Non-Literalness in Idioms:
Do Metaphor and Metonymy Make a Difference to their Perception and Semantic Processing?

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Chapter 1

Introduction

1.1 Overview and Framework

Idioms are old relatives; occasionally, you meet a new one, but you have known most of them since you can remember. But does this also mean that idioms are all a piece of cake for the mind? Typically, idioms do not mean what they literally say, but rather have a non-literal meaning. Non-literalness, in turn, comes in a variety of ways, shapes and forms. So, are all idioms equally easy to comprehend?

One very common phenomenon of non-literal language is METONYMY, stemming from the Greek μετωνυμία, *metōnymía*, which literally means "change of name". Thus, something is referred to by an expression that is not identical, but semantically contiguous to the intended meaning. This occurs, for example, in the idiom *Sally never raised a hand against her sister*, where *raise a hand against sb.* stands for *hitting sb.* and is usually the first step in the act of hitting. Thus, the expression of *raising a hand* literally names only one part of hitting, yet vividly refers to the entire act.

An even better-known, highly common phenomenon of non-literal language is METAPHOR, stemming from the Greek μεταφορά/μεταφέρω, *metaphor*, which translates to "transfer" or "carry something over". It means that an expression is taken from its original semantic context and transferred to a different, semantically distinct, in some respects similar, context. Thereby, the expression is attributed a different meaning, semantically distinct from its original meaning. This occurs, for example, in the idiom *Alena eats from the palm of her husband's hand*. In this case, *eating from the palm of sb.'s hand* is reminiscent of the behavior of an animal trustful of a human. The expression *eating from the palm of sb.'s hand* is "carried over" to a context in which it means 'being extremely trusting and devoted'.

Linguistic literature reveals abundant research on metaphor or metonymy on the one hand, and on idioms on the other. Most theoretical research on metaphor and metonymy in linguistics is rooted in the field of cognitive

linguistics. In fact, metaphor and to a lesser degree metonymy pervade many cognitive linguistic areas, such as cognitive semantics and cognitive grammar. Also, typical models of cognitive representation or structure – for example, conceptual metaphor theory, blending theory, or mental spaces theory – are mostly applicable to metaphor and metonymy. The pervasion of metaphor and metonymy is a distinct feature of cognitive linguistics which sets it apart from traditional generativist approaches and other linguistic fields in which metaphor and metonymy are of marginal concern. In comparison to metaphor and metonymy, fixed, multiword expressions such as idioms play a very minor role in cognitive linguistics and are mostly researched within the subject area of cognitive grammar (Evans & Green, 2006). There is very little theory as to how idioms are cognitively represented or modelled, other than that they must be learned as whole entities due to being "non-compositional" (Evans & Green, 2006, p. 643) and partly "idiosyncratic" (Fillmore et al., 1988, p. 516). Generally, cognitive linguistics is a theoretically oriented subfield of linguistics; consequently, empirical evidence for cognitive linguistic theories mainly comes from other fields.

The field of psycholinguistics, on the other hand, is empirically oriented. It centers on three questions: How do humans acquire a – native or foreign – language? How do humans comprehend language? How do humans produce language? (see also Höhle, 2010; Rickheit et al., 2007). In pursuit of the second question, many studies on metaphor and idiom comprehension use psycholinguistic methods. Literature on these subjects indeed shows that empirical research heavily relies on theoretical work on metaphor and metonymy from cognitive linguistics, as has also been noted by Gibbs and Perlman (2006). Both metaphor and idioms have received abundant attention in psycholinguistic research (for metaphor, see for example Blasko & Connine, 1993; Bohrn et al., 2012; Bortfeld & McGlone, 2001; Cacciari & Tabossi, 1988; Caillies & Butcher, 2007; Gildea & Glucksberg, 1983; Iakimova et al., 2005; Lai et al., 2009; Lai & Curran, 2013; for idioms, see for example Cacciari & Tabossi, 1988; Cacciari & Zardon, 1993; Canal et al., 2015; Carrol et al., 2018; Chan & Marinellie, 2008; Libben & Titone, 2008; Schweigert, 1986; Tabossi et al., 2009; Titone & Connine, 1999; Titone & Libben, 2014; van de Voort & Vonk, 1995; Vespignani et al., 2010). Psycholinguistic research on idioms investigates the multitude of properties idioms have, and their effects on semantic processing. There is little research on the processing of metonymy, although a few studies

exist (Annaz et al., 2009; Markert & Hahn, 2002). There also very few studies that compare types of metonymy and metaphor directly (Bambini et al., 2013; Rundblad & Annaz, 2010; van Herwegen et al., 2013; Weiland et al., 2014).

