-wa-n-ku*	*-wa-n-qa-n-ku*

A few complications arise when we consider the first person plural objects. When the first person object is plural, the morpheme *-nchik* occurs for the inclusive and *-yku* appears for the exclusive. Note that *-nchikx̃-chik* modifies the first person inclusive and the second person *subject* in paradigm 3. The morpheme *-nkux̃-yku* marks the first person exclusive and third person subject in Table 3. Thus, the plural markers are not coded directly for specific grammatical relations but appear to obey some type of person hierarchy regarding what participant they modify (Cerrón-Palomino 1987, Lakämper & Wunderlich 1998).

Table 5: Transitive suffixes in SBQ with P as plural first person object

	Past/Pres. →1PL.INCL	Future →1PL.INCL	Past/Pres. →1PL.EXCL	Future →1PL.EXCL
1SG	-	-	-	-
2SG	-	-	*-wa-yku*	*-wa-sa-yku*
3SG	*-wa-n-chik*	*-wa-su-n-chik*	*-wa-yku*	*-wa-sa-yku*
1PL.INCL	*-ku-n-chik*	*-ku-su-n-chik*	-	-
1PL.EXCL	-	-	*-ku-sa-yku*	*-ku-sa-yku*
2PL	-	-	*-wa-yku*	*-wa-sa-yku*
3PL	*-wa-n-chik*	*-wa-su-n-chik*	*-wa-yku*	*-wa-sa-yku*

We have seen throughout that the morphs *-sa*, *-su* and *-q(a)* reoccur throughout the future paradigm. The suffix *-sa* occurs in future forms when the subject is first person. The suffix *-qa* occurs when there is third person subject in the future. The suffix *-su* surfaces in place of *-sa* when a first person inclusive is either the subject or the object; *-su* blocks *-sa* in position 25. The generalization works until we consider the paradigm where the second person is the object provided in Table 6. On the surface it appears that *-su* codes 3 ⟶ 2, even when the verb is present.

Table 6: Transitive suffixes in SBQ

	Past/Pres. →2SG	Future →2SG	Past/Pres. →2PL	Future →2PL
1SG	*-yki*	*-sa-yki*	*-yki-chik*	*-sa-yki-chik*
2SG	*-ku-nki*	*(-ku-nki)*	*-ku-nki-chik*	*-ku-nki-chik*
3SG	*-su-nki*	*-su-nki*	*-su-nki-chik*	*-su-nki-chik*
1PL.incl	-	-	-	-
1PL.excl	*-yku*	*-sa-yku*	*-yku*	*-y-sa-ku*
2PL	-	-	*-ku-nki-chik*	*(-ku-nki-chik)*
3PL	*-su-n-ku*	*-su-n-qa-nku*	*-su-nki-chik*	*-su-n-qa-chik*

The rule for accounting for the distribution of *-su* is as follows:

(11) a. *-su* falls into position 25 if 3 ⟶ 2;
  b. *-su* falls into position 25 if 2+1 (incl.) is a participant and the predicate is future.

The rule for accounting for the distribution of *-sa* is as follows:

(12) a. *-sa* falls into position 25 if 1 or 1+3 (excl.) and the predicate is future;
b. The presence of *-su* (in position 25) blocks *-sa* from occurring.

The rule for accounting for the distribution of *-qa~-q* is as follows:

(13) a. *-qa* fills position 27 if $3_i \longrightarrow 3_j$ and the predicate is future;
b. *-q* fills positions 26 and/or 27 if 1SG is subject and the predicate is future.

We can add that *-q* in position 27 also occurs as part of an imperfective auxiliary verb construction in combination with *-ka* in position 41 (see §5.1 for some preliminary discussion).

The rules for accounting for the distribution of morphemes in positions 26 and 28 are as follows:

(14) a. *-ni* fills out position 26 when 1 ⟶ 3 and the predicate is non-future;
b. *-nki* fills out position 26 when 2 is subject;
c. *-yki* fills out position 26 when 1SG ⟶ 2;
d. *-n…-n* fill out position 26 and 28, respectively, elsewhere (when 28 is not filled out);
e. *-n-n* is realized as *-n*.

Note that *-sa-q* could also be reanalyzed as a single suffix that occurs when the subject is first person singular and the predicate is future. Furthermore, there is ambiguity in terms of which position *-q* is supposed to fit out in our analysis. It could fit out position 26 or 27. The person/number suffixes *-ni -nki*, *-n*, and *-yki* can also be broken down into smaller parts as long as we are willing to admit even more complexity into the realization rules (Myler 2017). Such analytic issues will not concern us in this chapter as they do not affect the application of constituency variables as far as we know.

We can now briefly consider elements outside of the traditional Quechua word. As it is well known, noun phrases can be variably ordered with the verb across varieties of Quechua. If no clitics occur between the verb and the NP, we assume that this NP fits out position 42. The NPs never interrupt the 12-29 span.

(15)

	apa	*-mu*	*-nqa*	*runtu*	*-s*	*-ta*	*eh*
v:	12	-19	-26	42	-	-	
	bring	-DIR	-3SG.FUT	egg	-PL	-ACC	eh

‘She will bring the eggs here ah (certainly).’
Sp. ‘Ella traerá los huevos aquí.’

Examples of A-V and and P-V order are provided in (16) and (17), respectively. If there are no clitics before the NP in this position, we assume it fills out position 11.

(16)

	papasu	*-yki*	*-pis*	*tarpu*	*-kamu*	*-n*	*ari*	*¿i?*
v:	11	-	-	12	-19	-26	-	-
	father	-2SG.POSS	-also	plant	-own.choice	-3SG	eh	right

‘Your father also goes and plants potatoes ah, right?’
Sp. ‘Tu padre también va y siembra ¿no ve?’

(17)

	papa	*-ta*	*alla*	*-kampu*	*-n-ku*
v:	11	-	12	-19	26-29
	potato	-ACC	harvest	-go&do	-3PL

‘They went to harvest their potatoes (the direction involves away from the speaker and for safety reasons).’
Sp. ‘Fueron a cavar su papa (por seguridad).’

An NP is represented in position 1 if it occurs before the clitics and before the verb.

(18)

	alqu	*manka*	*-ta*	*=chus*	*lluqchi*	*-yamu*	*-n*	*ima*	*=chá*
v:	1	-	-	8	12	-19	-26	-	-
	dog	pot	-ACC	=DUB	touch	-go&do	-3SG	what	=DUB

‘Perhaps it went and touched the dog’s pot or I don’t know what.’
Sp. ‘No sé si fue a tocar la olla del perro o no sé que.’

Another example is provided in (19) with the fronted P-NP *-pi* ‘what’. Notice that while the clitics occur in a fixed order with respect to each other, they do not necessarily all have to be adjacent, i.e. they do not have to ‘cluster’. The example in (19) illustrates this point, with the clitics *=taq* ‘and’ and *=ri* ‘interrogative’, which occur in a fixed order in relation to each other, though they do not occur adjacently.

(19)

	pi	*=taq*	*sam*	*-ita*	*-ta*	*-pis*	*wayk’u*	*-pu*	*-n*	*=ri*	*Ay*	*llakiy*
v:	1	=5	11	-	-	-	12	-19	-26	=39	-	-
	who	=CONJ	food	-DIM	-ACC	-also	cook	-BEN	-3SG	=INTER	ay	sad

‘Then who cooks him food? How sad!’
Sp. ‘Y quien se lo cocina comidita, ay que triste!’

SBQ displays a constraint on the distribution of XPs in the verb complex. Position 31 *cannot* be fit out if the auxiliary position 41 is filled. This fact somewhat complicates the interpretation of non-interruptability domains, as we will see in §4.2 below.

4 Morphosyntactic domains

Four types of morphosyntactic constituency variables are applied to SBQ according to the classification in Tallman (2021): (i) non-permutability; (ii) non-interruptability; (iii) ciscategorial selection; (iv) subspan repetition. We first consider a variable, free occurrence, which is usually taken to be a morphosyntactic test (Haspelmath 2011), but which is, in fact, indeterminate because it is interpreted with respect to a notion of *boundedness* which is ambiguous between a morphosyntactic and a phonological interpretation. After this we move to the four more straightforwardly morphosyntactic tests.

4.1 Free occurrence (12-26, 12-40)

In the verb complex, all elements are optional except for position 23-29 suffixes, which obligatorily mark the person/number of the subject. Position 26 must be filled regardless of person. One cannot remove the suffix of this position, but all other elements can be dropped as illustrated in the examples in (20) and (21).

(20)

	(nuqa | *=puni)*	*kuti*	*-yu*	*-chi*	*-kampu*	*-sha*	*-rqa*	**(-ni)*
v:	1	=4	12	-13	-18	-19	-21	-25	(-26)
	1.sg	=emph	return	-cmpl	-caus	-safely	-prog	-pst.rep	-1.sg

‘I was causing (the sheep) to safely return (back home).’
Sp. ‘Yo estaba haciendo que (la oveja) regresa a casa con seguridad.’

(21)

	(mana)	*(chilvi-situ-s-ta)*	*(qayna)*	*wisq’a*	*-yu*	*-rqa*	**(-ni)*
v:	1	1	8	12	-19	-25	-26
	(neg)	(chick-dim-poss-acc)	(yesterday)	lock	-cmpl	-pst.rep	*(-1.sg)

(=chu)
=38
(=neg)

‘(Yesterday), I did (not) lock up (my little chicks)/them.’
Sp. ‘Ayer, no encerré mis pollitas.’

The minimal free occurrence domain is the smallest span that can be fit out by a single free form and is a complete utterance overlapping the verb core. For the verb complex this test identifies the 12-26 span. The maximal free occurrence domain identifies a span that covers the largest string that can be fit out by a single free form which can occur as complete utterance. In order to determine this domain, we should consider what elements outside of the traditional word are *bound* in the sense that they cannot stand as a free utterance.

All of the morphemes from positions 32 through 39 are bound in the sense that they cannot be minimal free forms. Verb forms can appear without any overt NPs and the clitics up to position 39. The clitics cannot occur preverbally (in positions 2 through 10) and position 11 would necessarily be fitted out by a free form if it occurred.

The example in (22) shows a cluster of clitics occurring after the verb complex. The verb form in (22) is a single free form.

(22) *... ranti -ni* ***=ña*** ***=chu*** *eh*
v: ... 12 -26 =32 =38 -
... buy -1SG **=already** **=NEG** eh
'(I used to buy lemon very often) now I no longer buy it.'
Sp. '(Acostumbraba comprar limón) Ahora, ya no compro pues.'

The domain extends to position 40. This is illustrated in the following reported speech construction in (23).

(23) *(tipi -ysi -n sapa dia) ... ni -wa -rqa* ***=qa***
v: (12 -16 -26 42 -) ... 12 -23 -26 =40
peal.corn -ASSIST -3SG every day ... say -1SG:P -3SG:PST **=TOP**
'"She (Teofila) helps peel the corn's dried skin", s/he told me.'
Sp. 'Me dijo que cada día le ayuda a pelar maíz'

The maximal free occurrence domain therefore identifies a 12-40 span for the verb complex.

4.2 Non-interruptability (12-21, 12-26, 12-41)

Non-interruptability domains are spans of structure that cannot be interrupted by free forms, combinations of free forms, or elements that need to be represented in non-adjacent positions in the planar structure. We can identify a few non-interruptability domains in SBQ.

The span 12-26 of the verb complex cannot be interrupted by a free form as in *qayna* 'yesterday' or *mana* 'negative' as in (24) and (25), respectively.

(24)

**chilvi*	*-situ*	*-s*	*-ta*	*wisq'a*	*-yu*	*qayna*	*-rqa*	*-ni*	*(=chu)*
v: 11	-	-	-	12	-13	-25	-	-26	(=38)
chick	-DIM	-POSS	-ACC	lock	-CMPL	yesterday	-PST.REP	-1.SG	(=NEG)

'(Yesterday), I did (not) lock up (my little chicks)/them'

Sp. 'Ayer, no encerré mis pollitas.'

(25)

**chilvi*	*-situ*	*-s*	*-ta*	*wisq'a*	*-yu*	*mana*	*-rqa*	*-ni*	*(=chu)*
v: 11	-	-	-	12	-13	-	-25	-26	=38
chick	-DIM	-POSS	-ACC	lock	-CMPL	NEG	-PST:REP	-1.SG	(=NEG)

'(Yesterday), I did not lock up (my little chicks)/them.'

Sp. 'Ayer, no encerré mis pollitas.'

Nor can the structure be interrupted by "promiscuous" (elements placed in more than one non-adjacent position) forms such as *=chu* 'negative' as illustrated in (26).

(26)

**chilvi*	*-situ*	*-s*	*-ta*	*wisq'a*	*-yu*	*=chu*	*-rqa*	*-ni*
v: 11	-	-	-	12	-13	-	-25	-26
chick	-DIM	-POSS	-ACC	lock	-CMPL	=NEG	-PST:REP	-1.SG

'(Yesterday), I did not lock up (my little chicks)/them'

Sp. 'Ayer, no encerré mis pollitas.'

The NON-INTERRUPTABILITY BY FREE FORM DOMAIN identifies a 12-26 span. There are no free forms that can interrupt this span.

The non-interruptablity variable can be fractured such that one version refers to non-interruptability by free forms (Haspelmath 2011) and another refers to bound but structurally promiscuous elements such as *=lla* 'limitative' (Lieber 2017). The 12-26 span can be interrupted by *=lla* which can occur outside this domain as well. An example of *-lla* 'limitative' occurring in position 22 before the person-number marker of position 26 is provided in (27).

(27)

wallpa	*-s*	*-pis*	*jaqay*	*wayq'u*	*-s*	*-pi*	*-pis*	*wacha*	*-mu*	*-lla*	*-n-ku*
v: 11	-	-	11	-	-	-	-	12	-19	-22	-26-29
chicken	-PL	-also	that	river	-PL	-LOC	-also	lay.egg	-MOT	-LIMIT	-3-3.PL

'The chickens as well, including those there go and lay eggs, no more or less.'

Sp. 'Las gallinas tambien, incluso allá en los rios van y ponen huevos no más.'

The same morpheme can occur on the other side of the person-number concord suffixes as well in position 30. An example is provided in (28).

(28)

	qhamá	*chay*	*-man*	*sat'i*	*-yu*	*-ku*	*-n*	*-lla*	*=ña*	*=taq*
v:	12	11	-	12	-13	-19	-26	-30	=32	
	look	that	-ALL	get.into	-CMPL	-REFL	-3SG	=LIMIT	=already	=and

'Look he went back to putting himself there (into the mud) no more or less.'
Sp. 'Mirá y se volvió a meter ahí (ej. barro, un lugar etc).'

The right edge of the -lla non-interruptability domain is 24. The left edge is 12. Evidence for this is provided in in (29).

(29)

	q'ipi	*-jina*	*-lla*	*t'aka*	*-yarpa*	*-ku*	*-n*
v:	11	-	-	12	-13	-19	-26
	lump	-like	-LIMIT	fall.down	-suddenly	-REFL	-3SG

'Suddenly, it spilt as if it was from a lump (from a car towards the ground)'
Sp. 'De pronto el se derramó como si fuera un bulto (del auto hacia el suelo).'

The -lla non-interruptability domain, thus, identifies a 12-21 span. In SBQ, when an auxiliary fills out position 41, no XP can occur in position 31. In auxiliary verb constructions, we can thus identify a non-interruptability by complex of free forms domain that identifies the span 12-41.

4.3 Non-permutability (12-12, 12-15)

Non-permutability domains are spans of structure where elements cannot permute. In this section we defend the fixedness of order in the verb complex in more detail, as well as describing the domains of non-permutability in Quechua.

At least 11 clitics have been in identified in Uma Piwra SBQ. The "clitics" are listed in Table 7 with their glosses and the positions that they can occur in. All of the positions for clitics are slots.[5]

[5] Note that Myler (2017) argues that object markers are clitics in (all?) Quechuan languages. Here we wish to emphasize (again) that the planar-fractal method assumes no distinction between affix and clitic. We only refer to 'clitics' for expositional reasons, to make our discussion more easily readable to Quechuanists and because it is easy to discuss clitics as a class because they cluster together in a fixed templatic order.

Table 7: Clitics in Uma Piwra South Bolivian Quechua

Formative	Meaning	Position
=ña	already	2, 32
=raq	conjunction	3, 33
=puni	always, certainly	4, 34
=taq	coordinator	5, 35
=sina	apparently	6, 36
=pis	also	7, 37
=ri	doubt	8, 38
=chu	negative	8, 38
=chus	or	8, 38
=ri	although	8, 38
=rí	interrogative	9, 39
=qa	topic	10, 40

The clitic *=ña* 'already' occurs before *=raq* 'conjunction' as in (30). A minimally contrastive sentence where the order of these elements is reversed is ungrammatical. The clitic *=raq* 'conjunction' must precede the clitic *=puni* as in (31), a minimally contrastive sentence with the order reversed is ungrammatical.

(30) *jap'i -n* ***=ña*** ***=puni*** *eh sesenta -yuq -mán jaqay*
v: 12 -26 =32 =34 - - - - -
get.paid -3SG =**already** =**certainly** eh sixty-GEN -ABL DEM -ALL
*-man jap'i -nku eh / … *=puni=ña …*
- 12 -26 -
get.paid -3PL eh
'For sure he received his payment/bonus, those who are 70 years and up receive the payment.'
Sp. 'Claro que recibe su pago (bono), de los 70 años en adelante reciben el pago.'

(31) *mana kuti -mu -nqa* ***=raq*** ***=puni*** *eh / (*=puni=raq)*
v: 11 12 -19 -26 =33 =34 -
NEG return -DIR -3SG:FUT **still** =**certainly** -
'No, clearly he will still come back.'
Sp. No, claro que aún va a regresar.'

The clitic *=puni* 'certainly' always occurs before *=taq* 'conjunct' as in (32). The reverse order (**=taq=puni*) is ungrammatical.

(32) *ch'aki -pu -sha -n* ***=puni*** ***=taq*** *kay jina qanqa -pi =qa*
v: 12 -19 -21 -26 =34 =35 31 - 31 - 40
dry -CMPL -PROG -3 **=certainly still** DEM like heat -LOC =TOP
í?
-
right
'And clearly it is drying in so much heat.'
Sp. 'Y claro que se está secando pues en tanto calor.'

The clitic *=taq* 'coordinator' always occurs before *=sina* 'dubitative' as in (33). The reverse order is ungrammatical.

(33) *para -lla -nqa* ***=taq*** ***=sina*** *manchay t'irkura -ri -mu*
v: 12 -22 -26 =35 =36 11 12 -14 -19
rain -LIMIT -3SG:FUT **=CONJ** **=DUB** extremely sprout.rain -AFF -DIR
-sha -n ni -sha -rqa =qa (=sina=taq)*
-21 -26 12 -21 -26 =40
-PROG -3SG say -PROG -3SG:PST =TOP
'I think it is going to rain again, it is said that the rain is being made.'
Sp. 'Creo que va a llover otra vez, dice que se estaba armando la lluvia.'

The clitic *=pis* 'also' always occurs before *=chu* 'negative' as in (34). The reverse order is ungrammatical.

(34) *ni uyari -sha -lla -n =pis =chu puñu -rpa -n =ña*
v: 31 12 -21 -22 -26 =37 =38 12 -16 -26 =32
NEG listen -PROG -LIMIT -3SG =also =NEG sleep -suddenly -3SG =already
(=chu=pis)*

'She is not even listening.'
Sp. 'Ni siquiera está escuchando, (ya se quedó dormida.)'

The topicalizer *=qa* always appears after all of the other clitics as in (35) and (36).

(35)

	ay	*qunqa*	*-pu*	*-sqa*	*-ni*	***=ña***	***=qa***
v:	-	12	-19	-25	-26	=32	=40
	-	forget	-CMPL	-PST	-1SG	**=already**	**=TOP**

‘Ay, I have already forgotten.’
Sp. ‘Ay, ya me había olvidado.’

(36)

	ri	*-sha*	*-yku*	*pasiu*	*-man*	*jamu*	*-ri*	*-sha*	*-lla*	*-n*
v:	12	-21	-26	12	-	12	-14	-21	-22	-26
	go	-PROG	-1:2PL	walk.around	-ALL	come	-AFF	-PROG	-LIMIT	-3SG

=puni	***=sina***	***=qa***
=34	=36	=40
=certainly	**=DUB**	**=TOP**

‘We are passing through. I think he is still coming, right?’
Sp. ‘Estamos yendo de paseo. Creo que sigue viniendo ¿no es cierto?’

The clitics cannot fill out positions 2 through 40 unless there is an element in position 1. The suffix *-ri* ‘inceptive’ always occurs before *-na* ‘reciprocal’ as in (37). The reverse order is ungrammatical as in (38); a clitic cannot occur in first position before an NP.

(37)

	aysa	*-ri*	*-na*	*-ku*	*-sun*	*eh*	*nuqa*	*-lla*	*-nchik*	*=taq*
v:	12	-14	-15	-19	-26	-	31	-	-	=35
	pull	-INCEPT	-RECP	-REFL	1:2PL	-	hand	-LIMIT	-1:2PL	=CONJ

‘We ourselves will take each other’s hands one by one.’
Sp. ‘Nosotras mismas nos tomaremos de la mano uno al otro pues.’

(38)

	**aysa*	*-na*	*-ri*	*-ku*	*-sun*	*eh*	*nuqa*	*-lla*	*-nchik*	*=taq*
v:	12	-15	-14	-19	-26	-	31	-	-	35
	pull	-RECP	-INCEPT	-REFL	1:2PL	-	hand	-LIMIT	-1:2PL	=CONJ

Intended: ‘We ourselves will take each other’s hands one by one.’
Sp. ‘Nosotras mismas nos tomaremos de la mano uno al otro pues.’

Position 16 is a zone. This means that the morphemes that can fit out this domain can be variably ordered. The morphemes *-ysi* ‘assistive’ and *-rpa* ‘quickly’ can be variably ordered for instance. Both of the orders are attested in the corpus as in (39) and (40). The variable ordering is illustrated in (39) and (40) below.

(39) *chay caraju -s q'ala uña pili -situ -s -ni -y -ta uqu*
v: 1 - - - - 11 - - - - - 12
DEM idiot -PL entirely little duck -DIM -PL -E -1SGPOSS -ACC devour
-ysi* *-rpa *-nku eh*
-16 -16 -26 -
-ASSIST -quickly -3PL -
'Those carajus (birds) help finishing my little ducks' food up ...'
Sp. 'Esos (pájaros) le ayudan a terminar de comer la comida de mis patitos ...'

(40) *jajaja kuntan t'iqpa* ***-rpa -ysi*** *-lla -sqa -yki ni*
v: - 11 12 -16 -16 -22 -25 -26 12
- soon peel **-quickly -ASSIST** -LIMIT -? -2SG<1SG say
-spa
-25
-GERUND
'Hahaha, I will quickly help you peeling (the corn) soon.'
Sp. 'Jajaja, enseguida voy a ayudarte a pelar el maíz.'

In position 16, *-ysi* 'assistive' and *-rqu* 'nimbly' can variably order as is illustrated by comparing (41) and (42). The variable ordering between these morphemes is not very prominent in the corpus, but it is certainly possible.

(41) *libri -ta jamu -rqu -nku q'alata mikhu* ***-ysi -rqu***
v: 11 - 12 -16 -26 11 12 -16 -16
extremely -ACC come -nimbly -3PL completely eat **-ASSIST -nimbly**
-nku ni -n
-26 12 -26
-3PL say -3SG
'Nimbly they come, they help to finish eating their food completely.'
Sp. 'Agilmente vienen, dice que le ayudan a comer su comida completamente.'

(42) *jaqay chimpa -pi ujchhika sar -ita -ta ruthu* ***-rqu -ysi***
v: 1 - - - 11 - - 12 -16 -16
DEM front -LOC a.little corn -DIM -ACC cut **-nimbly -ASSIST**
-mu -wa -rqa
-19 -23 -26
-go&do -1:P -3SG:PST
'There in front, he helped me cut the maize a little.'
Sp. 'Allá, al frente, me ayudó a cortar un poquito de maíz.'

There is no evidence that the variable ordering of morphemes in position 16 corresponds to a difference in scope. Both the possible orderings are ambiguous with respect to the scope. The following restrictions are also present. The assistive suffix *-ysi* cannot co-occur with the affective *-ri* 'affective' from the following slot after the zone where *-ysi* 'assistive' occurs. Only *-rqu* 'nimbly' and *-rpa* 'suddenly' can occur with *-ri*. The suffixes *-rqu* 'nimbly' and *-rpa* 'suddenly' from the zone in the verb template can occur with *-ri* from the next slot. Example (43) shows *-rqu* preceding *-ri* 'affective' and (44) shows *-rpa* 'nimbly' preceding *-ri* 'affective'. The suffix *-ri* 'affective' cannot precede any of the suffixes from the zone. The reverse order is ungrammatical.

(43) *chay -ta tumpá qunqa* ***-rqu -ri*** *-ni / … *-ri-rqu …*
v: 1 - 1 12 -16 -14 -26
DEM -ACC a.little forget -nimbly -AFF -1SG / … -AFF-nimbly …
'I forgot that story a little.'
Sp. 'Esa (historia) me olvidé un poco.'

(44) *kay paloma pasa -sha -nman i ajná pasa* ***-rpa -ri***
v: 11 - 12 -21 -26 - 11 12 -16 -14
DEM pigeon pass -PROG -3SG:COND - like:ACC pass **-suddenly -AFF**
*-n / … *-rpa-ri …*
-26
-3SG / … -AFF-suddenly …
'Just like the pigeon that would be passing, passing flying.'
Sp. 'Así como la paloma que estaría pasando (volando), asi mismo pasan (volando).'

The affective *-ri* precedes the causative *-chi* as in (45) but the causative *-chi* cannot precede the affective *-ri*.

(45) *ajin -ita -n -ta llami* ***-ri -chi*** *-wa -rqa / … *-chi-ri …*
v: 11 - - - 12 -14 -18 -23 -26 / … 18-14 …
DEM -DIM -3SG:POSS -ACC try **-AFF -CAUS** -1:P -3SG:PST / …
'She had me try it (a chunk of huminta), small like this.'
Sp. 'Me hizo probar (un trozo de huminta) asi pequeño.'

The causative *-chi* precedes the reflexive *-ku*, the associated motion simplex and complex suffixes *-mu*, *-kampu*, *-kamu*, and also the benefactive suffix *-pu* and the completive *-kapu*, *-mpu*. Reversing the order between *-chi* and any of these morphemes is not accepted. The ordering relations are illustrated in (46) through (49) below.

(46) *tukuy ima -wan atipa* ***-chi*** ***-ku*** *-n jamp'atu -wan waqta atipa*
v: 11 - - 12 -18 -19 11 - - 12 -18
all what -COM beat **-CAUS** **-REFL** -3SG frog -COM another beat
*-chi -ku -lla -n =taq / ... *-ku-chi ...*
-19 -22 -26 =35
-CAUS -REFL -LIMIT -3SG =CONJ / ... -REFL-CAUS ...
'It makes everyone gain/win with everything, with the toad as well, he makes him win/gain.'
Sp. 'Se hace ganar con todos, con el sapo también se hace ganar (el zorro).'

(47) *pay ri -nqa eh punchu ruwa* ***-chi*** ***-mu*** *-nqa eh / ...*
v: 11 12 -26 - 11 12 -18 -19 -26 -
3SG go -3SG:FUT eh poncho knit **-CAUS** **-go&do** -3SG:FUT eh / ...
**-mu-chi ...*

-MOT-CAUS ...
'She is going to go, she will go and make a poncho...'
Sp. 'Ella va a ir pues, ella irá a hacer tener poncho...'

(48) *nuqa =puni kuti -yu -ri* ***-chi*** ***-kampu*** *-sha -rqa -ni / ...*
v: 1 =4 12 -13 14 -18 -19 -21 -25 -26
1SG =certainly come -CMPL -AFF **-CAUS** **-DIR** -PROG -PST -1SG / ...
**-chi-kampu ...*

-CAUS-MOT ...
'I always decided to bring my sheep on the way back.'
Sp. 'Yo siempre decidí traer de regreso (mis ovejas).'

(49) *Zapatú -y sira* ***-chi*** ***-kamu*** *-saq / ... *-kamu-chi ...*
v: 11 - 12 -18 -19 -26
shoe -1SG:POSS sew **-CAUS** **-go&do** -1SG:FUT / ... -go&do-CAUS ...
'I will go and repair my shoe.'
Sp. 'Iré y haré costurar mi zapato.'

The suffix *-naya* 'about to' occurs in position 20. Out of all the suffixes that fit out slot 19, only *-kamu* 'go and do' can be followed by *-naya* 'proximal future' as we can see in example (50). The other suffixes from position 19 cannot combine with *-naya*: **-ku-naya*, **-kampu-naya*, **-kapu-naya*, **-mpu-naya* and so on.

(50) *t'aka -ri -kamu -naya -sha -lla -n =ña =taq*
v: 12 -14 -19 -20 -21 -22 -26 =32 =35
spill -INCEPT -DIR -about.to -PROG -again -3SG =already =CONJ
'You see, they (the rain drops) are starting to fall (lit. spill) again.'
Sp. 'Ves? (Las gotas de lluvia) está empezando a caer de nuevo.'

The morpheme *-sha* 'progressive' always precedes *-wa* 'first person singular' as in (51). There can be no morpheme intervening between these two and the reverse order is ungrammatical.

(51) *kay -pi graba* ***-sha -wa****-n eh / … *-wa-sha …*
v: 11 - 12 -21 -23 -
DEM -LOC record **-PROG -1SG:P** -3SG - / … -1SG:P-PROG …
'She is recording me here.'
Sp. 'Me está grabando aquí pues.'

The morpheme *-lla* 'limitative' will always follow the morpheme *-qti* 'when' and the reverse order is not grammatical. This is also illustrated with (52).

(52) *t'ika* ***-sha -qti*** *-n jampi -na eh t'ika* ***-sha -qti***
v: 12 -21 -24 -26 12 -25 12 -21 -25 -22
bloom -PROG -when -3SG fumigate -OBLIG eh bloom -PROG -when
-lla *-n =raq / … *-qti-sha … / … *-lla-qti …*
-26 =33
-LIMIT -3SG still / … -when-PROG / … -LIMIT-when …
'One has to fumigate when they are blooming, when it just starts to bloom.'
Sp. 'Hay que fumigar cuando está floreciendo, cuando a penas está floreciendo.'

The second person markers *-su~-sa* can variably order with the past tense marker as in (53) and (54). The rest of the suffixes occur in a fixed order.

(53) *pí ni* ***-su -rqa***
v: 1 12 -25
who say **-2:P -PST**
'Who told you?'
Sp. 'quien te ha dicho?'

(54) *qayna tarde ri -sha -lla -n =taq ni -sha -rqa -su*
v: 11 - 12 -21 -22 -26 =35 12 -21 -25 -25
yesterday afternoon go -PROG -LIMIT -3 =CONJ say -PROG **-PST -2:P**
-nki =qa
-26 -40
-2
'He told you yesterday in the evening that he is going again.'
Sp. 'Te ha dicho que ayer por la tarde nuevamente estabas yendo.'

Non-permutability domains can be fractured into two types depending on whether the lexical *-chi* 'causative' of position 13 and the *-chi* of position 18 are treated as a single morpheme or not. We could regard these morphs as instances of the same morpheme on the grounds that they have the same form and function (see §3). On the other hand, they could be treated as distinct morphemes on the grounds that only position 18 can be filled out consistently. The non-permutability domain (*-chi* = *-chi*) identifies a span overlapping the verb core where elements cannot be variably ordered on the interpretation that there is a single *-chi* morpheme. This domain identifies a 12-12 span. The non-permutability domain (*-chi* ≠ *-chi*) overlapping the verb core according to the view that we should understand lexical *-chi* and productive *-chi* as distinct elements. This domain identifies a 12-15 span. After position 15, morphemes can variably order in position 16.

4.4 Ciscategorial selection (12-21, 12-25, 2-41)

A ciscategorial selection domain is a span of structure that refers to elements which are selectively restrictive such that they can only combine with a single part of speech category.

Ciscategorial selection can be fractured into at least two types. The minimal ciscategorial domain identifies a span overlapping the verb core containing positions whose elements can only combine with the verb. This domain covers the 12-25 span. It covers the verbal complex until we arrive at position 26. After this position there are a number of number/person agreement markers which also appear in the nominal paradigm.

The maximal ciscategorial selection domain has to be fractured according to whether we consider clitics to be verb ciscategorial or not (the strict interpretation). A lax ciscategorial selection domain assumes that a morpheme is ciscategorial if it does not combine with other part of speech classes semantically. A strict ciscategorial selection domain assumes that an element is ciscategorial *if* it only combines with overt verbs.

Clitics are different from the morphemes that fit out positions 12 to 29 of the verb complex. They do not require an overt verb to surface in an utterance – they can combine with any construction where a predicate is involved. In SBQ, predicates can be expressed without an overt verb. Clitics can occur in such non-verbal predicate constructions as in (55)–(58).

(55) *Cochabamba -pí chay -lla* ***=puni***
Cochabamba -LOC:TOP DEM -LIMIT =**always**
'In Cochabamba things are always the same.'
Sp. 'En Cochabamba siempre es lo mismo.'

(56) *Abran -paq -pi* ***=sina =qa*** *í*
Abrah -GEN -LOC **=DUB =TOP** right.INTER
'I think it was by the house of Abran.'
Sp. 'Creo que donde Abran (la casa de Abran), cierto?'

(57) *chay ch'ul -itu -n* ***=puni*** ***=chá*** *mana na -n*
DEM hat -DIM -3SG:POSS =**certainly** =**DUB** NEG DEM -3SG.POSS
'This should always be his hat, not his other thing (lit. not his this).'
Sp. 'Eso debe ser su gorrita siempre, no su este.'

(58) *k'ullu -lla* ***=sina =qa***
trunk -LIMIT =**DUB** =**TOP**
'I think it's just a trunk.'
Sp. 'Creo que solo es un tronco.'

The MAXIMAL STRICT CISCATEGORIAL DOMAIN identifies the largest span overlapping the verb core that contains ciscategorial verbal elements. This domain identifies a 12-26 span. This domain excludes clitics because they can appear without a verb as in (59).

(59) *kay -lla -pi =puni*
DEM -LIMIT -LOC =certainly
'Clearly, he is just there.'
Sp. 'Obvio, siempre está aquí.'

The domain also does not include person-number agreement markers because some of these also occur as possessives on the verb; these are not ciscategorial selective. The lax ciscategorial domain assumes that for an element to be verbal ciscategorial, it need only not combine with nouns or adjectives. A verb ciscategorial element can combine appear without a verb as long as it modifies the predicate. All clitics are verbal ciscategorial according to the lax definition.

The MAXIMAL LAX CISCATEGORIAL DOMAIN identifies a 2-41 span. This domain would include all of the clitics and the auxiliary as well.

4.5 Subspan repetition (1-29, 12-29, 1-42, 12-18)

Subspan repetition variables are constituency tests based on constructions that involve some type of structural repetition or recursion (reduplication, coordination, subordination, serialization etc.). The structural properties of recursive structures in Uma Piwra SBQ are still not completely understood. Below we review some preliminary findings.

SBQ has two strategies for combining clauses. One strategy involves juxtaposition of clauses. Another strategy involves combining a matrix clause with a nominalized clause. There are a few different types of nominalizers, however, as far as we have been able to discern they all select for the same span of structure in the verb complex. Future research might discern that each clausal nominalization should be treated as a separate clause-linkage strategy. Subspan repetition tests are fractured into at least types. The minimal domain refers to the span of structure wherein none of the elements can display widescope. The maximal domain refers to the span of structure where positions *can* be filled out in each repeated span (see Introduction to this Volume (Section 7) for a formalization).

4.5.1 Clause (asyndetic) juxtaposition

For the clause juxtaposition strategy the maximal domain simply identifies the entire verb complex (1-42). The minimal domain is more challenging to determine. NPs and PPs can always be ‘shared’ across juxtaposed clauses, and thus the minimal domain would exclude positions 1, 11, 31, and 42. Our preliminary evidence suggests that clitics do not scope over multiple juxtaposed clauses. For instance, *=chu* adds interrogative or negative semantics. In the examples below it displays local scope modifying only the clause it appears in (see Bickel 2010 for discussion from a typological perspective).

(60) *apa -mu -wa -rqa qan =chu apa -chi -mu -wa -rqa*
v: 12 -19 -23 -25 1 =8 12 -18 -13 -23 -25
take -go&do -1.P -PST 2SG =INTER take -CAUS -go&do -1.P -PST
-nki
-26
-2SG>1SG
'Yes, she brought it (the chicha drink) did you sent it to me?.'
Sp. 'Si, ha traido (la chicha), tu me has enviado?'

(61) *limun-tá anchata =taq ranti -q ka -ni eh kunán*
v: 1- 5 12 -27 12 -26 -26 11 11
lemon-ACC:TOP a.lot =CONJ buy-NMLZ be-1SG eh now NEG ...
má ... ranti -ni ***=ña =chu*** *eh*
12 -26 =32 =38
buy -1SG =still =NEG eh
'I used to buy lemon very often, now I no longer buy it (lemon).' (*'I never bought lemon very often, now I do not either).'

We conjecture preliminarily that clitics do not display multiclausal scope over juxtaposed or linked clauses. However, we have not yet systematically tested the claim with all clitics. Examples from naturalistic speech are hard to interpret without speaker commentary (e.g. Does *=puni* 'certainly' scope over one clause or two?).

None of the suffixes in the verb complex scope over juxtaposed clauses. For instance, if two juxtaposed clauses are future, future marking appears twice as in *-sa* in (62). Notice also that the subject marker *-q* is repeated in both clauses.

(62) *jap'i -sa -q kunán mikhu -mu -sa -q ni -sqa*
v: 12 -25 -26 31 12 -25 -26 -12 -25
hunt FUT -1SG now:TOP eat -go&do -FUT -1SG say -GERUND
'I will go and hunt and then I will go and eat.'
Sp. 'Le voy a cazar y le voy a comer, dijo (el zorro).'

Another illustrative example is provided in (63). The causative suffix *-chi* must appear in both clauses as well and cannot scope over both.

(63) *wasi -ta ruwa -chi* ***-kamu*** *-saq pirqa -chi -saq*
v: 11 - 12 -18 -19 -26 12 -18 -26
house -ACC build -CAUS **-go&do** -1SG:FUT build.wall -CAUS -1SG:FUT
'I will go and I will build a house and I will go (somewhere else) to build a wall.'

Sp. ‘Ire y haré construir una casa, iré y haré elevar la pared.’
‘I went to build a house and build a wall.’
Sp. ‘Iré y hare construir una casa, hare elevar la pared’

The only suffixes that display multiclausal scope in Quechua appear to be the associated motion markers (*-mu*, *-kamu*, *-kampu*). Wide scope over two clauses can be seen with the suffix *-mu* ‘go and do’ in (62) and with the suffix *-kamu* ‘go and do’. These facts require us to fracture the minimal domain into a stricter and laxer interpretation. On the strict interpretation, the minimal domain spans from 12-18. On the lax interpretation, the minimal domain spans from 12-29.

4.5.2 Clause combination with clausal nominalization

Thus far, five nominalizers have been documented: *-na* ‘obligatative’, *-q* ‘habitual’, *-sqa* ‘preterite’, *-spa* ‘gerund’, and *-ytawan* ‘prior event’. Clausal nominalizations can have all the positions of the verb complex filled out except the clitics, to our knowledge.

The main structural difference between main clauses and nominalized clauses with respect to the planar-structure is that nominalized clauses cannot take clitics, are obligatorily verb final and do not take (most) of the inflectional suffixes from positions 23-29. The maximal domain of the nominalized clause is therefore 1-22. The lax minimal domain is 12-22.

Apart from the inflectional suffixes and the associated motion suffixes, none of the other suffixes are shared across conjuncts in a nominalized clause. For illustration consider (64). In the sentence below, the inceptive *-ri* can only modify the main verb *kuti* ‘turn over’. The inceptive meaning does not carry over to the verb *qu* ‘give’ (fig. ‘kill’).

(64)

ujta	*kuti*	***-ri***	***-ytawan***	*qu*	*-ni*	*caraju*
v: 11	12	-14	-	12	-26	-
suddenly	turn.over	**-INCEPT**	**-NMLZ:PRIOR**	give	-1SG:PST	dammit

pharaq	*pharaq*	*ni*	*-rpa*	*-chi*	*-ni*	*eh*
-	-	12	-16	-18	-26	-
pharaq	pharaq	say	-suddenly	-CAUS	-1SG:PST	

‘As I turned quickly I gave it to him (killed him), and at this moment he made him say “pharaq pharaq”.’
Sp. ‘De pronto me di la vuelta y le di (arrojé con piedra a la perdiz, maté), y le hice decir “pharaq, pharaq” (revolcar en el piso aleteando antes de morir).’

The causative only has scope over the verb complex it combinations with as illustrated in (65).

(65) *jak'u -chi -kamu -spa na -yku wakin -tá vende -ku*
v: 12 -18 -19 -? -26 11 - 12 -19 -26
grind -CAUS -go&do -GERUND ? -3PL the.rest -ACC:TOP sell -REFL
-yku

-3PL
'Making them crush the rest, we sold it.' (*we made them sell it)
Sp. 'Lo demás (el resto del trigo), haciendo moler na-mos, nos vendemos.'

The morpheme *-rpa* 'quickly' does not display wide scope over clauses and must be repeated as well as in (66).

(66) *má ñapis carnaval jina pasa* ***-rpa*** ***-lla*** *-n ñapis*
v: 11 11 11 11 12 -16 -22 -26 11
NEG suddenly carnival like go.away -suddenly -LIMIT -3SG suddenly
chamu -n pasa ***-rpa*** ***-lla*** *-n =ña =taq eh*
12 -16 -22 26 =32 35 -
arrive -3SG go.away -suddenly -LIMIT 3SG -again
'No, quickly as with the carnival it goes rapidly, quickly we arrived and went.'
Sp. 'No, de pronto asi como el carnaval se va rápidamente no más, quickly it arrived and quickly it went away.'

The only morphemes that consistently scope over nominalized clauses are position 26 morphemes. Examples above and (67) below illustrate this.

(67) *khana -spa suysu -spa ruwa -nchika eh*
v: 12 - 12 -? 12 -26 -
burn -GERUND sift -GERUND make -1:2PL eh
'Burning (sit'ikira) exists, we made legia from that.'
Sp. 'Quemando (sit'ikira), cerniendo hacemos (legia) de eso.'

Just as with the juxtaposed clauses, the suffix *-mu* can display wide scope in nominalized clause combinations as in (68).

(68)

	sapa	*viernes*	*Anzaldo*	*-pi*	*chicharron*	*-ta*	*mikhu*	*-ri*	(*-**mu***)
v:	11	-	11	-	11	-	12	-14	-19
	every	friday	Anzaldo	-LOC	Chicharron	-ACC	eat	-AFF	(**-go&do**)

-ytawan	*patan*	*-pi*	*aqhá*	*toma*	*-ri*	***-mu***	*-ni*	*eh*
-	11	-	11	12	-14	-19	-26	
-ACC	on.top	-LOC	chicha:ACC	drink	-AFF	**-go&do**	-1SG	

'Every Friday in Anzaldo, I go eat Chicharron then I drink chicha on top of it.'

We tentatively conjecture that the strict minimal domain for such clauses could therefore be 12-18. This result could change in light of more research on the scopal properties of more of the suffixes in the SBQ verb complex, which are not always easy to discern from naturalistic speech alone. The results of this section are rather speculative at this point because the possibility that different types of clause linkage constructions display different scope/gapping/conjunction facts with respect to all the suffixes of the verb complex has not been explored systematically.

5 Phonological domains

We have been able to identify and describe three phonological domains in SBQ: (i) the pitch accent domain; (ii) a suffix deletion domain; (iii) a vowel lowering domain. SBQ is typically described with a vowel lowering rule whereby /u/ becomes /a/ word internally at some morpheme boundaries (Muysken 1981). As discussed in §3, we do not think that this analysis is correct, at least for the data available to us. Secondly, as far as we have been able to discern, SBQ's intonational phrasing consists of either L% or H% marked on the last syllable of an utterance. However, we have not yet investigated the topic in detail, and thus our proposal for intonational phrasing remains tentative.

5.1 Stress/pitch accent (12-29, 12-41)

In this section, we provide a brief description of pitch accent in SBQ. Describing SBQ pitch patters requires no reference to lexical tone categories. A bitonal L+H* pitch accent appears to always map to the stressed syllable (see Pierrehumbert & Beckman 1986, Gussenhoven & Bruce 1999 for terminology/notation). Intonational phrases are marked by a final L% or H%, and usually by an initial %H. Intonation level high tones are marked by "↑" and intonation level low tones are marked by "↓". An accute accent "´" marks the L+H* bitonal unit in the phonetic transcription. Providing a description of SBQ intonation must be left for future research at this point. It is not yet clear whether stress is realized by any acoustic correlates apart from the f0 of the pitch accent. We use the "´" accent to mark the presence of the pitch accent.