To summarize, there is abundant theoretical research on metaphor and metonymy, but comparably little on idioms in cognitive linguistics. In psycholinguistics, there is some empirical evidence on metaphor processing, scarce evidence on metonymy processing, and abundant empirical evidence on idiom processing. Despite the different foci and traditions between cognitive and psycholinguistics, there is one mutual characteristic in the areas of multiword metaphor and metonymy, and idioms: they are usually researched as entirely separate phenomena. Findings on idioms are usually not linked or transferred to findings on metaphor or metonymy, or vice versa. This is astounding for the following reason: There is considerable overlap between these three categories. Metaphors and metonymies can become conventionalized (Bowdle & Gentner, 2005; Chiappe et al., 2003; Goldstein et al., 2012; Goossens, 1995a; Lakoff & Johnson, 1980a; Lakoff & Turner, 1989; Svanlund, 2007), and then strongly resemble idioms or are idiomatic, while vice versa, idioms, widely characterized as 'non-literal', are often based on metaphors (Gibbs & O'Brien, 1990; Glucksberg et al., 1993; Kövecses & Szabcó, 1996) and metonymies (Al-Adaileh & Abbadi, 2012; Geeraerts, 2002; Hilpert, 2005).

There is cognitive linguistic as well as psycholinguistic evidence that metonymy is more basic, thus easier, to cognition than metaphor (as further discussed in 1.2.2 and 1.2.6). The cognitive linguistic view on idioms is that their meaning is 'entrenched', i.e. "established as a cognitive pattern or routine" (Evans & Green, 2006, p. 114; see also Schmid, 2010). Yet the distinction between metonymy/metaphor vs. conventionalized metonymy/metaphor vs. metaphoric/metonymic idiom is gradual and overlapping rather than clearcut and thorough. Thus the questions arise to what degree semantic processing is steered by entrenchment or lexicalization of idiomatic meanings – and whether or to what degree non-literalness (such as metaphoric or metonymic structures) determines semantic processing as well. From the psycholinguistic view, numerous properties of idioms – such as transparency, compositionality, comprehensibility, familiarity, length, and others (discussed in chapters 2-4) – can affect their semantic processing. As a consequence from this reasoning and from findings on metonymy and metaphor, it is at least questionable whether an

"easier" (i.e. metonymic) or "more difficult" (i.e. metaphoric) structure affects the semantic processing of idioms as well.

Centering on the second psycholinguistic question of how humans comprehend language, this thesis asks how non-literalness affects the comprehension of idioms. It investigates metaphor and metonymy in German idiomatic expressions from an empirical point of view. For this purpose, psycholinguistic methods of experimentation are employed. The thesis firsts aims to answer whether native speakers perceive differences between metonymic and metaphoric idioms, especially with regards to their degree of non-literalness. In the next step, it examines whether native speakers unconsciously differentiate between metonymic and metaphoric idioms when they semantically process them. The effect of higher or lower non-literalness can be gauged more comprehensively when compared to expressions in which non-literalness is clearly absent. Thus, this thesis also tests and compares semantic processing ease of literal idiomatic expressions to that of metonymic and metaphoric idioms. In the last chapter, it locates the findings of the experiments in the frameworks of adequate idiom processing models. The findings are viewed as evidence for or against existing models, or as lack of evidence for or against them.

The thesis exclusively focuses on multiword, not single-word, expressions in the German language as used throughout Germany. It examines idioms and non-literalness therein, and it mainly views metaphor and metonymy in this light. For this reason, it will not particularly investigate and discuss metaphor processing and representation theories. It uses cognitive linguistic as well as psycholinguistic theories and psycholinguistic methods.

1.2 Theoretical background

In language sciences, language has mostly been regarded as being divided into literal language on the one hand and non-literal or figurative language on the other. Literal language is intended to be understood literally; figurative or non-literal language is intended to be understood figuratively, and in many cases its literal meaning is contextually inapplicable, or even invalid. 'Literal meaning' refers to the most direct and straight-forward meaning of an utterance, that is, the most verbatim meaning that can be generated through

combining the lexical meanings of the constituents. Examples of literal utterances are:

(1) *A and B are sitting in a room with an open window. Cold air fills the room and A is cold. A says to B: 'Please close the window.'*[1]

(2) *A and B are waiting at the bus stop. B realizes the bus is behind schedule. B says to A: 'The bus is late.'*

(3) *The bus is approaching. B exclaims: 'Ah, the bus is coming!'*

In these examples, all utterances are intended as they are said (which we know from the description of the context); the imperative in (1) and the realization in (2) are expressed explicitly; (3) assesses A's and B's immediate reality in a direct and straight-forward manner. None of these utterances contain any hints of any meaning beyond the immediate, literal one.