What we and much of the literature refer to as "clitics" fall within the pitch accent domain of SBQ, which is illustrated in (69) (see Bills et al. 1971, Joaquín & de Lozada 1978, Adelaar 1977, Cerrón-Palomino 1994 for similar descriptions). The stressed syllables occur on the penultimate syllable in a 12-38 span in the verb complex. This is illustrated in (69). In the following example, there is also a final L% utterance level tone. In the examples below, 'stress' is marked with an accute accent.

(69) [má.na.dʒi.khu.rin.pu.ní.tʃu ↓]
mana rikhuri -n =puní =chu
v: 11 12 -26 =34 =38
NEG appear -3 =certainly =NEG
'It certainly does not appear.'
Sp. 'Ciertamente no aparece.'

The pitch accent does not fall on the penultimate position when there is a clitic which bears stress as in *=chá* in the example in (70).

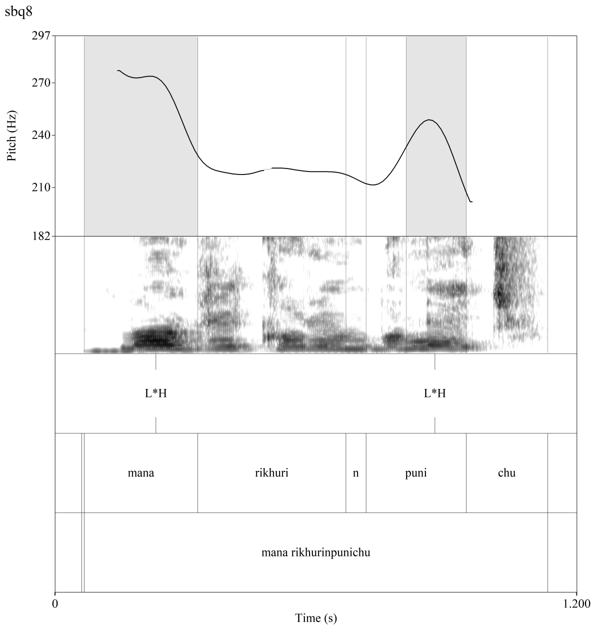

Figure 1: Pitch track of the sentence *mana rikhurinpunichu*

(70) *mikhu -n -ku =chá imana -n -kú =chus*
v: 12 -26 -29 =38 12 -26 -29 =38
eat -3 -PL =DUB not.know.what -3 -PL =DUB
'I don't know what they did, perhaps they eat it.'
Sp. 'No estoy segura si comen o no. No sé que hacen.'

Copula constructions in Quechua are formed with the morpheme *ka-* 'be'. Copulas receive stress like any other verb.

(71) [se.ɲóɾ .má. ʎuq.si.mun.qá.tʃu. pé.ɾo. mí.sa. kán.qa. nín ↓]
señor má lluqsi -mu -n -qa =chu pero misa ***ka*** ***-n*** ***-qa***
v: 1 - 12 -19 -26 -27 =38 - 1 12 -26 -27
saint NEG go.out -DIR -3 -FUT:3 =NEG but mass **be/AUX** -3 -FUT:3
ni -n
12 -26
say -3
'It is said that the saint won't leave (from the church), but there will be a festival.'
Sp. 'Dice que el Santo no va a salir (de la iglesia) pero va a haber fiesta.'

Auxiliary verb constructions combine a main verb with *ka-* or *tiya-*. Preliminary research suggests that the auxiliary verb falls within the stress domain of the verb. In other words, the auxiliary verb behaves like the sentence level "clitics" in SBQ with respect to pitch accent assignment. An illustrative example is provided in (72) with the verb complex *purimuq kayku* 'going'. The auxiliary *-q … ka-* appears to encode an imperfective aspect, judging by the Spanish translation, but the precise meaning of the auxiliary construction requires more research still.[6]

(72) [↑ɾiʁ.pú.ni ga.ni eh ↑tʃaɾaŋguitu guitaʁúp nuʁaj puɾimuq káik ↓]
ri -q =puni ka-ni eh charangu -itu guitarra -pi
v: 12 -27 =34 41 - 11 - 11 -
go -IPFV =certainly AUX-1SG yes charango -DIM guitar -LOC

[6]One can also observe that the positioning of the stress-attracted pitch accent is potentially complicated by the presence of sentence-level particles such as *á* 'yes, surely' as in *riqpuni kani a* 'Well, obviously I went'. Here the pitch accent moves back onto the main verb *ri-q-puni*, perhaps conditioned by the presence of a pitch accent on the particle *á*. Again, the precise interaction between intonational phrasing and pitch accent assignment requires more research in SBQ.

nuqaykú *puri* *-mu* *-q* *ka-yku*
11 12 -19 -27 41
1PL:EXCL:TOP walk -go&do -IPFV AUX-1PL:EXCL
'Well I obviously went, right, and we went singing guitar.'
Sp. 'Claro que iba pues, charanguito, nosotros caminábamos (cantando) en guitarra.'

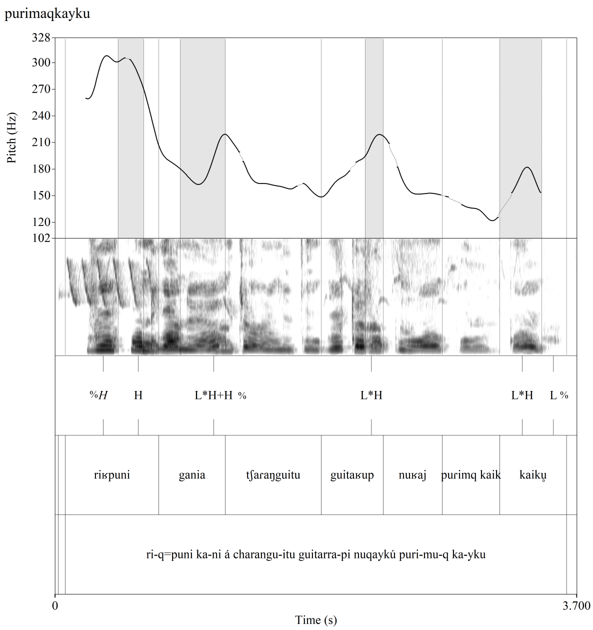

Figure 2: Pitch track of the sentence *ri-q=puni ka-ni eh charangu-itu guitarra-pi nuqaykú puri-mu-q ka-yku* provided in (72)

In the verb complex, the pitch accent domain is 12 to 29 when position 31 is filled out with a noun phrase or adverb. If position 31 is not filled out, then the domain extends further right to position 41. The MINIMAL PITCH ACCENT DOMAIN is thus 12-29 and the MAXIMAL PITCH ACCENT DOMAIN is 12-41.

5.2 Final syllable/suffix deletion (1-29)

SBQ has a suffix deletion rule. The rule applies to *-ta* 'accusative', *-spa* 'gerundive', *mana* 'negative', and *-qa* 'topicalizer'. The rule applies after stress assignment such that the underlying presence of *-ta* or *=qa* can be observed from the position of stress one syllable to the left of where one would expect it even where all the segmental material is deleted. An illustrative example where *-ta* 'accusative' is deleted is provided in (73) and (74). The final stress occurs on *papa* 'potato', because the accusative suffix *-ta* deletes after stress is assigned.

(73) [nuʁa **pa.ˈpa** wajk'ujuni hamunʁa kunan nispa]
nuqa papa-~~ta~~ wayk'u -yu -ni jamu -n -qa kunan ni
v: 11 11 12 -19 -26 12 -26 -27 31 12
1sg father:acc cook -cmpl -1 come -3 -fut:3 now say
-spa
-
-gerund
'I cooked potatoes, thinking "she's coming today".'
Sp. 'Yo cociné papa, pensando "va a venir hoy".'

(74) [ʎan.ˈt'á a.pa.na kaχ bu.ʐu.pi↓]
llant'á ~~-ta~~ apa -na kaq burru -pi
v: 11 12 -25 41 - 42 -
firewood:acc take -imp aux-hab donkey -loc
'One had to take the lumber on the donkey.'
Sp. 'Se tenía que llevar llena en burro.'

The gerund *-spa* is reduced to *-s* in some contexts. When this occurs the stress also occurs in the vowel of the last syllable as in (75).

(75) [kaj kalderaman tʃu.ˈrás tʃajatʃísun ari ↓]
kay kaldera-man churá -s~~pa~~ chaya -chi -sun ari
v: 11 - 12 ? cook -18 -26 -
dem boiler-to put -gerund cook -caus -fut:1pl eh
'We will cook, after placing the boiler (somewhere).'
Sp. 'Pues haremos cocer luego de haber colocado a la caldera.'

In the following example *mana* deletes its final syllable in (76).

(76) [six.tim.bri ki.ʎa.pi tʃaj.man.ˈta ma.na ˈma wa.ʁan.tʃu tʃaj.man.ta ↓]
*sijtimbri killa -pi Chaymantá mana ... **má** waqa -n =chu*
v: 1 1 - 1:10 11 ... 11 12 -26 =8
September month -loc then:top neg ... **neg** cry -3sg =neg
chaymanta
42
then
'In the month of September, not after. After that (the fox) doesn't cry.'
Sp. 'En el mes de septiembre. Después no. Después ya no llora (el zorro).'

Note that in the example above a post-verbal and utterance final *mana* does not delete its final syllable in (76). The deletion rule cannot apply when a the suffix occurs on a verb or noun which is utterance-final. This is illustrated with the examples below (77) and (78).

(77) [qha.wa.mu.ni.pú.ni rís.pa a ↑]

	qhawa	*-mu*	*-ni*	*=puni*	*ri*	***-spa***	*eh (*...-s...)*
v:	12	-19	-26	=34	31		
	watch	-go&do	-1SG	=certainly	go	-GERUND	- -

'Clearly I am going to look when I go.'
Sp. 'Claro que voy a mirar cuando voy pues.'

(78) [tú.ta en.té.ɾo t'om.pu.tʃín.tʃik tʃáj.ta q'i.ta.tá.qa áɾi ↓]

	tuta	*entero*	*t'impu*	*-chi*	*-n*	*-chik*	*chay-ta*	*q'ita-ta*	***=qa***	*ari*
v:	11	-	12	-18	-26	-29	31	31	=40	
	night	all	boil	-CAUS	-3	-1PL:INCL	DEM-ACC	arrope-ACC	=TOP	eh

'We boil all night, the maiz arrope.'
Sp. 'Hacemos hervir toda la noche, el arrope de maíz ah.'

The span of structure identified by the SUFFIX DELETION DOMAIN is 1-29. This is because the rule applies before verbs and to elements in positions 1 and 11.

5.3 Vowel lowering (12-13, 12-29)

In SBQ the phonemes /u/ and /i/ have allophonic variants [u]~[o] and [i]~[e], respectively. The low variants [o] and [e] occur adjacent to /q/.

(79)
a. *q'uñi* [q'o.ɲi] 'hot'
b. *uquy* [o.ʁoj] 'to devour'
c. *t'iqi* [t'e.ʁe] 'full'
d. *uqa* [o.ʁa] 'kind of potato'

The high variants [u] and [i] occur elsewhere. Some illustrative examples are provided in (80).

(80) a. [ta.ki.ni] *taki-ni*
sing-1SG
'I sing.'

b. [tu.suŋ.ki] *tusu-nki*
sing-2SG
'You sing.'

c. [ham.piŋ.ku] *jampi-nku*
cure-3PL
'They cure.'

d. [ta.puŋ.ki] *tapu-nki*
ask-2SG
'You ask.'

Note that the vowel lowering to [o] and [e] occurs across morpheme junctures as well. Illustrative examples are provided in (81).

(81) a. ta.ker.ʁa.ni
taki-rqa-ni
sing-PST-1SG
'I sang.'

b. tu.sor.ʁaŋ.ki
tusurqanki
dance-PST-2SG
'You danced.'

c. ham.per.ʁaŋ.ku
jampi-rqa-nku
cure-PST-3PL
'They cured.'

d. waj.k'or.ʁaj.ku
wayk'u-rqa-yku
cook-PST-1PL:EXCL
'We (excl.) cooked.'

e. ta.por.ʁaŋ.ki
tapu-rqa-nki
ask-PST-2SG
'You asked.'

The vowel lowering rule appears to not apply across all junctures, however. For instance in (82) we find that the rule does not apply across a 11-12 juncture in the verb complex.

(82) [kaj tu.tu.mas.pi ʁo.tʃi.sun.tʃik a ↓]

	kay	*tutuma-s-pi*	*qu*	*-chi*	*-su*	*-n*	*-chik*	*eh*
v:	11	-	12	-18	-25	-26	-29	-
	DEM	tutuma-PL-LOC	drink	-CAUS	-FUT	-n	-1PL	-

‘In these tutumas we are going to drink.’

Sp. ‘En estas tutumas vamos a beber pues.’

There is no evidence for the lowering rule across most of the boundaries of the verb complex, because most of these boundaries contain no suffixes with uvular consonants. The rule does not apply across a 38-42 juncture, however.

The MINIMAL VOWEL LOWERING DOMAIN in the verb complex spans 12-13. There is evidence that the rule applies inside the verb root and across the boundary between the verb core and the derivational suffixes/clusters. The MAXIMAL VOWEL LOWERING DOMAIN in the verb complex identifies a 12-38.

6 Summary and discussion

The pooled results of constituency tests in the verb complex are displayed in Figure 3.

Judging by highest convergences, one candidate word constituent emerges from the results. The first identifies the 12-29 span (layer 8). This domain corresponds to the traditional word. It corresponds to the domain of (maximal) vowel lowering, (minimal) pitch accent, and (minimal) asyndetic clause conjunction. The first two domains are phonological and the third one is indeterminate. Thus, the planar-fractal method seems to reveal that the traditional word in Quechua is closer to a phonological one.

If the traditional word is a phonological domain, it is less clear what the morphosyntactic word corresponds to in SBQ. Based on convergences, it could be either the domain from 12-21, or from 12-26. Whatever the case, insofar as we assume the tests identify constituent structure, the ‘word’ of SBQ appears to bear some internal structure, even while, as we have argued in this chapter, claims concerning “layering” of suffixes are somewhat exaggerated.

The convergence plot could also be interpreted as suggesting a shift from word to phrase structure in the shift from layer 8 to layer 9. There are a few properties of the distribution of the domains that suggest such a shift. First, the layers from 1–8 cluster relatively close together in terms of the spans which they occupy compared to domains above layer 8. When one ascends from layer to layer,

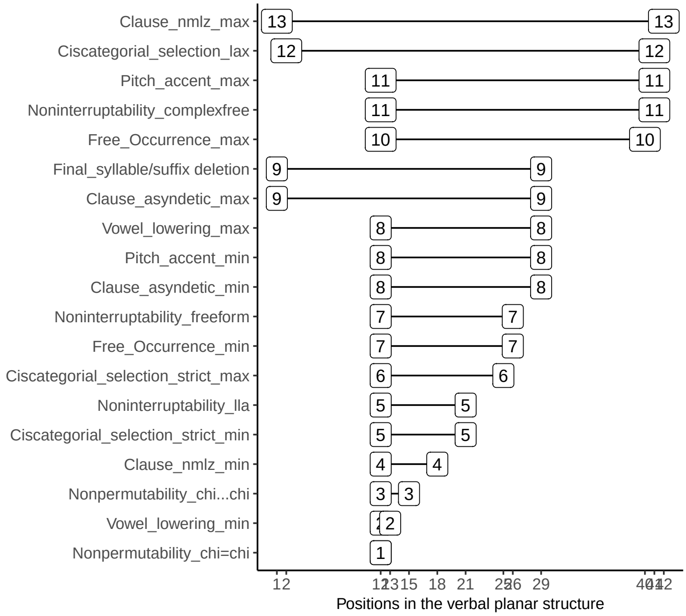

Figure 3: Domains of Uma Piwra South Bolivian Quechua

they are not strongly separated from each other in terms of span size until we arrive at the shift from layer 8 to layer 9. Secondly, after layer 9 most of the layers are 'maximal' interpretations of other tests. The results suggest that maximal domains might be better associated with phrase-level domains. Nevertheless the relationship is not perfect (consider MAXIMAL CISCATEGORIAL SELECTION STRICT). Also domains associated with conjunction occur at layer 8 and above. These properties show a general separation between morphology and syntax in Uma Piwra Quechua.

We think that the results might bring some clarity to an apparent disagreement in the Quechua literature regarding the lexical vs. syntactic structure of the 'word' (Muysken 1981 vs. Weber 1983).

Muysken (1981) argues that in Quechua there is a general separation of morphology from syntax. He formulates his claims in terms of different properties associated with word formation rules (WFRs) versus prase structure rules (PSRs). Muysken, focusing on Tarma Quechua of Peru, makes the following arguments about WFRs: (i) WFRs can only create structures with up to three branches (compared to phrase structure rules which are "unconstrained"); (ii) WFRs are subject to a "unitary base hypothesis", meaning all affixes will be ciscategorial; (iii) WFRs cannot impose co-occurrence constraints between elements that are not in the same cycle; (iii) WFRs create opaque allomorphy, but PSRs do not.[7]

It is somewhat difficult to assess Muysken's claims about branching now, because there are models of syntax available where phrase structure rules are constrained in ways that he states they could not be (e.g. models which impose binary branching). But the basic claim might hold if we assume that the variable ordering of clitics and NPs around the verbal word implies a flatter constituency structure. The "unitary base hypothesis" translates to the CISCATEGORIAL SELECTION DOMAIN. There appears to be only rough support for this claim in Uma Piwra SBQ. The morpheme *-lla* intervenes in the verbal word, and at least plural suffixes could be analzyzed as transcategorial, modifying a subject or a verb or a possessor of a noun. The third point made by Muysken is partially a matter of analysis. The opaque *-ku*-based allomorphy might disappear once we admit complex suffixes, as we suggested in this chapter. Based on the properties he attributes to word formation rules required to describe Quechua, Muysken argues that "…it is both accurate and helpful to postulate the [morphology-syntax] dichotomy" (Muysken 1981: 279).

Weber argues against Muysken based on data from Huallaga Quechua:

> … Quechua provides considerable evidence that morphology and syntax must be closely integrated, and that strictly separating them makes capturing certain regularities of the language–if not impossible– at least very difficult I take the position that morphology and syntax are not distinct components and that they should be treated as a single domain called *morphosyntax.* (Weber 1983: 162)

The main arguments that Weber provides are cases where a suffix scopes over a word-external element or cases where co-reference appears to require the construction of word formation rules (e.g. causativization, passivization) which are interlaced with the construction of phrases.[8] Weber seems to assume through-

[7]A fourth point Muysken makes is about a "subjacency condition", which imposes constraints on WFRs such that they cannot refer to elements across different cycles. We found this claim somewhat hard to decipher, but as far as we have been able to discern it also holds of Uma Piwra word-internal elements. However, it is not clear to us whether the claim might not also hold over word-external relations, if one attempts to define a cycle (or "phase") at this level of grammar. We leave this question to future research.

[8]Weber 1993: 176 also argues that ditropic clitics ("wrong-way cliticization") provide evidence against the morphology-syntax distinction. This argument only seems to follow if one does not admit that phonological words or phrases can be misaligned with morphosyntactic words or phrases.

out his argument that any issues of semantic scope should be reflected in base-generated phrase structure rules. It is not clear if this assumption is adopted by Muysken, as he focuses more on distributional and phonological differences between elements inside words compared to those outside. We suspect, therefore, that the theoretical issue is somewhat obscured because the empirical facts are mediated by phrase structure rules coupled with unstated assumptions about what these phrase structure rules are supposed to account for, represent or predict.

Putting aside the details of the formal proposal, in a general sense, both Muysken and Weber are correct. Quechua suffixes are deeply intertwined with syntax accomplishing expressive feats often reserved for "syntax" in less polysynthetic languages. On the other hand, dichotomous structure emerges when we aggregate over surface constituency diagnostics, suggesting a quantal morphology-to-syntax-like shift in organization from morph to utterance. Perhaps a better research strategy is to focus on the empirical details which could motivate the dichotomous structure in language after language first, before attempting to enshrine these in universal formal principles based on data from a couple of languages. We might be able to model modularity in morphosyntax, while also recognizing its typological plasticity.

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Abbreviations

ABL	ablative	GEN	genitive
ACC	accusative	GERUND	gerundive
AFF	affective	HAB	habitual
ALL	allative	IMP	imperative
ASSIST	assistive	INCEPT	inceptive
AUX	auxiliary	INCL	inclusive
BEN	benefactive	IPFV	imperfective
CMPL	completive	LIMIT	limitative
COM	comitative	MOT	motion
COND	conditional	NMLZ	nominalizer
CONJ	conjunction	OBLIG	obligative
DIM	diminutive	PRIOR	prior
DIR	directional	PROG	progressive
DUB	dubitative	RECP	reciprocal
EMPH	emphasis	REGRET	regretative
EXCL	exclusive	TOP	topic
FUT	future		

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Chapter 15

Wordhood in Chorote (Mataguayan)

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This chapter discusses the results of applying constituency tests to Chorote (Iyojwa'aja' or "Ribereño" variety, ISO code: crt), a Mataguayan language spoken in Argentina and Paraguay. The outcomes are interesting for a number of reasons.

Firstly, Chorote has the highest number of positions of all the languages surveyed in this volume: 46 positions. There are several reasons for this: the high number of categories expressed (lexical arguments/adjuncts, personal clitics, agreement and TAME markers, adverbs, applicatives), the strict ordering of elements such as adverbs or applicatives, which forces one to assign a distinct position to each of them, and the fact that many morphemes can appear in multiple positions in the template.

Secondly, no clear wordhood candidate emerges from the application of constituency diagnostics. Only one subspan reaches the convergece of three diagnostics, and four or perhaps five more spans the convergence of two diagnostics each. Chorote, thus, provides another example of a language where language-internal evidence suggests no quantal shift from word (morphotactic) to phrasal (syntactic) structure, but rather a smooth cline, morphology-like to syntax-like combination.

Thirdly, Chorote makes apparent some methodological problems in the application of the diagnostics based on ciscategorial selection. A general issue is that it is difficult to define a cross-linguistically valid notion of transcategoriality given the presence of mixed constructions, i.e. those that cannot be neatly categorized as verbal or nonverbal predication. The predicate in Chorote can be syntactically headed not only by verbs but also by Ns, NPs, DPs, pronouns, and negation, which take then most of the usually "verbal" markers. Furthermore, NPs and DPs can take some of the "verbal" TAME markers even when they function as arguments. All these facts pose questions regarding how ciscategoriality should be defined as a comparative concept, since it is not clear whether it should be defined with respect to verbs or to predicates in general.

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1 Introduction

This chapter describes and discusses the application of a set of constituency tests to the verb complex of Chorote, a Mataguayan language spoken in the Argentine and Paraguayan Chaco. The data come from extensive original fieldwork (over 120 days in yearly trips from 2005 to 2011) and text corpora, namely the collection of 33 short stories compiled in Drayson et al. (2000), a New Testament translation into Gomez & Drayson (1997), cited by the corresponding verses, and a few other scattered materials.

Chorote is interesting for typological issues in constituency for a number of reasons. First, it has more positions than any other language surveyed this volume: 46 positions. The number of categories expressed (lexical arguments or adjuncts, pronominal clitics, agreement and TAME markers, adverbs, and a number of applicatives) is relatively high. Furthermore, many of them display a strict order with respect to each other, which forces one to assign a distinct position to each of them. But this alone does not suffice to explain the number of positions in the template. Many morphemes can occur in many different positions in the template. Some TAME markers, for instance, may occur bound not only to the verb (or non-verbal predicate) but also to other word-classes or phrases. Moreover, there is a critical distributional distinction between DPs headed by demonstratives, and NPs (or DPs headed by possessives). The former appear to the right of the predicate that selects them — verb, noun or adposition/applicative, and the latter to the left. This results in a duplication of many positions dedicated to verbal arguments, and also those of the applicatives/adpositions (these are a single lexical class that attach to the verb (“applicatives”) or to the nominal (“adpositions”)).

Secondly, no clear wordhood candidate emerges from the application of the constituency tests used in this chapter. The diagnostics discussed here are both morphosyntactic (free occurrence, non-interruption, non-permutability, subspan repetition, deviation from biuniqueness) and phonological (accent, *yod*-insertion, palatalization). All but one are fractured into two or more subtests. All in all, the highest convergence level is two diagnostic subtests per layer, which is reached by five or perhaps six subpans. There is significant convergence in the left edge of the domain containing the predicate: 14 subtests converge on the position of the verbal prefixes and a further six subtests on the verbal stem or predicate. However, there is much less convergence on the right edge. The highest convergence is again three subtests, reached by three or maybe four positions. But if we do not count subtests of the same diagnostic, convergence is reduced to two diagnostics in two of those positions. Chorote thus provides another example of a language where language-internal evidence suggests no quantal shift from word (morphotactic) to phrasal (syntactic) structure, but rather a relatively smooth cline from morphology-like to syntax-like combination (Tallman 2021).

Thirdly, Chorote reveals some methodological problems in the application of the diagnostics based on ciscategorial selection. A general issue is that it is difficult to define a cross-linguistically valid notion of transcategoriality given the presence of mixed constructions, i.e. those that cannot be neatly categorized as verbal or nonverbal predication.[1] The ciscategoriality diagnostic for verbs can be formulated as follows: if a morpheme can only co-occur with verbal bases but not with other word classes, then it belongs to the verb word, i.e. it is ciscategorial to it. But the predicate in Chorote can be syntactically headed, not only by verbs, but also by nouns (N), noun phrases (NP), determiner phrases (DP), pronouns, and negation, which then take most of the usually "verbal" markers. Furthermore, NPs and DPs can take some of the "verbal" TAME markers even when the former function as arguments. All these facts pose questions regarding how ciscategoriality should be defined as a typological variable (or perhaps as a comparative concept), since it is not clear whether it should be defined with respect to verbs or with respect to predicates in general.

The rest of this chapter is organized as follows: §2 gives information on the language and its speakers; §3 presents the predicate planar structure, §4 presents morphosyntactic wordhood diagnostics except for those related to ciscategoriality, §5 presents phonological diagnostics, §6 presents diagnostics based on ciscategorial selection and discusses some implications of the Chorote facts, and §7 concludes.

2 The language and its speakers

Chorote is a Mataguayan language spoken by about 2000 people in Argentina (Salta Province) and about 500 in Paraguay (Boquerón county), where it is known as Manjúi. The language is fairly vital, and children learn it in both countries, although much less in communities surrounding the cities (Tartagal in Argentina, Mariscal Estigarribia in Paraguay).[2] The family is often called "Matakoan" in

[1] I would like to thank Adam Tallman for pointing this issue out to me.

[2] The 2010 census in Argentina gives the number of 2270 people who recognize themselves as Chorote (Instituto Nacional de Estadística y Censo 2012). The *Encuesta Complementaria de Pueblos Indígenas* [Complementary Poll on Indigenous Peoples] conducted in 2004-2005 documented 1700 Chorote speakers under a total of 1768 participants (Instituto Nacional de Estadística y Censo 2005). The 2012 census in Paraguay gives the number of 582 Manjúi (Dirección General de Estadísticas 2012). Based on my own personal field experience, I would say it is reasonable to assume that most or almost all those who recognize themselves as Manjúi speak the language and that probably a majority of them are monolingual.

English-speaking literature, according to the convention of naming the family by adding *-an* to the name of the better-known language. But since *Matako* is considered pejorative, the Spanish-speaking literature prefers *mataguayo* (Mataguayan). This chapter focuses on the riverside or *Iyojwa'aja'* variety (ISO code: crt), spoken in Argentina in communities by the Pilcomayo river and surrounding the city of Tartagal.

The language has a complex phonology. It has six phonological vowels; /a e i o u a*/. The phoneme /a*/ (or rather /ɑ/) is realized as /e/ after a palatal(ized) phone. In the same environment, /e/ is realized as /i/ and merges with phonological /a/ elsewhere. When no palatal(ized) phone precedes it, stressed /i u/ vowels lower to mid vowels, but do not merge with phonological /e, o/, which in turn are open in such environment. The surface contrast is thus roughly [e o] versus [ɛ ɔ]. In the notation used here, lowered phonological /i u/ are transcribed <*ẹ ọ*>; the practical spelling used in the communities, including in educational and religious texts does not distinguish them from phonological /e o/, using <*e o*> in either case.

Plain consonants are /p t k^j k hw hl l s h m n w j ʔ/ (<*p t ky k jw jl l s j n w y '*>). There is a series of laryngealized consonants /p' t' k^j' k' ts' ʔm ʔn ʔl ʔw ʔj/ whose phonological status is debatable, at least for non-stop sounds (Carol 2014a, Gutiérrez & Nercesian 2021). I transcribe the laryngealized consonants as <C'> for stops and as <'C> for sonorants. A widespread process of progressive palatalization creates palatalized allophones for almost any consonant, including laryngealized ones. They can mostly be regarded as a sequence of C plus a palatal glide, which I transcribe as <y>. Palatalized phones are accordingly transcribed as <Cy> (although recall that velars <*ky, k'y*> have phonemic status; they can have in turn palatalized counterparts, which are transcribed <*sy, ts'y*>). To avoid confusion, from now on I will use the orthographic conventions even in phonological representations, e.g. /y/ represents a palatal glide, except for the fact that I will use /h/ and /hC/ to correspond to orthographic *j* and *jC* respectively.

A sequence of a consonant and a glottal stop produces a laryngealized consonant, e.g. *y+'ut* → *'yut* '(s)he puts in'; a sonorant plus a voiceless laryngeal (transcribed as <*j*>) gives <*jC*> e.g. *in+jetik* → *ijnetik* 'someone's head'. In these cases, the corresponding glosses are separated by a colon, e.g. 3:put for *'yut.* A voiceless laryngeal is lost after an obstruent. Before a pause, any sonorant is laryngealized: for vowels, a final <'> is added, and for consonants the stop is added before the consonant, e.g. *jlam* '(s)he/it' → *jla'm* /_##; sometimes an "echo vowel" is also inserted, e.g. *jla'am.*

Syllable structure is CV(C). To avoid onsetless sylables, /y/ is inserted between a suffix/enclitic that begins with a vowel and a base that ends in a vowel, and a glottal stop <'> is inserted elsewhere. This will be described in more detail in

§5.3. Onset position can only be filled by one plain or laryngealized consonant (or by clusters of C and glottal stop if these are not considered single phonemes), including their palatalized allophones. Neither palatalized or phonemically laryngealized consonants nor /w, h/ occur in coda position. However, laryngealized consonants can occur in final position because of the phrase-level process mentioned above that laryngalizes any sonorant before pause. The language displays stress marking, realized as an increase of intensity in the stressed syllable. The stress falls in the first or second syllable of the stem and is thus not fully predictable. In the practical spelling used here, an acute accent is used to mark any stress that does not fall on the first syllable of the stem, and any orthographic word has no more than one stress. Raising and neutralization processes often occur in unstressed vowels.

The practical spelling adopted here follows the one used in the speech communities and introduced by missionaries, but differs in the following respects: 1) the orthographic word can only have one accent, so I write *i-**ni** ’**we**nis* ‘they see each other’ or *ta-**ka le**ja’n* ‘they wash (antipassive)’ (stressed syllables in boldface) instead of *ini’wenis*, *takaleja’n* as in the missionaries’ spelling; 2) I transcribe the palatalized consonants as *Cy* instead of *Ci* before vowels, e.g. *kya* instead of *kia* ‘that (moving away or disappeared)’, 3) I use graphical accents when they don’t fall on the first syllable of the stem (missionaries’ spelling uses no accents), and 4) I distinguish *ẹ*, *ọ* from *e*, *o*.

The language has an active-inactive alignment, and phrases can be both head-initial and head-final, depending on the “weight” of the complement - complements headed by a demonstrative are “heavy” and follow the phrase head, while other complements are “light” and precede it. This will be dealt with in detail in §3.3.

In glosses, no distinction is made between clitics and affixes, and morphemes are always separated by “-”, i.e. “=” is not used. The main reason is that the distinction between affix and clitic is mainly based on the notion of “word”, which is what this chapter seeks to scrutinize. As will be seen, it is not easy to determine what a word is in Chorote. Furthermore, the distinction often relies on assumptions related to cis-/transcategoriality (affixes have categorial preferences, clitics do not) which are complicated to apply in Chorote compared to other languages.

3 The predicate planar structure

The predicate planar structure of Iyojwa’aja’ Chorote has 46 positions (see Table 1).

Table 1: The predicate planar structure

Position	Type	Elements
(1)	Zone	Conjunction or conjunctive locution; interrogative *ma*(?)
(2)	Zone	Topic: DP {A, S}, Adverb, Adverbial clause
(3)	Zone	Focalized adverb or AdvP
(4)	Slot	Complementizers *ti*, *ka*
(5)	Zone	N', N, light DP, Pronoun/Adverb
(6)	Zone	N', N, light DP, Pronoun/Adverb
(7)	Slot	Mirative *-p'an*; reportative *-jen*
(8)	Slot	Prospective *ja*
(9)	Slot	Incompletive *-ta(j)*
(10)	Slot	Negation *je*
(11)	Slot	Indirect evidential *-t'i*; mirative *-p'an*
(12)	Slot	Interrogative *-mi*
(13)	Slot	Demonstrative *kyak* 'that (way)'
(14)	Slot	Cross referencing active/nonactive markers
(15)	Slot	Reflexive/reciprocal *ni(n)*; antipassive *ka*
(16)	**Slot**	**Predicate base**
(17)	Slot	Participle *-k*
(18)	Slot	Causative; antipassive; verbalizer
(19)	Slot	Concord 1
(20)	Slot	Concord 2
(21)	Slot	Perdurative *-jli*
(22)	Slot	Momentary *-a*
(23)	Slot	Irrealis *-a*
(24)	Slot	Reportative *-jen*
(25)	Slot	Indirect evidential *-t'i*
(26)	Slot	Mirative *-p'an*
(27)	Slot	Incompletive *-ta(j)*
(28)	Slot	Interrogative *-mi*
(29)	Slot	Concord (3PL, A/S) *-is*
(30)	Slot	Applicative: orientation *-a(j)*
(31)	Slot	Applicative: instrumental *-e(j)*
(32)	Slot	Applicative: distal *-ey*
(33)	Slot	Applicative: locatives *-jiy*, *-jam*
(34)	Slot	Applicative: punctual locative *-'e*, distributive/comitative *-k'i*, and possibly others

(35)	Slot	Oblique marker (only realized if position 36 is filled)
(36)	Slot	Applicative
(37)	Slot	Pluractional/downwards *-jen*
(38)	Slot	Pluractional/iterative *-'ni(j)*
(39)	Slot	Remote past *-pe(j)*; perfect *-('V...)je(j)*
(40)	Zone	Temporal, aspectual and discourse particles
(41)	Slot	Locatives
(42)	Zone	N, N', light DP
(43)	Zone	N, N', light DP
(44)	Slot	Adpositions-applicatives
(45)	Zone	Heavy DP (A, S, O, Obl, Possessor of)
(46)	Zone	Heavy DP (A, S, O, Obl); S

The analysis whereby Chorote has 46 positions is conservative for two reasons. First, at least some of the particles in position 40 might be rigidly ordered with respect to one another, which might require that we split this position into many. These particles include *pet* 'please' (among other meanings), *'ne* 'then', *-na'a* 'later', among many others. Some appear always in the same order in texts, though no exhaustive elicitation work has been conducted to test whether this order can be altered.

Secondly, texts produced by elderly speakers occasionally show a few morphemes in positions not recorded in Table 1; this will be shown in §3.2. My main consultant, >60 years old when the fieldwork was conducted (2007-2011), accepted these forms in elicitation, though he did not produce them spontaneously, nor did other consultants represented in my corpus. Therefore, I decided to build a table with a "standard" version of the language and exclude these cases.

On the other hand, the number could be reduced if we assume some internal constituent. In effect, one could assume an initial host position (e.g. a complementizer head) and a clitic cluster bound to it. Under such an analysis, the number of positions that hosts fronted elements (which is especially high in the Chorote varieties discussed in §3.2), as well as the many positions for some bound morphemes, could each be reduced to one. The positions could also be reduced if some morphemes (e.g. adverbs) proved to modify others, so that they would constitute a zone, rather than distinct positions.

The rest of this section is organized as follows. §3.1 describes the orthographic word in Chorote, §3.2 discusses the fact that some elements can occur in more than one position, and §3.3 explains the distribution of NPs and DPs in Chorote.

3.1 The orthographic word

This section is concerned with the orthographic "word" in Chorote, which largely corresponds to the practice of writing spaces by missionary linguists. Such a notion offers an idea of what the traditional notion of word is like in the language. In broad terms, it corresponds to a stress domain. Thus, the orthographic word containing the verb core usually has the unstressed personal prefixes of position 14 as its left edge. But when the unstressed prospective marker *ja* of position 8 surfaces, it usually becomes the left edge and, more rarely, the complementizer *ka* of position 4 (most usually written in a separate word).

However, when the stressed reflexive or antipassive markers of position 15 surfaces, the correlation between the orthographic word and the stress domain is broken. Drayson and the authors of religious texts include it in the orthographic word altogether with the verb core, so that the word has two accents - in position 15 and in position 16, e.g. *i-ni-'we'en* (14-15-16) '(S)he sees himself/herself'. Nevertheless, some native speakers split this into two orthographic words, with only one stress each: *i-ni 'we'en* (14-15 16).

As for the right edge, the remote past marker of positon 39 can be the right edge or appear in a different orthographic word, which is consistent with its facultative stress. Something similar occurs with the markers of position 40, some of which are stressed, while others are not.

But when the oblique second person markers of position 35 surface, the correlation with the stress domain is again broken. This morpheme bears (secondary) stress, despite which it is written altogether in word with the verb in most texts. (Although I have not tested it, it is possible that some speakers would write it as a different word).

In the two cases mentioned above in which, in the missionaries' writing, orthographic word does not correspond to a stress domain, some sort of 'morphological word' criterion seems to be involved. Namely, the stressed morphemes of position 15 form a morphological domain with the verb core of position 16 according to all the tests that will be discussed below. Similarly, the marker of position 35 forms a domain, at least, with the material immediately to its left, if not with the verb core too.

3.2 "Promiscuous" elements

Some TAME markers may appear bound not only to the predicate but also to other hosts that are often defined as phonological domains, and some of them even occur as free particles: see the incompletive *-ta(j)/-tye(j)* bound to the verb in (1a) and to the prospective pre-verbal particle in (1b); the indirect evidential *-t'i(y)* bound to the verb in (2a) and to negation (also pre-verbal) in (2c); the interrogative *-mi* bound to the verb in (2b) and to negation in (2c), and as a sentence-initial particle in (2d);[3] and the mirative *-p'an* bound to the verb in (3a), to negation in (3b) and to an initial DP/NP in (3c).[4]

(1) Incompletive *-ta(j)/-tye(j)*

a. post-verbal

	Y-	*ik-*	***tye***
v:	14	16	**27**
	3-	leave	-INCOMP

'(S)he was leaving/about to leave (but didn't).'

b. After prospective

	Jo-	***ta***	*y-*	*ik*
v:	8	**9**	14	16
	PROSP-	INCOMP	1.IRR-	leave

'I would leave', 'I intended to leave'.

(2) Indirect evidential *-t'i(y)* and interrogative *-mi/ma*

a. post-verbal evidential

	'Yijén-	***t'iy-***	*i*
v:	14:16	**25**	31
	3:know-	**EVID-**	AP.INS

'(S)he must probably know.'

b. post-verbal interrogative

	Ji-	*woy-*	*e-*	*t'i-*	*tye-*	***mi***	*[ka*	*Ø-*	*'wen-*	*a*	*syunye*
v:	14	16	20	25	27	**28**	46	-	-	-	-
	2-	LV-	2PL-	EVID-	INCOMP-	**INTER**	COMP-	2.IRR-	see-	2PL	DEM

[3] I tentatively assign this particle the same position as the conjunctions, because they do not introduce a topic or a focus, and there is evidence they precede adverbial clauses. Since many of the neighbouring positions do not seem to occur in interrogatives, the precise relative position of *ma* is difficult to determine.

[4] Cases where morphemes are basically unsegmentable but occur over a whole span are glossed with an x:y notation, where x is the left-most position occupied by the morph and y is the right-most element. An example is *'yijén-* 'THIRD PERSON+know' in (2a), which covers positions 14 through 16. Where a position involves more than one morpheme, as is often the case in zones, the position is enclosed in brackets and only the first one receives a number. An example is *kya si'yús* 'the fish' in (2a).

i'nyó'...]

-

man

'Did you intend to see that man?' (Mt 11:8)

c. Evidential and interrogative after negation

¿Je- ***t'i-*** ***mi*** *'naján-* *ay-* *i..?*

v: 10 **11** **12** 14:16 20 31

NEG- **EVID-** **INTER** 2:know- 2PL- AP.INS

'Don't you (pl.) know.'

d. Sentence-initial interrogative

*¿**Ma*** *y-* *am-* *'nijne?*

v: **1** 14 16 38:39

Inter 3- go.away- PLACT:PRF

'Are they already gone?'

(3) Mirative *-p'an*

a. post-verbal

¡A- *sẹnyan-* ***p'an-*** *taj* *[kya si'yús]!*

v: 14 16 **26** 27 45 -

1- roast- MIR- INCOMP DEM fish

'I have roasted the fish in vain!' (E.g. because you are not hungry)

b. After negation

Je ***p'an*** *Ø-* *'ẹs-* *i-* *ji* *[ka* *i'nyát* *i'nyó* *Ø-* *wujw-*

v: 10 **11** 14 16 31/32 32/33 46 - - - -

NEG MIR 3- be.good- AP.INS AP.LOC COMP water man 3- be.big-

a- *ja'm]*

- -

IRR- AP.LOC

'It is not good if a man gets full of water.' (Drayson et al. 2000: 116)

c. After initial NP/DP

[As- *taj]* ***p'an*** *je* *Ø-* *wujw-* *a-* *k'i,* *[ti* *a-* *'wen-*

v: 5 - 7 **10** 14 16 22 34 46 - -

2PL.POSS- sight MIR NEG 3- big- MOM- AP.DISTR COMP 1- see

k'i *ja-* *pọ* *i'nyó'...]*

- - - -

-AP.DISTR DEM- PL man

'It turns out that you (pl.) do not remember when I saw those men.' (Lit. 'your sight is not large enough to)' (Mt 16:9)

Many, if not all of these morphemes, have the appearance of second position clitics, with differences regarding how far they can move to the left, the mirative *-p'an* and the reportative *-jen* reaching the leftmost positions. Therefore, the high number of positions might be somewhat deceiving. If the approach mentioned above turned out to be correct, each morpheme of the clitic cluster would have its own position in the planar fractal method, but the different positions of each morpheme when fronted could be reduced to one: bound to the initial host position. The mirative *-p'an*, for instance, occupies a second position in both (3b) and (3c) but, since in (3b) negation occupies the first position and in (3c) a DP precedes negation, *-p'an* appears to the right and to the left of negation respectively, in two apparently different positions. If the host positions, namely negation in (3b) and the DP in (3c), were the same, so would be that of *-p'an*. We leave more thorough consideration of this possibility for future research.

Moreover, as mentioned above, some texts by elderly speakers occasionally contain morphemes occurring in positions not recorded in Table 1 as in (4).

(4) Elements in positions not recorded in Table 1

a. Discontinuous first person plural inactive with mirative *p'an* in between

kas p'an ts'ẹlya- k'i'
kas p'an s- 'ila- k'ye
v: Ø 7 **14** 16 34
1PL MIR 1PL- be.eager- AP.DISTR
'We wanted to keep (eating)!' (Drayson et al. 2000: 40)

b. Discontinuous first person plural inactive with negation *je* in between

kas- é ***s-*** *ọjme'n*
v: Ø **10 14** 16 38
1PL- NEG 1PL- be.drunk:JEN
'We are not drunk.' (Gerzenstein 1983)

c. Indirect evidential *-t'i* attached to reflexive/reciprocal

i- ni- ***t'i*** *'wen- k- in- a- ja'ajme [ja Santiago]*
v: 14 15 **Ø** 16 17 18 22 33:39 45 -
3- REFL- **EVID** see- PP- VBLZ- MOM- AP.LOC:PRF DEM Santiago
'He appeared in a vision (lit. 'made himself seen') to Santiago.' (1 Cor 15: 7)

The properties of the first person plural inactive *kas-* might have a metrical explanation, at least historically. Capable of forming a closed syllable, unlike the personal prefixes of the form CV, *kas-* could have constituted a minimal foot (and therefore a minimal word). This has been argued for in the sister Nivaclé language by Gutiérrez (2015: 178–179), where a cognate of *kas-* exists, although in the nominal domain. Thus, if a morpheme needs to be not smaller than a foot in order to appear left-dislocated and/or to be a host, *kas*, or more precisely its first segment, is the only verbal person marker that meets this condition. (In the "standard" variety the first person plural inactive occupies position 14 only, and there is no reason to assume two segments.)

3.3 Distribution of DPs/NPs

Another factor that multiplies positions in Chorote is the fact that complements may appear to the right or to the left of their heads. Complements headed by a demonstrative are heavy and surface to the right, while other complements are light and surface to the left. Examples (5a) and (5b) illustrate this in the nominal domain. Here the possessor appears to the right in (5a) and to the left in (5b).

(5) Heavy and light complements in the nominal domain

a. Heavy complement
jl- as na Juan
3poss- son dem Juan
'Juan's son.'

b. Light complement
Juan jl- as
Juan 3poss- son
'Juan's son'

The phenomenon in the verbal domain is shown in (6), where *(puwa) alẹnas* 'the dogs' is the subject of a transitive verb (A). But in the first sentence it is a heavy DP and appears post-verbally, in position 45, whereas in the second sentence it is light (=no demonstrative) and appears pre-verbally, in position 5. (Light NPs/DPs are licensed to the right when followed by an irrealis nominal marker, however; see (14), (15) and (17) below).

(6) Heavy and light complements in the verbal domain
i- 'wi'in ***[pu- wa alẹna- s]***$_{(A)}$. ***[Alẹna- s]***$_{(A)}$ *i- jyan- a- 'ni*
v: 14 16 **45** - - - **5** - 14 16 22 38
3- find dem- pl dog- pl dog- pl 3- chase- mom- plact

[ja- pa 'najáte]$_{(O)}$
45 - -
F- DEM rabbit
'...the dogs find [some rabbit]. The dogs then chase the rabbit.' (Drayson et al. 2000: 48)

The same conditioning on the position applies when the NPs/DPs are complements of adpositions/applicatives, but in this case it affects the position of the heads as well. In effect, Chorote has morphemes that may encliticize to their complements ("adpositions") or to the verb ("applicatives"), depending on whether they take a light complement or not, respectively. It is argued elsewhere (Carol 2011, Carol & Salanova 2012) that they are simply grammatical adpositions that may occur superficially bound to the verb in some cases. They are glossed here indistinctly as "P".

In (7a) there is no light complement, but an optional heavy complement *(na Mosik)*; hence, P encliticizes to the verb. (7b) and (7c) exemplify Ps with light complements. These may be NPs, as in (7b), or oblique pronouns, as in (7c), which have different positions in the template. The complex element *oblique pronoun+adposition*, in turn, attaches to the verb. Therefore, the same applicative/adposition (the distal in this case) may appear in three different positions: 32, 36 and 44.

(7) Heavy and light complements with Ps

a. P bound to V; optional heavy complement
*Ø- Tajl- ej- **e** wek ([na Mosik])*
v: 14 16 31 **32** 40 (45 -)
3- come.out- AP.INS- AP.DIST finally DEM Mosik
'(S)he finally obtains it (from Mosik).' Lit. 'comes out with it from Mosik.'

b. P bound to a light nominal complement
*Ø- Tajl- e tewk- **i***
v: 14 16 31 43 **44**
3- come.out- AP.INS river- AP.DIST
'(S)he finally obtains it from the river.'

c. P bound to a pronoun
*Ø- Tajl- a 'a- **i** **wek***
v: 14 16 31 35 **36** 40
3- come.out AP.INS- 2- AP.DIST- finally
'(S)he finally obtains it from you.'

4 Morphosyntactic diagnostics

This section discusses the morphosyntactic diagnostics, except for those related to ciscategorial selection, which will be discussed in more detail in §6.

4.1 Free occurrence (16-16; 4-40)

This abstract type identifies the minimal free form, i.e. a complete utterance that is a single free form. The test can be fractured into *minimal* and *maximal*. The *minimal* subtype identifies the smallest possible minimal free form that contains the predicate head. This corresponds just to position 16, i.e. the verb root or non-verbal predicate, which stands alone as an utterance in imperatives, e.g. *kasit* 'stand up'.

The *maximal* subtype identifies the span defined by the largest minimal free form that contains the predicate head, i.e. the largest possible span containing a predicate head (typically a verb) plus the more distant bound elements to the right and to the left, such that no other free form intervenes. This defines the subspan 4-40. I have no examples of this subspan in main clauses in spontaneous speech, but (8a) shows an example in an embedded clause. The left edge of this span is occupied in main clauses by the complementizers *ka* and, more rarely, *ti*.[5] *Ka* selects for the irrealis mode on the predicate and behaves as a phonological proclitic. It heads some complement, conditional, temporal and in general future-oriented embedded clauses, as well as some main clauses including optative, hortative, and prohibitive. An example of *ka* on the left edge in a main clause is given in (8b).

(8) Free occurrence *maximal*

a. Subspan 4-40 in embedded clause

	ka	*Ø-*	*'nes-*	*ta-*	***na'a***
v:	**4**	14	16	27	**40**
	COMP	3.IRR-	arrive-	INCOMP-	**later**

'When (s)he/it arrives.'

b. Left edge in main clause

	Ka	*y-*	*ik*
v:	**4**	14	16
	COMP	1.IRR-	go.away

'I'm leaving, may I go'.

[5]The complementizer *ti* introduces temporal completives and others selecting *realis*. Examples of *ti* in main clauses are not as clear as those of *ka*; one of them is the second *ti* of (48). The interrogative *ma* does appear in main clauses, but its inclusion in this position is only tentative.

Positions 1 through 2 include phrases and other elements that can occur as free forms and are thus excluded from the span. Notice that there are free forms between 4 and 16 but, since they are not obligatory, they are irrelevant for this diagnostic.

The right edge is more problematic. In 8a it is represented by the adverb *na'a* 'later' in position 40. Example (9) below is another example of *na'a* as right edge but in a main clause; *pet* 'please' also belongs in position 40.

(9) Free occurrence (maximal): right edge (Drayson et al. 2000: 70)

	Jo-	*kyu-*	***nye'e***	***pet***	*ts'ijí*	*[i-*	*'wit-]*	*e*
v:	16	40	**40**	40	41	43	-	44
	go-	a.while-	**later**	**please**	there	1POSS-	place-	AP

'Go to my place (i.e. my house) there.'

This adverb does not occur as a free form in my material. But at least some of the other adverbs of position 40 are free forms, e.g. *t'e*,[6] which can function as an answer to questions with the meaning 'who knows'. For other elements in the same position I have no conclusive evidence regarding their bounded character; some can appear fronted in position 2 (e.g. *ta'a* 'immediately', 'already') and have been spontaneously uttered alone at least in metalinguistic uses, unlike applicatives and unstressed TAME markers, but perhaps the latter holds as well for the remote past *pe(j)* of position 39; notice that both positions 39 and 40 host optionally stressed elements. As for material to the right of position 40, there is no doubt it must be excluded from the span. The locative adverbs of 41 *ts'ijí* 'there' or *'nijí* 'here' are clearly free forms. Further to the right the only bound elements are the adpositions in position 44, but they occur bound to nouns (in position 43), which in turn are free forms; the adpositions can also occur bound to verbs functioning as applicatives, but they are then analyzed as occurring in a different position, see §3.3.

4.2 Non-interruption (14-39/38; 7-41; 14-22)

The diagnostic of non-interruption identifies the span of positions that includes the predicate head and cannot be interrupted by some interrupting element (Tallman 2021). The diagnostic is fractured according to how the interrupting element is defined. The *single free interruptor* subtest defines the interruptor as any free

[6] This has the same underlying form as the evidential *-t'i* of position 23, namely /t'ey(h)/. The difference in the surface forms correspond to regular differences between stressed and unstressed vowels.

form and is the most straightforward version of the diagnostic. This gives the span 14-39 or maybe 14-38, see (10).

(10) Non-interruption - *single free interruptor*

a. Span 14-39
Y- am ***pej***
v: **14** 16 **39**
3- go.away REM.PST
'(S)he/it left.'

b. Span 14-38
Y- am- ***'ni***
v: **14** 16 **38**
3- go.away- PLACT
'They left', '(s)he/it left repeatedly'

Regarding the left boundaries, position 13 hosts a demonstrative pronoun *kyak* (and less frequently other pronouns) that indicates distancing from the speaker (either through the speaker's or through the subject's movement), but which functions also as a locative or a manner adverb 'this/that way'. This is the first interruptor found to the left of the predicate head. The rest of the demonstratives in this paradigm occur most usually before negation in positions 5 and 6, but *kyak* is documented between the negation of position 10 (and presumably its enclitics of 11 and 12) and the verbal prefixes of position 14 when the verb is *-wo*, a light verb meaning 'do', 'become, be' (among many other meanings) and its derivatives. (The expressions with *-wo* 'do, become, be' might be somewhat lexicalized, but since the verb can bear TAME morphemes and inflect for person, I still consider it a verbal head in position 16 and not an auxiliary verb)

(11) Single interruptor *kyak* on the left

a. *Je* ***kyak*** *i- yo- ø*
v: 10 **13** 14 16 32
NEG DEM 3- do- AP.DIST
'It is not like that, it is not the same'.

b. *Jlam'ne je* ***kyak*** *ji- won- ay- i [na- pọ as- 'lejwa- s]*
v: 1 10 **13** 14 16 20 32 45 - - - -
but NEG DEM 2- do- 2PL- AP DEM- PL 2PL.POSS- fellow- PL

[ka Ø- en- a'yi ni syuni ti- jnajyi]
46 - - - - - - -
COMP 2.IRR- put- 2PL:AP DEM DEM 3- be.straight:AP.LOC
'But you neglect justice with your fellows' (Lit 'you don't do the same to your fellows when you make justice').' (Lc 11:42)

To the right of position 16 the closest free forms are some of the adverbs of 40, or perhaps the remote past of 39 if considered a free form - it can be uttered alone at least in metalinguistic uses, unlike applicatives and monosyllabic adpositions, and also fronted in other varieties of Chorote. Neither can these or any other free forms intervene between positions 13 and 40 (or 39), so the span defined by this diagnostic subtype is 14-39 (or -38).

The interruptor can also be defined as a construct that contains more than one free form, i.e. a *multiple free interruptor*. The interruptors of positions 13 and 40 (or 39) seen above are single forms, so they do not count in this version of the diagnostic; the same holds for negation (position 10), which is also a free form. The most typical multiple free interruptors are NPs (Tallman 2021). Recall that even light NPs may be multiple interruptors, since they can consist of a possessive construction with two Ns, like the one shown in (5b). In fact, these light NPs are the interruptors that function as the boundaries for this diagnostic. On the left side, light NPs appear in positions 5 and 6; although usually only one of these positions is filled, (12) illustrates the need to postulate two distinct positions for light pre-verbal NPs.

(12) Multiple interruptor to the left. Two NPs as interruptors (Rom 4: 13)
[Si- nya] [ji- 'lij] *i- wijnam [pa Abraham]*
v: 5 - 6 - 14 16:33 45 -
1PL.POSS- father 3POSS- **speech** 3- give:AP.LOC DEM Abraham
'God (lit. 'our father') gave his word to Abraham.'

To the right of the predicate head the first complex interruptor is the NP of position 42 exemplified in (13) and (14). (14) shows a construction with a complex light NP to the right of the verb, which is licensed by the irrealis nominal marker *-a* that follows the NP. The construction will be explained in more detail later in this section. (The NP means literally 'son of boy', but *jlas* is here a diminutive: 'young/little boy'.) In the following position 43 there is also an NP (complement of the adposition of position 44) that can be complex. The example in (13) illustrates the need of postulating two different zones for positions 42 and 43:

(13) Positions 42 and 43 (Drayson et al. 2000: 114)
Ø- Laj [i'nyát -a] [s- ate jl- as-] i'
v: 14 16 42 - 43 - - - 44
3- not_exist water -IRR 1PL.POSS -pitcher 3POSS- son -AP.LOC
'There was no water in our (little) pitchers.'

(14) Multiple interruptor to the right
a- wo ***[jwemik jl- as- a'].***
v: 14 16 **42** - - -
1- LV **boy 3POSS- son- IRR**
'I was a young boy.' (Drayson et al. 2000: 122)

In sum, the multiple interruptors closest to the predicate head are in positions 6 on the left and 42 on the right. Thus, the span defined by this diagnostic is in principle 7-41. An example including both 7 and 7-41 is lacking; (15) shows the span 7-38, and 41 was shown in (9).

(15) Multiple free interruptor: left edge in position 7
Kyak- ***p'an*** *i- yo- ø- pi [pa i'nyó] [ti i- yo- ø*
v: 5- **7** 14 16 32 38 45 - 46 - - -
DEM- **MIR** 3- do- AP.DIST- REM.PST DEM man COMP 3.IRR- LV- AP.DIST
ka i- wo aye'wu- ye']
\- - - - -
COMP 3- do shaman -IRR
'That is what a man used to do when he wanted to become a shaman.' (Drayson et al. 2000: 134)

Note however that position 7 is occupied by the mirative and (less frequently) by the reportative. If these morphemes turned out to be second position clitics as discussed in §3.2, such that the pronoun *kyak* here occupied a clause-initial position rather than position 5, then the left boundary should be the first positively fixed element that follows the interruptor NP. This would give us the prospective particle *ja* of position 8.

Finally, the interruptor can also be defined as a *non-fixed* element. This subtype defines the subspan 14-22, exemplified in (16). In this example, the relevant part is in an embedded clause introduced by the complementizer *ti*. Therefore, the positions are given for the embedded clause only. In the main clause, enclosed in brackets, *sek yi'i* 'there is [the fact]' can be translated as 'then' and selects most usually for a verb with the momentary morpheme in position 22.

(16) Non-fixed interruptor: subspan 14-22

	[Sek	*y-*	*i*	*-'i]*	*ti*	*y-*	*am-*	***a'***.
v:	[-	-	-	-]	4	**14**	16	**22**
	[DEM	3-	be	-AP.PUNCT]	COMP	**3-**	go.away-	**MOM**

'Then (lit. there it is) (s)he left.'

In this subtype, the left boundary is still the demonstrative pronoun *kyak* that occurs in position 13 among others, i.e. the same as in the *single free interruptor* version, but the right boundary is now the irrealis marker *-a* of 23. This morpheme occurs bound to non-verbal predicates and certain 'adjective-like' verbs (Class V in Table 2 below) indicating irrealis mood, as the embedded clause in (3b).; another example is shown (17a). In the remaining classes of verbs, irrealis is realized by means of a special set of personal prefixes in position 14. The suffix *-a* appears furthermore following nouns or light NPs in a predicative construction, like the one shown in (14). Another example of this can be seen in (15), whose relevant part is repeated and adapted in (17b).[7]

(17) *Irrealis* suffix/enclitic

a. On the predicate head

	Ka	*Ø-*	*wujw-*	***a'***
v:	4	14	16	**23**
	COMP	3-	be.big-	**IRR**

'If it were big.'

b. On the noun in constructions with light verb

	i-	*yo*	*[aye'wu-*	***ye']***
v:	14	16	43	-
	3-	LV	shaman-	**IRR**

'(He) becomes a shaman.'

Thus, the span of interruptability by a non-fixed element is 14-22. An important issue, however, is that the momentary morpheme *-a* of position 22 has the same form as the irrealis suffix/enclitic, and they never co-occur. Attempts to

[7]The multiple meanings of this construction, consisting of a light verb *-wo/-yo* 'do, become, be' and an N(P) followed by the irrealis, depend on the N(P) involved: 'become', 'look for', 'build', 'use' or even 'be', among others (Carol 2015: 909–910). In these constructions the existence of the referent of the (N)P is not asserted, e.g. with negated existential verbs, existential verbs under conditional clauses, constructions with the meaning 'looking for' etc., or the referent comes into existence by the event itself, e.g. with verbs meaning 'build', 'become' and others; the meaning 'be' of (14) is the only exception.

elicit both together consistently failed, even in contexts where both are selected for.[8] Clearly, they are two different abstract morphemes, since they can cooccur when irrealis is marked by a special set of personal prefixes, and that is the reason why two different positions have been assigned; besides, only the irrealis is non-fixed. But the choice in the linear order between them, in the absence of empirical evidence, has a purely theoretical motivation: aspectual morphemes are usually expected to be more internal than modal ones.

4.3 Non-permutability (14-23)

This diagnostic identifies a span whose elements cannot be variably ordered with respect to each other. In Chorote this defines the span 14-22, already exemplified in (16).

We have already discussed the pronoun *kyak*, which can appear both to the right of negation, in position 13, or to the left, in positions 5 or 6. Thus, *kyak* should be excluded from the span, since its position is interchangeable with that of negation.

As for the right edge of the span, the irrealis morpheme in position 23, exemplified in (17a), only occurs in that position in the verbal template and is therefore not interchangeable with any other element. Thus, I consider it the right edge in this diagnostic. It is true that it can occur to the right of the reportative (position 24), as in (17b), but in that case it belongs in the nominal template and is not relevant for the diagnostic. The reportative, in turn, can occur in a different position besides position 24, so it must be excluded from the span; see (18).

(18) Reportative occurring in position 7

	Sek-	***jin***	*y-*	*i-*	*'i-*	*pe*	*[syupi*	*i'nyó'*	*ji-*	*kyo*
v:	5	7	14	16	34	39	45	-	-	-
	there	**rep**	3-	be-	ap.punct	-rem.pst	dem	man	3poss-	hand

t'isyé$^{(')}$n	*y-*	*i'lya-*	*je'].*
-	-	-	-
3poss:flesh	3-	be.dry-	ap.loc

'There was (hearsay) a man whose hand was dry.' (Mc 3:1)

[8] These contexts are (a) the sequence *sekyi'i ti* 'there is (the fact) that…', approximately equivalent to 'then', which selects for the momentary morpheme on the verb and (b) the complementizer *ka*, which selects for irrealis. When (a) is in the prospective form, it includes *ka* instead of *ti*: *sek jane'yi ka…*, so that both contexts co-occur. In that case, when the verb marks irrealis with the irrealis set of personal prefixes, both irrealis and momentary co-occur. But when the predicate is non-verbal or a Class V verb, such that irrealis need to be indicated with *-a*, only one *-a* surfaces.

The diagnostic as described above corresponds to *strict* non-permutability. A possible fracture discussed in the introduction of this book and in Tallman (2021) considers scope: *flexible* non-permutability admits inside the span elements whose order can be altered if that entails changes in scope. However, I have not considered this version of the diagnostic for Chorote due to lack of reliable data on scope changes when order is altered. In §3.2 it was shown that the TAME markers of positions 24 through 28 can be fronted to positions 1, 7-9, and 11-12. In some cases, these morphemes occur bound to nominals and have nominal scope, as discussed in Carol (2015), and thus do not occupy a position in the verbal template; but in others, as those of §3.2, it is not clear to me whether the variation in position affects scope in the verbal template.

Despite that, it is worth considering what happens to the right of those TAME markers since, were it confirmed that their variable ordering is sensitive to scope, we would have results for the diagnostic of flexible permutability.

After the TAME markers comes third person plural marker *-is*, which only occurs in position 29, and thereafter the string of Ps functioning as applicatives, which are rigidly ordered in positions 30 through 34 if no complement (NP or pronoun) surfaces. But if an oblique pronominal complement surfaces in position 35, then the P which selects the pronoun as its complement occurs to the right of the latter in position 36, which may alter its relative order regarding other Ps.[9] In 19a the P called here "orientation" appears to the left of the instrumental, but in 19b the former takes a first person pronominal complement and surfaces thus to the right of the instrumental.[10] This does not relate to semantic scope; hence, position 30 is outside the span of a flexible non-permutability (under the assumption that all TAME markers are potentially able to display scopal variation).

(19) Permutability of Ps

a. Orientation before instrumental in regular order

	i-	*nyu-*	***yej-***	***e***
v:	14	16	**30**	**31**
	3-	pass-	**AP.OR-**	**AP.INS**

'(S)he helps him/her.'

[9]Recall that I assume that the Ps always belong to the verbal template, but they can surface as applicatives or adpositions depending on the "weight" of the NP. If an alternative analysis were adopted, according to which the Ps surfacing as adpositions belonged to a distinct template other than the verbal template, there would be no permutability of Ps.

[10]The basic allomorphs are *-a(j)* for "orientation" and *-e(j)* for the instrumental. After a vowel, epenthetic /y/ is inserted and included as part of the Ps. This /y/ in turn raises front vowels, as explained in §2, thus the Ps result in *-yej*, *-yij*, respectively. The P "orientation" takes here a suppletive form when the pronominal complement surfaces.

b. Instrumental to the right when it takes a non-null complement

i- nyu- ***yij-*** *k'i-* ***'m***

v: 14 16 **31** 35 **36**

3- pass- **AP.INS**- 1SG- **AP.OR**

'(S)he helps me.'

4.4 Subspan repetition (8-38; 8-39)

For this diagnostic, I consider repetition of a subspan of contiguous positions in a construction that is functionally equivalent to 'and' coordination. In fact, the construction in question probably involves subordination: it is *jla'yi ti/ka*, where *jla'yi* means literally 'his/her/its fellow' and *ti/ka* are the complementizers that select for *realis* and irrealis predicate, respectively.[11] If we consider elements that *must* be repeated in order to be interpreted, i.e. the *minimal* subtype of this diagnostic, the subspan is 8-38. If we consider the elements that *can* be repeated, i.e. the *maximal* version, the span is 8-39. In (20) we can see evidence for the left edge: failing to repeat the prospective marker *ja* gives an ungrammatical result. The elements to the left of *ja* cannot be repeated.

(20) Prospective *ja* repeated under coordination

Ja- *'yit-* *aj-* *a-* *'a* *[na* *si-* *'lij]* *jla'yi*

v: **8** 14:16 19 31 34 45 - - 1

PROSP- 1:stab?- 1PL- AP.INS- AP.PUNCT DEM 1PL.POSS- language and

ti ***ja-*** *y- amti-* *jyen-* *a* */*y- amti-* *jyen-* *a*

4 **8** 14 16 18 19 /*14 16 18 19

COMP **PROSP**- 1- speak- CAUS- 1PL/ *1- speak- CAUS- 1PL

'Let us write our language and read it.' (From an educational book, Drayson 1999)

In (21a) we can see the repetition of the remote past *pe(j)*, but not in (21b), even though the remote past *is* interpreted in the second conjunct; both examples come from the same text and presumably the same speaker. This can be taken as evidence that repetition of *pe(j)* is optional.

[11] Coordination of NPs also involves *jla'yi* (or the feminine *jla'yiki'*), but with determiners instead of complementizers. For 'or' coordinating VPs or clauses, Chorote uses *ni'ne*, with the same complementizers; *ni'ne* could be translated in isolation as 'perhaps, maybe'. The behavior of *ni'ne ti/ka* is apparently similar to that of *jla'yi ti*, but less examples were found.

(21) Remote past *pe(j)* under coordination

a. Repeated

[Naka ni ø- paj- k'i ti a- pe'ya- k, si-
v: [- - - - - - - - - -
[DEM DEM 3- be.ancient- AP.DISTR COMP 1- hear- 1PL 1PL.POSS-
tyet- e i- 'wi'in,] a- 'yen- a- 'nij- ***pe*** *jla'yi ti a- kyes-*
- - - -] 14 16 19 38 39 1 4 14 16-
eye- PL 3- see] 1- look- 1PL- PLACT- **REM.PST** and COMP 1- touch-
a- 'a- ***pe***
19- 34- 39
1PL- AP.PUNCT- **REM.PST**

'[That what was at the beginning (lit. 'long ago'), what our eyes saw,] what we observed and touched…' (1 John 1:1)

b. Not repeated

[…a- wo- k- i s- amtiky- e- 'as- e naka
v: […- - - - - - - - - -
[1- LV- 1PL- AP.DIST 1PL.POSS- speech- IRR- 2PL- AP.DIST DEM
syunye] a- 'wen- a- ***pe*** *jla'yi ti a- pe'ya- k.*
-] 14 16 19 39 1 4 14 16 19
DEM] 1- see- 1PL- **REM.PST** and COMP 1- hear- 1PL

'[We tell you what] we saw and heard.' (1 John 1:3)

Moreover, this is consistent with the general behavior of *pe(j)*, which is "optional" in the sense that it does not need to follow the predicate when the information it provides can be recovered e.g. from previous discourse. The pluractional *'ni(j)* is *not* repeated in the second member of the coordination of (21a) and thus not interpreted (*'ni(j)* in combination with *'yen* 'watch, look at' gives literally 'watch repeatedly', i.e. 'observe'.) This is a clear indication of its difference with respect to *pe(j)*.

4.5 Deviation from biuniqueness (14-18; 16-18; 14-29)

This type identifies deviations from the biuniquess relation between form and meaning, which might be used as indication of word boundaries. The most common case in Chorote is more than one form corresponding to a single meaning. In this regard, the personal prefixes of position 14 are the left edge. There are five different sets for the third person. They are predictable in some cases — transitive verbs always select for Class I *i-/y-*, antipassive verbs for Class III *t-/tV-*, and there is some correlation between semantic classes and prefixes, but the latter are not fully predictable in intransitive non-antipassive verbs (Carol 2013, 2014b). To the left of the prefixes of 14 no such deviation is ever found.

Table 2: Third person verbal prefixes

	Realis /_C (_*k*) ~ _V	Irrealis /_C ~ _V	Goes with...
Class I	*i-* (*ya-*) ~ *y-*	*in-*	transitive, active and inactive
Class II	*Ø-*	*in-*	active and some inactive
Class III	*ti-* (*ta-*)- ~ *t-*	*in-* ~ *int-*	active and a few inactive
Class IV	*in-* ~ *n-*	*in-*	inactive
Class V	*Ø-*	*Ø-...-a*	inactive

The rightmost position where such deviation can be found is 18, which hosts antipassive and causative suffixes. Leaving aside the indirect causative *-jan/-yin*, whose allomorphy is limited and predictable, the antipassive and especially the direct causative suffixes display a strong allomorphy which cannot be predicted on phonological or semantic grounds, see (22)-(23); for simplicity, with causatives only bases ending in vowel are shown. Sometimes the same verbal base is acceptable with two distinct allomorphs, as can be seen with *-po-yi* 'be full of' in (23b) and (23c) (again, the epenthetic *y* inserted between vowels is analyzed as part of the suffix, so in (23c) *-it* becomes *-yit*).

(22) Allomorphs of the antipassive suffix

a. Regular antipassive with *-jan*, verb *-lej* 'wash'

	ta-	*ka*	*le-*	***ja'n***
v:	14	15	16	**18**
	3-	ANTIP	wash-	**ANTIP**

'(S)he does the washing'

b. Irregular antipassive with *-n*, verb *-jlu* 'send'[12]

	ta-	*ka*	*jlọ-*	***n-***	*i*
v:	14	15	16	**18**	31
	3-	ANTIP	send-	**ANTIP-**	AP.INS

'(S)he sends.'

[12]Here the demoted object is reintroduced by the instrumental applicative.

c. Irregular antipassive with *-ki*, verb *-lan* ‘kill’

   ta- ka- lan- ***ki***’[13]
   v: 14 15 16 **18**
   3- ANTIP- kill- **ANTIP**
   ‘(S)he kills.’

d. Irregular antipassive with no suffix, verb *-sinyan* ‘grill’

   ta- ka sẹnya’n
   v: 14 15 16
   3- ANTIP grill
   ‘(S)he makes a barbecue.’

(23) Allomorphs of the direct causative suffix

a. Suffix *-jat*, verb *-nu* ‘pass by’

   i- nyu- ***jwat***
   v: 14 16 **18**
   3- pass_by- **CAUS**
   ‘(S)he makes [someone] pass by.’

b. Suffix *-nit*, verb *-po-yi* ‘be full of’

   i- pyo- ***nit-*** *i*
   v: 14 16 **18** 31
   3- be.full- **CAUS-** AP.INS
   ‘(S)he fills with it.’

c. Suffix *-it*, verb *-po-yi* ‘be full of’

   i- pyo- ***yit-*** *i*
   v: 14 16 **18** 31
   3- be.full- **CAUS-** AP.INS
   ‘(S)he fills with.’

d. Suffix *-jVnit*, verb *-pu* ‘exist’

   i- pyu- ***junit***
   v: 14 16 **18**
   3- exist- **CAUS**
   ‘(S)he creates, brings into existence, imports.’

[13] An alternative analysis, perhaps historically more accurate, consists in splitting *-ki* into *-k*, the participle of position 17, and *-i(y)*, a verbalizer in position 18 that creates denominal verbs. In any case, the right edge of the domain under discussion would still be position 18.

e. Suffix *-t*, verb *-’uy* ‘enter, get in(to)’

’yu-	***t***
v: 14:16	**18**
3:be.full-	**CAUS**

‘(S)he puts (it) in (e.g. a pocket).’

No deviations of this kind occur beyond position 18. In position 19 there appear the concord suffixes of 1PL. Although this morpheme has at least three allomorphs, their distribution is phonologically conditioned: *-Vk* after *-j*, *-k* after V and *-a(j)* elsewhere, e.g. *alej-ek* ‘we wash’, *awo-k* ‘we fish’ and *a’wen-a(j)* ‘we see’, respectively.

The exponence of irrealis could also be seen as a case of deviation from biuniqueness, since it is realized both through a suffix *-a* and a distinct set of personal prefixes. However, it is of a different kind, because the different forms appear in different positions - 14 and 23. Besides, the occurrence of one or the other exponent is fully predictable on categorial grounds (see (17) and text above). In sum, the diagnostic analyzed up to now is inapplicable to irrealis exponence, which is better treated as a distinct morphological category rather than as a question of allomorphy.

The previous account describes a language-specific fracture of the diagnostic, called *inflectional class* in Table 4 (§7) because its left boundary includes prefixes that define the inflectional class of the verb. An alternative fracture is possible, where only “derivational” morphology is included; this is referred to as *fossilization* in Table 4. In this case, the right edge is still position 18, but the inflectional personal prefixes of position 14 would fall outside the span. The antipassive morpheme of position 15 too, but for a different reason: even if considered derivational, its allomorphy seems to be predictable. The basic allomorph is *ka*, as shown in (22); if the base begins with a glottal stop followed by a stressed vowel, an epenthetic *n* is inserted, which fuses with the glottal in *’n*, cf. *taka****’n****eyasan* ‘teach (intransitive)’ < *ta-ka****n****-’éya*san*, cf. *’yiyas* ‘(s)he teaches [someone]’ < *y-’éya*san*, while with bases beginning with a vowel its form is *k-* e.g. *ta-****k****-ámtijnye’n* (14 15 16:18) ‘(s)he talks’, cf. the transitive *y-amti-’ni* (14 16 38) ‘(s)he talks [about someone]’. Thus, the left edge is the predicate head of position 16, and the span is defined as 16-18.

There is a third fracture which considers *extended exponence*. This phenomenon is seen in the personal prefixes of position 14 on the left, and on the verbal third person plural marker *-is* in position 29 on the right, both of which are exponents of third person; *-is* cross-references third person subject of transitives and also intransitives with an oblique introduced by an adposition or applicative, see (24).

Notice there are other cases of extended exponence between these edges: the antipassive morpheme *ka* in position 15 may determine changes in the root, as in 22c, where the root becomes deaccented, as well as the verbal plural markers of positions 19 and 20, which are specific to first and second person, respectively, and thus show extended exponence of these features.

(24) Extended exponence - third person: subspan 14-29

	y-	*am-*	***is-***	*i*	*(ja-*	*pa*	*jlọsye)*
v:	**14**	16	**29**	31	(45	45	45)
	3-	go.away-	**3PL-**	AP.INS	f-	DEM	girl

'They take (the girl) away.'

5 Phonological diagnostics

5.1 Accent (15-16; 16-34; 4-40)

Three subtypes are considered under this rubric. *Accent minimal-minimal* is defined as the minimal span containing the positions where the accent can appear in utterances with only one accent. In such cases, the accent falls almost always on the verbal root or non-verbal predicate of position 16, but in fossilized, irrregular antipassives, it falls on the antipassive morpheme in 15, as in (22c). Thus the span is 15-16.

The *minimal-maximal* subtype considers the maximal span where no position other than the predicate head, that is, position 16, can bear stress. Since position 15 can bear the stress alongside with position 16 in regular and some irregular antipassives, as well as in in reflexives, (cf. in *i-ní 'wé'en* (14-15 16) '(s)he sees himself/herself') then it should be excluded from the span and the left edge should be placed in position 16. As for the right edge, the oblique second person pronoun *-a* of position 35 bears secondary stress and, optionally, another main stress, as in (25).[14] Thus the *minimal-maximal* span is 16-34.

(25) Accent *minimal-maximal*: stressed pronoun of position 35 as right boundary

	si-	*tyánt'ya*	***á-***	*j*
v:	14	16	**35**	36
	1SG-	know	**2-**	AP.INS

'I know you (sg.)'

[14]This oblique pronoun is usually written together with the previous element in Chorote texts. However, according to the convention adopted in this chapter — no more than one stress per orthographic word — it is written separately (see §3.1). The second person plural oblique marker *-(')as* could arguably be segmented as *-(')a-s*, where *-s* would be the plural also found in nouns after a vowel. For the initial glottal stop, see below in this section.

The *maximal-maximal* subtype includes the longest possible span with only one accent. Since positions 15 and 35 are not necessarily present in a word, they do not define a boundary in this subtype. The *accent maximal-maximal* subspan is 4-40, already exemplified in (8a), repeated here as (26); see also (8b) and (9) for examples of the edges in spans occurring in main clauses.

(26) Accent *maximal-maximal*: subspan 4-40

	ka	*Ø-*	*'nes-*	*ta-*	***na'a***
v:	**4**	14	16	27	**40**
	COMP	3.IRR-	arrive-	INCOMP-	**later**

'When (s)he/it arrive.'

Notice that other particles in position 40 are stressed, e.g. *tá'a* 'immediately; already', *pet* 'please' and others, as well as the locative adverbs of position 39 *ts'ijí*, *'nijí* and others, as well as all the elements occurring to their right.

None of the fractures proposed for this test gives position 14 as a left limit, which is the position with the highest number of convergences for the lef edge. This is because position 15 is stressed. Otherwise, the left edge for the minimal-maximal subtype would be position 14. In fact, position 14 *is* a left edge in the minimal-maximal subtype, but of a domain that excludes the verb core of position 16 and includes only the verbal prefix of position 14 and the reflexive or the antipassive of position 15. In the following section we will see another potential diagnostic which points to position 14 as a left edge.

5.2 Another potential diagnostic related to accent (14-)

There is another potential phonological diagnostic which has not been included in Table 3. For other languages of the family, namely Wichí and Nivaclé, an iambic rhythmic type has been proposed (Nercesian 2014, Gutiérrez 2015, Gutiérrez 2016). This can be clearly seen in the following alternation in 'Weenhayek Wichí, where long vowels (written as geminates) regularly correspond to stressed vowels in Chorote: *qasiit* 'stand (up)' (imperative) vs. *ta-qaasit* '(s)he/it stands' (Claesson 2016). In Nikulin & Carol (Forthcoming) it is argued that this may have been the default stress pattern in Proto-Mataguayan, activated when no underlying accent is present in a three-mora window at the left margin of the "word" (i.e. of the stress domain). If applied to Chorote, and if the iambic structure should be aligned with the left edge of the verb word, this would suggest a span in which position 14 constitutes the left edge, since it is the leftmost possible initial syllable of a iamb containing the verbal root; see (27), where stress is indicated with an acute accent for the sake of clarity:

(27) Iambic structure of the verb
ta- kásit
v: 14 16
3- stand
'(S)he stands (up).'

In Chorote, a default left-aligned iambic type would also explain why most non-possessed nouns bear the stress in the second syllable of the stem, e.g. *ajwénta* 'chicken', but possessed nouns in the first one when the stem begins with a consonant and the possessive prefix has the form (C)V-, e.g. *i-pyúsi'* 'my beard': in either case, the iambic structure is preserved. There are still some cases of alternation in adpositions that take possessives to indicate the complement: *kyajwẹ́* 'under, in the lower part of' versus *ji-kwájẹ* 'under it, in its lower part'. This would also explain the rare cases where the stress does not fall in the first vowel of a verbal stem, e.g. *'najwél* '(s)he is shy/ashamed', explained as /n+'ahwél/ (3-be.shy), where the prefix is C-, rather than (C)V, and thus does not add a syllable.[15]

Nevertheless, there is no clear evidence that this iambic pattern is still syncronically productive in Chorote. In verbal stems, the position of the stress is fixed: contrast the 'Weenhayek example above with Chorote *kásit* 'stand up' (imperative), *ta-kásit* '(s)he/it stands (up)'. In any case, it is an indication of a metrical criterion for defining the left edge of the phonological word which might have been productive for a long time in the (pre)history of the language.

5.3 Insertion of /y/ between vowels (16-32, 16-34, 16-44)

When two vowels are in hiatus across a base-suffix (or -enclitic) border, epenthetic /y/ is inserted. With only one documented exception,[16] this applies consistently to any suffix/enclitic element of the predicate up to the distal applicative *-e(y)* of position 32, see 28a; recall that morphemes that can surface both as applicatives or adpositions, like the distal, are glossed here as 'P' in either case. The /y/ is considered to be part of the suffix/enclitic in the template, and is not

[15]Under this hypothesis, cases like *y-imi'n* [yími'n] (3-love) '(s)he loves', where the iambic structure is not preserved, are explained by assuming an underlying long vowel in the first syllable of the stem in the proto-language. This is not mere speculation, but what actually happens in present-day 'Weenhayek Wichí, cf. *ya-**huu**min* (3-love) '(s)he loves'. In sum, the accent in the proto-language (whatever its nature was) would have fallen in the second *mora*.

[16]The exception occurs between the light verb *-wo* 'do, become, be' and the distal *-ey*, where no /y/ is inserted; instead, the allomorph *-y* of the distal is selected, resulting in the form *-wo-y*. An example of this is shown in (32).

segmented as a different morph elsewhere in this chapter unless explicitely indicated. In positions 33 and 34 the Ps begin with a consonant, e.g. *-'e* or *-k'i*, so there is no context for insertion; however, as these elements belong to the same class as the distal, it seems reasonable to consider some version in which the right edge extends to position 34. To the right of 34, the only case of /y/ insertion occurs between the P of position 44 (acting there as postposition) and its host, the (N)P of position 43, see 28b.. We take thus that the right edge is position 32 in the *minimal-minimal* version, 34 in the *maximal-minimal* version, and 44 in the *maximal-maximal* version of the /y/ insertion diagnostic. In the latter case I assume that the NP is part of the verbal domain; see §3.3 on the distribution of applicatives/adpositions and NPs. Since /y/ insertion does not occur between a prefix (or proclitic) and a base, the left boundary has to be position 16.

(28) Insertion of epenthetic /y/

a. *Minimal-minimal* - between the applicative of position 32 and its host: span 14-32

	/a-	ho-	ey/	➔	*o-*	*jo-*	***y-***	*i*
v:	14	16	32	➔	**14**	16	**32**	32
	1-	go-	AP.DIST	➔	1-	go-	EPEN-	AP.DIST

'I went there.'

b. *Maximal-maximal* - between the postposition of 44 and its host: span 14-44

	o-	*jo*	*[']Iwit'osi-*	***y-***	*i*	*/*o-*	*jo-*	***y-***	*iwit'osi-*	***y-***
v:	14	16	43	**44**	44					
	1-	go	Tartagal-	EPEN-	AP.DIST	/1-	go-	EPEN-	Tartagal-	EPEN-

i

AP.DIST

'I went to Tartagal.'

Now let us address some analytical issues that deserve consideration. To the right of position 44 all elements begin with a consonant, so what remains to be considered is only what happens between positions 34 and 44.

Before an underlying initial vowel, Chorote regularly inserts a glottal stop whenever no /y/ is inserted. This can be seen before the initial vowel of *Iwit'osi* '(the city of) Tartagal' in (28b)[17]. We do not expect /y/ insertion there, since

[17] Actually, in normal/fast speech the first vowel of the N is assimilated to the preceding vowel across the glottal stop, so *Iwit'osi* 'Tartagal' becomes ['owit'osi]. Vowel assimilation across laryngeals is a regular process in Chorote.

Iwit'osi is not a suffix or enclitic. We also find that a glottal stop, rather than /y/, is inserted at the beginning of a P in position 44 when it is a polysyllabic adposition, see (29) (the relevant inserted glottal stop is added between brackets, since it is not written in Chorote spelling). Contrast this with the insertion of /y/ before position 44 when the P is monosyllabic, as in (28b).

(29) Glottal stop insertion before polysyllabic P in position 44

a. Following an N(P)

	y-	*i*	*a'lénta*	*[']**apé'e***
v:	14	16	43	**44**
	3-	be	horse	**AP.over**

'(S)he is on the horse.'

b. Not following an N(P)

	i-	*jyo*	*[']**apé'e***	*[jlaják*	*tikíjnaki']*
v:	14	16	**44**	45	-
	3-	go	**AP.over**	DEM	mountain

'(S)he climbed that mountain.'

I take this, together with the fact that polysyllabic adpositions can bear stress (unlike monosyllabic ones), as an indication that they make up a stress projecting domain, so they are not phonologically bound elements.[18] Thus, /y/ insertion occurs *inside* this stress domain, i.e. between bound elements, and glottal stop insertion *between* these domains.

There are still two places between positions 34 and 41 where *prima facie* a morpheme-initial vowel may occur: in position 35, with the second person oblique pronoun *-a* (singular), *-as* (plural) seen in (25) and repeated here as (30a), and position 39, with the perfect *-Vje(j)/-V...je(j)*, seen in (30b). In both cases a glottal stop occurs.

(30) Inserted or underlying glottal stop?

a. Before oblique second person marker

	si-	*tyant'ya*	***[']a-***	*(j)*
v:	14	16	35	36
	1-	know	2-	AP.INS

'I know you (sg.).'

[18] As one of the editors points out, a question for future work arises here - whether adjacent stress domains form a larger prosodic domain. Perhaps some stressed syllables are stronger than others, forming a larger prosodic domain. If so, adpositions might be candidates for 'weaker' syllables.

b. Before the perfect marker

y-	*am-*	*a-*	***'aja***
v: 14	16	22	39
3-	go.away-	MOM-	**PRF**

'(S)he/it left again.'

It is difficult to determine whether the initial glottal stop in (30) is inserted or underlying. In (30a) there is some evidence to consider it underlying, i.e. /'a*/, not /a*/. The evidence for treating the glottal stop here as underlying is as follows; (i) the glottal stop here triggers glottalization of a preceding /s/ into /ts'/, like an underlying glottal stop, and unlike an epenthetic glottal stop: e.g. *'ẹ**s*** + ***'**asé(j)* ➔ *ẹs**ts'**yase* 'it is good for you (pl.)' (with further palatalization due to the previous vowel, see below), and (ii) the glottal stop here labializes after a rounded vowel, like an underlying glottal stop, and unlike an epenthetic glottal stop: i.e. /'/ ➔ /'w/, e.g. *ijy**o*** + ***'**asé(j)* ➔ *ijy**o'w**asé(j)* '(s)he goes to you'. These two processes are not documented in my material with epenthetic glottal stops, but they are with the locative P -*'e* of position 33, whose initial glottal stop is underlying beyond any doubt , e.g. *yiyi**s*** + ***'**e* ➔ *yiyi**ts'**i'* '(they) are in...'; *'y**u*** + ***'**e* ➔ *'yu**'w**e'* 'it fits in...'.[19]

Alternatively, one could consider that the morphemes of (30) belong to a distinct accent projecting domain, like polysyllabic adpositions, and hence glottal stop instead of /y/ is inserted there. There is some historical evidence for this.[20] In sum, even if there is no conclusive evidence for glottal stop insertion between positions 34 and 41, there is no evidence at all for /y/ insertion, so the right boundaries for the three versions of this diagnostic hold as determined above, namely as positions 32, 34, and 44.

As for the left edge, since /y/ insertion applies to suffixes only, the left edge can only be the predicate head itself; (31) shows that /y/ insertion does not apply in prefix-base boundary (/y/ is segmented there as distinct morpheme for the sake of clarity). Note that in what follows the first line contains a surface form, and the second line an underlying form to which the processes under discussion apply.

There is no evidence of /y/ being inserted between two positions to the left of the predicate (although it is inserted *inside* positions, e.g when the position

[19]The underlying character of the glottal stop in -*'e* can be seen in the contrast with the distal and other Ps with initial subjacent vowel, which expectedly take /y/, while -*'e* does not: *yi*+ -***'e*** ➔ ***yi'i'*** '(s)he/it is at (a precise place)' vs. *yi* + -***ey*** ➔ ***yiyi*** '(s)he/it arrives (at a distant place)'.