'Literal' is not synonymous for 'unambiguous', and it does not mean that an utterance offers no room for interpretation. Rather, any utterance is to some extent ambiguous depending on context, lexical selection, and other factors. Neither is there one kind of 'literal'; rather, literal language has been subdivided into different types by Gibbs (1993) and Lakoff (1986).[2] However, the mutual and defining property of all literal utterances is that they do not have an additional, separate, different, actually intended meaning.[3] This demarcates them from non-literal and figurative utterances.

Figurative language comprises linguistic utterances[4] in which a literal meaning is transformed, resulting in a meaning different from the literal one (Black, 1954/1996). 'Figurative' in a narrower sense is often used to refer to an utterance that bears highly non-literal meaning that tends to evoke or even depict mental images, as in the examples (4) and (5). Figurative language used to be mostly associated with poetry and fiction. In these contexts, it is often highly unusual and idiosyncratic, while its meanings are often not intuitively understandable, such as here:

[1] Examples are my own unless indicated otherwise.
[2] They distinguish between conventional literality, subject-matter-literality, context-free, truth conditional, and nonmetaphorical literality.
[3] This does not mean that the literal meaning of every actual non-literal utterance is always valid and sensical.
[4] Black (1954/1996) himself used the term "figure of speech" here, but his description is applicable to other non-literal utterances as well.

(4) *The apparition of these faces in the crowd:*
Petals on a wet, black bough
('In a station of the metro', Ezra Pound, 1913)

(5) *…again the music swells, and the dreams […] writhe to and fro more merrily than ever, taking hue from the many-tinted windows…*
('The masque of the red death', Edgar Allen Poe, 1842)

The principled dichotomy of literal language on the one hand and figurative language on the other has been called into question (Evans & Green, 2006; Gibbs, 1994). At any rate, it leaves a very substantial gap as is: it does not comprise the vast plenty of common, everyday language that is neither strictly literal as (1), (2), and (3), nor figurative as (4) and (5). Instead, many instances of language use range somewhere between these two extremes and are in some cases closer to one extreme, in other cases to the other. To capture the abundant and manifold kinds of utterances between these extremes, such in-between examples will be referred to as 'non-literal' throughout this thesis. Instead of a dichotomous conception, it does better justice to language to conceive of the distinction as a continuum with the opposing two poles 'literal' and 'figurative', and a substantial transition with varying degrees and types of 'non-literal' expressions in between.

Until about four decades ago and within the dichotomy of literal versus non-literal or figurative language, non-literal language was seen to be restricted to literary and rhetoric contexts in linguistic tradition. Today, linguists have gradually recognized that it is in fact about as frequent and relevant in everyday communication as literal language (Deignan et al., 2013; Evans & Green, 2006). Common non-literal examples in everyday language are, for example, irony (which has subtypes such as litotes or sarcasm) or hyperbole, to name only two out of a multitude. Usually in cases of pure irony, the intended meaning is not immanent in the utterance itself, but becomes understandable ONLY through knowledge of the immediate circumstances of the utterance, and the speaker's intention. In contrast, there are types of language whose non-literalness lies within the structure of the utterance and can be grasped and often even be understood by reading or hearing the utterance out of context. Consider

(6) *Life is an everlasting battle*

(7) *She's drinking you under the table*

(8) *They've washed their hand of responsibility for this*

(9) Not a word will pass my lips

(10) This song has gotten under my skin

(11) We'll turn a blind eye

(12) My daughter is still in the spring of her life

(13) This dissertation is eating me up

(14) He took my heart by storm.

Among the most well-known and wide-spread types of such non-literal language are metaphors and metonymies. The classification of non-literal language into different types – irony, hyperbole, metaphor, metonymy, and many others – is traditionally rooted in the field of rhetoric. In rhetoric tradition, they are seen as stylistic or communicative devices referred to as 'tropes'. Tropes can modulate meanings and inter-conceptual relations and produce a shift in the meanings of utterances. Metaphor and metonymy are examples hereof.