[20]The Wichí cognates for this second person marker show a long vowel (Claesson 2016), i.e. a bimoraic morpheme, like polysyllabic adpositions.

contains an N(P), such as in positions 1 through 3). Therefore, in any version of this diagnostic the left edge is position 16.

(31) No /y/ insertion without suffixation/encliticization

a. Before the personal prefixes

	ø-	*ẹmi'n / *a-*	*y-*	*imi'n*
	/a-	imin/		
v:	14	16		
	1-	love / *1-	EPEN-	love

'I love it/him/her.'

b. Before the reflexive-reciprocal base

	a-	*nín-*	*ẹmi'n / *a- ni*	*y-*	*ími'n*
	/a-	ni	imin/		
v:	14	15	16		
	1-	REFL	love / *1-	REFL- EPEN-	love

'I love myself.'

This diagnostic has two serious limitations: (i) it cannot be used to define the left edge of a word, since it applies to suffixes/enclitics only, and (ii) it cannot be applied to any of the positions where only items beginning with a consonant exist.

However, an alternative formulation might be interesting. In effect, notice that in (31b), instead of the glottal stop, an epenthetic *n* is inserted between the final vowel of the reflexive/reciprocal of position 15 and the initial one of the verb. Therefore, if the diagnostic were formulated as "non glottal stop insertion", rather than "/y/ insertion", position 15 should be added to the span as its left edge.

5.4 Palatalization (14-16; 14-40; 14-18/25; 14-40; 14-16; 14-46)

Underlying /i, y/ palatalize all consonants, while epenthetic [i] and underlying /u/ palatalize only coronals. The former is referred to as "first palatalization" and the latter as "second palatalization". Thus, for instance, prefixes of the form *i-* (possessive and irrealis active first person, *realis* active third person) palatalize any consonant because *i* is underlying there (first palatalization), but prefixes of the form *Ci* (nominal and verbal) palatalize coronals only, because the *i* in such cases is not underlying but derived (second palatalization) (Carol 2014b).

Palatalization usually means *C* ➔ *Cy*, but also /w/ ➔ /y/ before rounded vowels, /ky/ ➔ /sy/, and /k'y/ ➔/ts'y/ (notice that /k$^{(')}$/ and /k$^{(')}$y/ are distinct phonemes; surface *k$^{(')}$i* reflects subjacent /ky$^{(')}$i/). Neither the context nor the process itself are always transparent for two reasons: (i) /y/ is regularly dropped in coda after triggering palatalization, and (ii) *Cy* causes raising of a following *e* into *i*, among other vowel changes, and thus /Cye/ appears superficially as *Ci*; see (32).

(32) Palatalization of /w/, deletion of /y/ in coda and /e/ → /i/ after palatal

	i-	*yo-*	*ø*	*pi*
	/i-	wo-	y	peh/
v:	14	16	32	39
	3-	LV-	AP.DIST	REM.PST

‘(S)he said/wanted/did it.’

A number of domains can be identified based on palatalization phenomena in Iyojwa’aja’ Chorote. On the one hand, diagnostics can be subdivided into *minimal* and *maximal*: a set of *minimal* subtypes that define contiguous subspans of positions that trigger and/or undergo palatalization whenever the relevant context exists, and a set of *maximal* ones that define the largest possible span where *all* the occupied positions trigger or undergo palatalization (in other words, a span outside of which no palatalization is known to occur inside the verbal template). On the other hand, the diagnostics can be classified according to the target and environment of palatalization. We can consider A) the “first” palatalization as a whole, B) the “first” palatalization excluding that of /k$^{(’)}$y/,which is somewhat exceptional, and C) palatalization of coronals only, regardless of whether they are affected by the first or the second palatalization rule. In all, six different domains arise; see Table 3 for a summary of these tests.

Table 3: Palatalization diagnostics

Subtype	**Specific fracture**	**Left edge**	**Right edge**
Minimal-A	With k$^{(’)}$y	14	16
Maximal-A	With k$^{(’)}$y	14	40
Minimal-B	Without k$^{(’)}$y	14	18/25
Maximal-B	Without k$^{(’)}$y	14	40
Minimal-C	Coronals only	14	16
Maximal-C	Coronals only	14	46

The need for postulating the subtype B is based on the absence of palatalization of *-k* in positions 17 and 19, which is unexpected, because no other diagnostic places boundaries there. The absence of palatalization in position 17 is especially surprising if we consider that the position corresponds to 'derivational' morphology. Moreover, the *j*-initial causatives in position 18 do show palatalization: /i-limi-**hat**/ → *i-limi-**jyet*** (3-be.white-CAUS) 'make white'. These data suggest that it is reasonable to set aside the palatalization of /k$^{(ʼ)}$y/ as a special case, thus justifying the B subtype of the diagnostic.

For any version of this diagnostic the left edge is position 14, which hosts prefixes (or proclitics) that trigger palatalization (see e.g. (32)) but do not undergo palatalization of any kind, e.g. *t-amti'* '(s)he speaks' is never realized as **ty-amti'*, not even when preceded by /i, y/. In the *minimal* subtypes, the contiguous subspan is thus necessarily interrupted in position 14.

It is true that there is no direct evidence that palatalization cannot operate between positions 13 and 14, because the pronouns of position 13 never end in /i/ or /y/; hence, they provide no context for palatalization. But neither other NPs nor any other material ending in /i/ or /y/ trigger palatalization of the prefixes of position 14, so there is no reason to suppose that an eventual pronoun in position 13 ending in /i, y/ would. Furthermore, since position 13 is occupied by a tonic pronoun which is arguably an NP and can occupy other positions as well, I find no reason to suspect that the relationship between positions 13 and 14 should be any different from that between position 14 and any other position to its left.

As for the *maximal* subtypes, position 14 is also the left edge for verbal non-imperative predicates, where position 14 is obligatory. In reflexive-reciprocal and antipassive verbs in imperative mode position 14 is empty but position 15 is occupied by the reflexive/reciprocal *ni* and the antipassive *ka*.[21] If these morphemes were shown to be palatalized by some element to the left of position 14, the position of that element would be considered to be the left edge. However, there is no way to prove this, since *ka* and *ni* can never be target of palatalization. The regular antipassive marker *ka* does not palatalize because /k/ (unlike /ky/) never palatalizes in the variety under consideration,[22] while the reflexive/reciprocal

[21] Of course, it could be argued that the position of the personal prefixes is not actually empty in imperatives, but occupied by an abstract morpheme with zero exponence. Some indirect support for this is found in the Manjúi variety, where an optional *a-* second person prefix for imperative exists. In any case, this implies no changes for the diagnostics.

[22] In the Montaraz varieties of Argentina and Paraguay (known as Iyo'awújwa' and Manjúi respectively), in contrast, /k/ palatalizes, thus the antipassive becomes *kya* after prefixes of the form *i-* (Gerzenstein 1983; Carol 2018). However, even in these varieties *ka* is not palatalized by elements to the left of position 14.

morpheme *ni* should be analyzed as underlying /yne/ or /yni/, and thus palatalization cannot be applied.[23] In non-verbal predicates, where position 15 is also empty, the left edge could be pushed further to the left if the non-verbal predicate of position 16 could undergo palatalization. But this is not the case, hence position 14 remains as the left edge.

What remains to be considered are the right edges. Let us address the A-set first. The *minimal-A* palatalization is limited by the participle /-ky/ of position 17, which does not undergo palatalization, as can be seen in (33), so the span is 14-16. I found no clear examples of a context of palatalization for the participle in the verbal domain, hence (33) comes from the nominal domain; recall also that palatalized phones neutralize with plain ones in coda position, so only examples with onsets are shown.[24] (In (33) /Cye/ ➔ *Ci*; if we had /k/ instead of /ky/ we would expect **amtike*.)

(33) Lack of palatalization in the participle -*ky* of position 17.

y-	*amti-*	***ky-***	*e'*
1SG.POSS-	speak-	**PP-**	IRR

'my speech (irrealis).'

The *maximal-A* version reaches the TAM particles of position 40, which undergo first palatalization: *pet* 'please'[25] ➔ *pit*, *kyu* 'a while' ➔ *syu*, -*na'a* 'later' ➔ -*nye'e*, etc. The subspan is thus 14-40, see examples of the right edge in (34).

(34) Palatalization *Maximal-A*: right edge in position 40

a.

	jwel-	*i*	***syu'.***
	/hwel-	ey	kyu/
v:	16	32	**40**
	tell-	AP.DIST	a.while

'Tell him/her.'

[23]We can infer this from the following: *ni* is stressed, and stressed *i* only surfaces after a palatal(ized) phone (underlying /i/ is otherwise ẹ, a closed mid or very open high vowel). Thus, the previous /n/ must be palatalized, which in turn supposes a previous /y/ which regularly falls in coda.

In the Montaraz varieties the reflexive/reciprocal is *wet* and can be palatalized by a personal prefix of the form /i-/ in *wit* or *yit*, depending on the variety. However, it has not been documented that elements to the left of position 14 are able to palatalize *wet*.

[24]That there is a context for palatalization in (33) can be seen in the contrast with *t-amti-**ts'i**-ji'n* 'they speak', with the same root, where -*ts'i* is the palatalized allomorph of the distributive -*k'i* of position 34.

[25]The translation 'please' (*por favor*) was suggested to me with imperatives. In other cases, however, it is very difficult to find an equivalence. It seems to indicate a benefit for some participant.

b. *kyak iyo- Ø* ***pit***
/i- wo- y pet/
v: 11 14 16 32
DEM 3- LV- AP.DIST
'This is the way it is.'

The locatives *ts'ijí*, *'nijí* of position 41 do not provide a target for palatalization. The NPs/DPs to the right of position 41 do, but first palatalization is not documented there. First palatalization does occur in the postpositions in position 44, but is always triggered by their complement in position 43 which in turn does not palatalize, so it cannot define a maximal subspan.

Subtype B ignores palatalization of /k$^{(')}$/, which fails to occur not only in position 17 but also in positions 19 and 35, see (35).[26]

That *-k'i* is in a palatalization context in 35b. can be seen in the contrast with *'yen-a-****jyi'n*** (look-2pl-*JEN*) 'watch', where *-jen#* ➔ *-jyi'n* after the second person plural marker which is underlyingly /ay/; for 35c. it can be seen in the contrast with *ti jna-****jyi'*** (3-be.straight-P_{PLOC}) 'it goes straight', where *-ji#* ➔ *-jyi'* after the root which is underlyingly /hnay/. Notice that if palatalization took place in 35c. we would see its traces in the regular *e* ➔ *i* after a palatal and for 35a.

(35) Lack of palatalization of *k$^{(')}$y*

a. Concord first person plural: position 19
ø- amti- ***k-*** *i* *(*- **s**- i)*
v: 14 16 **19** 32
1- speak- **1PL-** AP.DIST
'we talke(d) about (it)'

b. Oblique marker first person singular: position 35
wen- a- ***k'i-*** *'m* *(*-**ts'i**-'m)*
/wen- ay- k'V- m/
v: 16 20 **35** 36
give- 2PL- 1SG- AP.LOC
'give (it to) me'

[26]This suggests considering that at least the palatalization of /k$^{(')}$y/ might be a 'lexical' process, i.e. one that allows exceptions, so that the lack of palatalization in a certain position does not necessarily place it outside the word, if this is a valid wordhood diagnostic. The lack of palatalization of /k$^{(')}$y/ in position 35, however, is not as surprising as that of positions 17 and 19, since this position is outside the boundaries determined by several diagnostics, and also /ts'/ fails to palatalize in position 35.

c. Oblique marker first person plural: position 35
ti- jna- ***ts'e-*** *'m* (**-****ts'****i- m)*
/t- hnay- **ts'e-** m/
v: 14 16 **35** 36
3- be.right- **1PL-** AP.LOC
'it is our job, it is proper for us'

The *minimal-B* subtype has a right edge in position 18. The causatives *-jan, -jat* of position 18 palatalize to *-jyen, -jyet*, as exemplified above. In positions 19 through 25 there is no way to know whether palatalization applies, either because the relevant morphemes begin in a vowel or for other reasons.[27] A positive instance of absence of palatalization is the mirative *-p'an* of position 26, which never palatalizes into **pyan* or **pyen*; contrast this with (36) with *'wanjli-jen* ➔ *'wanjli-****jyi'n*** '(s)he rests', where the same root triggers palatalization of *-jen* (position 37).

(36) No palatalization in position 26
ø- 'wanjli- ***p'an-*** *e*
v: 14 16 **26** 31
3- remain- **MIR-** AP.INS
'also..!', 'even...!' (Spanish *incluso*, *hasta*)

The *maximal-B* subtype defines again the span 14-40, like the *maximal-A*, see examples in (34).

The subtype C considers palatalization of coronals only, which can be triggered by underlying but also by some derived /i/, and also by /u/.

The *minimal*-C version gives just the span 14-16. A positive boundary is the oblique first person plural *-ts'e* of position 35, which fails to palatalize, as shown in 35c. But between 16 and 35 there is no target for palatalization, or any other way to verify whether palatalization would apply. Most morphemes do not begin in a coronal; others do (positions 21 and 25) but they have the form *Ci*, and although the concord marker of position 29 *-is* shows palatalization in *-isy* before a vowel, the trigger is morpheme-internal, and thus it should not define an edge.

Finally, the *maximal*-C version gives the subspan 14-46. Palatalization affects the initial phonemes of the DPs in positions 45-46 when they begin in a coronal: the demonstratives of the form *Ca* appear as *Ci* (where C=coronal), and the

[27] The morphemes in positions 20 through 23 begin in a vowel or in *Ci*, and thus contain no target for palatalization. The evidential of 25 is underlyingly /-t'ey/, but since it is unstressed, it becomes *-t'i(y)*, so again a target is lacking. And the reportative of 24 is scarcely documented in my material in this position, and I am not able to confirm or discard palatalization.

demonstratives *jlaja*, *jla'a* as *jlyaCa* or *jliCa*, see (37).[28] Although the examples available are for palatalization in position 45 only, it seems reasonable to extend the edge to the following position 46, since it hosts elements of the same class, i.e. heavy DPs.

(37) Palatalization *Maximal-C*: right edge in the DPs of 45-46

	y-	*i-*	*'i*	*[**jlyaja***	*Orán]*
v:	14	16	34	**45**	-
	3-	be-	AP.PUNCT	**DEM:f**	Orán

'[It] is in Orán.' (Drayson et al. 2000: 100)

6 Ciscategoriality revised

A domain of ciscategoriality is defined in Tallman (2021) as the span of structure wherein all elements are ciscategorial. If applied to wordhood diagnostics, it means that if, e.g., a morpheme can only attach to verbs but not to other word classes, then it belongs to the verb word. In other words, only ciscategorially selected elements belong to the word. Chorote is interesting in this regard because it allows not only the verb to head the predicate in position 16, but also other word classes — Ns/NPs, pronouns and even negation, which then take most of the usually 'verbal' markers. Furthermore, NPs and DPs can take some of the 'verbal' TAME markers even when they function as arguments. These two facts pose questions regarding how ciscategoriality should be defined as a comparative concept, since it is not clear whether it should be defined with respect to verbs or to predicates in general. Furthermore, Chorote is also interesting regarding typology of transcategoriality (Robert 2003) because it does not display transcategoriality evenly throughout its grammar. Thus, data from Chorote reveal that cis/transcategoriality is a matter of degree.

With respect to wordhood diagnostics, I suggest that two versions of ciscategorial selection diagnostics should be considered: a strict one, specific to verbs, which includes elements that can only be selected by verbs, and a lax one, which considers every element that can only be selected by the predicate head, no matter whether it is verbal or non-verbal, but not by the same categories in non-predicative functions. Importantly, notice that the *lax* subtype does not really define a word class, but rather a set of elements in predicate function.

[28]The basic allomorphs are *-a(j)* for 'orientation' and *-e(j)* for the instrumental. After a vowel, epenthetic /y/ is inserted and included as part of the Ps. This /y/ in turn raises front vowels, as explained in §2, thus the Ps result in *-yej*, *-yij*, respectively. The P 'orientation' takes here a suppletive form when the pronominal complement surfaces.

Distinguishing between verbal and non-verbal predicates, in turn, forces one to address the question of what constitutes a verb in Chorote. The section is thus organized as follows: §6.1 proposes a definition of verb in Chorote; and §6.2 applies the diagnostics.

6.1 Defining verb in Chorote

In previous work (Carol 2013, 2014b) verbs in Chorote were defined as the words that take the personal prefixes of position 14. This of course makes ciscategoriality diagnostics circular, if those prefixes are used to define the left edge of a span on the basis that only verbs can combine with them, as will be seen below. But this definition is also problematic for a different reason. Class V verbs (see Table 2) take the personal prefixes, but differ from typical verbs in the form of the irrealis, where they take the suffix/enclitic *-a* of position 23, like nominal predicates, and not the irrealis set of personal prefixes; see (38). Furthermore, their third person prefix is always zero, and the plural of any person is expressed through a suffix *-(i)s* identical in form to the most common plural suffix of nouns. I underscore that this *-(i)s*, unlike the *-is* of position 29, is not used just with third person, but with *any* person, and comes inmmediately after the stem and *before* the TAME morphemes, all of which brings this Class V closer to the nominal domain. Provisionally, I assign this plural *-(i)s* the same position as the predicate head, i.e. 16, just like the nominal plural in nominal predicates.

(38) Exponence of irrealis in different kinds of predicates

a. Typical verb

	Ja	***n-***	*ek*
v:	8	**14**	16
	PROSP	**3.IRR-**	go.away

'(S)he/it will leave.'

b. Nominal predicate

	Ja	*anéchiyas-*	*as-*	***a'***
v:	8	16	16	**23**
	PROSP	chief-	PL-	**IRR**

'He will be chief.'

c. Class V verb

	Ja	*Ø-*	*'esy-*	***e'***
v:	8	14	16	**23**
	PROSP	3-	be.good-	**IRR**

'(S)he/it will be good.'

d. Plural Class V verb

	Ja	*Ø-*	*is-*	***ísy-e'***	
v:	8	14	16	**16**	**23**
	PROSP	3-	be.good-	**PL-**	**IRR**

'They are good.'

Being something between nouns and verbs regarding their morphosyntax, and considering the notions they express ('big', 'nice', 'white', etc.) it looks attractive to label Class V verbs as adjectives, as Drayson (2009) does in his dictionary. However, I have preferred to label them "verbs" for two reasons. Firstly, they take the same person indices as verbs in first and second person. Secondly, there is no evidence that these candidate adjectives in attributive function are structurally different from relativized clauses with a (typical) verbal predicate. Even though they appear superficially juxtaposed to nouns, as adjectives do in European languages, the same goes for verbs. The analysis of these is as free relative clauses with a null relative pronoun (Carol 2014b), which is the most usual strategy when the relative pronoun is the subject; see (39b) (otherwise a demonstrative usually surfaces as an explicit relative). Thus, there is no syntactic evidence to assign (39b) a syntax different from that of (39a).

(39) Class V verbs and typical verbs in attributive function

a. Class V verb

	Si'yús	***Ø-***	***wuj***	*in-*	*ka-*	*je'.*
v:	5	**5**	**5**	14	16	33
	fish	3-	**be.big**	3-	have_joy-	AP.LOC

'The big fish is tasty.' (Lit. 'contains joy inside')

b. Typical verb

	Pi	*i'nyó'*	***'yijén-***	***e***	*i-*	*jlyut-*	*i'.*
v:	2	2	**2:2**	**2**	14	16	33
	DEM	person	**3:be.wise-**	**AP.INS**	3-	rub-	AP.LOC

'The man who knows (how to make fire) drills (a piece of wood with stick).' (Drayson et al. 2000: 62)

The next question is whether Class V verbs can head a DP/NP in argument function, i.e. assume the typical syntactic function of nouns. Class V verbs can head a DP/NP in argument function, but so can typical verbs, and in the same way. Besides the zero relative shown in (39), demonstratives can also function as relative pronouns, so that a verb preceded by a demonstrative can be 'nominalized' in this way; (40) shows a lexicalized case. In sum, an NP/DP can be both

Dem+N or Dem+V, so here there is no reason to assign Class V verbs a different, more nominal status than that of the other verbs.

(40) Typical verb heading a DP
Jana ta- kelisye'n
DEM 3- sing
'radio/tape recorder' Lit. 'the one that sings'

Furthermore, when a DP/NP headed by a typical verb takes part in a construction that requires nominal irrealis (see example (17b) and the text that precedes it), the nominal irrealis morpheme *-a* surfaces, as in any DP/NP headed by a noun, see (41). Therefore, there is again no reason to assign Class V verbs in argumental function a distinct, non-verbal status.

(41) DP headed by a verb with the nominal irrealis morpheme
*Ø- Laj [ya- ka ta- kelisyen- **a**']*
v: 14 16 43 - - - -
3- not_exist 1SG.POSS- ALI.POSS 3- sing- **IRR**
'I have no radio/tape recorder.' Lit. 'There is no radio/tape recorder of mine.'

6.2 Diagnostics based on ciscategoriality

The strict and lax versions of ciscategoriality proposed above can combine with the known *minimal-maximal* distinction - a subspan of contiguous positions that satisfy the requirements, or the longest possible subspan which only includes elements that satisfy the requirements, respectively. Or, in other words, a minimal subspan which only includes ciscategorial elements, and a maximal subspan outside of which all elements are transcategorial. In sum, we obtain four diagnostics.

6.2.1 Strict ciscategoriality (14-20; 14-37)

The *strict* (i.e. specific to verbs) *minimal* version has the person prefixes of position 14 and the concord morphemes of position 20 as its edges, see (42). Neither occur in non-verbal predicates, where person/number is indicated through oblique morphemes (and a postposition bound to them), see (43).

(42) Ciscategoriality - strict minimal: span 14-20
***ji**- 'wen- **a**'*
v: **14**- 16- **20**
2- see- 2PL
'You (pl.) see it/him/her.'

(43) Person marking in nominal predication

	l-	*lis*	***as-***	*e'm*
v:	16	16	**35**	36
	1SG.POSS-	sons	2PL-	AP.LOC

'You are my sons.'

The left edge is 14 only if we consider that Class V verbs are real verbs. Otherwise, the edge should be placed in position 15 - only transitives can take the reflexive/reciprocal and antipassive morphemes, and Class V are not among them.

The positions to the right of 20 can co-occur with non-verbal predicates. The perdurative of 21 is scarcely documented with non-verbs in my material, but co-occurs with a noun in *jlọma-jli'* (day-PERD) 'during the day', as well as in *'wena-jli-yi* (different_thing-PERD-$\mathrm{P}_{\mathrm{INST}}$) 'but' (Spanish 'sino'; Drayson et al. 2000: 'WENAJLIYI), lexicalized as a conjunction. The momentary, in position 22, can also combine with other word classes; see (44) (also 46a-b below); in 44aa-b (as well as in (46), I assume negation occupies the position of the predicate head, i.e. position 16 .[29] Also the irrealis and the other TAME morphemes that follow combine with non-verbs, as was seen in (17b) and (38b), and will be seen below in (46).

(44) Momentary with non-verbs

a.

	[A: E-	*jetik*	*Ø-*	*a'tye-*	*je'?]*	*B: Je-*	***ye***	*'ne'*
v:	16	**22**	40					
	[A: 2.POSS-	head-	3-	hurt-	AP.LOC]	B: NEG-	**MOM**	now

[A: 'Do you have a headache?'] B: 'Not anymore.'

b.

	[Syupa]	*ti*	*jlọma-*	***ye-***	*t'i-*	*jyi...*
v:	[-]	4	16	**22**	25	39
	[DEM]	COMP	day-	**MOM-**	EVID-	PRF

'[Then] the next day...' Lit. 'when it was day again...'

The *strict maximal* subtype has the same left edge as the *minimal* one. The right edge is position 37, occupied by the polysemous *-jen*, which combines even (though rarely) with Class V verbs, as in (45), where it functions as a plural marker. What makes Class V verbs different is that they pattern with nouns in many respects, as shown in (39). Nevertheless, they pattern with the other verbs here and not with nouns, on which *-jen* is not documented.

[29] That there is a context for palatalization in 33 can be seen in the contrast with *t-amti-**ts'i**-ji'n* 'they speak', with the same root, where *-ts'i* is the palatalized allomorph of the distributive *-k'i* of position 34.

(45) Ciscategoriality - strict maximal: subspan 14-37

	kas-	*'wasajne'n*	
	/**kas**-	'wasan-	**jen**/
v:	**14**	16	**37**
	1PL-	be.alive-	**JEN**

'We are alive.'

Any material to the left of position 14 can combine with other word classes, even the prospective of position 8, which combines with nominal predicates, see (38b). As for material to the right of 37, position 38 is occupied by the pluractional -*'ni(j)*, which usually attaches to verbs, even from Class V, but which can be seen attached to negation in (46).

(46) Pluractional *'ni(j)* of position 37 with non-verbs

	'Yina	*je-*	*ye-*	***'ni***	*wata'a*	*[ka*	*Ø-*	*tojw-*	*a-*
v:	1	16	22	**38**	40	46	-	-	-
	I_mean(?)	NEG-	MOM-	**PLACT**	so_much	COMP	3-	be.distant-	IRR-

k'i'].

-

AP.DISTR

'I mean, it is not so distant [as the previous place].' (Drayson et al. 2000: 94)

6.2.2 Lax ciscategoriality (14-22; 8-40)

The *lax* subtype is similar to the strict one, but replacing "verb" by "main predicate of the clause", whether verbal or not. Recall that, as stated above, this cannot define a word class, but an element that displays a predicate function. As a consequence, if an element, e.g. the oblique markers in position 35 that host applicatives, can combine with a non-verbal category, e.g. nouns, only when the noun is in predicate function, this does not mean that the oblique markers belong to the noun class - if they can only combine when the noun heads a predicate, then they belong to predicates, not to nouns themselves.

The *lax-minimal* subtype also has the person prefixes in position 14 as its left edge. By definition, when the predicate is non-verbal, this position, as well as position 15, is simply empty. The right edge is the momentary morpheme in position 22, which only occurs bound to the predicate head, verbal or not, as in (44). The span is thus 14-22; an example of this was provided in (16).[30] In turn, the ir-

[30]The translation 'please' (*por favor*) was suggested to me with imperatives. In other cases, however, it is very difficult to find an equivalence. It seems to indicate a benefit for some participant.

realis of position 23 attaches to nouns in argument function when the existence of the entity denoted by the N(P) is not asserted, as in (17b) and (41), and is thus excluded from the span identified by this diagnostic.

The *lax-maximal* version of the diagnostic has the prospective morpheme of position 8 as its left edge; see examples in (38). The right edge is position 40, which contains some adverbs only documented attached to the predicate head. In sum, the subspan is 8-40. An example of the *lax-maximal* subspan is (47).

(47) Ciscategoriality - lax maximal: subspan 840.
Ja- *kas-* *'wasan-* *a-* *jan-* ***na'a***
v: **8** 14 16 23 37 **40**
PROSP- 1PL- be.alive- IRR- JEN- **later**
'We will be alive, we will survive'.

The morphemes *ja* and *-na'a* at the edges of (47) are only documented bound to the predicate head, although other adverbs in position 40 are free, e.g. fronted to position 3; see §4.1. The complementizers of position 4 usually co-occur with predicate heads of any class, but not always - in cases like (48) *sa'am* 'we' can hardly be considered a predicate head; in this example, the first *ti* in position 2 introduces the topic *sa'am* 'we', the second *ti* in the usual position 4 apparently heads the main clause, and the last *ti* in position 46 heads an adverbial clause. Thus, position 4 is excluded from this subspan.

(48) Complementizer *ti* not introducing a clause
Jlampet ***ti*** *sa'am* *ti* *a-* *wa-* *k-* *i* *[siuni-* *wa* *jloma-* *s]*
v: 1 **2** 2 4 14 16 19 32 45 - - -
but **COMP** 1PL COMP 1- be- 1PL- AP.DIST- DEM- PL day- PL
[ti *Ø-* *'nes-* *a-* *t'i-* *pi* *ni* *Si-* *nya'* *jl-* *amt-*
46 - - - - - - - - - -
COMP 3- arrive- MOM- EVID- REM.PST 1PL.POSS- father 3POSS- word- PL
is].
-

'But we were already there those days when the Gospel arrived.'
(Drayson et al. 2000: 106)

7 Conclusions

From the application of constituency diagnostics to Chorote using the methodology advocated in Tallman (2021) there does not emerge an obvious wordhood candidate. As can be seen in Tables 4 and 5, which summarize the results of applying morphosyntactic and phonological diagnostics, respectively. As stated in the introduction, the maximum of diagnostic subtypes for a complete span is two, for the subspans 4-40, 14-16, 14-22, 14-40, 16-34, and maybe 14-18. If each edge is taken separately, the left edge shows more convergence, with 14 diagnostic subtypes converging on the personal prefixes in position 14, and six on the predicate head in position 16, while the right edge has the highest convergence of five diagnostic subtypes on position 40.

If one takes morphosyntactic and phonological diagnostics separately, looking for separate grammatical and phonological words, the results are not very different. The left edge of a possible grammatical word could reasonably be position 14 (convergence of eight subtypes), but the right edge could be the positions 18, 22, 39 (or -38) or 40, with two subtypes converging in each case; from these, only position 22 shows convergence in position 14 (for both subtypes) in the left edge as well.

As for a possible phonological word, the left edge has two candidates: again position 14, with a convergence of six subtypes, and position 16, with four subtypes. But all six subtypes converging in position 14 correspond to the palatalization diagnostic, while the ones converging in position 16 correspond to accent (one) and *y*-insertion (three) diagnostics. If we take into account the iambic type conjectured for Proto- or Pre-Chorote, there would be a seventh subtype converging in position 14, which would not be related to palatalization. As for the right edge, positions 16 and 40 show the highest number of subtype convergences - three, belonging each to two different diagnostic types. However, position 16 is very problematic as a candidate for the right edge of the phonological word if we consider that it is the position of verbal root and the left edge for several other diagnostics. In turn, position 40, filled by adverbial particles that can encliticize to the predicate head, appears as a more reasonable candidate. Two subtypes that give position 40 as right edge also give position 14 as a left edge, which makes the span 14-40 the only 'candidate' for the phonological word, but with only two diagnostic subtypes converging in it.

Finally, Chorote is interesting regarding the typology of transcategoriality because it shows features of different types. On the one hand, there is a distinct verb word class. Concord morphology can be selected only by certain stems, *verbal* stems. Other words are not "transcategorialized" into verbs when they function as predicates. In those cases, the subject is cross-referenced by oblique markers, as seen in (43). In this respect, Chorote is not different from languages with heavy morphology and limited transcategoriality (Robert 2003), except for the fact that it lacks a copula.

Table 4: Morphosyntactic wordhood diagnostics

Abstract type	Subtype	Language specific fracture	Left-edge	Right-edge	Size	Convergence
Freedom	Minimal		16	16	1	1
	Maximal		4	40	37	2
Non-Interruption	Single free interruptor		14	39 (or -38)	26 (or 25)	1
	Multiple free interruptor		7	41	35	1
	Nonfixed interruptor		14	22	9	2
Deviation		Inflectional class	14	18	5	1/2
		Fossilization	16	18	3	1
	Extended Exponence		14	29	16	1
Non-permutability	Rigid		14	23	9	1
Subspan repetition	Minimal	Coordination	8	38	33	1
	Maximal	Coordination	8	39	34	1
Ciscategorial selection	Strict minimal		14	20	7	1
	Strict maximal		14	37	24	1
	Lax maximal		14	22	9	2
	Lax minimal		8	40	30	1

Table 5: Phonological wordhood diagnostics

Abstract type	Subtype	Language specific fracture	Left-edge	Right-edge	Size	Convergence
Accent	Minimal-minimal		15	16	2	1
	Minimal-maximal		16	34	19	2
	Maximal-maximal		4	40	37	2
y-insertion	Minimal		16	32	17	1
	Maximal-minimal		16	34	19	2
	Maximal-maximal		16	44	28	1
Palatalization	Minimal-A	With k⁽ʾ⁾y	14	16	3	2
	Maximal-A	With k⁽ʾ⁾y	14	40	27	2
	Minimal-B	Without k⁽ʾ⁾y	14	18/25	5/12	2/1
	Maximal-B	Without k⁽ʾ⁾y	14	40	27	2
	Minimal-C	Coronals only	14	16	3	2
	Maximal-C	Coronals only	14	46	32	1

On the other hand, in other respects the language seems to make extensive use of transcategoriality, something which has been correlated with the isolating type (i.e. the type of languages with weak morphology; Robert 2003). For example, an inflected verb can perform a referential function -i.e. head a noun phrase- without any overt transcategorial morphology, as (40) shows. Moreover, many TAME markers can be bound to NPs, clearly taking nominal rather than clausal scope (Carol 2014b, 2015). All this gives Chorote some properties of an 'omnipredicative language' (Launey 1994), which in turn underscores that tests based on cis-/transcategoriality deserve further discussion.

Abbreviations

ALI	alienable	LV	light verb
ANTIP	antipassive	MIR	mirative
AP	applicative/adposition	MOM	momentary
CAUS	causative	OR	orientation
COMP	complementizer	PLACT	pluractional
DEM	demonstrative	PP	participle
DIST	distal	PRF	perfect
DISTR	distributive	PROSP	prospective
EPEN	epenthetic	PST	past
EVID	evidential	PUNCT	punctual
INCOMP	incompletive	REFL	reflexive
INTER	interrogative	REM	remote
IRR	irrealis	REP	reportative
JEN	pluractional/downwards	VBLZ	verbalizer
LOC	locative		

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Chapter 16

Constituency in Northern Chaco Mocoví (Guaycuruan, Argentina)

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This chapter explores 22 different constituency tests applied to the verbal planar structure in Northern Chaco Mocoví, the northern-most Mocoví speech community in Argentina. It is shown that the verbal subspans selected by different tests display divergences and convergences within and across phonological and morphosyntactic domains. Regardless of the divergences, there are recurrent convergences, identifying minimal and maximal subspans. I argue then that those recurrent subspans can be interpreted as the best exemplars of a word-like constituent in this language.

1 Introduction

The empirical definition of a cross-linguistically valid notion of "word" has been shown to be a theoretically and descriptively challenging task. For Mocoví, a Guaycuruan language spoken in northeastern Argentina, the definition of "word" has not received a specific study to show the necessary and sufficient criteria that identify such a category (cf. Carrió 2009, Gualdieri 1998, Grondona 1998).

Following the methodology delineated in this edited volume, this chapter explores ten different constituency tests applied to the verbal planar construction, i.e., "an entire sentence headed by a verb where no distinction between word-internal and sentence-level structure is presupposed" (Tallman 2020: 52–53), in Northern Chaco Mocoví. Both phonological and morphosyntactic domains are tested to determine the extent to which a verbal word constituent can be identified by the planar structure position/s that each test targets.

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Results presented in this study suggest that a word constituent in the verbal domain is not categorical. Convergences and divergences are observed in both phonological and morphosyntactic domains. When comparing both domains, however, convergences that identify minimal and maximal subspans of the planar structure emerge, which suggest that those constituents might represent the best exemplars of non-arbitrarily defined verbal words.

In §2 of this chapter, I describe the Mocoví planar structure in which all elements of a clause are organized in a linear fashion. Then, phonological and morphosyntactic tests are applied to the planar structure in §3 and §4, respectively. Major findings on constituency and word detection are presented in §5.

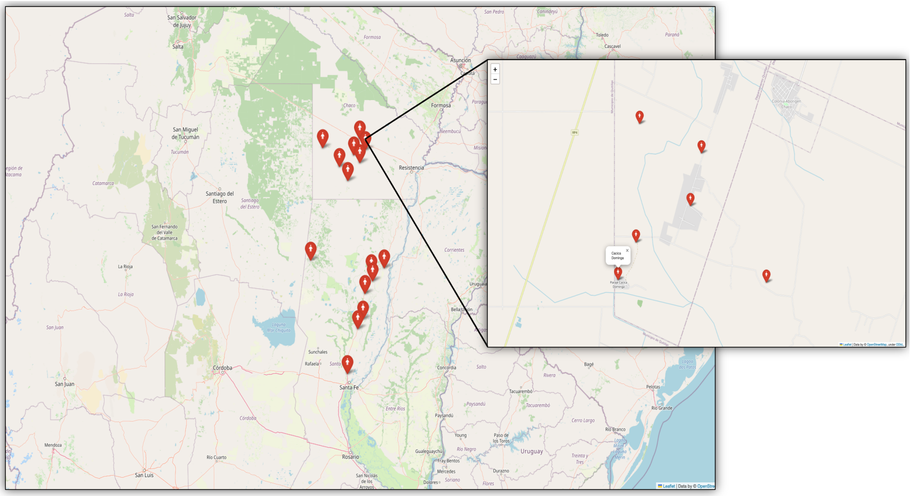
1.1 Mocoví: geographic location, linguistic family and data

Mocoví is spoken in northeastern Argentina and belongs to the Guaycuruan linguistic family, along with Toba, Pilagá, Kadiweo and Abipón (extinct). While current estimates of the Mocoví population are not up to date, the last Argentine national census in 2010 recognized more than 16,000 Mocoví members.

So far, it has been argued that there are at least two distinct variants of Mocoví within the Mocoví dialectal chain in Argentina. One is spoken in the province of Chaco and has been initially documented by Buckwalter (1995) and described by Grondona (1998) and Gualdieri (1998). These three studies were primarily based on data from Colonia El Pastoril in Southern Chaco. The other variant is spoken in the province of Santa Fe and is nowadays mainly studied by Cintia Carrió and her students (see, for instance, Carrió 2009, 2011, 2015, Carrió et al. 2019, Rabasedas & Carrió 2017), covering different morphosyntactic and lexical domains of Mocoví grammar (but see also Gualdieri & Citro 2006). To the best of my knowledge, none of these scholars working on Mocoví has produced specific publications dealing with wordhood issues.

In this chapter, the Mocoví data come from the Northern Chaco community, a cluster of socially connected families located specifically in the indigenous territory known as Colonia Aborigen, a multilingual region that has served as the home for Mocoví and Toba communities for more than hundred years (see Hermitte et al. 1995: vol II, Salamanca 2008). Map 1 zooms in on the sites in Colonia Aborigen where I carried out fieldwork, and displays the current locations of Mocoví communities in Santa Fe and Chaco.

Northern Chaco Mocoví has not received much attention from Mocoví studies until recent years (e.g., Juárez 2013). Since then a series of studies have been produced, advancing the current knowledge on the northern-most Mocoví community of the dialectal continuum. The corpus for this study combines naturally-



Map 1: Localization of Northern Chaco Mocoví in Colonia Aborigen in the context of the Mocoví communities in Argentina

occurring and elicited data collected via original fieldwork from 2011 to 2021. Part of this corpus is available at the fully open-access Mocoví collection at ELAR (Juárez 2019).[1] Each individual example comes with an identifier, indicating its source. Examples taken from the Mocoví corpus are accompanied by short abbreviations of the language and community names where they were recorded in addition to the year, month, day and the exact start time of an utterance in the recording session. Natural discourse examples are differentiated from elicited ones in that the former are preceded and followed by three dots in the first and fourth line of transcription.

2 Verbal planar structure

This chapter explores multiple individual tests that allow us to empirically assess the extent to which a verbal constituent exists in Northern Chaco Mocoví. To do so, a methodological implementation to capture verbal constituency is in order. Following recent work by Tallman (2020, 2021), I propose the following planar structure in Table 1. A planar structure captures all the elements that are part of a specific domain; in this chapter I only focus on the verbal domain.

[1]To access the collection, visit https://elar.soas.ac.uk/Collection/MPI1314056.

All elements in a planar structure are part of a flat structure that does not presuppose any type of constituency structure or morphological organization, i.e., class/templatic system or layered system (for a recent overview of these morphological systems, see Mithun 2016). Within a planar structure, elements occupy individual positions arranged in two different types: slots and zones. The application of tests described in Sections 3-4 will identify different spans of positions, whose alignment might single out what the best candidate for a word constituent is.[2]

Table 1: Verbal planar structure of Mocoví

Pos.	Type	Elements	Forms
(1)	slot	clause linkers	*nakoʔ*, *maʔ*, *kan*, *qaʔ*
(2)	zone	S/A, adverbs	
(3)	slot	1^{st}, 2^{nd} P	*ajim*, *qomiʔ*, *qamiʔ*, *qamiɾi*
(4)	slot	negation	*sV-*, *sqa-*
(5)	slot	subject defocusing	*qa-* ~ *qo-*
(6)	slot	bound person forms	Set I, Set II and Set III
(7)	slot	**verb core**	
(8)	slot	valence modifier I	*-ɢat*, *-ɢan*, *-n*
(9)	slot	causee	*-it*
(10)	slot	valence modifier II	*-ɢan*
(11)	slot	1^{st}PL, 2^{nd} S/A, 3^{rd}‘PL’ P	*-ɢ*,*-iɾ*,*-i* ~ *-iː*, *-eʔ*
(12)	slot	aspect	*-ta*, *-tak*, *-sa*, *-sak*, *-teg*
(13)	slot	desiderative	*-ake*
(14)	slot	reflexive, reciprocal	*-taʔ*, *-ltaʔ*
(15)	zone	transitivizer	*-a* ~ *-aʔ* ~ *-aʔa*
		directionals	*-ʃigem*, *-ɲi*, *-wek*, *-o*
		locatives	*-ge*, *-gi*, *-lek*, *-git*
(16)	slot	non-subject plural	*-lo*
(17)	slot	diminutives	*-okiʔ*, *-oʎiʔ*
(18)	slot	temporal/ evid?	*=oʔ*
(19)	slot	3^{rd} P or A	
(20)	slot	oblique nominals	*ke*-nouns

[2]The labels S, A, P in the planar structure are based on Comrie (1981), and T and R on Malchukov et al. (2010).

The relative order of elements as well as their occurrence in the same position of the structure are based on two principles: mutual exclusivity and co-occurrence. Thus, individual elements will occupy different positions if they co-occur. For example, in the positions preceding the verb core, a bound person form, e.g., *i-* '3.II' can co-occur with other preceding elements such as the SUBJECT DEFOCUSING marker *qa-* and the NEGATIVE prefix *sa-* in the following order, i.e., *sa-qa-i-aʔden* 'they don't know it'. In contrast, different elements will occupy the same position if they exclude one another. In positions following the verb core, for example, the suffixes *-lek* 'LOC$_1$' and *-ge* 'LOC$_2$' exclude each other and the sequences **-lek-ge* or **-ge-lek* do no exist in the language.

3 Phonological diagnostics

This section focuses on phonological diagnostics applied to the Mocoví planar structure. The diagnostics are stress (§3.1), palatalization (§3.2), epenthesis (§3.3) and vowel harmony (§3.4). The description of these segmental and suprasegmental properties of Northern Chaco Mocoví builds on previous works of Southern Chaco Mocoví phonology (see Gualdieri 1998: chap.2 and Grondona 1998: 21–42). Examples are represented following a standard practice of an input-output schema, in which the output is produced by rules in the course of a phonological derivation (Hayes 2009, Gussenhoven & Jacobs 2011, Kenstowicz & Kisseberth 1979). Thus, the first line represents the output, whereas the second line provides the underlying representation of sounds.

3.1 Stress: spans 6-7 and 4-18

Mocoví has been described as a stress language at the lexical level, although the acoustics of stress remain to be studied in detail. I limit myself here to reporting on the position of stress and the spans of elements that stress identifies.

The position of stress is fixed and thus predictable. It falls on the last syllable of a single element or a string of elements of the planar structure. Stress can identify minimal and maximal spans of positions. The minimal span includes positions 6-7, as in (1).

(1) [so jaːˈleɣ jaˈβik]

so	*i-jaːle-g*	*i-awik*
2		6-7
DET$_2$	1SG.POSS-descendent-M	3.I-get.burn

'My son is burnt.' (mocCA191111: 00:02:16)

The maximal span, on the other hand, includes positions 4-18, as in (2). The stress regularly moves to the right edge of a constituent regardless of the number of elements added to the verb structure.

(2) [soja:ˈleɣ jaβiˈkoʔ]
so *i-ja:le-g* *i-awik=oʔ*
2 6-7-18
DET$_2$ 1SG.POSS-descendent-M 3.I-get.burn=EVID/TPRL?
'My son got burnt.' (mocCA191111: 00:03:46)

The occurrence and position of stress aligns with what speakers intuitively identify as a word. Thus, speakers consider this suprasegmental property as a strong clue to recognize a word in the language. Not only the span of positions 4-18 and 6-7 are considered independent words, but also other elements outside these spans, such as adverbial elements in 2 and independent pronouns in 3, among others. However, since other individual elements or spans of positions that also carry main stress do not include the verbal core, they are not considered here.

3.2 Palatalization: spans 7-11 and 6-15

A pervasive phonological process in Mocoví is palatalization. Alveolar consonants such as /d, t, l, n, s/ become [dʒ, tʃ, ʎ, ɲ, ʃ] when followed by /i/. In (3)-(5), palatalization occurs at morpheme boundaries. Alveolar consonants in the right edge of core element 7 are affected by the high front vowel [i] that is part of the suffix in position 11. However, palatalization not only affects those consonants at the right edge of the core element, but also alveolar consonants on its left edge. Observe the change [d] → [dʒ] in (4b). The span where palatalization occurs thus runs from 7 to 11.

(3) /t/ → [tʃ] / _ [i]

a. [qoˈpa**t**]
∅-qopat
6-7
3.I-be.hungry
'She/He is hungry.' (mocCA120713: 00:03:48)

b. [ɾoqopaˈ**tʃ**iʔ]
ɾ-qopat-iɾ
6-7-11
2SG.I-be.hungry-2SG.I
'You are hungry.' or 'Are you hungry?' (mocCA120713: 00:03:38)

(4) /n/ → [ɲ] / _ [i]

a. [jaʔˈ**den**]
i-ʔden
6-7
3.II-know
'She/He knows it.' (mocCA120706: 01:24:28)

b. [**dʒ**iˈ**ɲ**iʔ]
ʔden-iɾ
7-11
know-2SG.II
'You know it.' (mocCA120713: 00:01:12)

(5) /l/ → [ʎ] / _ [i]

a. [neˈsa**l**]
n-sal
6-7
3.I-vomit
'She/He vomits.' (mocCA110711: 00:10:29)

b. [ɾesaˈʎiʔ]
ɾ-sal-iɾ
6-7-11
2SG.I-vomit-2SG.I
'You vomit.' or 'Did you vomit?' (mocCA110705: 02:18:14)

The element in position 6 can also palatalize. Compare the articulation of the first-person bound form *s-* before [a] and [i], as illustrated in (6).

(6) [**s**aβotaˈke **ʃ**ikʃimˈge aɾaqoˈpaq]

s-wo-ta-ake	*s-k-ʃimge*	*a-ɾa*	*qopaq*
6-7-12-13	6-7-15	19	
1.II-want-DUR-DES	1.II-move-DIR:UP	F-DET$_4$	tree

'I want to climb the tree.' (mocCA120626: 00:15:24)

However, the palatalization of alveolar consonants in position 6 is rare and seems to be subject to variation within and across speakers. Typically, morphological elements that contain an alveolar consonant in that position, i.e., certain bound person forms and the negative marking, do not palatalize. For example, unlike (6), the first-person bound form *s-* in (7a) does not change its articulation in the context of [i]. The same holds for the negative prefix *s-* in (7b).[3]

(7) Left-edge non-patalization: *s-* '1.II' and *s-* 'NEG'

a. [**s**iˈkin ɾajaqaˈja]
s-kin *ɾa* *i-aqaja*
6-7 19
1.II-greet DET_4 1.POSS-brother
'I greeted my brother.' (mocCA160725: 00:37:46)

b. [**s**ijaʔˈden]
s-i-ʔden
4-6-7
NEG-3.II-know
'(They) don't know it.' (mocCA180807: 00:04:04)

Similarly, the third-person bound form *n-* does not palatalize before [i], as shown in (8). The contrast between second and third person shows that *n-* in (8) does not change its place of articulation in position 6 before the epenthetic [i].

(8) Left-edge non-patalization: *n-* '3.I'

a. [ɾijaˈtʃiʔ]
ɾ-jat-iɾ
6-7-11
2.I-be.worried-2.I
'You are worried' or 'Are you worried?' (mocCA120717: 01:33:51)

b. [niˈjat]
n-jat
6-7
1.I-be.worried
'He/She is worried.' (mocCA120717: 01:34:03)

[3] Syllable structure constraints and other phonological processes directly interact with palatalization in (7), e.g., vowel harmony and vowel epenthesis. In both examples, the segment [i] is inserted to maintain the syllable structure CV. Additionally, in (7b) that vowel harmonizes in height with the semiconsonant /j/, which underlyingly correspond to the bound person form *i-*, but re-syllabifies as [j] to produce the structure CVC with this specific verb root.

As one of the reviewers pointed out, palatalization might not affect alveolar consonants on the left edge of the verb complex because they precede a non-underlying [i]. This explanation might be valid, but it should also be considered that the non-palatalization of a segment like *n-* for the third person preserves a meaningful paradigmatic distinction in the language. In Set III bound person form, for example, the contrast *ɲ-* vs. *n-* distinguishes first and third-person arguments, as illustrated in (9).

(9) a. [ɲenaːɲi]
ɲ-naːn-ɲi
1.III-lay.down-DIR:DOWN
'I lay down.' (mocCA120717: 01:07:14)

b. [nenaːɲi]
n-naːn-ɲi
3.III-lay.down-DIR:DOWN
'He/She lays down.' (mocCA120717: 01:10:03)

Although examples (7) and (8) show that palatalization is ruled out with *n-* and (optionally) *s-* on the left edge of core element in 7, we do not find sequences such as /t + i/ or /l + i/ in verbs to empirically prove that this process is blocked across the same consonants attained by palatalization on the right edge. The segment *t-*, for example, is a third-person bound form, lexically restricted to predicates that do not contain [i] in their phonological structure, e.g., ***t**aʔwe* 'S/he goes to a place'. The segment *l-*, on the other hand, is a third person possessive bound form, e.g., ***l**awa* 'His/her arm', and does not occur with verbs.[4]

3.3 Vocalic epenthesis: spans 6-7 and 6-15

As generally assumed in phonology literature (e.g., Hayes 2009: 263), epenthetic processes are motivated by syllabification constraints. In other words, epenthetic elements are added to create valid syllable types within a language. In Mocoví, the simplest syllable type is V, but we also find CV, CVC and CCVC as other syllable types. The two most frequent syllable types are CV, as in (13c) and (14a), and CVC, as in (10), which are also the cross-linguistically least marked types of syllables (Gordon 2016: 84–85). This section shows the application of vocalic epenthesis as another diagnostic that identifies a span of positions in the planar

[4] In Mocoví, unlike its sister language Western Formosa Toba (see Carpio 2012), there is no verbal marker *l-* indicating third-person arguments.

structure. This diagnostic targets minimally positions 6-7 and maximally positions 6-15.

Epenthesis occurs on both sides of the core element in position 7. When epenthetic vowels are inserted to the left of position 7, the minimal sub-span is identified. In (10), for example, the vowel [e] is inserted between the bound person form *n-* and the verb root *-tʃaq* 'cut'.

(10) [neˈtʃaq]
n-tʃaq
6-7
3.III-cut
'She/He cuts himself/herself.' (mocCA210803_1: 00:08:38)

On the other hand, the maximal span of positions can be seen on the right side of position 7, as in (11). The epenthetic vowel [a] is required between the verb base and the locative suffix *-ge* 'LOC$_2$'.

(11) [itʃaq**a**ˈɣe]
i-tʃaq-ge
6-7-15
3.III-cut-LOC$_2$
'She/He cuts it completely.' (mocCA210803_1: 00:32:55)

Outside the domain of positions 6-15, the epenthetic process does not apply. Morphological elements preceding position 6, for example, already include a vowel in their underlying form, e.g., *sV* or *sqa* 'NEG' in positions 4 and *qa-* or *qo-* 'DEF.SBJ' in position 5. Likewise, morphological elements occurring between positions 15-18 come in a syllabic structure that does not require the addition of an extra segment to conform a valid syllable type. These elements add another CV syllable to the verb structure or create close syllables of the type CVC.

3.4 Vowel harmony: spans 4-7, 6-11 and 7-11

Vowel harmony is another common phonological process in Mocoví. In many cases, vowel harmony interacts with vocalic epenthesis, in that the inserted vowels must harmonize with the vowel or the semi-consonant [j] that is part of the closest syllable to the verb.

Two classes of vowels usually condition one another; on the one hand, the front vowels /e/ and /i/, and on the other hand, the non-front vowels /a/ and /o/. One vowel of each group can trigger the assimilatory process, while the other is the target of the change. The directionality of vowel harmony can be progressive or regressive (in the sense of Katamba 1996: 82).

3.4.1 Verb-conditioned vowel harmony

Verb-conditioned vowel harmony identifies the span of positions 4-7, as shown in (12). This example illustrates a case of progressive assimilation, i.e., the inserted sound is similar to the sound that follows it. The vowel included in the negative prefix *sV-* changes its articulation depending on the structure of the following syllable. Preceding a syllable of the type CV, where the consonant does not correspond to the semi-consonant [j], the inserted vowel harmonizes with the root vowel [a], as in (12a). However, when the syllable after the negative marker includes [j], the vowel articulates as [i] like in (12b). Recall that in this latter example, the underlying [i] surfaces as [j] due to the preference of the CV syllable structure.

(12) a. [s**a**saʔ'den]
sa-s-aʔden
4-6-7
NEG-1.II-know
'I don't know (something).' (mocCA120706: 00:15:50)

b. [s**i**jaʔ'den]
si-i-aʔden
4-6-7
NEG-3.II-know
'She/He does not know (something).' (mocCA180807: 00:09:06)

On positions to the right side of 7, vowel harmony identifies the span of positions 6-10 and the directionality of the harmonic process is regressive, i.e., a vowel becomes similar to the preceding vowel. In (13), vowel harmony involves the mid back vowel /o/. Observe that the verb base in (13a) does not include a final vowel on its right edge structure. The epenthethic vowel /o/, inserted at the juncture of positions 7 and 10, is identical to the vowel of the preceding syllable, as in (13b). Furthermore, that inserted vowel conditions the realization of /a/ in the valence modifier /-GAN/. The example in (13c) shows that vowel harmony does not affect other elements beyond position 10.

(13) a. [qajpeˈlok]
qa-i-pelog
5-6-7
SBJ.DEF-3.II-rake
'Someone raked it.' (mocCA160725: 00:02:03)

b. [ɾepeloɣ**o**ˈʁ**o**n]
ɾ-pelog-ɢan
6-7-10
3.II.INTR-rake-VM:INTR
'He/She rakes.' (mocCA160725: 00:09:32)

c. [peloɣ**o**ˈtaʔ]
∅-pelog-taʔ
6-7-14
3.II-rake-RECP
'He/She rakes them.' (mocCA160725: 00:03:07)

3.4.2 Affix-conditioned vowel harmony

Unlike examples above, vowel harmony is also produced by the second-person bound form *-i*. The expression of the second person triggers progressive assimilation in the verb vowels, as in (14). This process identifies the span 7-11. Observe the inflectional contrast of the verb *-keʔe* 'eat$_1$' and note that the verb vowels change when the verb inflects for the second-person A argument. Since the second person is expressed by the suffix *-i*, the verb vowels change to [i], assimilating in height to the following vowel suffix, as in (14b).

(14) a. [sek**e**ʔ**e**ˈtak]
s-keʔe-tak
6-7-12
1.II-eat$_1$-PROG
'I'm eating (something).' (mocCA120706: 00:21:03)

b. [k**i**ʔ**i**ˈsak]
keʔe-i-sak
7-11-12
eat$_1$-2.II-PROG
'You are eating (something).', 'Eat.' or 'Are you eating?'
(mocCA120706: 00:22:44)

This type of vowel harmony rule occurs across verbs that include the vowel /e/ as part of their vocalic elements. As shown in many other other examples throughout the chapter, vowel harmony feeds another phonological process, such as palatalization. This phenomenon was observed earlier in (4), but the same examples are repeated here in (15) for convenience.

(15) a. [jaʔˈ**den**]
i-ʔden
6-7
3.II-know
'He/She knows it.' (mocCA120706: 01:24:28)

b. [**dʒi**ˈ**ɲi**ʔ]
ʔden-iɾ
7-11
know-2SG.II
'You know it.' (mocCA120713: 00:01:12)

Underlyingly, the verb 'know' is *ʔden*, but when the verb inflects for the second person, the vowel /e/ changes to [i]. Since the inflected verb form only contains the high vowel /i/, the palatalization of alveolar consonants follows, as in (15b).

3.5 Phonological tests: interim results

Figure 2 summarizes the results of the phonological tests applied to the planar structure. The graph shows that individual tests identify different spans of positions and these subspans do not align with the same constituent.

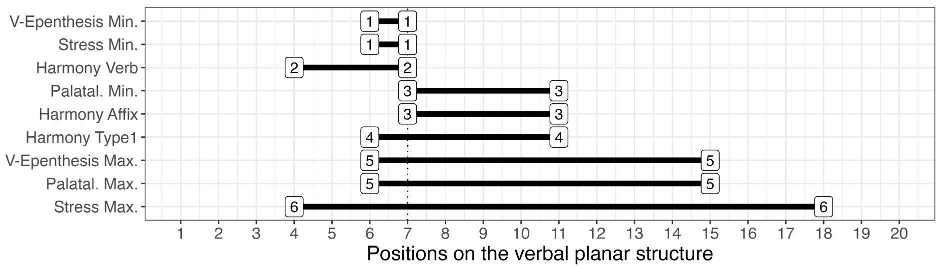


Figure 2: Results from phonological tests

There are certain subspans that are selected more than once, 6-7, 7-11, 6-15, but still other results add more variation to the selection of constituents. Thus, the phonological domain does not provide strong evidence for selecting a subspan of positions and defining it as the best exemplar of a phonological word.

4 Morphosyntactic diagnostics

The following sections analyze morphosyntactic diagnostics applied to the Mocoví verbal planar structure and show the different spans of positions that are selected by each diagnostic. The diagnostics explored are free occurrence (§4.1), non-interruptability (§4.2), sub-span repetition (§4.3), (non)-permutability (§4.4), deviation from bi-uniqueness (§4.5) and (non)-ciscategorial selection (§4.6). Each of these diagnostics is described in turn.

4.1 Free occurrence: span 6-7 and 4-18

Free forms, i.e., a combination of elements that can occur as a complete utterance (Tallman 2020: 18–19), can be divided into minimal and maximal free forms. Minimal free forms identify the smallest span of positions that can stand alone, whereas maximal free forms represent the largest number of positions, corresponding to a full utterance.

A minimal free form in Mocoví is commonly identified by the combination of the core element in 7 and the expression of core arguments via bound person forms. Three bound person form paradigms are the main morphological coding devices of core arguments. The complete paradigms of bound person forms are presented in Table 2. Typically, only one argument is expressed in each verb, S or A, via one of the bound person forms. The span of positions identified by the verb core and the expression of core arguments varies. Two different minimal free forms can be recognized depending on the grammatical person that is expressed and the bound person form paradigm that is (lexically) selected.

Table 2: Bound person form paradigms in positions 6 and 11

Person & Number	Set I	Set II	Set III
1SG	*dʒ-*	*s-*	*ɲ-*
1PL	*qaɾ-*	*s-...-G*	*ɲ-...-G*
2SG	*ɾ-...-iɾ*	*-iɾ*	*n-...-iɾ*
2PL	*ɾ-...-i ~ɾ-...-iː*	*-i ~ -iː*	*n-...-i*
3	*i-*	*i-*	*n-*
	ɾ-	*ɾ-*	
	∅-	*∅-*	
	n-	*t-*	

For example, a minimal free form includes only two positions, 6-7, with verbs that take Set II to express first-person singular and third-person arguments. Consider the verb *iwaɢan* 'S/he hits him/her/it' in (16) inflected for the third-person A. The predicate in position 7 takes the bound person *i-* from the Set II in position 6. As a free form, this verb, furthermore, can be used as a complete answer to a question, such as *What happened?* or *What did he do?*. Neither verbs nor bound person forms can occur by themselves.

(16) a. *i-waɢan*
6-7
3.II-hit
'She/He hit him/her.' (mocCA160725: 01:23:11)

b. * *waɢan*
7
hit
'She/He hit him/her.'

The default interpretation of a verb form like *iwaɢan* is that the P argument corresponds to a third person. However, if the P argument corresponds to non-speech act participants, independent pronouns are employed, e.g., *ajim* '1SG.PRON' or *qamiɾ* '2SG.PRON' and their corresponding plural counterparts, to explicit the argument's referentiality. The same holds for nominal elements, in that they are employed to establish the specific extra linguistic referent in the discourse.

On the other hand, the maximal free form identifies the span of positions 4-18, including the negative prefix to the left edge of the verb structure and the enclitic *=oʔ* 'EVID/TPRL?' to the right. Almost all elements of that string of positions are illustrated in (17). None of the elements in the maximal free form span can occur by themselves.

(17) ***qa****-n-oʔteg-ʃigem=****oʔ***
5-6-7-15-18
SBJ.DEF-3.III-pull.out-DIR:UP=EVID/TPRL?
'Somebody has pulled it out.' (mocCA160720: 00:17:58)

Adding other elements to the span 4-18 is possible, but the clause structure would include multiple free forms that do not necessarily overlap with the verb core. Natural discourse examples illustrate cases of this kind.

(18) ... *maʔ* *s-wiɾ-lek=oʔ* *a-so* *i-kome:na...*
1 6-7-15-18 19
because 1.II-arrive-LOC$_1$=EVID/TPRL? F-DET$_2$ 1SG.POSS-grandmother
'... (I'm talking about this) because I reached my grandmother back then...'
(mocCA191010_1: 00:14:02)

In (18), for instance, more elements of the planar structure are included, e.g., the adverbial marker *maʔ* in position 1 and the nominal constituent *aso ikome:na* in position 19.[5]

4.2 Non-interruptability: span 4-18

The span of positions 4-18 cannot be interrupted by simple or complex free forms. Simple free forms can be, for example, adverbial elements in position 2, whereas complex free forms can correspond to nominal constituents, such as those in positions 2, 19 or 20. For the sake of brevity, interruptability will be tested here by taking an adverbial free form as the interrupting element. If the interrupting element was a nominal constituent, the result provided by this test would not be different.

As mentioned earlier, the span of positions 4-18 cannot be interrupted by any type of free form. It does not matter whether the verbal free form is minimal, as in (16), or maximal, like in (17), no other free form can interrupt that string of positions. An example of the interruptability test is given in (19). The span of positions that goes from 6-10 can not be interrupted by the free form *nagi* 'now'.

(19) a. *so* *i-taʔa* *ajim* *i-kin-aʁan-aʁan* *ke-so*
2 3 6-7-8-10 20
DET$_2$ 1.POSS-father 1SG.PRON 3.II-greet-VM:INTR-VM:TR OBL-DET$_2$
qaɾ-piɾ

1PL.POSS-grandfather
'My father makes me greet my grandfather.' (mocCA160725: 01:11:22)

b. * *so* *i-taʔa* *ajim* *i-kin-**nagi**-aʁan-aʁan*
2 3 6-7-nagi-8-10
DET$_2$ 1.POSS-father 1SG.PRON 3.II-greet-now-VM:INTR-VM:TR

[5] I mark the position of large nominal constituents under the first element that corresponds to that constituent. In the case of (18), the first element of the nominal structure is the prefix *a-* 'F'.

ke-so *qaɾ-piɾ*
20
OBL-DET$_2$ 1PL.POSS-grandfather
'My father makes me greet my grandfather.' (Fieldnotes 2021)

c. *so* *i-taʔa* ***nagi*** *ajim* *i-kin-aɢan-aɢan*
2 3 6-7-8-10
DET$_2$ 1.POSS-father now 1SG.PRON 3.II-greet-VM:INTR-VM:TR
ke-so *qaɾ-piɾ*
20
OBL-DET$_2$ 1PL.POSS-grandfather
'My father makes me greet my grandfather now.' (Fieldnotes 2021)

It is quite frequent in natural discourse to find adverbial units placed before or after the verb structure formed by elements 4-18 (see, for instance, *naʔɢa* 'day' in (30) below). In the case of *nagi*, for example, it can occur relatively freely between other positions of the planar structure. It can occur before the P argument in position 3, as illustrated in (19c), or after position 18. In (20), for example, *nagi* occurs between two predicates occupying different positions of the planar structure.

(20) *... qaʔ* *s-kin-ɢan-tak* ***nagi*** *s-kin-tak* *na-ʔe*
1 6-7-10-12 2 6-7-12 19
LINK$_1$ 1.II-greet-VM:INTR-PROG now 1.II-greet-PROG DET$_3$-ʔe
qaja-ɾ-pi...

sibling-PL-COLL
'...thus, I'm greeting, now I'm greeting my siblings...'
(mocCA180709: 00:21:12)

It is not clear yet what pragmatic or semantic factors control the distribution of adverbial elements in the clause structure. No studies have explored this topic in detail yet, therefore further research is needed to gain a better understanding of the variable positioning of temporal elements in the language.

4.3 Subspan repetition

This test evaluates the subspans of the planar structure combined in specific constructions. The constructions analyzed here involve different types of clause linkage, including overt and non-overt clause linkers. The repeated sub-spans are defined according to the elements that have local scope and, therefore, must occur in each combined portion of the planar structure. Omitting elements with local scope can lead to changes in meaning and ungrammatical utterances. Similar the previously discussed tests, the conjunction of repeated subspans can also be divided into minimal and maximal subspans of positions.

4.3.1 Non-overt clause combination: span 6-7, 3-18 and 6-19

The maximal span of repeated elements needs to be devided further according to the grammatical person of the P argument. When the P argument corresponds to a third person, the repeated span is 6-19, as in (21). A combination of two predicates of this kind is employed to syntactically express caused events. Both predicates form a complex clause and are integrated by the joint function of *ajim* '1SG.PRON', which is usually not repeated with the second predicate of this type of clauses. This independent pronoun functions as P in the first clause, and as A in the second. There is no overt linker in the sentence and the logical sequence of events mirrors the linear occurrence of predicates.

(21)

ajim	***i**-laɾ*	***so***	***i-taʔa***	*s-alawat*	***a-so***	***waqaeʔ***
3	6-7	19		6-7	19	
1SG.PRON	3.II-order/send	DET$_2$	1SG.POSS-father	1.II-kill	F-DET$_2$	chicken

'My dad ordered me to kill the chicken.'
(Lit. My dad ordered me, I kill the chicken.) (mocCA191025: 01:05:21)

The other fracture of maximally repeated subspans is 3 to 18, which is only observed when the P argument corresponds to first or second-person. Elements within this subspan of positions do not display wide scope and they are repeated in the syntactically combined subspans. I do not have examples that illustrate all the positions of the subspan 3 to 18, but finding examples in which individual elements within that span can be repeated is not hard. For the sake of brevity, here I only provide three examples that support this argument. I focus on examples that illustrate the edges 3 and 18, which delimit the maximal repeated subspan, and one example illustrating an itermediate subspan of repeated positions.

The left edge of the subspan 3-18 is illustrated in (22). As shown in this example, the independent pronoun *qamiɾ* '2SG.PRON' in position 3 must occur in each of the combined clauses and commonly precedes two-place predicates (or any minimal and maximal free form with a core element of that valence, see §4.1). If, for instance, the independent pronoun does not occur in the second clause, that event would naturally entail a third-person P argument, which commonly follows two-place predicates (cf. (21) above).

(22) ... ***qamiɾ*** *s-alawat-q* ***qamiɾ*** *s-ʔgin-q...*
3 6-7-11 3 6-7-11
2SG.PRON 1.II-kill-1.II.PL 2SG.PRON 1.II-kill-1.II.PL
'... we are going to kill you and we are going to eat you...'
(mocCA191025: 00:38:35)

Other elements can be added to the right side of the core element and they also show local scope. This is the case, fro example, of the directional *-ɲi*, which repeats in each subspan of (23). Note that the element in position 2 can be omitted but all the other elements of the combined predicates are obligatory to have grammatical clauses.

(23) ... *so* *peget* ***n****-ah-****ɲi*** ***ɾ****-amoɢoja-****ɲi***
2 6-7-15 6-7-15
DET$_2$ plate 3.III-fall-DIR:DOWN 3.II-get.broken-DIR:DOWN
'The plate fall and broke in many parts.' (mocCA170803: 08:52:00)

The right edge of the maximally repeated subspan is delimited by the element in position 18. As shown in (24), the enclitic *=oʔ* repeats in each of these combined predicates, which also indicates the local scope of this element.

(24) ... ***n****-owiɾ-ta=****oʔ*** ***ɾ****-pil-ta=****oʔ****...*
6-7-12=18 6-7-12=18
3.III-come-DUR=EVID/TPRL? 3.II-come.back-DUR=EVID/TPRL?
'...she then came and went back (just like that)...'
(mocCA191010_1: 00:14:22)

Finally, the minimal repeated subspan of positions is 6-7. This type of subspan is found in a lexical causative construction, as in (25).

(25) *jim* *s-tʃiko* *qaʔen*
2 6-7 6.7
1SG.PRON 1.II-be/get.sad make.3
'She/He made me sad.'
'Lit: I am sad, She/He makes (it).' (mocCA160705: 00:53:15)

Both predicates only include one core argument each and they are obligatory elements with local scope. Syntactically, the first predicate expresses the causee argument via the bound person form *s-*, whereas the second predicate expresses the causer argument via the suppletive verb form of 'make'.

4.3.2 Overt clause combination: span 6-14 and 6-19

Clause combination by overt linking elements also identify maximal and minimal subspans of repeated positions. The precise number and function of clause linkers has yet to be studied for the different Mocoví variants, but see Grondona (1998: 170–175) and Gualdieri (1998: 109–113) for some preliminary information about clause linkers in Southern Chaco Mocoví. Here I focus on two clause linkers, *kan* and *nakoʔ*, present in Northern Chaco Mocoví. These linkers are similar in form to some of the clause linkers found in Southern Chaco Mocoví.

The clause linker *kan*, which can be translated as ‘and then’, identifies the span of positions 6-19, as in (26). This span of positions represents the maximal number of repeated elements, which are linked by *kan*.

(26) … *n-atʃel=oʔ* *ʔa:lo* *kan* *i-ʔwe-lek=oʔ*
6-7=18 19 1 6-7-15=18
3.III-shower-EVID/TPRL? woman LINK$_2$ 3.II-mount-LOC$_1$-EVID/TPRL?
so *l-lo…*
19
DET$_2$ 3.POSS-POSS.CLF
‘… the woman showered herself and mounted her animal (horse)…’
(mocCA180807: 00:04:51)

Note that elements in position 19 differ in their syntactic function. Both predicates share the participant *ʔa:lo* ‘woman’, which expresses the S argument for the predicate *natʃeloʔ* and A for the predicate *iʔwelekoʔ*. On the other hand, the participant *so lalo* ‘his/her animal’ in position 19 after the second predicate corresponds to the argument P.

A minimal span of repeated positions is 6-14, but this subspan is linked by *nakoʔ*. Like (26), the combination of clauses in (27) deals with a same subject construction. Each predicate requires its own bound person form *n-* and the reciprocal marker *-taʔ*. Both of these elements have a local scope restricted to each predicate.

(27) *n-wiɾ-taʔ* *nakoʔ* *n-qaʔal-taʔ*
6-7-14 1 6-7-14
3.III-come-RECP LINK$_1$ 3.III-hug-RECP
‘They met each other and hug each other.’ (mocCA191017_2: 00:35:19)

Like asyndetic clause combination, we could have expected that predicates having just a distance of one between their elements, e.g., 6-7, can naturally be overtly linked. I have not tested that possible combination yet, thus, further research is needed.

4.4 (Non)-permutability: span 4-18 and 4-15

This test explores the extent to which elements overlapping with the core element in 7 can be flexibly ordered within the planar structure. Elements in the span of positions 4-18 have fixed positions, i.e., each element is assigned to a single unique position. However, some elements within that span of position have a flexible order, which is constrained by verb types. Thus, I fracture this test according to such internal organization of elements. First, I show the rigid positioning of elements, and then turn to the examples where permutability of affixes is observed.

The non-permutability of elements can be observed on both sides of the core element in position 7. On the left side, for example, the negative marker *sV-* and the third-person bound form *i-* in (28a) cannot switch positions. The reverse order of these elements produces an ungrammatical sentence, as in (28b). Furthermore, I did not document examples in which the negative marker nor the third-person bound forms are placed somewhere else within the planar structure.

(28) a. … *si-i-aʔden* *mi*$_{sp}$ *pensamiento*$_{sp}$…
4-6-7 19
NEG-3.II-know my thought
'…he doesn't know my thought…' (mocCA191025: 00:32:33)

b. * *i-s-aʔden* *mi*$_{sp}$ *pensamiento*$_{sp}$
6-4-7 19
3.II-NEG-know my thought
'he doesn't know my thought.'

On the right side, all elements up to position 18 have a rigid order as well. This can be observed by looking at different subspans including the core element in addition to other positions; see, for instance, the positions of the progressive marker *-teg* and the reciprocal marker *-taʔ* in (29a). These two elements cannot occur in any other order or position within the verb structure. Thus, the progressive must precede the reciprocal and the reverse order produces an ungrammatical clause, as in (29b).

(29) a. *n-me:n-**teg-taʔ*** *na* *l-owen-ek*
6-7-12-14 19
3.III-exchange-PROG-RECP DET3 3.POSS-property-M
'They are exchanging their belongings.' (mocCA191017: 00:44:56)

b. **n-me:n-**taʔ-teg*** *na* *l-owen-ek*
6-7-14-12 19
3.III-exchange-PROG-RECP DET3 3.POSS-property-M
'They are exchanging their belongings.'

Similarly, the non-permutable property of elements is observed up to the enclitic *=oʔ* 'TPRL/EVID?'. Here I focus on this latter element, which indicates the edge of the larger spans 4-18. This element occupies the final position of the predicate, like other examples analyzed before (e.g., (18), (24), and (26)), and it is not found in any other position within the verbal planar structure. The marker *=oʔ* is analyzed as an enclitic, as it is one of the two elements in Mocoví's grammar, showing a great deal of flexibility to combine with different hosts, e.g., nouns, verbs and noun-like units (see Juárez 2022a for a recent analysis of this suffix in Northern Chaco Mocoví). Regardless of the host, the enclitic occurs always to the right end of the host constituent. Its meaning, however, expresses a fuzzy notion linking the domains of evidentiality and temporality. For example, in (30) *=oʔ* is related to the temporal domain, as the enclitic indicates that events occurred in a remote time compared to the moment of speech.

(30) *... so* *tapiɲik* *i-waɢan-git=**oʔ*** *naʔɢa* *qopaq* *so*
2 6-7-15-18 19
DET2 armadillo 3.II-hit-LOC3-EVID/TPRL? day three DET2
l-ja:le-qa...

3.POSS-descendent-PL
'...the armadillo hit his sons against the tree...' (mocCA191025: 00:17:21)

The main fracture of this test is motivated by elements in position 15, which display permutability properties and delimit the subspan 4-15. A property that distinguishes this fracture is that one can observe the flexible order of elements by comparing the behaviour of the same element with different types of predicates and other elements. Let us consider the suffix *-a*, one of the multiple forms of the transitivizer *-aʔa*, *-aʔ*. This element shows a range of functions. With intransitive predicates, it increases the verb valency by one, like an applicative, adding a P argument. The semantic role of the added argument varies, including

LOCATION, GOAL, INSTRUMENT, etc. With transitive predicates, the transitivizer appears to indicate that the verb base is transitive and does not increase the verb valence. In these two contexts, the common denominator is a broad notion of transitivity.

The transitivizer can occupy two different positions and combine with, at least, two grammatically different suffixes, directionals and locatives. One position is illustrated in the contrast of (31). Here the suffix *-a* occurs next to the root, preceding the locative *-lek*, as in (31b). While *-a* entails the presence of another argument, *-lek* indicates the path of the movement, which in English can be rendered as ‘over’.[6]

(31) a. *jim* *ɲ-noɾ-ʃigem*
2 6-7-15
1SG.PRON 1.III-jump-DIR:UP
‘I jump (in the same place).’ (mocCA120626: 01:18:21)

b. *ajim* *s-not-**a**-lek* *so* *n-po-ɢan-ɢat*
2 6-7-15-15 19
1SG.PRON 1.II-jump-TRVZ-LOC$_1$ DET$_2$ POSS.IND-close-VM:INTR-INS
‘I jumped over the fence.’ (mocCA120626: 01:20:16)

The other possible position that *-a* can occupy is after the directional *-ʃigem*, as in the contrast of (32). The specific function of *-a* in these examples is not easy to delimit. It indicates, on the one hand, the end point of the climbing event, as noted in the translation, but, on the other hand, also increases the transitivity of the clause. Note that the nominal phrase *so qopaq* ‘the tree’ can no longer receive the oblique marking *ke-*, as in (32b).

(32) a. *qamiɾ* *k-ir-ʃigem* *ke-na* *qopaq*
2 7-11-15 20
2SG.PRON move-2SG.II-DIR:UP OBL-DET$_3$ tree
‘You climbed the tree.’ (mocCA120717: 00:36:28)

b. *qamiɾ* *k-iɾ-ʃigem-**a*** *so* *qopaq*
2 7-11-15-15 19
2SG.PRON move-2SG.II-DIR:UP-TRVZ DET$_2$ tree
‘You climbed to the top of the three.’ (mocCA120717: 00:37:45)

[6]I analyze *-a* as an instance of the transitivizer rather than as an epenthetic vowel. This vowel here does not follow any of the vowel insertion rules described for Mocoví and is coincidentally the same vowel that occurs in other contexts, where *-a* clearly adds a P argument.

As shown in these previous examples, the two possible orders of the transitivizer are found with (i) two different predicates and (ii) two different suffixes, i.e., a locative marker in (31b) and a directional in (32b). It is not clear yet whether the predicate or each of these suffixes constraint the position of the transitivizer element. What is empirically observable, nevertheless, is that the relative order of the transitivizer is not possible with the same predicate. Thus, only one position is possible for the transitivizer depending on those two internal variables, predicate and locative/directional types.

Other elements with a variable order are also found on the right side of the core element. This is the case for the locative *-gi* and the directional *-ɲi*. The basic locative meaning of *-gi* can be rendered as 'inside', or 'the interior part of an object'. However, as shown in the following examples, the meaning of this element can be broader and less clearly related to its locative component. The meaning of *-ɲi*, on the other hand, can be translated as 'down', but this suffix also shows some idiosyncratic meanings with certain verbs. The two possible combinations of these suffixes are *-ɲi-gi* and *-gi-ɲi*. Each of these combinations, however, is linked to specific types of verbs, as both of them are not attested with the same predicate.

In (33), the suffixes *-gi* and *-ɲi* combine with the predicate *-tʃaq* 'cut'. Note that they can occur independently as the last segments of the verb structure, as in (33a) or (33b). The combination of both elements is also possible, but only in the order *-ɲi-gi*, as in (33c).[7] The reverse order is ungrammatical (33d).

(33) a. *i-tʃaq-**gi***
6-7-15
3.II-cut-LOC$_3$
'She/He cut it accidentally.' (mocCA210803_1: 00:34:32)

b. *i-tʃaq-**ɲi***
6-7-15
3.II-cut-DIR:DOWN
'She/He cut it deeply.' (mocCA210803_1: 00:35:12)

c. *i-tʃaq-**ɲi-gi***
6-7-15-15
3.II-cut-DIR:DOWN-LOC$_3$
'She/He fornicates with him/her.' (mocCA210803_1: 00:36:09)

[7]Note that the combination of these suffixes also changes the verb meaning. The locative and directional appear to describe metaphorically the denoted meaning. Thus, the event of fornication could be roughly described as the act of cutting somebody internally in a lower part of somebody's body.

d. * *i-tʃaq-**gi-ɲi***
6-7-15-15
3.II-cut-LOC3-DIR:DOWN
'She/He fornicates with him/her.' (mocCA210803_1: 00:36:42)

Although the sequence *-gi-ɲi* is ungrammatical with a verb like *-tʃaq* 'cut', it is possible with a verb like *iʔmaqata* 'feel good', as in (34). Like the example above, the suffixes can occur independently, as in (34a) or (34b), but also in combination (34c). The meanings that each of these suffixes convey with this predicate are not appropriately captured by the translation of these examples. These suffixes appear to serve as elements that help to describe the stative meaning of the verb root, but when they are combined, the verb meaning is modified, expressing a gradable reading that emphazises the root meaning similar to 'very' or 'really' in English.

(34) a. *i-ʔmaqata-**gi***
6-7-15
3.II-feel.good-LOC3
'She/He is happy, feels optimistic.' (Buckwalter 1995: 211)

b. *i-ʔmaqata-**ɲi***
6-7-15
3.II-feel.good-DIR:DOWN
'She/He is ready, gets better.' (Buckwalter 1995: 211)

c. *i-ʔmaqata-**gi-ɲi***
6-7-15-15
3.II-feel.good-LOC3-DIR:DOWN
'She/He feels really good.' (mocCA160711_3: 00:36:36)

I have not yet test whether the sequence *-ɲi-gi* is ungrammatical with this verb, but data suggest that such a sequence might not be possible. For instance, Buckwalter (1995) did not document the sequence *-ɲi-gi* with 'cut', although he listed other verb forms combined with locative and directionals. Also, the sequence *ɲi-gi* is not present in my corpus, including elicited and natural speech data.

4.5 Deviation from bi-uniqueness: span 6-7 and 6-18

Deviation from bi-uniqueness, i.e., a deviation from a one-to-one correspondence between form and meaning, is a common property of morphological and, to some extent, of lexical elements in Mocoví.

A common example of multiple forms related to one meaning is found in the third-person bound forms, e.g., *n-* (35a), *i-* (35b), *∅-* (35c) and *ɾ-* (35d) (examples are re-adapted from Juárez & Álvarez-González 2021: 322; see also Juárez 2013). These third-person bound forms are part of the Set I paradigm and the selection of almost all of these prefixes is lexically conditioned. Only the prefix *ɾ-* is conditioned by the transitivity of the base, as it occurs with intransitive predicates and is required for detransitivized verbs (see Juárez & Álvarez-González 2017). The multiple forms of the third person occur in position 6 and identify a minimal span of positions of two, 6-7.

(35) a. ***n**-esal*
6-7
3.I-vomit
'She/He vomits.' (mocCA110711: 00:10:29)

b. ***i**-ʔloɢol*
6-7
3.I-tremble
'She/He trembles.' (mocCA120716: 01:16:03)

c. *∅-qopat*
6-7
3.I-be.hungry
'She/He is hungry.' (mocCA120713: 00:03:48)

d. ***ɾ**-apil*
6-7
3.INTR.I-come.back
'She/He comes back.' (mocCA120711: 00:14:00)

Another example of deviation from bi-uniqueness is illustrated with the multiple forms of aspectual markers. As Gualdieri (1998: 246–255) noted for Southern Chaco Mocoví, aspectual markers show variation conditioned by the grammatical person of the subject or the object. Here I only focus on the progressive marking conditioned by the subject person, but readers are referred to Gualdieri's work for more details on this topic.

The progressive aspect in Northern Chaco Mocoví also shows two forms for one meaning, the suffixes *-tak* and *-sak*, as in (36). They identify a subspan of the planar structure that includes positions 6-12. The distribution of these two suffixes is as follows. The suffix *-tak* occurs when the A or S arguments are first (36a) or third person (36c), but *-sak* only occurs when A or S are a second person (36b).

(36) a. *s-keʔe-**tak***
6-7-12
1.II-eat_1-PROG
'I'm eating something.' (mocCA120706: 00:21:03)

b. *qamiɾ keʔe-i-**sak***
2 7-11-12
2SG.PRON eat_1-2.SG.II-PROG
'You are eating something.'/ 'Are you eating?'/ 'Eat.'
(mocCA120706: 00:22:43)

c. *so nogot-okiʔ ∅-keʔe-**tak** pan*
2 6-7-12
DET_2 adolescent-DIM.M 3.II-eat_1-PROG bread
'The child is eating bread.' (mocCA160726: 00:03:02)

Other elements also show deviation from bi-uniqueness and identify different subspans. Thus, the maximum subspan of positions defined according to this test is 6-18. As mentioned earlier, the tansitivizer in position 15 has multiple forms for different but semantically related meanings. Similarly, the enclitic *=oʔ* represents a single formative with fuzzy meanings related to temporal discourse and evidentiality.

4.6 (Non)-ciscategorial selection: span 7-11

Ciscategorial selection refers to elements that exclusively combine with one part of speech, e.g., nouns or verbs. In other words, we explore the extent to which elements of the planar structure are constrained by a specific part of speech. Some elements in the planar structure can be categorized as ciscategorial whereas other are transcategorial, which means that they occur with both verbs and nouns. The minimal/maximal fracture identifies the span overlapping the verb core that only contains verb-specific elements.

In this test, positions 7 to 10 represent both the minimal and maximal span of positions that only include ciscategorial elements. The reason for this analysis is that other positions preceding and following that subspan can include both ciscategorial and transcategorial elements. For example, on the left edge of such subspan, elements such as the negative and the subject defocusing markers in positions 4-5 do not occur with nouns. However, some bound person forms in position 6 can be categorized as transcategorial whereas others are clearly ciscategorial. Compare, for instance, the bound person forms from Table 3 and the possessive markers in Table 4.

Table 3: Bound person form paradigms in positions 6 and 11

Person & Number	Set I	Set II	Set III
1sg	*dʒ-*	*s-*	*ɲ-*
1pl	*qaɾ-*	*s-...-ɢ*	*ɲ-...-ɢ*
2sg	*ɾ-...-iɾ*	*-iɾ*	*n-...-iɾ*
2pl	*ɾ-...-i ~ɾ-...-iː*	*-i ~ -iː*	*n-...-i*
3	*i-*	*i-*	*n-*
	ɾ-	*ɾ-*	
	∅-	*∅-*	
	n-	*t-*	

Table 4: Northern Chaco Mocoví possessive paradigms

Person & Number	Inalienable		Alienable
1sg	*i-*		*ɲ-*
1pl	*qod-*	*qaɾ-*	*qan-*
2sg	*qad-...-iɾ*	*ɾ-...-iɾ*	*n-...-iɾ*
2pl	*qad-...-iː*	*ɾ-...-i*	*n-...-i*
3	*l-*		*n-*
indet	*n-*		

We have bound person prefixes that only occur with verbs in position 6, e.g., *r-* '3.intr' or *s-* '1.II', but other bound person forms are formally similar to nominal morphology. The prefix *i-* '3.II', for instance, is identical to the possessive marker *i-* '1sg.poss' in nouns like *i-komeena* 'my grandmother' and *i-taʔa* 'my father'. However, they clearly encode two different grammatical persons, i.e., third and first, and neither of them can be used to encode both nominal or verbal arguments. That is, the verbal *i-* cannot encode third-person possessor nor the nominal *i-* can encode first-person A or S. Thus, both of these elements are transcategorial and delimit the left edge of the transcategorial span.

Furthermore, note the paradigmatic similarity between the Set III and the alienable paradigm. These two paradigms only differ in the expression of the first-person plural. To illustrate the similarity between these two paradigms consider, for example, the uses of the prefix *n-*. It encodes a third-person S or A argument (37a) with verbs, but an undetermined possessor with some derived and non-derived nouns (37b). Semantically, these two meanings are not exactly identical, as they only share the third-person referentiality. There is no implication of an 'indeterminate' argument when *n-* is used with verbs.

(37) a. ***n***-*oɢon-ʃigem=oʔ* *so* *iːmek*
6-7-15-18 19
3.III-construct-DIR:UP=TPRL/EVID? DET$_2$ house
'She/He built the house.' (mocCA120706: 01:01:57)

b. *na* ***n***-*oʔwen-aɢa* *ʔwe* *ɾa* ***n***-*wag-aɢa*
DET$_3$ POSS.IND-work-NMLZ EXIST DET$_4$ POSS.IND-be.calm-NMLZ
'The field is quiet.' (mocCA120706: 01:17:55)

The right edge of the ciscategorial span is at position 10, because the person markers in 11 are transcategorial. Consider the bound person form *r-...-iɾ* in (38). The same marker encodes the second person possessor in (38a) and the S_P argument in (38b).[8]

(38) a. *wet-iɾ* *na* ***ɾ***-*aqaig*-***iɾ***
7-11 19
feel.pain-2.II DET$_3$ 2SG.POSS-head-2SG.POSS
'Does your head hurt?' or 'Your head hurts.'
(mocCA120626: 01:33:42)

b. *qamiɾ* ***ɾ***-*oqopat*-***iɾ***
2 6-7-11
2SG.PRON 2SG.I-be.hungry-2SG.I
'Are you hungry?' or 'Your are hungry.' (mocCA120713: 00:03:28)

After position 11, the planar structure includes ciscategorial and transcategorial elements. In positions 12-13 elements are only attested with verbs, however, the suffix *-taʔ* in position 14 represents another transcategorial element. This suffix occurs with both verbs and nouns. Its general meaning could be captured under the synchronic rubric of 'interaction among plural participants', a function that is cross-linguistically associated with pluractional constructions (Mattiola 2019: 21–40; see also Juárez 2022b: chap. 6). In the verbal domain, *-taʔ* is part of reciprocal constructions, as in (39b), whereas in the nominal domain, it simply indicates nominal plurality, as in (40b). However, this suffix is not obligatory.

[8]Northern Chaco Mocoví displays a split at the encoding of S arguments: S_A=A and S_P=P. The S_P=P alignment is, however, restricted to intransitive Speech Act Participants and P arguments in a transitive scenario such as 3 → SAP (see further details in Juárez 2013: chap.3).