Interestingly, metaphor and, to a lesser degree, metonymy, have been the focus of interest in both the ancient field of rhetoric and the less than 40-year-old field of cognitive linguistics. In both fields, the definition of metaphor can be traced back to Aristotle. Aristotle saw the use of metaphors mainly in the context of poetry and rhetoric. He originally defined metaphor as follows: 'Eine Metapher ist die Übertragung eines Wortes (das somit in uneigentlicher Bedeutung verwendet wird), und zwar entweder von der Gattung auf die Art, oder von der Art auf die Gattung, oder von einer Art auf eine andere, oder nach den Regeln der Analogie', translated by Fuhrmann (1982, p. 67). This very broad conceptualization developed into a more restricted interpretation in later traditions, and from a more recent point of view, Aristotle's definition fits that of a 'trope' or figure of thought rather than a metaphor (Henle, 1958/1996). For decades or even centuries, metaphor has been defined as being based on analogy only. In rhetoric today, however, analogy is a separate trope, and Aristotle's definition of metaphor subsumes a large variety of tropes. These tropes are often referred to as metaphors (Harjung, 2000) by both scientists and laypeople, as is wrong by today's standards. Cognitive linguistics, on the other hand, has a broader view of what constitutes a metaphor, and this view is again closer to Aristotle's definition. Thus, although Aristotle's ideas have been and

are still pivotal to general rhetoric, the rhetoric notion of metaphor is significantly more narrow today (Harjung, 2000; Lausberg, 1976), On the other hand, the cognitive linguistic notion of metaphor – "one conceptual domain is systematically structured in terms of another" (Evans & Green, 2006, p. 38) – is slightly closer to Aristotle's definition.

1.2.1 Metaphor

In the cognitive linguistic view, metaphors are not only a type of trope, but a very large category of non-literal language. Lakoff and Johnson (1980c, 1980b, 2004) and Lakoff and Turner (1989) emphasize that non-literal language, particularly metaphor, is natural and deeply-rooted in everyday communication and cognition[5], thus occurs very frequently. As Steen et al. (2010) summarize their metaphor detection findings from a 47,000-word sample of the British National Corpus (BNC): "on average, one in every seven and a half lexical units in the corpus is related to metaphor" (Steen et al., 2010, p. 765). Within metaphoric language, commonness and familiarity range from extremely unusual to extremely frequent and ordinary – while the second extreme assumes a crucial part of everyday language and cognition.

General consensus today is that metaphorically used expressions refer to a target in a semantic concept distinct from the expression's literal meaning, thus functioning in between two concepts or domains (both to be further explained in 1.2.3, Fauconnier & Turner, 1996; Kövecses & Radden, 1998; Spieß & Köpcke, 2015). Metaphor is based on a relationship of similarity or analogy (Aristoteles, 1982; Barcelona, 2003; Barnden, 2007; Bartsch, 2002; Bortfeld & McGlone, 2001; Bowdle & Gentner, 2005; Coulson & Matlock, 2001; Gentner et al., 2001; Ortony, 1979/1993; Sweetser, 1990/2001; Whately, 1846/2013). Metaphors express one semantic concept or idea by means of another, which is the "conceptual relation 'X understood in terms of Y'" (Evans & Green, 2006, p. 311). The metaphoric mapping is based on selected similar aspects of the two domains involved while other aspects are ignored. Consequently, individual metaphors can be understood in certain fashions but not in others. For example, in

(15) Love is a rose

[5] While their work has been pivotal to the research on metaphor, their ideas and even terminology have been voiced by Richards over 50 years earlier (Richards, 1936/1996).

'rose' may offer aspects of 'love' such as beauty and delicacy (blossom) and pain (thorns), but it will not trigger notions such as loyalty, trust, or eternity that may also be aspects of love. Thus, a metaphor structures a concept in PART, not entirely; if the structure was matched entirely, metaphor and concept would be identical.

Lakoff and Johnson (1980c) have argued that metonymy is a conceptual mechanism related to metaphor and equally basic to everyday language and cognition.

1.2.2 Metonymy

Interestingly, Aristotle's definition of metaphor also includes forms of metonymy, particularly the very common forms of a PART STANDING FOR THE WHOLE or vice versa, as he expresses by "entweder von der Gattung auf die Art, oder von der Art auf die Gattung" (Aristoteles, 1982, p. 67). In linguistic terminology, 'Gattung' ('class' or 'category') could thus best be translated as 'hyperonym' whereas 'Art' ('species' or 'type') would thus be roughly equivalent to 'hyponym'. From a cognitive linguistic point of view, metaphor and metonymy are equally important: they are both seen as fundamental thought patterns that structure our conceptual thinking and language use (Barcelona, 1997; Glucksberg & Keysar, 1990; Lakoff & Johnson, 1980b; Radden, 2003, 2005; Richards, 1936/1996).