(39) a. *so jale jim i-waɢan*
2 6-7
DET$_2$ man 1.SG.PRON 3.II-hit
'The man hit me.' (mocCA160725: 01:23:11)

b. *dʒi jale-ɾ n-waɢan-teg-**taʔ***
2 6-7-12-14
DET$_2$ man-PL 3.III-hit-PROG-RECP
'The men are hitting each other.' (mocCA191017_3: 00:37:59)

(40) a. *∅-ʔom na naʔɢa*
6-7 19
3.II-be.cold DET$_3$ day
'The day is cold.' (mocCA160712: 01:26:10)

b. *na naʔɢa-**taʔ** nagi n-ʔom-aɢa*
DET$_3$ day-PL now IND.POSS-be.cold-NMLZ
'These are the days of coldness.' (mocCA160712: 01:27:06)

Further down in the planar structure, elements in positions 15 and 16 have been identified only with verbs. Finally, elements in positions 17 and 18 are transcategorial. In a recent chapter, Juárez (2022a) showed the different nominal and verbal contexts in which these two elements occur, indicating that *=oʔ* is one of the most flexible elements in the language (in the sense of Bisang 2013, Van Lier & Rijkhoff 2013).

4.7 Morphosyntactic tests: interim results

Figure 3 summarizes the results of morphosyntactic tests applied to the planar structure. Like the phonological domain, tests do not identify a single and unique (sub)span of positions.

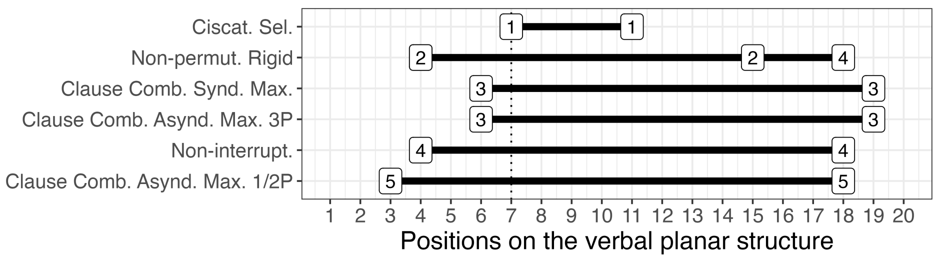


Figure 3: Results from morphosyntactic tests

We do find test results that overlap in selecting a subspan, 6-19 or 4-18, but not all the tests select the same span. Therefore, in this particular domain the emergence of a unique string of positions as a word is not clearly defined.

5 Major findings and implications

The main motivation of this chapter was to assess whether the category of "word" can be defined for Norhthern Chaco Mocoví. Building on the novel methodology for constituency delineated by Tallman (2020), I analyzed the verbal structure by testing properties of the phonological and morphosyntactic domains.

Figure 4, presents all the diagnostics applied in this work, organized by span size and color-coded for domains. Not all tests select the same span of positions, which indicates that a verbal word cannot be categorically recognized. There are, however, convergences between the minimally and maximally selected subspans as well as the edges of multiple tests. The span 6-7 aligns across diagnostics and domains. These two positions include essential elements of the verbal structure

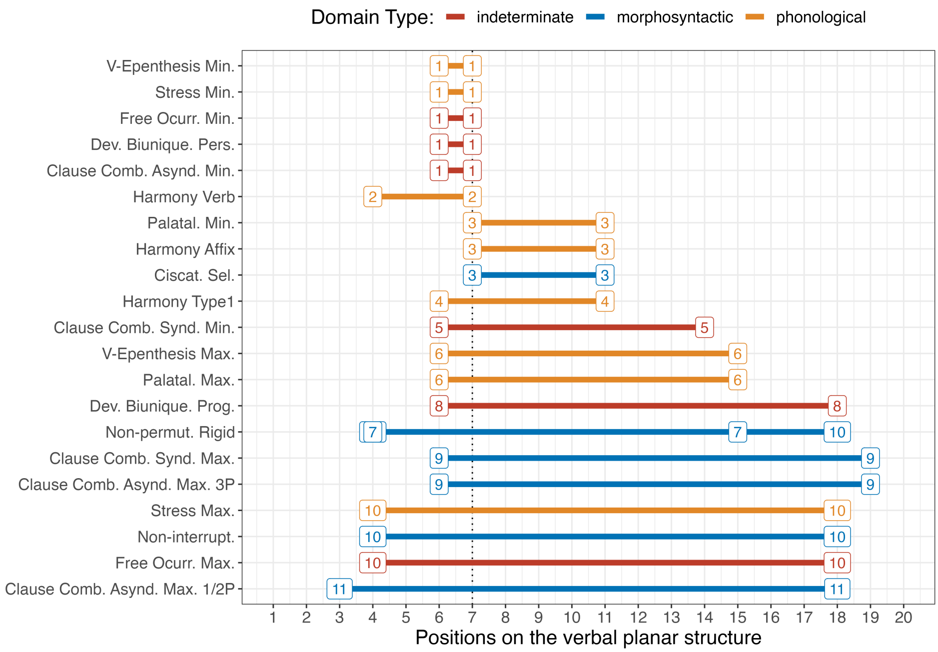


Figure 4: Results from phonological and morphosyntactic tests applied to Northern Chaco Mocoví

and discourse information (namely, who does what), as they include the verb root and one of the core arguments of the clause. The other subspans that are recurrently selected include 4-18 and 6-15, but they show less preference compared to the minimum subspan 6-7.

There are also recurrent positions that are taken as edges of different tests. For example, twelve diagnostics align in position 6 and six end at position 7 and 18. These results indicate a preference for specific limits that verbal constituents can reach and reinforce the presence of minimal and maximal ends of constituents.

If the notion of "word" would be understood as a gradient constituent, the minimally and maximally selected subspans, 6-7 and 4-18, can be interpreted as the best exemplars of such continuum, whereas the other subspans represent in-between instances of a word-like constituent.

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Abbreviations

sp	Spanish loanword	DET$_3$	determiner 3: coming, close
1	first person	DET$_4$	determiner 4: static, vertical
2	second person	DIM	diminutive
3	third person	DIR	directional
CLF	classifier	DOWN	downwards
COLL	collective	DUR	durative
DEF	definite	EVID	evidential
DES	desiderative	EXIST	existential
DET$_2$	determiner 2: going, far		

F	feminine	NEG	negative
I	set I bound person form	NMLZ	nominalizer
		OBL	oblique
II	set II bound person form	PL	plural
		POSS	possessive
III	set III bound person form	PROG	progressive
		PRON	independent pronoun
IND	indicative	RECP	reciprocal
INS	instrumental	SBJ	subject
INTR	intransitive	SG	singular
LINK_1	linker type 1	TPRL	temporal
LINK_2	linker type 2	TR	transitive
LOC_1	locative type 1	TRVZ	transitivizer
LOC_2	locative type 2	UP	upwards
LOC_3	locative type 3	VM	valence modifier
M	masculine		

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Chapter 17

Constituency and convergence in the Americas – Results and discussion

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This chapter provides a basic conceptual introduction to the planar-fractal method. The method is then contextualized with respect to multivariate typology. The structure of the database based on this method is then described and an illustration of what the database can be used for is also provided. Four issues related to contextualizing constituency in typological context are then assessed in relation to the data gathered in the current volume: (i) the index of synthesis; (ii) the absence of *a priori* wordhood tests; (iii) the relative reliability of wordhood tests; and (iv) the word bisection thesis.

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1 A synopsis of the planar-fractal method

The planar structure is a template over which constituency tests/domains can be coded (Tallman 2021b; Tallman 2024 [this volume]). It constitutes an attempt to apply the ideas of multivariate or distributional typology to the problem of constituency. The planar structure was developed order to assess the degree to which logically distinct constituency tests/domains align and/or nest with each other and explore how much typological variation there is in this regard.

The planar structure can be conceptualized as a template, built out of a "lumping" strategy (Good 2016), which means that the template is designed to describe aspects of linear stipulation over as many constructions as possible, or as a type of phrase structure grammar with constraints imposed on what types of non-terminal nodes are admissible (see Tallman 2024 [this volume]). We should point out that the device is not a "theory of grammar" in the sense of Chomsky (1965). It is a comparative concept used to study a very specific aspect of linguistic structure. In other words, it is a measuring device that could be constructed with different constraints and coding properties for different research questions (for example Good 2016). If we do not use a planar structure or some such measurement technology, we will not have any way of keeping track of when diagnostics align and when they do not.

The "fractal" aspect of the planar-fractal method runs off of the premise that constituency tests, stated in the abstract, can have ambiguous interpretations when applied to actual language data. When a constituency test is applied to a given language we cannot and do not apply the test *as is*. Rather, there is a process of abstraction and then reconcretization in the application of the "test" to a new system. We lift the test from its language specific context, making it abstract, and then add details to apply it to a new language, reconcretizing the test in the process. Every constituency test must be recycled in this fashion if it is to be applied beyond the context for which it was originally developed and used.

We note, for instance, that some span of structure which we call "words" cannot be interrupted by other elements we have already identified as words in some language, let's say English. We abstract away from this property and claim that "non-interruption" is a general diagnostic for the identification of "words." But non-interruption by what? Surely we cannot use words of English to test whether a given span of structure in Hup is a "word" based on non-interruption. So, we tackle the problem by reconcretizing the test, introducing or imputing a Hup–specific interrupting element into the equation. This involves an epistemic leap which might seem so trivial that it passes above conscious awareness.

It is in this reconcretization of recently abstractified "tests" where fracturing comes into play. The problem is that there is often more than one way in which a given constituency test can be reconcretized when it is applied to a new domain. This aspect of linguistic analysis can go unnoticed, especially when linguists are told to find specific categories or structures in novel data, but not told how one could possibly ever justify claiming that the category or structure is not present in a linguistic system (see Tallman's (2024b [this volume]) for a discussion of basic linguistic theory). Therefore, we seek to develop a method that makes the reconcretization explicit and compels us to not discard competing interpretations surreptitiously as a consequence of cognitive biases (Ackermann 1985). If we apply the process repeatedly to more and more languages, we will find that our original "test" has expanded into a number of sub-types. We view this as an application of the autotypologizing method (Bickel & Nichols 2002, Witzlack-Makarevich et al. 2022) to the problem of constituency. The goal of the project is to articulate a taxonomy of domains organized hierarchically from their abstract to their more concrete instantiations. The typology is constructed to discern whether there is statistical order to the patterns we find with these domains in and across languages.

A planar structure can be defined as follows:

(1) Planar structure: a template of consecutively ordered positions from 1 to n. There is a planar structure for each part of speech which is open class. Each planar structure has at least one position for a core element. All other positions are for non-core elements.

Positions can be "fitted out" by core or non-core elements. But for a given planar structure there is at least one position for a given core element. The core element can be defined as follows:

(2) Core: A core is an open class element. Any sentence that is fit out by a planar structure needs to have an overt core element. For instance, a verbal planar structure will have one position for a verb core and all sentences that contain that type of core should be able to be mapped to that planar structure. The core functions as the semantic head (see Croft 2001: 241–280 and Croft 2022: 35–37) of a planar structure and the constructions that it can be fitted out by (see Tallman 2021b and Tallman 2024 [this volume] and Woodbury 2024 [this volume] for discussion).

For instance, a verbal planar structure will have a position for a verb core. A nominal planar structure will have a position for a noun core. If it is necessitated by the facts of the language, we can also add adjectival or adverbial planar structures. In the present volume, we have limited the scope of the study to verbal planar structures, although two chapters provide preliminary nominal planar structures (Epps 2024, Gutiérrez & Uchihara 2024 [this volume]).[1]

As stated above, a planar structure is composed of a number of POSITIONS. A position has a number, contains elements and is associated with a specific planar structure. Each position is either categorized as a slot or a zone. Slots and zones are defined below.

(3) SLOT: A position which can only be filled by one element at a time.

(4) ZONE: A position which can be filled by more than one element and the elements can occur in any order in the zone.

For expository purposes, we provide a simple planar structure below. We have placed a superscript ^{c} over the core elements of the planar structure. The position with a core is obligatorily filled.[2]

Table 1: Example planar structure

1	slot	a, b, h
2	slot	c
3	slot	d^c, e^c
4	zone	f, g
5	slot	h

In position 1, there are 3 elements (*a, b, h*). In this position, only one of these elements can occur for a given sentence. This means that *acdfh* is an admissible string according to the planar structure above, but *abcdfgh* or *ahcdfgh* is not. However, in position 4 the elements *f* and *g* can co-occurr and variably order. Thus, *acd**fg**h* and *acd**gf**h* are both admissible strings. Positions can be obligatorily or optionally filled (as with categories in a phrase structure grammar). Positions can be *open* or *closed* contingent on the presence of specific elements or whether a given position is filled. For instance, if we find that element *b* never co-occurs

[1]A given core might be fit out in more than one position. But there can be no positions which can contain the same part of the core in them. For instance, our planar structures are not allowed to have a position 3 and a position 5 both of which could output a core (e.g. a verb root). However, a planar structure could have a core which is composed of two pieces one of which occurs in position 3 and other in position 5. The reason for this restriction, as described in Tallman (2024 [this volume]), is to make the reporting of constituency tests more manageable.

[2]The reverse is not true. We cannot determine that a position is a core position because it must always be filled.

with *h*, we can add a stipulation that position 5 is closed if position 1 is filled with element *a*.

Note that there are two ways of describing the variable ordering of elements in a planar structure. If the variable ordering is *local* in the sense that there are no intervening elements between the elements that variably order, then a zone is posited, as with the elements *f* and *g* above. Zones of this type are useful for defining cases where affixes variably order with one another (Bickel et al. 2007) in a traditional "word" or where adverbs or particles variably order locally (without intervening elements) with one another as well.

If the elements variably order but *around* an element which displays a fixed order, then we simply place the relevant elements in more than one position as with the element *h* above. Allowing *h* to be in position 1 or position 5 means that we can have the order *hd* and *dh*. A typical example of this type of variable ordering is with noun phrases around a complex verb structure in so called non-configurational languages (Austin & Bresnan 1996). A subject NP, for instance, can be given a position on each side of a span of verbal elements.

Finally, we need to define an element.

(5) Element: an element is a morph (Haspelmath 2020), another planar structure or a well-defined subspan of a planar structure.

As a consequence, a nominal planar structure can be an element of a verbal planar structure, or some subspan of a nominal planar structure can be an element of a verbal planar structure, and vice versa. The ability to have elements which are planar structures themselves is necessary to make them practically useful: if this condition was not met, planar structures would not be finite due to recursion. In other words, we do not flatten out phrase structure without limit. While a planar-structure grammar imposes some hierarchical structure by allowing planar structures to embed within each other, notions such as"word" and "phrase" are prohibited.

With the planar structure in hand, we use autotypology as a research method in the application of constituency tests. Constituency tests can now be operationalized as variables which code spans over planar structures of specific languages (see Tallman 2024 [this volume] for more details).

2 Multivariate typology and the constituency variables

Autotypology as a method emerged in the early 2000s as part of the larger AUTOTYP research program, which aims at systematically analyzing variation in the languages of the world as well as explaining this variation both quantitatively and qualitatively (Bickel & Nichols 2002, Bickel et al. 2017, Witzlack-Makarevich et al. 2022). It has also been referred to as "Multivariate Typology" and "Distributional Typology" (Bickel 2015), although these labels could be seen as more appropriately describing a whole research agenda, rather than only a typological method. However, they share the same approach, so in the remainder of this chapter we will use the label Autotypology as cover term for the methodology and theory behind the AUTOTYP project.

Typological variables always involve a certain degree of abstraction and generalization from language-specific details. In most typological approaches, the variables as well as the possible values they can realize are determined *a priori*, usually based on tradition, theoretical assumptions, and convenience (for more details and examples see Witzlack-Makarevich et al. 2022: 632). Even approaches that try to circumvent the issues with categorization based on tradition and theory by relying on known variation and pilot studies still define the variables top-down. This is also the case for the two largest typological databases currently available, WALS (Dryer & Haspelmath 2013) and Grambank (Skirgård et al. 2023).

Autotypology differs from these more traditional typological approaches in that the variables and their values are developed in a bottom-up fashion and constantly adapted to capture the variation present in the data at hand. The idea behind this methodology is to invest in coding fine-grained variables that adequately account for the diversity of the world's languages and that can be used to investigate a variety of research questions across different theoretical frameworks. While initially more time-consuming than relying on pre-defined, aggregated variables, the methodology ensures that the resulting database can be expanded on and (re-)used by other researchers. In the following, we will describe the methodology and how it was used in developing the diagnostics of the constituency database. As in other frameworks, the starting point for developing variables in Autotypology is usually found in earlier typological studies or theoretical discussions relating to the research question. In the case of constituency, we can draw on a wealth of literature proposing or evaluating diagnostics for constituency and similarly for wordhood and phrasehood (see Tallman 2024 [this volume]). These starting point variables are not seen as static, but rather they are re-evaluated and adjusted with each new language being coded. One type of adjustment frequently encountered with constituency diagnostics is fracturing, that is, the splitting of a diagnostic into multiple diagnostics, driven by details from a language or linguistic system over which one is coding grammatical or phonologigcal properties.

A constituency variable is defined as follows, following Tallman 2021b:

> Constituency variable: … a generalization within or across constructions that targets or crucially refers to some subspan of a planar structure. A constituency test can only be applied in a given language if it is specific enough such that it refers to a *well-defined* subspan. A subspan is well-defined if it contains a single left-edge (e.g. position 3) and a single right-edge (e.g. position 8).

We start with constituency tests which are frequently found in the literature (displacement, interruption). The diagnostics as they are found in the literature typically require a great deal of refinement to meet the definition provided above. Therefore, much of the intellectual work in developing constituency variables amounts to operationalizing relatively vague heuristics from the morphology, phonology and syntax literature so that they can be applied consistently. This often involves making finer distinctions than what is found in the literature. For instance, non-interruption can be divided into different tests depending on what we choose as the interrupting element. The converse situation also arises. There are cases where the literature attests of apparently distinct diagnostics but, upon closer scrutiny, it is revealed that they are the same; they were just described or conceptualized as different, perhaps by different authors, perhaps in different languages. An example of this concerns the distinction between non-interruption in the morphology/wordhood literature and displacement in the syntax literature. The identity between diagnostics that are often described as if they were distinct becomes apparent when we assess whether convergences between diagnostics might be a spurious consequence of the way such diagnostics are formulated.

The formulation of a constituency test and the operationalization of these tests as variables often elicits protest from certain linguists. It has been claimed that some of the tests used in this study are (or might be) "junk" tests that should be discarded. The basis for such claims often rests on these specific tests not giving a clear result in favor of some or another syntactic model, theory or analysis.

This point is actually partially valid. Many of the constituency tests developed in this book might very well be "junk." However, the protest misses an important point about database construction, measurement, and their relationship to hypothesis testing (Ackermann 1985: 125–149). By coding a constituency test in a database we are not thereby claiming that the test necessarily identifies a constituent in any specific linguistic theory (let alone all theories). A linguist researching within a perspective whereby one of the coded tests is considered useless is free to discard the test and assess what the results show after they have subset the data so it only contains what they deem relevant. What the database allows, or better yet, compels the researcher to do, is to be consistent and explicit about exactly which data and tests are used. For instance, they cannot discard a test in one language and, at the same time, regard that test as an important piece of evidence in another.

The methodology addresses a concern that linguists might treat a test as reliable only insofar as it confirms a given prejudged analysis and that they discard it otherwise (Croft 2001, 2010, Haspelmath 2011, Tallman 2021a). We argue that constructing a database which samples tests independently of the researcher's analyses attenuates this problem. Another reason we think that the protest against junk tests misses the mark is that it presupposes that we know *a priori* which tests will result in interesting generalizations and which ones not. Further justifying this perspective is the fact that protests about junk tests are not consistent with each other. It turns out that one linguist's trash is another linguist's treasure, a point we return to in §6. Rather, in the perspective adopted in this volume, whether a test turns out to be junk for language description or cross-linguistic generalization is an empirical question. A junk test is just one for which no useful language-internal, nor cross-linguistic generalizations can be made. In order to know which tests are junk, we need to actually code them.

3 The structure of the database and use cases

The constituency tests and the planar structures are collected in an interlinked database designed with AUTOTYP principles in mind. AUTOTYP principles include modularity, autotypology (see §2), separation of definition and data files, and late aggregation (Witzlack-Makarevich et al. 2022). As mentioned above, AUTOTYP is a typological database that has been continuously developed over the past twenty-five years as part of a large-scale research program in order to address problems that have arisen from the creation of more traditional typological databases. One of these issues is the use of fixed, *a priori* categories determined by theoretical considerations, or simply by traditional usage, which often fail to adequately capture a phenomenon across a large and diverse set of languages. The application of the AUTOTYP principles also facilitates the later re-use and expansion of the database. Another design principle concerns the separation of information across multiple files which are linked together via a common, standardized identifier. This flexibility makes it possible to address a larger number of different questions with one data set. As such, these design principles integrate well with the approach taken in this volume. The constituency test results are coded in a bottom-up fashion and we want to make the data usable for future studies.

The workflow for gathering the data and collecting it in the database is illustrated in Figure 1. It starts with the elaboration of the planar structure by the language expert based on data collected through fieldwork and collaboration with speakers. The planar structure then serves as the basis for applying constituency diagnostics as described in §2. The results are then written up, including discussion of issues with the methodology or application of specific tests that came up during analysis. Finally, the results are entered into the constituency database for cross-linguistic comparison. Given how autotypology works, the structure of the database and the variables are informed by the language-specific analyses and vice versa. In practice, this means that the database and variables are adjusted to accommodate language-specific facts not previously considered, but also that the exact application of a test in a language can be refined or adjusted based on what we learn from other languages.

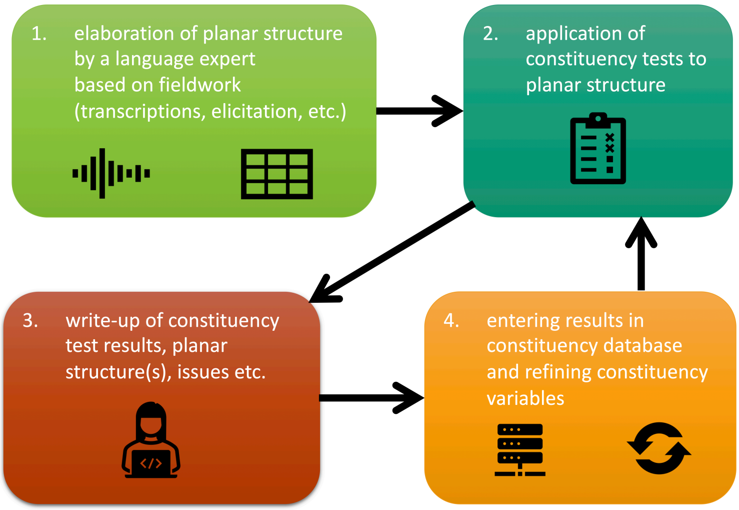

Figure 1: Schematic illustration of the workflow

The structure of the interlinked database is depicted in Figure 2. In the following, we discuss the modules and the variables in more detail, following the outline from left to right and top to bottom. The sources file contains bibliographic information and can be linked to the metadata file with the citekey. The metadata file contains information about languages and contributors, such as commonly used language names, Glottocodes (if available), geographic information, as well as contributor names and the form of the contribution. The planar structures are collected in the planar file, where each planar structure and each position within it receive a unique identifier. The positions are listed together with the position type (slot vs. zone) and the language-specific elements that can appear in each position. For analyzing convergences and other aspects of test domains, we need to know in which position the base of the planar structure occurs. This information is provided in the overlaps file, which can be linked to the planar file by the planar ID and to the other files by the language ID.

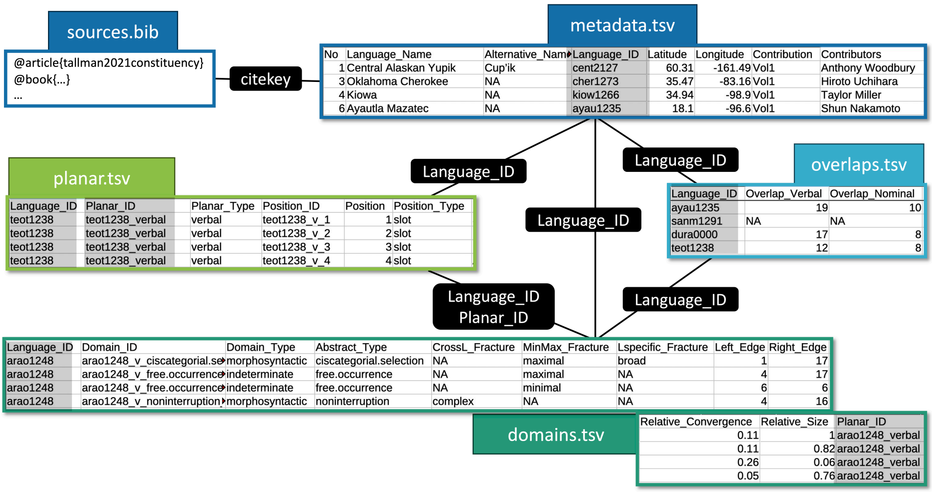

Figure 2: Illustration of the structure of the constituency database with file excerpts. Lines indicate which modules can be connected to each other. Black boxes show the unique identifier(s) that link(s) two modules together and the respective columns in the file excerpts are shaded in grey.

Finally, the test results are recorded in the domains file. This file can be linked to the other files via the language ID and additionally to the planar structure file with the planar ID. For each reported test in a language, we record the position indices that delimit the respective span, as well as information about the type of test applied and measures derived from it, such as span size and the number of other tests the span converges with in this language. Below, we briefly summarize the contents of this file:

(6) Domain Type: the linguistic level that the test applies to. Values:

   a. phonological: The test makes reference to phonological criteria. An example of this is a domain where vowel elision applies.

b. MORPHOSYNTACTIC: The test makes reference to morphosyntactic criteria. An example of this is a domain delimited by elements that are ciscategorial with the verb.

c. INDETERMINATE: The test can be interpreted as either making reference to phonology or morphosyntax or both. An example of this is free occurrence, as it could be seen as resulting from a phonological constraint or a morphosyntactic one.

(7) ABSTRACT TYPE: standardized classification of constituency tests into abstract classes. Values:

a. CISCATEGORIAL SELECTION: domains where the non-core elements are selectionally restricted to a specific core (e.g. verbal affixes which only combine with the verb);

b. DEVIATIONS: domains where elements display a specific type of deviation from biuniqueness (e.g. extended exponence);

c. FREE OCCURRENCE: domains that identify spans which are free forms;

d. NON-INTERRUPTABILITY: domains that cannot be interrupted by some element;

e. NON-PERMUTABILITY: domains which exhibit fixed ordering of elements;

f. SEGMENTAL: domains that undergo some segmental phonological process;

g. SUPRASEGMENTAL: domains defined by some suprasegmental phonological process;

h. REPAIR: domains that are identified by repair strategies;

i. PAUSING: domains that can be delineated by a pause;

j. PROFORM: domains that can be replaced by a proform;

k. PLAY LANGUAGE: tests that identify spans which are targeted in play language;

l. IDIOM: domains which contain elements that typically form idioms or non-compositional constructions.

(8) Fractures

a. CROSS-LINGUISTIC FRACTURE: a fracture that can be applied across languages with a standardized set of labels or a typological property that helps further subclassify an Abstract type. Such properties can be subtypes of phonological processes, for example, consonant and vowel deletion as fractures of a segmental domain. Our current data set contains 45 such fractures.

b. Language-specific fracture: a fracture that only applies within a specific language. Those fractures are thus not standardized. Our current data set contains 178 language-specific fractures;

c. Minimal-Maximal fracture: a fracture for the smallest and largest span where a test applies. Minimal-maximal fractures are those that always, by their definition, identify one inner and one outer domain where the former is embedded in the latter. For example, a maximal domain of 2-10, could identify a minimal domain that with a left edge which is the same or smaller than 2 and a right-edge which is the same or larger than 10. The fracture would not be coded in case the minimal and maximal fractures of the test give the same result;

(9) Other coded properties

a. (Right/Left) Edge: The boundary of the span, i.e the first and last positions where the test applies. This is recorded by the position number;

b. Size and Relative size: The size of the span in number of positions and the relative size of the span in number of positions divided the by the largest span identified by a constituency test in the respective language;

c. Convergence and Relative convergence: The number of other spans in the language that this span converges with. The relative convergence is the convergence number divided by the total number of tests applied in the language;

d. Largest: The largest span identified in a language;

e. Position total: The size of the planar structure in number of positions;

f. Tests total: The total number of tests applied in a language.

Due to the modular structure of the database it can be easily expanded upon in the future. The data collected in this volume are available on Zenodo as version 1.0 (Auderset & Tallman 2023), which also includes data from Chacobo (Tallman 2021b) and Siksika (Blackfoot) (Natalie Weber, p.c.) for which we do not yet have an accompanying paper.

The database is designed in such a way that it can be used for investigating a variety of research questions and for providing overviews and summaries regarding constituency. We provide a few examples relevant to the volume here. The sample languages are plotted on a map in Figure 3, which additionally displays the maximum relative convergence found in each language. The map shows that Cup'ik displays the highest relative convergence, while Chorote has the lowest one. It also shows that even languages spoken in the same geographical area, such as Hup and Yukuna, do not necessarily exhibit the same degree of convergence.

The database also allows one to compare layer sizes and convergences across languages. Figure 4 displays relative convergences versus relative span sizes and shows that there is great cross-linguistic variation in this domain. In terms of relative span size, most of the languages described here have spans of various sizes, ranging from targeting only one position to the whole planar structure, as in South Bolivian Quechua and Chorote. In others, the spans identified by the constituency diagnostics cluster around a few span sizes, as in Martinican, or are skewed to either relatively small spans, as in Kiowa, or relatively large spans, as in Oklahoma Cherokee. In terms of relative convergences, the languages also exhibit vast differences. In a few languages, a clear "winner" emerges, that is, a span that is identified by many diagnostics, while all other spans show no or very little convergences. This is the case for in Cup'ik, for example, where almost half of the diagnostics converge on a span with a relative size of 0.79 (covering 15 out of 19 positions of the planar structure). Martinican and Zenzontepec Chatino both have spans that are targeted by about a third of the diagnostics, but these are much smaller. In Zenzontepec Chatino, the span is has a relative size of 0.19 (covering 4 out of 21 positions) and in Martinican it is even smaller at 0.16 (covering 4 positions out of 25). Furthermore, in some languages, there are no strong convergences at all, as in Chácobo, Hup and Siksika (Blackfoot). These languages approach a situation where each test targets a different span.

The database can also be used to explore tendencies associated with certain test types across languages. Figure 5 displays the distribution of relative span size according to the type of constituency test. Many of the test types have similar bimodal distributions, with a larger peak targeting a smaller span and a smaller peak targeting a larger span. This reflects the minimum and maximum fractures of said tests. Deviations from biuniqueness, however, exhibit a different distribution: they overwhelmingly target small spans (with a peak around 0.15), with very few tests resulting in larger spans above 0.5. This could explain why deviations from biuniqueness are often seen as good wordhood tests – they capture almost exclusively small spans that can felicitously be interpreted as "words."

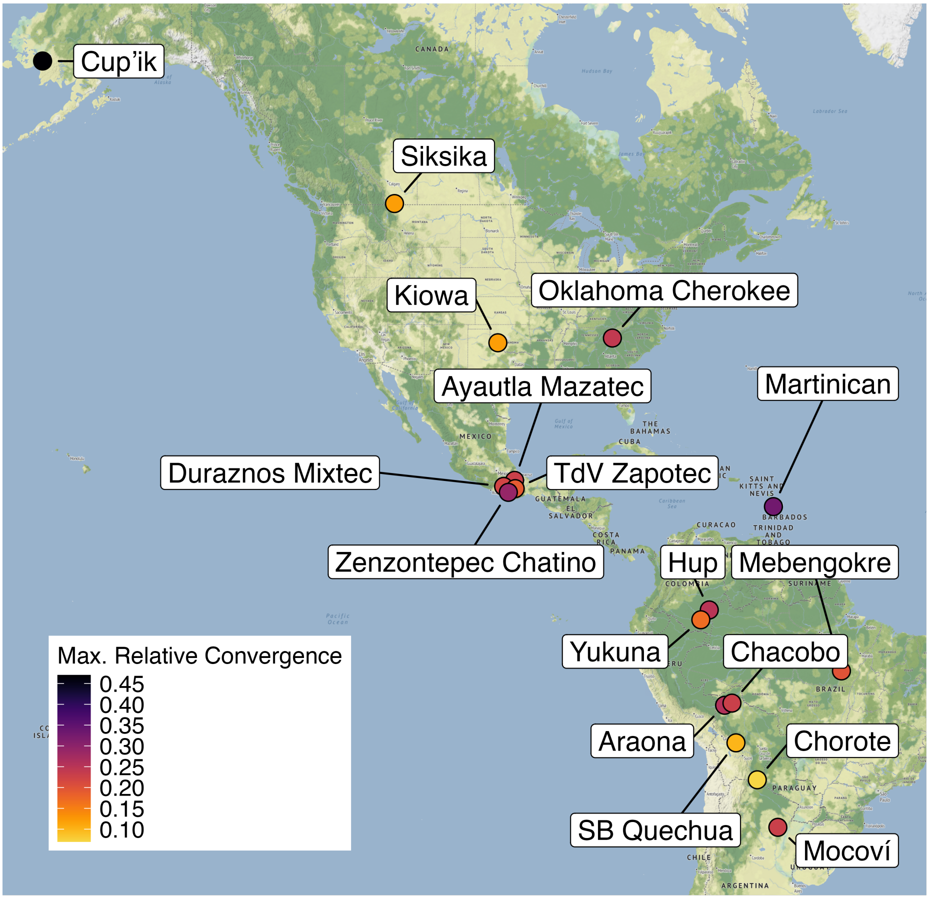

Figure 3: Location of the sample languages with maximum relative convergence (= the maximum number of test convergences per language divided by the total number of tests) represented as a color gradient.

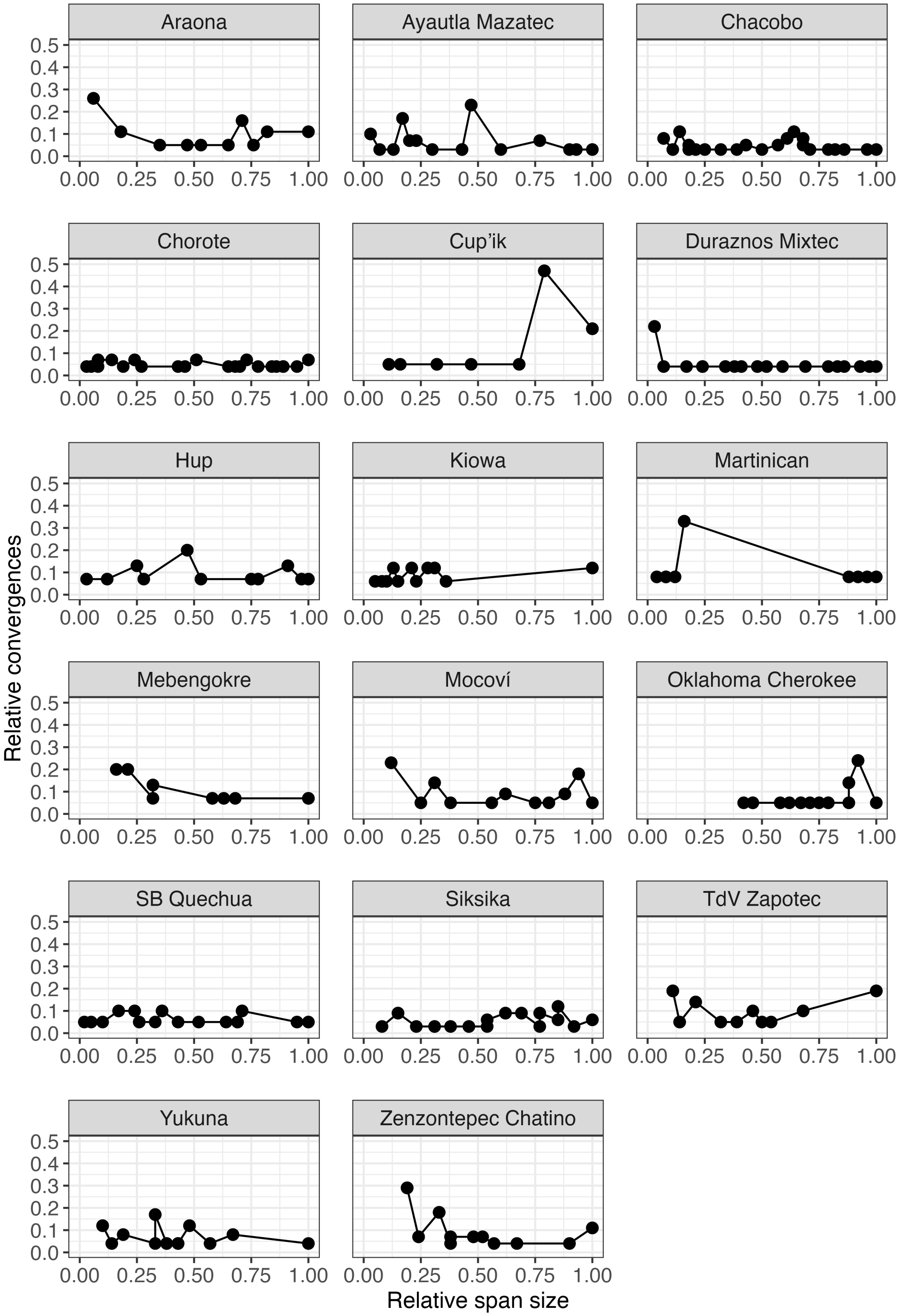

Figure 4: Visualization of relative convergences per relative span size across the languages of the sample in the verbal domain.

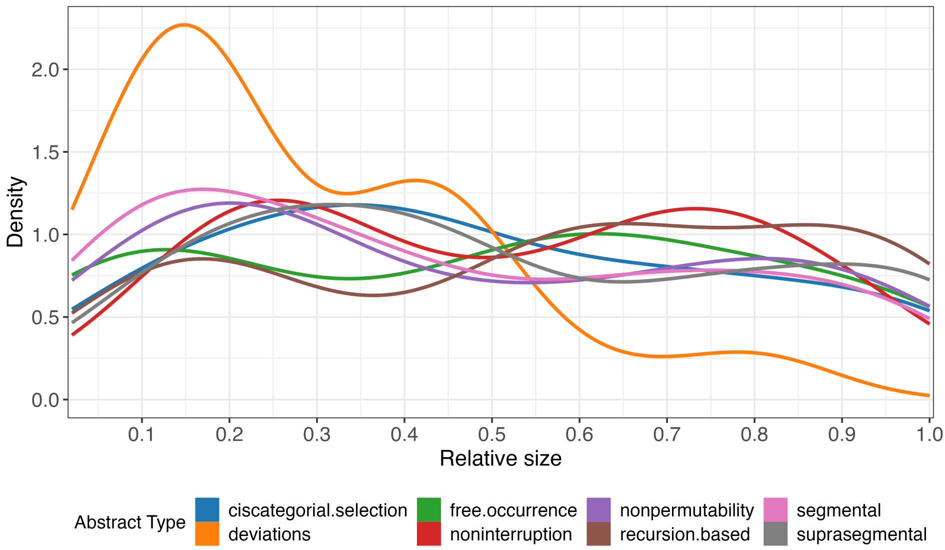

Figure 5: Density of relative size of spans by abstract type across sample languages

4 The index of synthesis reconsidered

Traditionally languages are described as varying in terms of their degree of synthesis. The degree of synthesis that a language displays refers roughly to its tendency to pack more or less concepts into a single word (Sapir 1921). For typological comparison the notion has been operationalized by counting the number of segmentable morphs that occur within each orthographically spaced out word on average over some text (Greenberg 1954, Easterday et al. 2021).[3] Such studies rely on orthographic words and they rest on the assumption that either orthographic words are legitimate units of comparison or are approximations to some unit of

[3]It is important to realize that the "number of segmentable morphs", once some criterion for morph segmentation is provided, is not the same as how "easily such morphs can be segmented". The former is most relevant for the analytic-synthetic distinction, while the latter speaks to the traditional distinction between agglutination and fusion. In an obvious sense, both clines are destabilized by the current study because they both make reference to the internal structure of words. We do not treat the agglutination-fusion cline in this chapter as it has already been shown to rely on empirically incorrect assumptions independent of its reliance on the notion of word Haspelmath (2009). We would also suggest that a metric of "exponence complexity" (Tallman & Auderset 2023) that measures deviations from biuniqueness across the grammar is more useful because it does not conflate distinct properties, as the traditional metric of fusion does.

comparison across languages. The analytic-synthetic continuum also forms an important aspect of describing variation and change in certain language families (e.g. Schwegler 1990, Ledgeway 2017 for Romance; Arcodia & Basciano 2020 for Sino-Tibetan).

The results of the language-specific studies in this volume highlight the fact that the synthetic status ascribed to a language can be contingent on which constituency tests are deemed to be appropriate wordhood diagnostics. There is no unified notion of synthesis, but a spectrum of different notions or candidates that may or may not align on their left and/or right edges in a given language.

Even in languages with a high degree of convergence it should be noted that not all diagnostics target what is traditionally considered a word. Clear examples come from Cup'ik and South Bolivian Quechua, which have both been described as polysynthetic languages in the literature. However, if we take the criterion of "conventionalized coherence" as definitional (Dixon & Aikhenvald 2002, Dixon 2010, Aikhenvald et al. 2020), both of the languages are much closer to being analytic. These languages contain pockets of word-like chunks or clusters within their traditionally defined words. This is not because linguists working with these languages have simply ignored wordhood criteria. On the contrary: free occurrence, non-interruption, phonological criteria such as stress, or syllabification all hit a domain of structure attached to the notion of"word" used by Inuit–Yupik–Unanganists and Quechuanists, respectively.

The observation that so-called polysynthetic languages have word-like pockets inside their grammatical words is not a theoretically innocuous observation: many morphologists and researchers in corpus linguistics propose that morphological structure emerges as a distinct component from syntax via "chunking." (Bybee 2001, 2010, Lorenz & Tizón-Couto 2019). This refers to a process whereby multiple pieces of structure are gradually reinterpreted as a single unit for processing and production, presumably on the basis of "conventionalized coherence."

If such a theory of morphological development and maintenance is maintained, then it follows that the traditional "word" in these languages is a phrasal (or post-word) constituent. But the convergences of wordhood tests around this domain still provide evidence for dichotomous structuring of some sort. Insisting that morphology is defined through conventionalized coherence does not result in the purported "morphological complexity" of polysynthetic languages disappearing but simply displaces it to a different terminological realm: we would now claim that many polysynthetic languages display dichotomous patterning in their "syntax."

Other languages pose even starker problems for the traditional analytic-synthetic distinction. It can be observed that in Chácobo, Duraznos Mixtec and Hup, a shift in perspective regarding which criterion we regard as defining the word can result in these languages being recategorized as isolating or (poly)synthetic. Put another way, these language could be classified as isolating or polysynthetic depending on which test is regarded as word-identifying. In both Chácobo and Hup, a focus on non-permutability (that is, contiguity or fixedness of order) and certain interpretations of non-interruption would result in the classification of these languages as isolating or at least highly analytic. If we shift our focus to free occurrence domains, the languages become (poly)synthetic, and the facts that were rallied to argue that they were isolating now become indicative of the languages displaying a "syntax-like" morphology (Payne 1990, Tallman & Epps 2020). Moreover it is too simplistic to claim that this is a difference between only two types of criteria: free occurrence vs. non-permutability or non-interruption. Mixtec is isolating or polysynthetic depending on how free occurrence is treated as a constituency test, the minimal fracture providing an isolating result and the maximal fracture providing a highly synthetic result. We are reminded of Boas' observation that in some languages (Tsimshian was his example) the division or combination of forms into separate or single words can be fairly arbitrary (Boas 1911: 28), but importantly languages may vary in terms of how arbitrary this division is (Boas 1911: 26; see Bazell 1953: 68 as well).

Claims about synthetic status usually make reference to morphological complexity (e.g. Easterday et al. 2021). But synthesis could also be discussed in terms of phonological domains – in terms of segmentable morphs per phonological word. This approach would run into the same problem, however, as there are competing definitions of the phonological word for many of the languages of the study. The notion of a phonological word is not unified in a single criterion either and so couching synthesis in terms of phonological integration does not necessarily simplify this notion.

These considerations do not mean that the analytic-synthetic notion should be abandoned for typological research, but rather that it should at least be refined. As a language has less and less converging wordhood criteria, the notion of synthesis becomes more complex and graded in that language. In this way, we could understand the index of synthesis as not only multidimensional (as it can be decomposed into a number of logically distinct variables) but as an index that interacts with other architectural properties of a language, as in how strongly the languages displays dichotomous patterning or how fuzzy the boundary between morphology and syntax is in the language (e.g. Tallman & Epps 2020 for this perspective).

5 No *a priori* wordhood tests

In a sense, the notion that there are wordhood tests presupposes that there are words to begin with (Lara 2004). If we claim that wordhood tests are not always picking out a unified notion of word, then what are these wordhood tests picking out? The apparent paradox is resolved once we recognize that words are a species of constituent which we assign special status because it represents a cut-off point between two different realms of structural organization. From this perspective it is somewhat misleading to even refer to "wordhood" tests as such. Rather, if the whole idea of a word is interesting because it indexes our belief that languages display some sort of modular[4] structure (with word-formation being distinct from phrase and sentence-level formation), then words emerge from patterns of structural groupings over utterances reoccurring over the domain, not from singular diagnostics applied in the abstract. From this perspective, there are reasons to think there should be no coherent notion of "wordhood test", as distinct from phrasehood test, at least not *a priori*.

The fact that there is no clear distinction between wordhood and phrasehood tests can be discerned in two ways. First, when we put formulations of wordhood and phrasehood tests side by side, we find that they are difficult to distinguish. Tallman (2024 [this volume]) gives the examples of non-interruption as a wordhood test versus displacement as a phrasehood test.

Another indication that constituency tests cannot be clearly grouped into wordhood and phrasehood tests arises when one considers that in numerous cases a diagnostic that hits a "word" according to its definition in one language (or linguistic tradition), hits a subword unit in the second language, and an apparently phrasal unit in a third. For instance, non-interruptability by a free form lines up with the traditional word in Cherokee (the orthographic word and what is considered to be a word by Iroquianists) (Uchihara 2024 [this volume]). The same is true of non-interruptability in Martinican (Duzerol 2024 [this volume]). The derivational prefix, the verb root and two pronominal indexes make up the orthographic word in Martinican as long as the pronominal indices are second or third person. However, if we take the way the word is described in Araona (and the Takanan tradition generally) the same interruption test identifies a subword unit, in fact, just the verb root, rather than the large polysynthetic structure described as

[4]Note that claiming that languages display modular structure does not entail that the modular structure is innate, nor that there are some fuzzy boundaries between domains. In cognitive science and biology generally it is well recognized that modularity is a matter of degree (Rasskin-Gutman 2005; Carruthers 2006: 14) and that it can be emergent (Coltheart 1999, Zerilli 2020).

a word by some linguists who have described the language (Pitman 1980, Emkow 2019). The converse problem is also attested. Non-interruption by a single free form identifies a span of structure *higher* (e.g. a phrase) than what Gutierrez & Uchihara argue is the best candidate for phonological word in Teotitlán del Valle Zapotec. Therefore, non-interruption by a single free form identifies a word, a subword or phrasal domain depending on the language. Should we still consider non-interruption a "wordhood test"? Another example is extended exponence. In Araona, extended exponence lines up with the traditional word, but in Central Alaskan Yup'ik, the same diagnostic identifies a subword constituent with respect to the traditional word of this language. Again, should extended exponence be identified with a word or a subword?

In the phonological domain these issues are so endemic that it is difficult to know where to start. Bickel et al. (2009) show that there is no overall tendency for phonological domains to cluster around a universal "prosodic word". Furthermore, once prosodic words are classified for the type of phonological generalization that defines them (e.g. rhythm, epenthesis etc.), there is no overall tendency for any specific phonological process to identify higher or lower domains, except for "stress", which shows a tendency to identify relatively higher domains (Schiering et al. 2012).

"Words" refer to boundaries between domains of different structural organization. But it is doubtful that a "wordhood test", abstracted from the rest of the structure of a language, is a useful starting point for typological investigation. Constituents, domains or groupings are a better starting point since they do not presuppose that we know *a priori* the properties of the modules we are interested in investigating, which may be subject to cross-linguistic variation.

6 Reliable and unreliable tests

6.1 Introduction

The literature on wordhood and constituency often implies that certain tests are better or more reliable than others. For instance, Dixon & Aikhenvald (2002) distinguish certain "main criteria" (cohesiveness, fixed order, conventionalized coherence). But the test of "isolatability", for example, only identifies words as a "tendency" (Dixon & Aikhenvald 2002: 25). Similarly, Payne (2006: 162) claims regarding coordination that it "can't be the major way of determining constituent structure", compared to the other constituency tests he discusses (Adger 2003: 125 and Carnie 2010: 21 for related claims).

Writers on these topics apparently do not agree with each other. Dixon & Aikhenvald (2002: 25) state that "the principle of uninterruptability … is only a tendency – which may apply more to phonological than to grammatical words – but can be a useful support for the other criteria." Bauer (2017: 17) has a discussion concerning "criteria involving structural integrity", which appears to be similar if not the same as non-interruption. He makes nearly the opposite claim regarding the reliability of this wordhood test: "The uninterruptability of the word is, in general terms, a much stronger criterion". Martinet (1962: 92) states "[a]s a matter of fact, inseparability is one of the most useful criteria for distinguishing what is formally one word from what is a succession of different words" (see Brown & Miller 1980: 164–165 as well). Booij (2005: 185-187) describes non-interruption as definitional of word constituents. Some of the apparent disagreement could be a result of authors interpreting the criteria in different ways[5], but the point remains that there is a re-occurring tendency to regard some tests as better or more reliable than others in some sense, yet it is unclear from the literature which ones should be regarded as more reliable.

It is worth asking on what basis such claims about the relative reliability of tests could be made. In the literature, the relative superiority of some tests over others is generally asserted without any justification. In some cases it is pointed out that a test is unreliable because it does not converge with a predefined or established constituency analysis (e.g. Payne 2006: 162, Carnie 2010: 21), which appears to be a circular argument. More charitably, what some of these researchers might mean is that unreliable tests are just those tests that are prone to not be applied correctly (presumably by linguists who are not as skilled at syntactic analysis as they are). Yet an articulation of the proper interpretation of a potentially unreliable test is never given, except insofar as it means "in line with my own theoretical expectations."[6]

[5]For instance, Dixon & Aikhenvald make a distinction between cohesiveness and non-interruption that the other authors do not make, to our knowledge. Non-interruption seems to also involve a pause, whereas "cohesiveness" is the more general term for any non-interruptable piece of structure. The ambiguity regarding how to interpret the diagnostics as they are formulated in the literature is perhaps one of the reasons why it appears so difficult to refute them. If one finds that a diagnostic is not working, one can be accused of misinterpreting it. Indeed as we have shown throughout the chapters of this volume, the diagnostics have multiple interpretations.

[6]In the context of coordination tests, Phillips states: "Traditionally, the results of movement tests have tended to be taken more seriously, and the results of other tests have been made to fit with these." (Phillips 1996: 27). As Phillips shows, one ends up with a quite distinct view of constituency structure if coordination is put on par with the other tests (see Osborne 2018 as well for relevant discussion).

In the context of the literature on word identification, we might speculate that the widespread sense that there are some tests which are better than others is based on how well a given test lines up with prescriptive orthographic conventions within some speech community. Given that prescriptive orthographic practices are socially constructed (not all languages/speech communities have them), it is not clear that they would correlate to the *same* degree with the *same* diagnostics cross-linguistically. Disagreements between linguists with respect to the reliability of some diagnostics together with the widespread feeling that some tests are better than others might be a reflection of the languages (or perhaps even constructions in languages) that these linguists are most familiar with and the degree to which the orthographic conventions of these languages line up with this or that diagnostic stated in literature.

We might, however, consider "convergence" to be a more empirically grounded, and perhaps theoretically grounded, way of assessing the relative reliability of tests. The convergence of logically distinct diagnostics has been used to justify categories such as "word" and "phrase" as valid linguistic units, as the quotations from Matthews (2002) and Levine (2017) below illustrate respectively.

For words:

> No criterion is either necessary or sufficient, as Bazell … made clear long ago. But they are relevant insofar as, in particular languages, they do tend to coincide. A form which is cohesive need not logically consist of elements whose order is fixed. (Matthews 2002: 276)

For phrasal constituents:

> The two phenomena which appeal to unithood must, in other words, be fundamentally independent. Normal methodological considerations then make it highly unlikely that the joint appeal to syntactic unithood from two independent sources envisioned here arose from coincidence. (Levine 2017: 13)

If we work our way backwards from such statements, then tests are reliable insofar as they tend to converge, because insofar as they tend to converge they are identifying (abstract?) constituents.

In what follows, we attempt to assess the relative reliability of certain tests by assessing the degree to which they converge with other tests in general. We report two findings: (i) there are some clear correlations between certain specific tests (e.g. free occurrence and segmental phonological processes); (ii) there is no overall tendency for any constituency test to be more reliable than another as judged by convergence. What this means is that for some tests, one can predict with some degree of accuracy what other tests they are more or less likely to converge with. However, for a given test one cannot say whether it is more likely to converge than any other test in general. Where possible, we point to some fairly straightforward functional motivations which have been pointed out in the literature. Overall the results suggest that edges ("junctures", "boundaries") might be a source of more meaningful generalizations as opposed to span-defined units such as "word" or "phrase".

6.2 Correlations between domains

Before presenting the results, some remarks regarding comparison are in order. The comparison of word/constituency tests cross-linguistically is complicated by a number of factors, two of which should be mentioned. First, we can compare constituency convergence in terms of convergence at individual edges of structure (e.g. left or right edge) or at both edges simultaneously. We will refer to the former as EDGE CONVERGENCE and the latter as SPAN CONVERGENCE. Secondly, constituency domains can be compared on different levels of abstraction. For instance, we could ask how well non-interruption, regardless of whether and how it is fractured into subtests, converges with domains related to accent/stress marking. If we wanted to get more granular we could ask how well non-interruption by a single free form converges with the minimal fracture of an accent-based domain. We will, therefore, be presenting results at different levels of abstraction corresponding to different levels in the taxonomic hierarchy of constituency tests that emerges from fracturing.

We exclude discussion of some test types that only have one example in our data set (e.g. "play language" in Zenzontepec Chatino).[7] We note that our results are preliminary as they only contain 463 test results from 17 languages. Furthermore, future research might involve applying and or further operationalizing more constituency domains which could change the results. We will also ignore fractures of recursion-based diagnostics such as those based on whether the marking is syndetic or asyndetic, or same or different subject clauses etc. This is done in order to simplify the discussion.

In what follows, we assess the relationships between individual domains using correlation matrices. Correlation matrices present the correlations between different tests. In order to present these correlations all variables are coded as binary variables. We use the Kendall rank correlation coefficient, referred to as

[7] This does not mean that we think this test is irrelevant. Rather, it means that future research is needed in order to compare the relevant domain cross-linguistically.

Kendall's tau, as our correlation metric. This metric measures the ordinal association between two variables. The meaning of a correlation metric in relation to constituency test convergence requires some commentary. Imagine that we have two tests, *x* and *y*. If *x* always converges with *y*, the correlation coefficient will be 1. If these tests never converge with one another, the correlation coefficient will be -1, which could be conceptualized as predictable divergence. If two tests have no tendency to either converge or diverge, the correlation coefficient will be 0. Constituency domains which tend to converge with one another will, therefore, show positive correlations. Note that two constituency tests can be non-convergent on their spans, but convergent on one of their edges.

The correlation plot in Figure 6 shows the correlations between tests in terms of span convergences. The correlation plot in Figure 7 provides correlations for left and right edges, respectively. These figures provide overviews of the tests coded by "Abstract Type." This means that the results pool fractures of constituency tests (e.g. minimal and maximal domains of free occurrence are coded together).[8]

Looking at spans as a whole, there are positive correlations and most of them are under 0.2, i.e. very weak. In fact, tests at an abstract level are more likely to be misaligned than not, since most correlations are negative. The strongest negative correlation, which is still considered moderate, is between recursion-based tests and suprasegmental domains (-0.23). When we consider span convergence, therefore, tests in the abstract are less likely to converge than not. When we look at edge convergences separately, cf. Figure 7, we see a different pattern.

The correlations become positive in the aggregate and statistically stronger when we consider edges by themselves. For left-edge convergence, there is a relatively strong correlation between non-interruption and non-permutability (0.54), followed by moderate correlations between free occurrence and non-interruption (0.41), and non-interruption and ciscategorial selection (0.36).

In general, the majority of test domains exhibit moderate or weak positive correlations with each other, especially those involving non-permutability. Deviations from biuniqueness, however, tend not to converge on left edges.

For right-edge convergence, the strongest positive correlations are found between free occurrence with segmental and suprasegmental processes (0.38, 0.28).

Domains defined by free occurrence tend to align more strongly than other domains on the right edge in general: we also see moderate correlations with ciscat-

[8] Abbreviations used in the figures: Deviations = "Deviations from biuniqueness"; Non-interrupt. = "Non-interruptability"; Non-permut. = "Non-permutability"; Free_occur. = "Free occurrence"; Selection = "Ciscategorial selection"; Segmental. = "Segmental phonological processes/domains"; Supraseg. = "Suprasegmental phonological processes/domains".

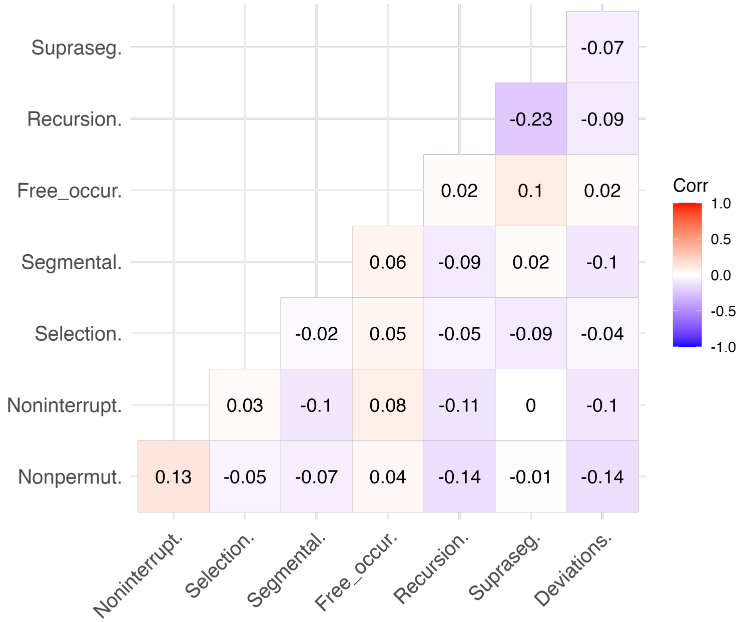

Figure 6: Correlations between test domains over the whole span by abstract type

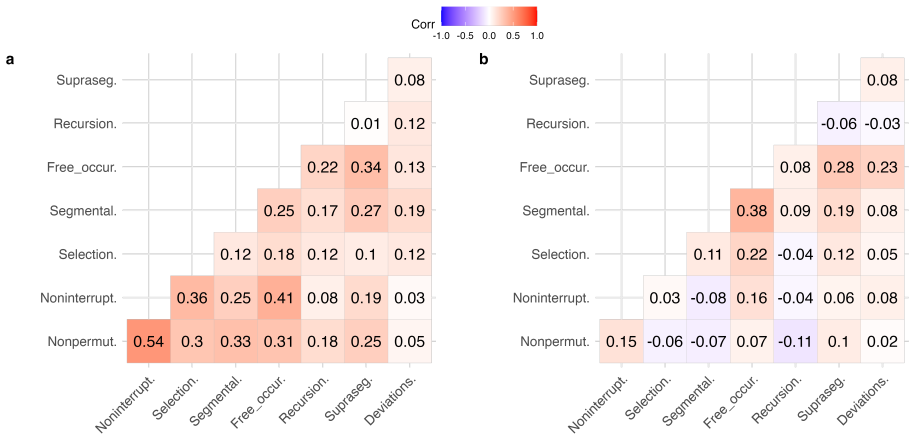

Figure 7: Correlations between test domains on the left (a) and right (b) edge by abstract type

egorial selection and deviations from biuniqueness. Segmental and suprasegmental processes are also weakly correlated with each other. On diachronic grounds, it is not surprising that suprasegmental and segmental processes should line up on an edge. The presence of a prominent syllable can result in segmental changes over time (Bybee et al. 1998), for instance, but prominent syllables are almost always attached to the edge of their domains.

The domains found in Figures 6–7 are perhaps too abstract to develop specific explanations. We consider more fine-grained domains next, taking into account domains fractured according to whether they are minimal or maximal, where this fraction is available. If not, we break apart tests by highly frequent cross-language fractures. In the case of non-interruption, the test is broken up into distinctions between simplex, complex, and multipositional interrupting elements. In the case of non-permutability, we break them apart according to whether the tests have scopal or non-scopal interpretations. Deviations of biuniqueness are not fractured at all, because there are no recurrent cross-language fractures nor minimal/maximal domains. All other tests are fractured across minimal and maximal domains.

Overall, correlations across spans are weak also when taking into account more specific fractures. There are a few moderate positive correlations (>0.2), all but one with minimal domains, as illustrated in Table 2. We can see that all but one of the test pairs involves a free occurrence test. The minimal free occurrence spans have a weak tendency to converge with minimal spans of segmental processes and recursion-based tests. Maximal free occurrence tests have a weak tendency to converge with non-interruption by a simplex form. Spans defined by non-interruption by a form that can variably order are weakly correlated with minimal spans defined by ciscategorial selection. The full table is found on Zenodo (Auderset & Tallman 2023).

Table 2: Pairwise correlations (Kendall's τ) between test domains over cross-language and minimal-maximal fractures across spans. Rows with weak or no correlations ($-0.2 \geq x \leq 0.2$) were excluded.

Test1	Test2	Correlation
Noninterrupt.simpl	FreeOccur.max	0.20
Noninterrupt.multipos	Selection.min	0.24
Recursion.min	FreeOccur.min	0.26
FreeOccur.min	Segmental.min	0.30

Once again, when we consider edge convergences, stronger relationships appear, as can be seen in Table 3. First, we observe that there are more meaningful and stronger convergences on the left edges than on the right edges, as was already the case when considering only abstract types as a whole. We also see that there are more convergences in minimal domains than maximal ones. Many of the minimal test domains target only the verb core and thus have a higher probability to converge than maximal spans, which mostly target spans larger than the verb core. There are no negative correlations below -0.2, that is, there is no general tendency to be misaligned when considering only edges.

Many of the stronger correlations involve the minimal domain of free occurrence, segmental and suprasegmental processes, often combined with non-permutability and non-interruption. Maximal domains overall tend to have lower convergences than minimal ones. A few chapters of this volume suggest that maximal domains might be more likely to indicate phrase-level structures (Gutiérrez & Uchihara 2024, Tallman 2024a). If convergences are more likely to hit edges of structural shift from morph to utterance (i.e. words), this difference between minimal and maximal domain convergence is potentially understandable.

Table 3: Pairwise correlations (Kendall's τ) between test domains over cross-language and minimal/maximal fractures on the left and right edges. Minimal domains are listed first, followed by maximal domains. Rows with weak or no correlations ($-0.2 \geq x \leq 0.2$) were excluded.

Test1	Test2	Corr.Left	Corr.Right
Noninterrupt.simpl	Noninterrupt.compl	0.06	0.20
Noninterrupt.simpl	Nonpermut.rigid	0.38	0.11
Noninterrupt.simpl	Selection.min	0.26	-0.08
Noninterrupt.simpl	Recursion.min	0.09	0.22
Noninterrupt.simpl	Deviations	0.23	0.04
Noninterrupt.simpl	Segmental.min	0.29	0.05
Noninterrupt.compl	Nonpermut.scopal	0.21	-0.06
Noninterrupt.compl	Recursion.min	0.46	0.05
Noninterrupt.compl	Segmental.min	0.21	0.06
Noninterrupt.compl	Supraseg.min	0.23	0.13
Noninterrupt.multipos	Selection.min	0.39	0.23
Nonpermut.rigid	Nonpermut.scopal	0.26	0.24
Nonpermut.rigid	Selection.min	0.20	0.11
Nonpermut.rigid	Supraseg.min	0.36	0.02
Selection.min	FreeOccur.min	0.26	0.36
Selection.min	Supraseg.min	0.24	0.11
Recursion.min	FreeOccur.min	0.31	0.29

Recursion.min	Segmental.min	0.30	0.12
Recursion.min	Supraseg.min	0.24	0
FreeOccur.min	Deviations	0.22	0.29
FreeOccur.min	Segmental.min	0.43	0.41
FreeOccur.min	Supraseg.min	0.37	0.23
Deviations	Segmental.min	0.38	0.13
Deviations	Supraseg.min	0.23	0.15
Segmental.min	Supraseg.min	0.36	0.23
Noninterrupt.simpl	Noninterrupt.compl	0.06	0.20
Noninterrupt.simpl	Nonpermut.rigid	0.38	0.11
Noninterrupt.simpl	FreeOccur.max	0.26	0.28
Noninterrupt.simpl	Deviations	0.23	0.04
Noninterrupt.simpl	Segmental.max	0.27	-0.01
Noninterrupt.compl	Nonpermut.scopal	0.21	-0.06
Noninterrupt.compl	FreeOccur.max	0.23	0.09
Noninterrupt.compl	Supraseg.max	0.23	0.13
Nonpermut.rigid	Nonpermut.scopal	0.26	0.24
Nonpermut.rigid	FreeOccur.max	0.52	0.01
Nonpermut.rigid	Supraseg.max	0.36	0.02
Nonpermut.scopal	FreeOccur.max	0.26	0.11
Selection.max	FreeOccur.max	0.25	0.13
FreeOccur.max	Supraseg.max	0.28	-0.05
Deviations	Supraseg.max	0.23	0.15
Segmental.max	Supraseg.max	0.30	-0.02

6.3 Predicting convergence

In this section we attempt to discern whether there is an overall tendency for some domains to converge more than others. First we need to discuss some metrics of convergence. One can discern the relative importance of domains based on how often they converge with other diagnostics. Each coded domain or test result can be coded with a an ABSOLUTE CONVERGENCE number. If a domain converges with no other tests in a language, its ABSOLUTE CONVERGENCE is 1. We assign each domain a RELATIVE CONVERGENCE METRIC by language. This takes the absolute convergence level and divides it by the total number of tests applied in a language. Thus a domain which converges with no other domains in a language for which 10 tests were applied has a relative convergence of 0.1. In a given language the relative convergence level is perhaps a more accurate metric of the convergence strength of a given test. The reason is that we expect overall convergence to increase as a matter of chance as the number of tests increases in a given language (Tallman 2021b).

Note that there are three types of absolute and relative convergence: span convergence, left-edge convergence and right-edge convergence.

Figure 8 provides density distributions showing span convergence (blue), right edge convergence (green) and left edge convergence (orange). The density distribution of span convergence is heavily skewed leftwards towards lower numbers. Most domains do not span-converge. Right edge convergence is less skewed to lower relative convergence values, and left edge convergence presents something approaching a uniform distribution (or else shows weakly distinguished bimodality).

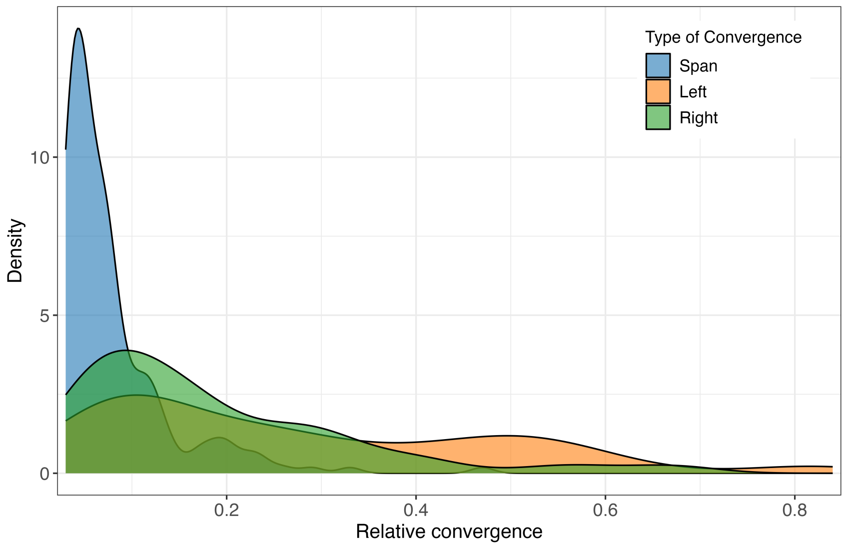

Figure 8: Density distributions of relative convergence at the right and left edge and the whole span across the sample languages.

One way we can discern whether certain domains are more convergent than others would be through comparing their distribution along relative convergence compared to the distribution of all the domains pooled. A more convergent test would exhibit a distribution more skewed to the right compared to the distributions of the domains as a whole. Figures 9 through 11 suggest that none of the tests are obviously more convergent than any others, as they all display distributions which are similarly left-skewed.

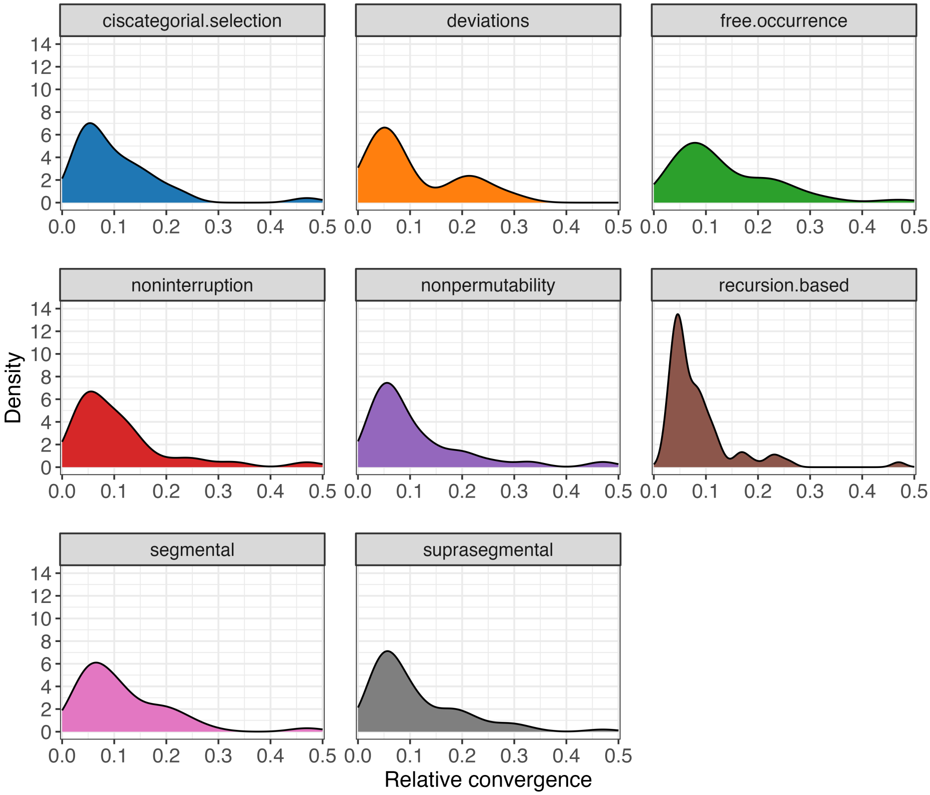

Figure 9: Density distributions of abstract types on relative span convergence in the verbal domain across sample languages. Types with fewer than 5 data points are excluded.

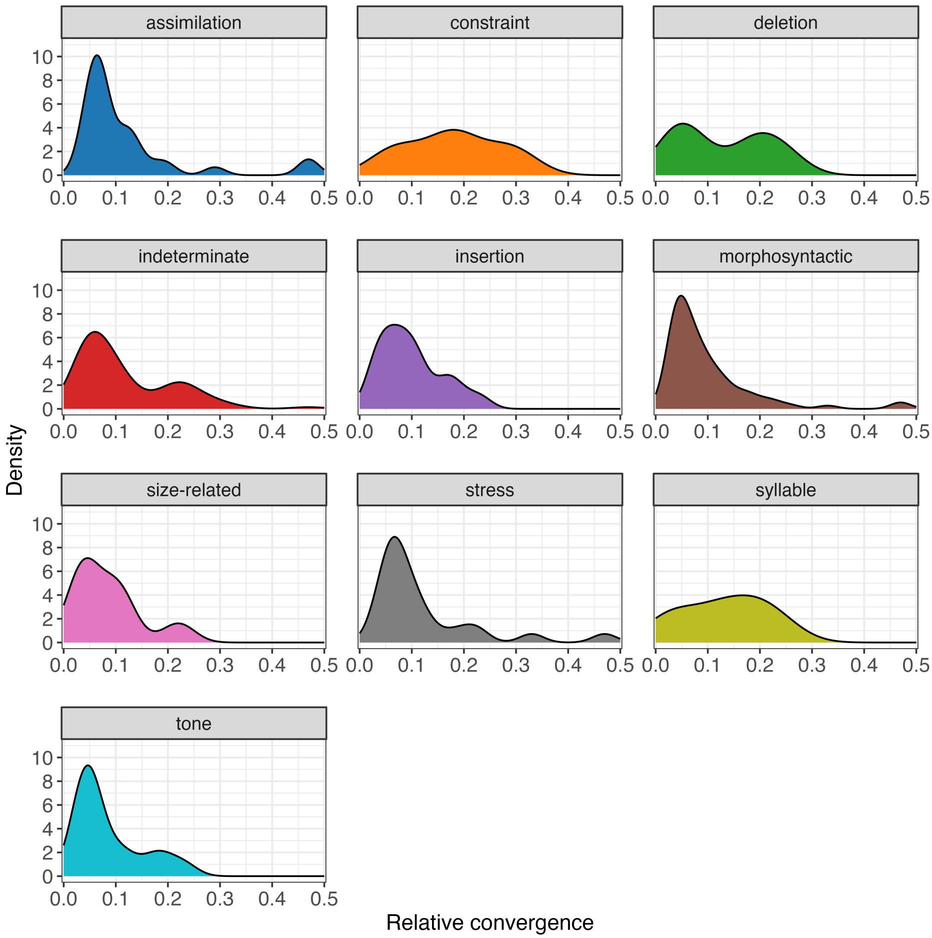

Figure 10: Density distributions of prosodic word domains inspired by the presentation in Bickel et al. (2009) for relative span convergence in the verbal domain across sample languages. Domains with fewer than 5 data points are excluded.

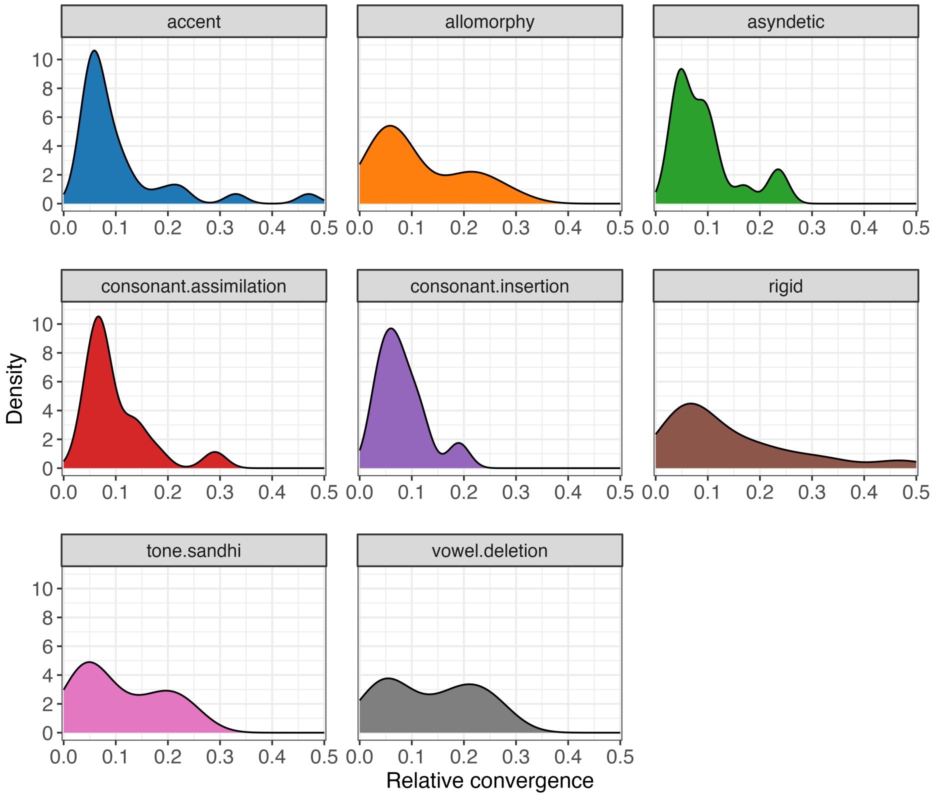

Figure 11: Density distributions of relative span convergence across cross-linguistic fractures with 10 or more tokens in the verbal domain across sample languages.

A statistical test of reliability might attempt to predict convergence level from the domain type. A more reliable domain should predict a higher convergence level than a less reliable one.

For span convergence a random forest was constructed in order to assess whether any of the domains might be good predictors of convergence level. A random forest model is a classification algorithm that aggregates over a multitude of decision trees. It is often used for variable selection and other classification tasks. It requires a dependent variable, which is the variable to be predicted, and predictor variables. We use absolute convergence as the dependent variable and the classification of different domains at all levels of abstraction as predictors. This includes abstract types, cross-language fractures, minimal and maximal domains, and the prosodic-word domain classifications. The model outputs error rates for each level of the dependent variables in a confusion matrix and an overall error rate for the model. However, the accuracy of the model should not be interpreted by itself. Rather it has to be interpreted against the baseline value in order to adjust for the skewness of the data. The baseline value can be understood as the accuracy value an RF would have it it simply chose the most frequent value for the dependent variable every time.

The random forest always predicts level 1 convergence for all domains. The baseline classification rate for the random forest is 0.409 and the accuracy is 0.411. This means that if all data points were classified as the most frequent category, the accuracy is roughly 40.9%. The random forest model outperforms the baseline by a negligible amount; its accuracy is at 41.1%. We do not interpret the model as significantly better than chance. As such constituency test classification does not appear to be an obvious predictor of convergence. If we can use convergence as a metric to rank constituency tests in terms of their reliability, then we currently do not have any good reason to think that any constituency tests are better than any others. Future research with a larger dataset, with new or differently defined constituency tests might provide evidence that some tests are superior to others, but we currently do not have strong empirical reasons to make such judgements.

7 The word bisection thesis

Another hypothesis that the data structures developed in this volume can test is the (empirical) word bisection thesis. Tallman (2024 [this volume]) notes that there are two versions of the word bisection thesis. The fiat-based word bisection thesis assumes that a universal distinction between morphosyntactic and phonological words can be maintained because diagnostics for the relevant constituents can be concocted. There is no sense in arguing against this claim because it has the status of a tautology. The empirical word bisection thesis is more interesting because it maintains that the relevant diagnostics tend to converge with one another to support the morphosyntactic versus phonological word dichotomy in language after language.

Tallman (2021b) attempts to test the empirical word bisection thesis with data from Chácobo. He shows that there are few convergences within morphosyntactic domains and within phonological domains. The paper attempts to articulate the word bisection thesis as a falsifiable hypothesis concerning the (mis)alignment of wordhood tests. Phonological and morphosyntactic tests may misalign with others, but morphosyntactic tests should tend to align with other morphosyntactic tests and phonological tests should tend to align with other phonological tests. Based on this methodology, convergence between tests is not meaningful by itself, however. As the number of tests increases, the probability that two or more tests align by chance increases. Some notion of "chance convergence" has to be constructed in order to assess an empirically contentful notion of the word bisection thesis. Hypotheses which are falsifiable in principle are not necessarily falsifiable in practice if methods cannot be designed to test them. Literature in the philosophy of science has emphasizes that scientific activity is not only narrowly concerned with theory construction, but also with designing experimental ideas, analytic techniques and new kinds of technologies that can be used to test (falsify) hypotheses (Hacking 1983: 214; Mayo 2018). Tallman (2021b) develops a methodology for calculating chance convergence between wordhood tests that relies on a simulated null distribution. The results suggest no support for the version of the word bisection hypothesis he constructs.

The constituency database allows us to give a first pass assessment of the word bisection hypothesis with more languages. Ideally, a method would also be used to construct chance probability, but we will leave that for future research. Here, we will present simpler metrics that can be derived from basic arithmetic. There are two main results from the current study that we wish to emphasize: (i) There is interesting language variation with respect to how strongly convergent word constituents are supported (see Figure 4 above). (ii) While there are some constituents that are strong word candidates for "word" in terms of convergence, cases where morphosyntactic *and* phonological words appear to be motivated based on convergence are less common and/or less obvious.

Figure 12 displays the relative convergence levels for phonological tests. Each panel displays a nominal or verbal planar structure in a given language of the sample. The y-axis shows the absolute number of convergences per relative span size, which is represented on the x-axis. We can give a preliminary assessment of

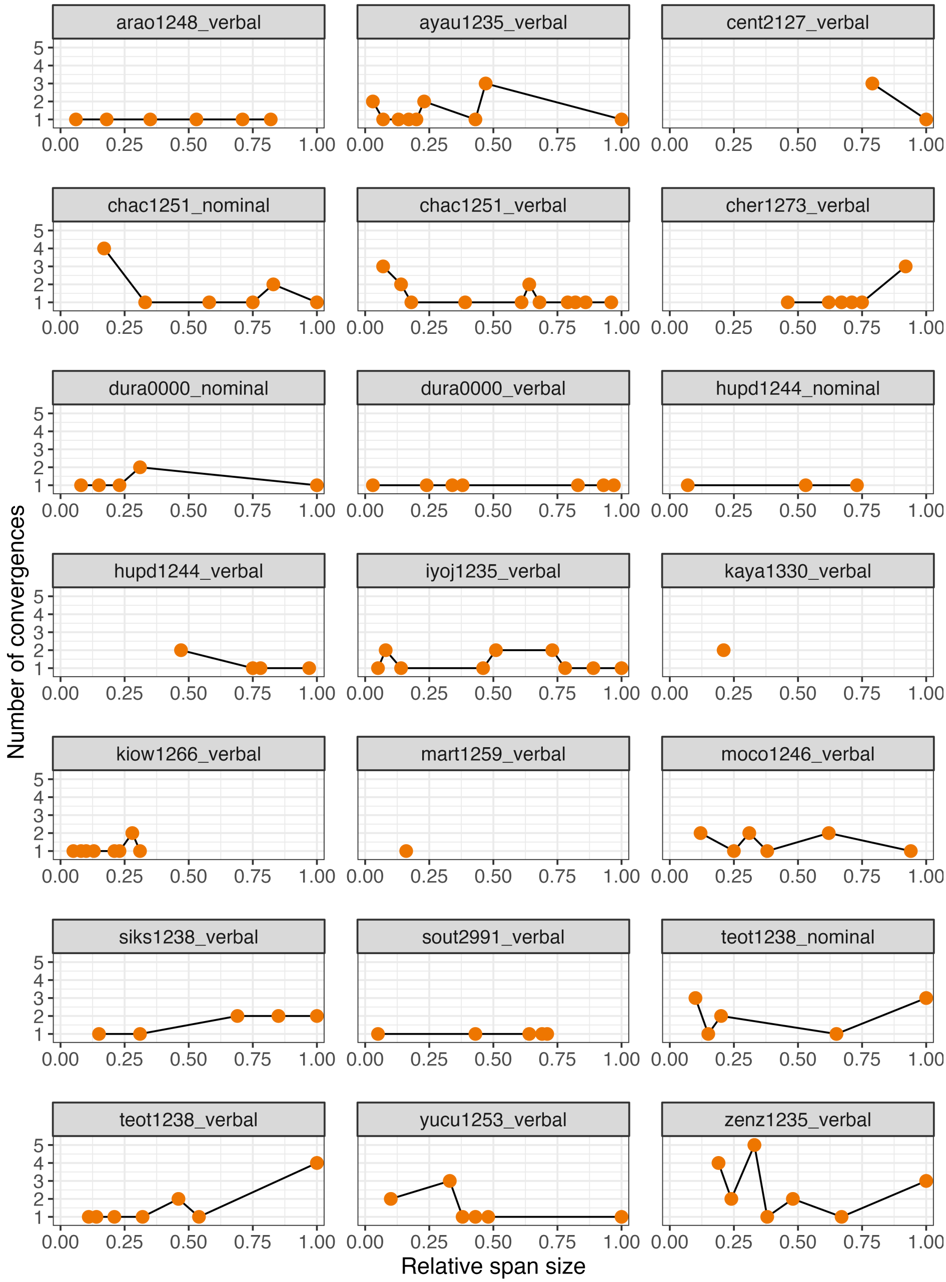

Figure 12: Distribution of relative convergence versus span size in phonological domains by planar structure.

the strength of a wordhood proposal based on a combination of absolute convergence and the number of tests that were applied in each language. An ideal case where phonological wordhood is supported would show a spike upward (high convergence) in relation to a relatively low number of tests applied. To the extent that convergence supports phonological wordhood, the strongest case appears in the verbal domain of Zenzontepec Chatino (with 5 convergences). The Chácobo nominal domain also displays some evidence for phonological wordhood (contrast this with the verbal domain, Tallman 2021b). The case of Teotitlán del Valle Zapotec is somewhat difficult, because although there are a relatively large number of convergences, these appear in a domain that most authors would consider to be an utterance/sentence level grouping (see Gutiérrez & Uchihara (2024) for discussion). We would also say that the phonological word in the Central Alaskan Yupik verbal domain is relatively well supported. While the convergence level is only 3, only 4 phonological tests were applicable in this case.

In the morphosyntactic domain (Figure 13), no layer of structure goes beyond a convergence level of 4. Central Alaskan Yupik, Zenzontepec Chatino, and Duraznos Mixtec seem to display the strongest candidates for morphosyntactic wordhood. Note that the latter is somewhat weaker because in Duraznos a larger repertoire of morphosyntactic tests could be applied. Slightly weaker domains appear for Oklahoma Cherokee, Siksika, Mocovi, and Mẽbêngôkre verbal domains.

There are only two languages that provide some type of support for the word-bisection thesis: Central Alaskan Yupik and Zenzontepec Chatino. In both cases, there are domains with relatively high convergences in both morphosyntax and phonology. While some degree of convergence appears to be the norm, the more typical pattern thus far is that either there is a highly convergent phonological domain or a highly convergent morphosyntactic one, but not both.

We emphasize again that the meaningfulness of the (non)convergences across languages is an open question both on methodological and theoretical grounds. On methodological grounds, more realistic simulation methods might find that the apparently highly convergent patterns are not surprising given factors such as the number of tests applied, the number of languages considered, the tendency for tests to nest, and the hypothesis space for test alignment (e.g. the planar structure). On theoretical grounds, researchers could challenge the idea that convergence is the right notion for the assessment of the word bisection thesis. We might also find independent reasons to consider some tests as more theoretically relevant than others. There are other tests that have not yet been included in the database (e.g. proform replacement), but whose inclusion might change the picture as well.