Like metaphor, metonymy is highly prevalent in everyday language. Actual counts are difficult to find, but even in a corpus of information technology test reports which may seem an unlikely source for non-literal language, metonymic expressions (without homonyms) were found in 15% of utterances (Markert & Hahn, 2002), which roughly corresponds to Steen et al. (2010)'s findings of "one in every seven and a half units" for metaphors. In contrast to metaphors, metonymies tend to be referential (Barcelona, 1997; Evans & Green, 2006): in many cases, a metonymy functions in that the chief detail or aspect of an entity is singled out to identify that entity. Similar to 'metaphor', the term 'metonymy' is treated and used considerably more crudely by cognitive scientists (Goossens, 1995b; Rapp et al., 2011) than by authors with a rhetoric stance (Harjung, 2000; Lausberg, 1976).

Consensus today is that metonymically used words or phrases refer to a target within the same semantic domain (see 1.2.3) (Fauconnier & Turner, 1996; Kövecses & Radden, 1998; Mendoza Ibánez, 2003; Spieß & Köpcke, 2015). This is also expressed by the aspect of "relatedness" in this otherwise very general metonymy description: "a word is used for some thing [sic] **related** [my emphasis] to that which it usually refers to" (Goossens, 1995b, p. 160). Hence metonymy is the "conceptual relation 'X stands for Y'" (Evans & Green, 2006, p. 311) and is based on a contiguity relationship between source and target domain (Annaz et al., 2009; Bartsch, 2002; Croft, 1993; Dirven, 2002; Feyaerts, 2003; Klepousniotou, 2002). In example

(16) Teacher: Ok, kids, <u>all eyes</u> on me now!,

the teacher wishes neither eyeballs nor even only gazes to be on her, but all attention to be focused on her. In this very common expression, 'all eyes' goes beyond its literal meaning and stands for more than it literally can, but the intended meaning – gazes and attention – is directly related to the organ 'eye' and its capabilities.

Metonymy has a variety of subtypes. A very common and often highly conventionalized subtype of metonymy is synecdoche (Goossens, 1995b; Harjung, 2000; Ullmann, 1979). It can be divided into the forms PARS PRO TOTO where a whole is referred to by a part of it, as in (18), and the TOTUM PRO PARTE where a part is referred to by the whole as in (19).

(17) <u>Evil tongues</u> say that Corona may not teach people a lasting lesson on how to live more sustainably (instead of 'some people with an inclination to speak ill').

(18) Last week, the <u>school</u> went to Berlin (instead of 'some of the school's students and teachers').

Other common kinds of synecdoche are plural for singular and ORIGINAL MATERIAL FOR FINISHED PRODUCT:

(19) Did he get the <u>rock</u> for his girlfriend? - Yes, it looks gorgeous on her tiny finger. (instead of 'six-carat diamond')

Metonymy is often suggested to be more basic to cognition and also easier to learn and comprehend than metaphor (Goossens, 1995b; Taylor, 1995). One

reason for this idea may be how meaning originates in metonymy compared to metaphor.

1.2.3 Comparison: Mapping in Metaphor and Metonymy

In both metonymy and metaphor, one semantic concept designates another, but the relationships between said and intended concept differ. We assume that the link between the two concepts – the used concept and the intended concept – must be found or created by the hearer's semantic processing system to make comprehension successful. This process is referred to as MAPPING. To make the mapping successful, a considerable amount of knowledge about and beyond both source and target concept is crucial. In cognitive linguistics, it is argued that concepts are arranged in conceptual DOMAINS.[6] A conceptual domain is "a body of knowledge within our conceptual system that contains and organizes related ideas and experiences" (Evans & Green, 2006, p. 14). The definition of a CONCEPT is vague and differs among scientific fields and traditions. It has been defined as a "mental representation" (Margolis, 2007) and refers to a semantic field that structures our knowledge, which is the definition applied in this thesis. It also structures larger concepts so that closely related ones are grouped together or belong to the same third concept. Concepts differ in scope and hierarchical status, can contain other concepts, and are structured in terms of conceptual domains. In the metonymy

(20) I want my own four walls!