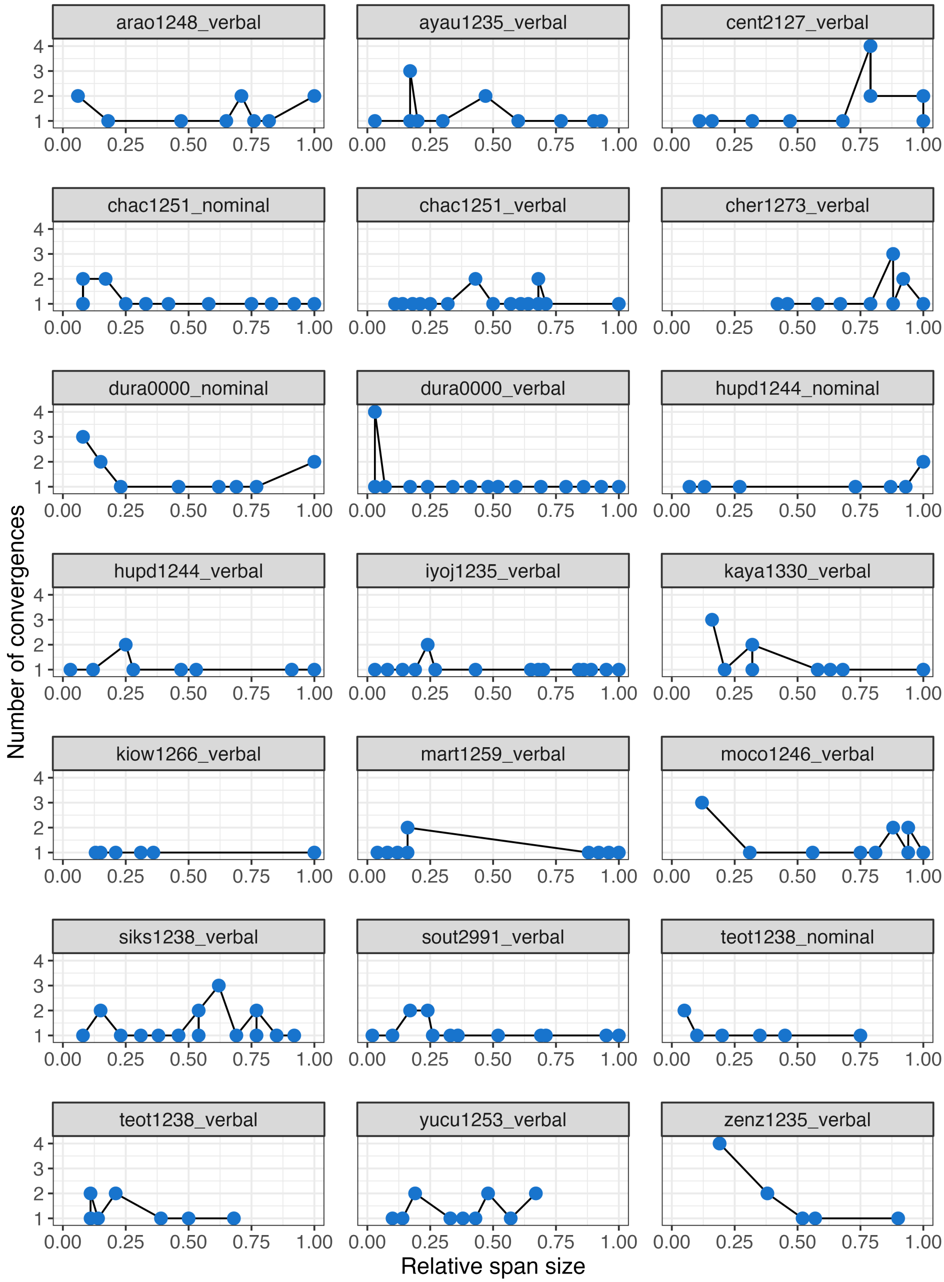

Figure 13: Distribution of relative convergence versus span size in morphosyntactic domains by planar structure

8 Summary and conclusion

The goal of this chapter is to summarize the construction, conceptualization and structure of the constituency and convergence data set. We also, in a general sense, show how the data set can be used to investigate typological questions in linguistics.

Apart from developing simulation methods as described in the previous section, future research can be concerned with developing more constituency tests, attempting to tease out an operationalizable distinction between wordhood and phrasehood level tests (or levels in general). A fuller account of convergences in nominal domains also needs to be provided. In this book we focused mostly on the verb, because we viewed this category as more consistently associated with problems of wordhood, probably because of its relatively high syntagmatic complexity compared to the noun. If both verbal and nominal domains are considered, an actual assessment of the degree to which verbal and nominal constituency structures are homologous could be given (e.g. some version of X' theory could be tested empirically rather than assumed).

A number of phonological domains are also likely missing across the languages. For instance, there is a relative absence of claims or information concerning utterance level phenomena in the studies of this volume. This is a natural consequence of the project starting with a focus on wordhood, but now that it has been revealed that a focus uniquely on wordhood is at best methodologically problematic and, at worst, incoherent, higher-level prosodic domains ought to be included.

Deviations from biuniqueness are also relatively superficially considered in the current approach. This is because in the current approach, deviation domains are fractured according to the type of deviation from biuniqueness (e.g. extended exponence, suppletion etc.). A great deal of complexity and variation is hidden behind such designations. Future research might be concerned with finding some way of syncing current studies on paradigmatic complexity and morphomic structure (e.g. Herce 2023) with a broader study of constituency.

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Chapter 18

Word domains, and what comes after

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This commentary summarizes the work done by in the Word Domains module within the Autotyp initiative, including scholarship on prosody-morphology interfaces and the Prosodic Hierarchy Hypothesis. The commentary includes the methods and findings from the Word Domains module, as well as ongoing initiatives and methodological challenges. The commentary then turns to how the case studies include in this volume expand/deepen/improve upon the work started by Word Domains, also including some commentary on challenges highlighted by this work and some possible directions for future initiatives.

1 Introduction

As articulated in the introduction to this volume, attempts at modeling the phonology-syntax interface have given rise to various ways of defining prosodic and morphological constituency, or more generally, "words." Proposals range from the tradition of invoking boundaries and junctures in describing constraints and patterns that map over morphological or syntactic structure (Chomsky & Halle 1968, McCawley 1968), on to prosodic phonology, where domains or phonology-grammar mapping are part of a larger prosodic hierarchy (Nespor & Vogel 1986/2007, Truckenbrodt 1999, *inter alia*), and also re-casting of these as violable constraints in the tradition of prosodic morphology (McCarthy & Prince 1986, 2001, applied cross-linguistically in Kager et al. 1999). All of these take as their underlying assumption that the word is universal, including the tradition of basic linguistic theory, for example, Dixon (2010) claim that phonological and grammatical words can be recognized for all languages, and whose word bisection thesis attempts to account for prosodic and grammatical misalignments by separating a single notion of word into two potentially misaligning constituents.

Kristine Hildebrandt. 2024. Word domains, and what comes after. In Adam J.R. Tallman, Sandra Auderset & Hiroto Uchihara (eds.), *Constituency and convergence in the Americas*, 779–792. Berlin: Language Science Press. DOI: 10.5281/zenodo.13208574

These modeling attempts have run into problems in cross-linguistic applications, with repeated instances of languages that display a proliferation of misaligned constituents, or with constituents defined by differentially defined and sometimes conflicting diagnostics, or else with a lack of any evidence motivating word domains altogether (Schiering et al. 2010, Haspelmath 2011, as covered in Tallman 2021). As such, capturing a cross-linguistically viable notion of wordhood has remained elusive, a challenge taken up most recently in this collection of language-specific treatments with modified diagnostic methods.

In this section, I summarize attempts to typologize on prosody-morphology interfaces in the Word Domains module, and then turn to how the methods and languages included in this volume expand/deepen/improve upon the work started by the Autotyp group. I also consider some ongoing challenges highlighted by this work and some possible directions for future initiatives.

2 The AUTOTYP Word Domains module: A recap and ongoing questions

The original project was proposed by Balthasar Bickel and Tracy Hall in 2002 and their ideas were situated primarily in the context of Prosodic Phonology (Nespor & Vogel 1986/2007), more specifically the predictions made within the Prosodic Hierarchy Hypothesis:

- Prosodic domains cluster on a single universal set of domains ('Clustering'), and,
- No level or node is skipped in the building of prosodic structure unless this is required by independently motivated higher ranking principles or constraints ('Strict Succession').

The focus in this project was to catalogue prosodic words, recast as "domains" in which phonological generalizations are mapped onto morphological structure, for example, a stem and its affixes. While the database was primarily aimed at tracking prosodic processes that mapped morphological material, other domains were also defined and tracked on a language-specific basis, including syllable, foot, and when the language provided evidence for these, phonological phrase, intonation phrase, and phonological utterance.

The Word Domains module investigated the challenges summarized above. Working with an original sample of 70 languages, the researchers who participated in this project discovered that domains proliferate in number and type across languages, or else in some circumstances are not motivated at all. Detailed illustrations of domain proliferation or undergeneration are detailed in Hildebrandt (2007) and Schiering et al. (2010), although it should be noted that other scholars have documented similar challenges in either a proliferation of prosodic word types (Post 2009, Dunn 1999, Hall & Hildebrandt 2008, McDonough 1999), or data that fail to identify lexically generalizable prosodic words (Bickel et al. 2009). The challenges are usually accounted for by including the exceptions in a finite list, by positing recursive domains, or by factoring out prosodic domains to different phonological tiers. Or, they have motivated a 'weak layering' of the Prosodic Hierarchy and this has been cast within the tradition of Optimality Theory.

The Word Domains module is part of the larger AUTOTYP network of typological linguistic databases (Bickel et al. 2017, Witzlack-Makarevich et al. 2022). The network seeks statistical universals by coding language-specific phenomena "from the bottom up" to help understand how a probable system might look. In the case of the word domains module, we are interested in how a probable prosodic system might look.. Breaking this more general goal down, each module in AUTOTYP, including Word Domains, is constructed based on the following basic principles of:[1]

- Modularity and Connectivity: AUTOTYP is a network of thematically defined and connected modules (including the Word Domains Module) with shared infrastructure & design principles;
- Autotypology: Like other modules, Word Domains avoids pitfalls of theoretical positioning or a-priori intuition that can influence database design by building modules that dynamically expand lists of possible values during data input;
- A database structure consisting of data files and definition files: Data files contain data on individual languages and Definition files are lists of possible values for each coded variable;
- Late data aggregation: During data entry, we choose the lowest-level, most exhaustive model that is appropriate to the data domain & purpose of data collection. Data filtering and aggregation are done outside of the database to avoid pitfalls connected to Principle ii.

[1]A fifth AUTOTYP principle, "Exemplar-based method" is not discussed here.

These principles, and the resulting database structure allowed us to undertake an empirical investigation of the presumptions behind the Prosodic Hierarchy Hypothesis, namely a set of predictions contained within the larger Hypothesis:

- Some kinds of domains are recurrently larger than others, and that larger domains properly contain the smaller ones;
- These hierarchies of domains will tend to cluster on universal "attractors" that are defined by some shared property. For example, vowel harmony processes might tend to cluster on certain domain sizes, while stress patterns cluster on another.

Schiering et al. (2010) asked whether probabilistic clusters may be identified, perhaps echoing what Hyman et al. (1987) suggested, namely that such patterns should be rather understood as a probabilistic trend rather than universal categorical constraint.

In fact, the multidimensional scaling analysis employed in Schiering et al. (2010) did not significantly demonstrate this, other than showing an increased proportion of stress-related prosodic word-patterns in one cluster. This gave rise to one probabilistic universal: stress-related domains tend to be universally larger than other domains. Their investigation of this universal across three families (Austroasiatic, Indo-European, Sino-Tibetan) supported this prediction, and they also observed that non-stress pw-patterns do vary across the families, a trend of stress domains aligning with genealogical affiliation.

Of course, the methods and the findings in Schiering et al. (2010) were met with a variety of critiques. Most related to this volume is that the Word Domains dataset focuses largely on morphologically defined domains to the exclusion of syntactically defined ones (Bennett & Elfner 2019, Miller 2018). The issue raised by these responses is that our database focuses primarily on so-called "word-level" prosodic units, without deeper consideration of larger morphosyntactic domains, leaving open larger questions of constituency that recognize larger grammatical units. On the one hand, this is a justified critique. On the other hand, the goal of the Word Domains project was always to survey (primarily) prosodic domains at sub-phrasal and sub-clausal levels, in line with specific predictions within the Prosodic Hierarchy Hypothesis regarding phonological words and the domains that are contained within it. The Word Domains project also had always recognized a lack of consistency in cross-linguistic descriptive accounts in terms of how "words", and larger syntactic units, were defined in different treatments. This required a decomposition of grammatical units such as "affix", "clitic" and "particle" into theory-neutral elements. For example, for the purpose of the Word Domains project, these units would be differentiated by means of application of a number of diagnostics, including the element's categorical type, its host restrictions, its behavior and position in the relevant domain, its degree of prosodic coherence, its gapability, its position with respect to the host, and so on (Bickel & Hildebrandt 2005, Bickel & Zúñiga 2017). This greatly increased the time it took to enter data comprehensively, and therefore had a constraining effect on the number of languages and the types of domain-related phenomena that could be tracked beyond the word level.

It is therefore refreshing to see this question of "wordhood" (and of constituency more generally) taken up again, with different methods, and with a sample of languages that were not included in the original Word Domains project. This volume represents a typological investigation of 16 languages of the Americas, including a French-based creole (Duzerol 2024 [this volume]). The studies employ controlled terms and methods, including larger morphosyntactic domains along with prosodic diagnostics, and tests constituency, rather than assuming it a-priori. The planar structures first illustrated in Tallman (2021), and employed here, building a bottom-up multivariate typology, and avoiding some of the assumptions and pitfalls inherent to the universalist models noted above. This makes Tallman et al.'s (ed.) approach similar to principle ii of AUTOTYP, while allowing for a greater range of diagnostics to be included in word-hood evaluations than allowed for in the Word Domains project.

3 Strengths and challenges of this volume

3.1 The planar-fractal method

The contributions in this volume all make use of (and in many cases, provide evaluative comments on) the planar-fractal method. In this approach, the morphosyntax of a language is rendered ("flattened") onto a templatic structure that represents all elements of some (verbal or nominal) domain, regardless of constituency structure. Planar structures thus conflate morphology and syntax, allowing for a more comprehensive application of constituency diagnostics.

A clear benefit of this approach is that "fracturing" such planes of constituency allows for a much finer-grained detail in constituency variables on a language-specific basis, and for more nuanced portraits of aligning (or mis-aligning) phonological and grammatical domains.

However, one potential challenge is that the planar structure by necessity and by design conflates morphology and syntax. While there are those who argue that word formation is intrinsically linked to syntactic operations (Baker 1988, Marantz 1997), under other views (for example, Jackendoff 1997, Ackema & Neeleman 2001, 2007, and in this volume), this homogenization could be seen as problematic. Rather than building a database based on an a-priori assumption of the distinctiveness of morphological and syntactic modules, the goal here is to discover (via empirical evidence provided on language-specific bases) whether these two components can justifiably be defended as distinct modules or not.

This approach also provides evidence for multiple constituencies even within grammatical or phonological components. For example, several treatments at least distinguish between verbal and nominal planar structures and least one contribution finds evidence for an adverbial planar structure. For example, Nakamoto's treatment of Ayautla Mazatec (Nakamoto 2024 [this volume]). On the other hand, the analysis of Cherokee (Uchihara 2024 [this volume]) provides further evidence for adjectives and nouns as a single constituent type.

Another important potential takeaway from this approach, one that can fuel further research, is a different way of thinking about what morphology is. Rather than a view in which morphology is simply a set of word-level alternations and operations, it can be viewed instead as referring to paradigmatic dimensions of structuring. The approaches as currently formulated in this volume unfortunately do not expand on this potential, as they necessarily underdescribe interesting cross-linguistic morphological variation (which makes this approach different, for example, from Baerman 2014, Corbett 2015, and other projects run by members of the Surrey Morphology group). As such, the planar-fractal method would need to be amended to further this view.

One potential challenge to this approach comes from languages that have so-called "root-and-pattern" or templatic morphological systems. While this is most famously described for Semitic languages, some languages in the Americas might be candidates for inclusion due to their templatic systems, for example Yowlumni Yokuts (Kuroda 1967, Archangeli 1992). For these languages, the planar-fractal method would result in their CV skeletons represented on the same morphosyntactic level, complicating attempts to tease out prosodic and morphological diagnostics. Other approaches to such languages suggest this is not a problem, and that aspects of the phonology point to syntactic structures (e.g., Faust & Lampitelli 2009 account of Hebrew and Italian non-concatenative morphology).

The case of Mẽbêngôkre (Salanova 2024 [this volume]), which displays more fusional and non-concatenative processes than the other languages in this volume, presents similar potential complications for a planar model. Salanova illustrates ambiguities in distinguishing simple and complex structures in the language, e.g., in nominal quantification and modification, and in sentence-level modification, with a continuum of more or less grammaticalized elements. Salanova decides to treat such cases as revealing a complex structure, and these elements as part of a single independent clause template.

Another area for future work is constituency and convergence in creoles. The one creole in this study is Martinican. The ways in which constituency cues may overlap with those found in the contributing languages is not explicitly considered but is worthy of future study in this approach (see e.g. Good 2004 analysis of a phonological split in Saramaccan creole).

One of the biggest strengths of this project is the active participation and criticism by the fieldworkers who engaged in the data collection and analysis for these chapters. Often working in tandem with the speech community (as evidenced by the many comments on speaker intuitions about constituency), they know the fine details, which can be left out in even the "thickest" of reference grammatical descriptions. They also can introduce new ways of thinking about diagnostics and domain, as I comment on in §3.3.

3.2 Fracturing

If a given test is ambiguous and delimits different spans according to the interpretation test fracturing is applied following Tallman (2021). For example, if the positive evidence and the negative evidence of a phenomenon define different domains, they are treated as two constituency diagnostics. This helps to identify minimal and maximal domains for free occurrence and for certain diagnostics (e.g. floating tone placement in Yukuna). It also allows for nuances in the description of diagnostic sub-types, for example, types and sub-domains of interruptions in a span of otherwise non-interruptible material in Chorote (Carol 2024 [this volume]).

Compared with the coding decisions made in the Word Domains project, fracturing is an important methodological advancement. In the Word Domains database, distinctions between "edge" and "span" processes and constraints were encoded, but there were times when this distinction was fuzzy (for example, how to encode a syllable-onset constraint and its resolution that applies between a prefix and a stem, and optionally includes the stem and all postposed inflectional/derivational material). Additional fields in our database (including examples) helped to disambiguate domain boundaries, but the fracturing approach here ensures that every constituency diagnostic is well-defined, including specific reference to a beginning position and an ending position. Similarly to the Autotyp principles stated above, this approach attenuates bias and a-priori assumptions about what/how many elements may be assumed or excepted from relevance in a diagnostic (Tallman 2021).

3.3 Diagnostics

A common concern in prior treatments of wordhood focus on the diagnostics for wordhood. Either they are too vague, there is uncertainty as to whether the tests identify words specifically, there is concern as to whether the tests themselves are reliable, or there is disagreement as to whether the tests identify prosodic or grammatical domains, rather than a unified notion of "word" (Tallman 2024 [this volume]). One way around this, taken on by both the Word Domains module and by the Convergence and Constituency group, is to apply multiple tests and to see if and how they converge around a domain that could be considered a word in the language (and then potentially comparing that to native speaker intuitions, which itself can be conflicting and problematic).

In this volume, some diagnostics are appropriate in all (or most cases), for example minimal and maximal domains, while other diagnostics are modified and applied in language-appropriate ways. This is the case in the analysis of Hup grammatical constituency (Epps), where non-interruptability (defined) is sub-grouped as non-interruptability by a full NP and non-interruptability by a a promiscuous element, resulting in two sub-tests with different sizes of interrupting element. In the case of Chorote (Carol), ciscategoriality is sub-grouped into "strict" (specific to verbs) and "lax" (referencing the "main predicate of the clause", whether verbal or not) versions. This accounts for the fact that in Chorote, both the verb, other word classes, as well as some inflectional markers (negation) may head the predicate in certain cases. Also in Chorote, NPs and DPs can take some of the "verbal" TAME markers even when they function as arguments.

In the same spirit, conflicting results are embraced, rather than discarded or ignored, responding to critiques of diagnostic fishing or methodological opportunism voiced by Croft (2001), Haspelmath (2011). This is illustrated in the case of Zenzontepec Chatino. Campbell notes that establishing the verbal planar structure of Zenzontepec Chatino is challenged in the diagnostic of "biuniqueness", defined as a deviation from a one-to-one form-meaning correspondence. In the case of Z. Chatino, aspect-mood inflection is partly prefixal and partly expressed by tone melody alternations (or lack thereof) on verb stems. Such cases of non-concatenativity and deviation from biuniqueness do not fit neatly into a discrete linear model. Similarly, in Cup'ik, biuniqueness reveals what Woodbury terms as two "patches" of constituency behavior outside of the verb core. In Chorote, Carol notes that the distinction between lexical classes is not always clean, which may be viewed as a challenge for the diagnostic of "ciscategorial selection", where the domain refers to elements that exclusively combine with one part of speech.

Again, this project does not start with an a-priori assumption about what should (and will) converge, or even if a singular notion of "word" is relevant/useful. Rather, the goal is to cross-linguistically survey the distribution of these diagnostic results, including how they might support or not support traditional understandings of words as grammatical and phonological constituents correlating with semantic relations, to use these data to test claims about the morphosyntax-phonology interface, and to then move into the "why" dimension (diachronic and cognitive forces) of contemporary typological inquiry (Bickel 2007, Levinson 2012).

4 Convergence, and what remains

Some languages in this volume demonstrate very little evidence for convergence of any kind of word-like unit, such as Mixtec (Auderset et al.), or else, strong convergence signals reference only smaller domains, as with Mẽbêngôkre (Salanova). But, roughly half of the languages in this study do show patterns in line with the working assumption of the volume, namely that domains of high-constituency convergence are candidates for what we might think of as "wordhood" (see Matthews 2002; Tallman 2021). However, this assumption can result in anomalies because in many of these cases, the largest constituency domains emerge as the most convergent. This is seen with Hup (Epps), Cherokee (Uchihara), Cup'ik (Woodbury), Araona (Tallman), and arguably Chatino (Campbell), although larger domain convergences reveal prosodic word candidates more so than morphosyntactic words. One solution to this anomaly is to propose some mix of convergence tests and then take into an account whether the fractured test is specifically a minimal or a maximal domain. With this approach, the difference between a minimal and maximal version of a constituency test would reflect degrees of freedom in the interpretation of a test and provide a clearer picture of domain trends.

In other cases, the lack of clearly converging diagnostics may also be an artifact of a domain not having the adequate morphosyntactic or phonological context for the constraint to be tested in the first place, as discussed in Salanova's treatment of Mẽbêngôkre's verb complex. Other cases of non-convergence can be attributed to diachronic forces, as nicely quoted in the Epps' contribution, that "every language is more or less a ruin." It is therefore not surprising that heterogeneous sets of diagnostics that are really the result of diachronic processes do not necessarily converge on a uniform domain akin to a "word." These issues also echo what was reported in Schiering et al. 2010, (at least synchronically), that domains are often language-particular, intrinsic, highly specific, and contra to a proposed universal hierarchy of aligning and strictly layered domains.

As such, is there futility in searching for a unified cross-linguistic notion of "word"? Even when attempts at morphosyntactic and phonological convergence are made in this volume, in many cases, even when there is a strong clustering signal, that convergence is still partial, as in the case of Quechua (Rios & Tallman 2024 [this volume]) or Ayautla Mazatec (Nakamoto 2024 [this volume]) or the signal reveals a domain alignment in only one component of the grammar, as in the case of prosodic word domain convergence in Chatino (Campbell 2024 [this volume]) and in Kiowa (Miller 2024 [this volume]) to the exclusion of morphosyntactic convergence. These recurring challenges are an opportunity to remind ourselves that the label "domains" was a deliberate decision made by Schiering et al. (2010) to recognize multiple, non-aligning span-units of constraints and processes.

Perhaps one way to go about identifying convergent notions of "word" is to adopt different methods of data collection and analysis. Some contributions to this volume have referenced speaker intuitions, orthographic word comparisons, and patterns from language games (e.g., *ludling* in Chatino). Tallman suggests that a combination of language documentation collaboration (already on display in this volume) and a larger corpus of spontaneous speech data with annotated lexical and clause-level phonetic phenomena will contribute to a more empirically rich planar structure analysis across languages (Tallman 2023). This data set would potentially reveal more diagnostics as candidates for convergence. These approaches could serve to unlock the potential for the planar-fractal approach to yield more empirically robust results in the search for wordhood.

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Chapter 19

Diagnosing phonological constituency

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The planar-fractal method is meant to provide a theory-neutral way to evaluate linguistic theories. In this commentary, I do this for the Combined Model, a new phonology-syntax interface theory which combines Tri-P Mapping and Cophonologies by Phase. The model successfully predicts and accounts for the patterns in Araona and Ayautla Mazatec, highlighting several strengths of the planar-fractal method and opening issues for future direction.

1 Introduction

As mentioned in the Introduction (Tallman 2024 [this volume]), the planar-fractal method is meant to provide a theory-neutral way to compare constituency across languages and may be used to evaluate competing linguistic theories. A model of the phonology-syntax interface, for example, should successfully predict prosodic constituents that align with and explain the phonological patterns and convergences in a given language. In Chapter 4, I identified five wordhood candidates in Kiowa (Tanoan) and found the results neatly coincide with constituents predicted by a new phase-based model (Miller & Sande 2021, 2023) which combines Tri-P Mapping (Miller 2018, 2020) and Cophonologies by Phase (Sande 2019, 2020; Sande & Jenks 2018; Sande et al. 2020). Here, I test and confirm the Combined Model's success for two other languages from this volume: Araona (Takanan) and Ayautla Mazatec (Popolocan). The results highlight several strengths of the planar-fractal method and open issues for future directions.

In Section 2, I introduce the details of the Combined Model. In Section 3, I test Tri-P's predictions against the wordhood candidates identified in each language. In each language, there is evidence for a Phonological Word (ω), Phonological

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Phrase (φ, and Intonational Phrase (ι). There is also evidence of the Prosodic Stem (ρ) in both languages and Constituent χ in Ayautla Mazatec, though neither constituent has been precisely defined yet under the Combined Model. In Section 4, I discuss the results and conclude.

2 The Combined Model

2.1 Tri-P Mapping

Tri-P Mapping (or Phase-based Prosodic Phonology)[1] is a model of the phonology-syntax interface, which builds on the findings of Miller (2018) that current interface models (i.e., Relational Mapping as in Nespor & Vogel 1986; Vogel 2019, Syntax-Driven Mapping as in Selkirk 2011, and Syntactic Spell-Out Approaches as in Sato 2006, Pak 2008; Samuels 2011) fall short when tested against data from languages with extreme morpho-syntactic complexity. Relational Mapping and (Direct Reference) Syntactic-Spell Out Approaches alone correctly predicted verb-internal domains in languages like Kiowa and Saulteaux Ojibwe, but neither provided full accounts for either language. Arguing a combined approach with assumptions from both models is necessary, and Miller (2018, 2020) advanced such a model in Tri-P Mapping.

Tri-P Mapping uses an Indirect Reference strategy for mapping prosodic constituents from morpheme- and clause-level phases (Miller 2018, 2020). Phonology may reference any spelled-out phase to map to prosodic structure, but phonology itself does not apply cyclically. This allows for domains of smaller sizes, as opposed to work like Cheng & Downing (2016) which assumes phonology applies after all Spell-Out operations. As in other Indirect Reference Spell-Out accounts (Ahn 2015; Cheng & Downing 2007; Compton & Pittman 2007; Dobashi 2003, 2004a, 2004b; Ishihara 2007; Kratzer & Selkirk 2007; Piggott & Newell 2006), morpheme-level phases (those headed by a categorizing head) map to ω and clause-level phases little *v*/VOICE map to φ. C's phase maps to ι. Phonologically motivated restructuring may then occur including or excluding various elements within the tree.

Recursion is banned below φ, as in Vogel's (2019)'s Composite Prosodic Model. This suggests at least one intermediate constituent between ω and φ is necessary: Constituent χ. This constituent is not yet formally defined, but it is expected to be mapped referencing prosodic and not syntactic structure.

[1]The three Ps of Phase-based, Prosodic, and Phonology are abbreviated as Tri-P.

2.2 Cophonologies by Phase

Cophonologies by Phase (CbP) is a model of the interface between morphosyntax and phonology, which assumes late insertion of vocabulary items, spell-out at syntactic phase boundaries, and a constraint-based phonology (Sande 2019, 2020; Sande & Jenks 2018; Sande et al. 2020). The innovation of CbP is in the content of vocabulary items, or lexical items. Specifically, in addition to their phonological feature content ($\mathcal{F}$), vocabulary items also contain a prosodic subcategorization frame $\mathcal{P}$ (Inkelas 1990, Paster 2006), and a morpheme-specific constraint ranking adjustment $\mathcal{R}$ (1).

(1) Example CbP vocabulary entry

$$[n] \longleftrightarrow \begin{Bmatrix} \mathcal{F}: & \text{in} \\ \mathcal{P}: & [_{\omega}\, \text{X-} \\ \mathcal{R}: & \textsc{NasalPlaceAssimilation} \gg \textsc{Ident-Place} \end{Bmatrix}$$

The segmental and suprasegmental content of the plural marker in (1) is /in-/, the prosodic subcategorization frame says it should be a prefix within a prosodic word, and the constraint adjustment tells the phonological grammar to rank NasalPlaceAssimilation above Ident-Place. In the spell-out domain containing the morpheme in (1), the default ranking of Ident-Place ≫ NasalPlace-Assimilation will be reversed, resulting in assimilation in this domain, even if assimilation is not a general process in the language. That is, similar to traditional Co-Phonology Theory (Orgun 1996, Anttila 2002, Inkelas & Zoll 2007), there are multiple phonological rankings of constraints within the same language, which vary with the specific morphemes present in a spell-out domain. The key difference is that, in CbP, phonological evaluation applies at phase boundaries, rather than on the addition of each morpheme.

The result of adding morpheme-specific constraint ranking adjustments to vocabulary items is a specific mechanism of communication between the morphology and phonology, such that the phonology knows which grammar or cophonology to apply in a given instance of phonological evaluation. Additionally, the fact that CbP assumes spell-out at syntactic phase boundaries means that morpheme-specific effects are predicted to apply within the phase in which they are introduced, but they are not predicted to affect morphemes introduced in higher phase boundaries (2).

(2) Phase containment principle (Sande & Jenks 2018, Sande et al. 2020): Morphophonological operations conditioned internal to a phase cannot affect the phonology of phases that are not yet spelled out.

The phase containment principle, which is related to previous predictions of level-ordering theories and cophonologies (cf. Orgun & Inkelas 2002) holds of morpheme-specific constraint rankings, but also of morpheme-specific prosodic subcategorization effects.

Previous work in CbP has shown that this framework can account for morpheme-specific phonological effects that apply in domains smaller than a word (Sande 2019), larger than a word (Sande & Jenks 2018, Sande et al. 2020), competing morpheme-specific specifications within a phase (Sande et al. 2020), category-specific effects (Sande & Jenks 2018; Sande et al. 2020), and morpheme-specific phonology conditioned by two simultaneous morphological triggers within a phase domain (Sande 2020).

3 Analysis

The two languages presented and analyzed below were selected for no other reason than they were first alphabetically from the list of languages discussed in the present volume (Table 1). The languages are unrelated genetically and aerially and thus offer an interesting test for the Combined Model. In the following subsections, I will present analyses for Aranoa (Takanan) as first analyzed by Adam Tallman in Chapter 12 and Ayautla Mazatec (Popolocan) as first analyzed by Shun Nakamoto in Chapter 5. Both languages are argued to present challenges for any prosodic analysis, but the Combined Model provides a principled account for both. I have included my own chapter's results for Kiowa (Tanoan) in the table below, though interested readers are directed to that chapter itself for the relevant analysis and discussion.

3.1 Araona

Tallman identifies six phonological domains that show no convergence at all. He, however, finds some convergence when including constituency tests which are indeterminate as to whether they fall under phonology or morphosyntax like Free Occurrence, Subspan Repetition, and Extended Exponence. In the end, Tallman only finds two domains that show some convergence: Pos. 4–17 "Prefix"–Connector which is the domain for Maximal Pitch Accent and Maximal Free Occurrence domain and Pos. 4–14 "Prefix"–TAM which is the domain for Minimal Subspan Repetition (*tso* 'prior'), Extended Exponence (Negation), and E-selection. Tallman posits that we may need to ignore span convergence and instead examine the strongest structural edges. In Araona, this is the "Prefix" (Pos. 4) and the Core Verb Root (Pos. 6).

Table 1: Summary of phonological results

Language	Domain	Reanalysis
Araona	Pos. 6 Verb Core	ρ?
	Pos. 4–15 Prefixes–tam	ω
	Pos. 4–17 Prefixes–Linkage	φ
	Pos. 1–17 Full Clause	ι
Ayautla Mazatec	Pos. 19 Stem	ρ?
	Pos. 15–19 Prog–Stem	ω
	Pos. 15–28 Prog–Pronom.	χ
	Pos. 6–28 Ant./Post.–Pronom.	φ
	Pos. 1–31 Full Clause	ι
Kiowa[a]	Pos. 30–34 Stem–hsy	ω
	Pos. 30–37 Stem–sub	χ
	Pos. 26–37 Pronom–sub	φ
	Pos. 2–40 Full Clause	ι

[a] In the original chapter, there are a total of five wordhood candidates identified via convergence. The fifth candidate is not listed here, as it consists of everything but the initial pronominal in the verb complex. This seems to be a reflex of the phonological separation of the pronominal from the rest of the verb complex and is therefore unrelated to the structure itself.

Tallman ultimately argues for a gradient and more fine-grained view of phonological patterns in the language itself as well as cross-linguistically. Therefore, we should move past formalist terminology and constituents used in the literature like "phonological word" or the rest of the Prosodic Hierarchy. While I agree that the results do look unclear at first glance, Tri-P's independent mapping criteria give us a much clearer picture with three predicted constituents confirmed in the analysis: ω, φ, and ι. There is also evidence for a Prosodic Stem (ρ) constituent, which is yet to be formally defined in Tri-P Mapping.

First, consider the ω domain. Tri-P Mapping predicts categorial heads' phases map to their own ω and may adjust phonologically to include or exclude elements that phonologically cohere or not. For verb complexes, this typically means that the verb stem and any suffixes tend to map to a ω. In Araona, there has been an apparent phonological adjustment to also include material preceding the verb stem. Inflectional prefixes, incorporated noun stems, and inflectional TAM suffixes join the verb core in the ω (Pos. 4–15 as seen in 3 below). This is the domain for E-Selection and Minimality, and it is the Maximal Subspan Repetition (Auxiliary). There is convergence with one morphosyntactic constituency diagnostic; the same subspan is the Maximal Ciscategorial Selection domain. None of these are surprising as ω-level processes and properties.

(3) Araona ω Domain[2]

"Prefix"-	N-	Root	-Aspect	-Margins	-TAM
4	5	6	7–9	10–13	14–15

It's interesting that Araona includes the "prefixes", which are reportedly complex morphological elements in and of themselves. Cross-linguistically, prefixes are often phonologically separate from the rest of the verb complex due to boundaries of the verb stem's ω and any intervening incorporated stems that also form ωs. These boundaries don't appear to be happening in this case. Though incorporated nouns are typically not included in an ω with another root/stem, bare roots coming together into a single ω are not unattested. In Greek, for example, compounds do not form two ωs to make a new, larger constituent (Athanasopoulou & Vogel 2015). The inflectional prefixes and bare noun roots thus seem to be included in the same domain as the verb core. Both modify the verb (part-to-whole) but are not semantically transparent for transitivity or any other syntactic process. Thus, I am comfortable assuming that the incorporated noun is included in the ω via phonological adjustment. The details of that adjustment are left to future research.

The verb core itself is clearly a domain as well (Pos. 6). I posit that it forms a Prosodic Stem (abbreviated here as ρ), but this constituent has not been formally defined within the framework of Tri-P Mapping. Let us adopt an analysis in the spirit of Downing & Kadenge (2015) and Downing & Kadenge (2020). The ρ in Araona is the Minimal Vowel Syncope domain, as well as the Minimal Free Occurrence and Minimal Subspan Repetition (Auxiliary) domain. There is convergence with two syntactic constituency diagnostics: Minimal Non-interruptability and Minimal Non-permutability.

(4) Araona ρ Domain = Core Verb Root (6)

Tri-P Mapping predicts that a φ will minimally consist of the little v/voice phase head's spelled-out phase. In Araona, this domain spans from the prefixes through to the auxiliary and connector at the end of the verb complex (Pos. 4–17).

[2]This is a simplified template provided for ease of understanding. The abbreviations used combine and adjust Tallman's verbal planar structure and Pitman's analysis of the Araona verb.

As expected, the language's rather free constituent order means the following XP in Position 18 is not included in the φ domain. The φ in Araona is the Maximal Pitch Accent Domain. There is convergence with two other constituency diagnostics: Maximal Free Occurrence and Maximal Non-interruptability.

(5) Araona φ Domain

"Prefix"-	N-	Root	-Asp.	-Margins	-TAM	-Endings
4	5	6	7–9	10–13	14–15	16–17

Finally, Tri-P Mapping predicts that the entire clause will map to an ι because it is the C's phase. There is no positive evidence for the full clause (Pos. 1–17) forming a phonological domain, but it is the domain for Maximal Subspan Repetition (-tso-) and Maximal Ciscategorial Selection (broad). Though empty categories with no clear explanation are undesirable, I suspect future research will find ι-level phonological patterns. This is likely a result of the types of phonological processes documented and analyzed rather than a sign there is no ι in Araona.

3.2 Ayautla Mazatec

Nakamoto identifies six wordhood candidates via convergence. Candidate 1[3] consists of the verb root itself (Pos. 19). Three diagnostics converge to identify the domain, all of which are phonological (Minimal *ɛ.ɹ and Minimal *3.24) or indeterminate (Minimal Minimum Free Form). Candidate 2 is comprised of all prefixes and the verb root (Pos. 15–19), and it is identified by 5 diagnostics: one is phonological (Minimal Sandhi-Blocking Tone Sequences) and two are indeterminate (Reduplication and Minimal Deviation from Biuniqueness).

Candidate 3 spans from the prefixes through to the comitative suffix (Pos. 15–20). In other words, this domain spans all non-clitic elements in the verb complex. Of the two diagnostics that converge, only one is phonological. This is the domain for Maximal Stress Assignment. Candidate 4 is just one position larger and includes the focus tonal marker (Pos. 15–21). Two phonological diagnostics converge to identify this domain: Maximal Sandhi-Blocking Tone Sequences and Maximal *ɛ.ɹ. Candidate 5 spans from prefixes through all enclitics (Pos. 15–28), and it shows the highest level of convergence with 7 diagnostics; two are phonological (Obligatory Sandhi and Minimal Possible Sandhi) and two are indeterminate (Maximal Deviation from Biuniqueness and Maximal Minimal Free Form). Candidate 6 (Pos. 6–28) consists of virtually the entire verb

[3] Nakamoto refers to Candidates 1–6 and Layer 1, 4, 5, 6, 9, and 11, respectively.

complex. The only position excluded is the focus marker in Position 5. This domain is only identified by two morphsyntactic diagnostics, though.

Because most convergences in Ayautla Mazatec are morphosyntactic and not phonological, Nakamoto concludes that prosodic domains must not be universal as in Schiering et al. (2010). He notes that the fine-grained differences between Candidates 1–6 often hinge on the tonal focus markers in Positions 5 and 21. Their tonal nature poses challenges for most phonological diagnostics. It is therefore separate and forms an incrementally larger domain (e.g. Candidate 4 versus Candidate 3) or left out entirely as in Candidate 6. As in the previous section, however, the Combined Approach (Tri-P Mapping and Cophonologies by Phase) provides a principled account of what we observe in Ayautla Mazatec.

First, Tri-P Mapping predicts that the ω will coincide with the categorial verb head's phase (i.e. stem and cohering suffixes) with optional phonological adjustment. In Ayautla Mazatec, there is clear phonological adjustment as the ω consists of Pos. 19 (the Stem) and its *preceding* phase (i.e. the inflectional prefixes (Pos. 15)) instead of the phase below like expected. Thus, the ω coincides with Nakamoto's Candidate 2, and it is the domain for phonological processes like Minimal Sandhi Blocking Tone Sequences and Minimal Deviation from Biuniqueness.

(6) Ayautla Mazatec ω Domain

Prog.-	Asp./Mode-	Assoc. Motion-	Caus., Incoh.-	root(s)
15	16	17	18	19

Recall that Nakamoto identified Candidate 3, which includes the ω plus an additional position: the comitative suffix *-ko^{13}* in Position 20. There is indeed a clear separation between the Stem (Pos. 19) and the Comitative (Pos. 20) for Minimum Deviation from Biuniqueness, Total Reduplication, and Verbal Paralellism. In all three cases, the comititative is blocked from being involved. Additionally, Candidate 3 is identified as the domain for Maximal Stress Assignment and Non-permutability. The only phonological diagnostic here is stress assignment, but a re-analysis is possible.

Stress is predictably assigned to the verb root, but it will shift to the comitative suffix if it is present. While Nakamoto identifies the root and comitative as the minimal domain for stress assignment, the maximal domain proceeds backward until the next element that may exhibit stress (i.e. independent pronouns in Pos. 14). It is possible to re-analyze stress as a ρ-final process where stress is applied to a verb root. The comitative's special nature can then be captured by a morpheme-specific overwriting stress assignment or a re-bracketing process. There is no need for an additional prosodic domain.

(7) Ayautla Mazatec ρ Domain = Verb Root (Pos. 19)

Next, Nakamoto's Candidate 4 consists of the ω, the comitative, and the focus marker in Pos. 21. This domain is associated with two phonological constituency tests: Maximal Sandhi Blocking Tone Sequences and Maximal *3.(2)4. In both cases, this domain is established by only negative evidence and no other convergence. While there is clear separation of the other enclitics, there is no way to tell whether the comitative and focus are also separated as they will never participate in either process. Thus, Candidate 4 is not actually a viable candidate and will be excluded from the present analysis. Sandhi Blocking Tone Sequences and *3.(2)4 are assumed to be restricted to ρ.

Turning again to Tri–Mapping, χ is not yet formally defined but seems to support spanning processes between the ω and φ (Miller & Sande 2021). In this language, this domain spans from the progressive prefix (Pos. 15) through the pronominal clitics (Pros. 28). Of the reported processes, only Obligatory Sandhi shows a spanning process across this domain. The remaining processes can be reanalyzed as edge-based phenomena that can be accounted for with a boundary-requirement or constraint instead of appealing to prosodic structure (e.g. pausability is likely referencing the right edge of φ).

(8) Ayautla Mazatec χ Domain

prefixes-root(s)	comitative	focus	enclitics
15–19	20	21	22–28

Next, Tri-P Mapping defines the φ as the little v or VOICE phase, which typically maps to the full verb complex. In Ayautla Mazatec, this domain spans from the anterior/posterior prefix (Pos. 6) to the pronominal clitics (Pos. 28). The adjacent positions are an NP's focus marker on the left, and another NP is on the right. Like the comitative suffix, these positions are mentioned as "prosodically variable" because there are few to no phonological contexts to check the domains of relevant phonological phenomena based on the shapes of the relevant morphemes. At this point, only morphosyntactic evidence converges on this domain (non-interruptability 1< and coordination min.), but that does not rule it out as a phonological domain. Future research may find a phonological phenomenon that takes place at this level of the prosodic structure. In fact, given the reanalysis above, pausability references the right edge of φ.

(9) Ayautla Mazatec φ Domain

proclitics	adv.,pro.	prefixes.-root(s)	comitative	focus	enclitics
6–13	14	15–19	20	21	22–28

Finally, the ι consists of the full clause, and it is the maximal Possible Sandhi domain. Nakamoto initially lists this as only Pos. 2–31 but there is no reason not to include position 1. It is simply never going to take part in the process, as it never includes tone 4. This is not identified by convergence, but phonological evidence may yet be found.

4 Discussion

The Combined Model's success in Araona and Ayautla Mazatec is only possible because of the fine-grained and comprehensive analysis via the planar-fractal method. First, justifying the planar structures and identifying each element as a zone or slot strips away theoretic decisions like morpheme type. Second, constituency diagnostics are defined precisely and may be fractured to formally account for different types of evidence that may identify subspans (e.g. positive vs. negative evidence). Miller (2018) offered a rudimentary attempt to do this by color-coding different types of evidence, but the final results became unwieldy and hard to follow. This, on the other hand, is quite elegant!

The above analysis raises issues related to convergence, however. Though the Combined Model successfully predicts the subspans in Ayautla Mazatec, most of the convergence is syntactic. In most cases, only one phonological diagnostic identifies each constituent. The fact that the Combined Model still successfully predicts the subspans provides support for convergence alone mattering, but I can see arguments against accepting such lean evidence. If two or more diagnostics of a particular type are required, we would also see issues of insufficient phonological diagnostics in order to satisfy the convergence requirement. Next, a subspan was identified in Ayautla Mazatec by two maximal fractures of tests. In other words, the subspan was identified entirely be negative evidence. This can be handled with a simple constraint that a subpsan cannot be exclusively identified by maximal fractures of diagnostics.

In all, the planar-fractal method successfully enables cross-linguistic comparison and is suitable for testing models of the phonology-syntax interface. Future research should focus on what exactly is expected for convergence across languages.

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Name index

Constituency and convergence in the Americas

This volume brings together studies on morphosyntactic and phonological constituency from a host of languages across the Americas. The study expands on previous multivariate typological work on phonological domains by simultaneously coding the results of morphosyntactic constituency tests. The descriptions are geared towards developing a typology of constituency and linguistic levels in both morphosyntactic and phonological domains. The multivariate approach adopted in this volume deconstructs constituency tests and phonological domains into cross-linguistically comparable variables applying and extending autotypology method to the domain of constituent structure. Current methodologies for establishing constituents have been criticized for containing an inbuilt selection bias, where the results and interpretation of tests are chosen or sampled in such a fashion that specific analyses are prejudged to be correct or false in a non-rigorous fashion. The papers of this volume develop novel methodology for reporting and coding constituency variables for language description and comparison that seeks to reign in selection bias allowing theories concerning the relationship between morphosyntactic and phonological constituent structure to be more severely tested.