'own four walls' refers to 'own room'. 'Four walls' and 'room' are both elements or semantic concepts of the same domain, namely 'living space': 'room' is the

[6] From the respective definitions of 'concept' and 'domain', it is not entirely clear where 'concept' ends and 'domain' begins. Domains can also be described as super-concepts based on universally and partially culturally shared experiences, such as SPACE, TIME, or ANGER, but they can also be more narrow. The extent of a concept is unclear as well, so that a number of semantic phenomena could be referred to as both 'concept' and 'domain'. In fact, the domain definition by Langacker (1987/2008) even suggests that the two terms can be interchangeable: "Domains are necessarily cognitive entities: mental experiences, representational spaces, concepts, or conceptual complexes" (p. 147). I introduce the term 'domain' in this introduction for the sake of completeness and its importance in cognitive linguistic takes on metaphor and metonymy. Yet, as this thesis and later chapters (which are published papers) do not have an exclusively cognitive linguistic focus, the term 'concept' is preferably used there in definitions and explanations instead of 'domain'. This is to make the text accessible to a wider range of readers.

target concept or domain,[7] the intended meaning; 'four walls' is the source, the used concept to refer to something else. In the metaphor

(21) That takes guts!,

'guts', a concept of the domain 'human body', is the source that maps onto the target domain 'courage'. The source clearly activates the target, but the possible relationships between source and target are manifold.

It has been suggested that in metaphor, the two concepts (guts, courage) must be in two discrete domains (Lakoff & Turner, 1989; see also Barcelona, 1997). This is true in our example: guts are associated with courage but conceptually, the two do not seem to have any obvious similar characteristics. Thus, they are discrete domains. In a metonymy, mapping occurs within one and the same domain, which means that source and target are elements of the same domain. In the example above, having four walls IS a characteristic of rooms. Since a room cannot exist without walls (usually four, possibly more), walls are necessarily closely associated with rooms, so walls and rooms will be in the same semantic concept or domain, e.g. 'building' or 'living space'. If 'room' is regarded as a concept, 'walls' are a mandatory element in it. To sum up: The key distinction between metonymy and metaphor is that in a metonymy, the mapping from source to target occurs within ONE AND THE SAME domain or concept – whereas in a metaphor, the mapping occurs between TWO SEPARATE domains or concepts in that the source is mapped onto the target.

For the sake of completeness, it needs to be mentioned that boundaries between metaphor and metonymy can be fuzzy. This can cause metaphor and metonymy to interpenetrate and create cases in which one is based on the other (Goossens, 1995b). While these cases will not be of particular interest in this thesis, they are briefly explained here, which also serves to further illustrate mapping processes: According to Barcelona (1997), *to catch sb.'s ear* is a metaphor-based metonymy. He argues that metaphoric mapping underlies and probably precedes metonymic mapping in this case: *to catch sb.'s attention* is the metaphoric basis in that attention is seen as an entity that can be 'caught'. On this metaphoric basis, 'attention' is then metonymically represented by 'ear', which stands for listening.[8] Metonymies based on metaphors are rare, according

[7] In de Saussure's terminology, the target concept would correspond to the 'signified' and the source concept to the 'signifier'.
[8] It is questionable which conceptual process occurs first in such cases. It is possible

to Goossens (1995b). Vice versa, there are metaphors based on metonymy, as for example *he just exploded* or *I reached my boiling point.* These cases involve a metonymic and a metaphoric mapping (Barcelona, 1997; Lakoff, 1987). First, physical reactions stand for an emotion: emotions trigger physiological reactions, and these typical reactions are used here to refer to 'anger'. This is the metonymy. Secondly, these examples are metaphoric in that 'explosion' and 'boiling point' are used to refer to the actual display of anger which was not literally an explosion or a person boiling.

The examples discussed are commonly used and based on ideas and conceptual patterns that are extremely familiar at least in Western cultures. Thus it needs to be borne in mind that they are unlikely to be actually processed in the two-step mappings described above because this would be highly inefficient. Instead, they are rather comprehended automatically, at least if a recipient is familiar with them. It is rather suggested that the described mapping processes trace how and where the meanings of these expressions originate and how the expressions are conceptually motivated.

1.2.4 Conventionalization: Idioms

As can be seen from the examples discussed, non-literal expressions can become conventionalized. Many metaphors have been suggested to be deeply rooted and omnipresent in our language and cognition, having been passed on through generations, such as DEATH IS DEPARTURE, A LIFETIME IS A YEAR, TIME IS MOTION, and many more (Lakoff & Johnson, 1980c). Certain metaphors are not even recognized as such but might be perceived as literal because they have become highly familiar to speakers and recipients. Occasionally – a point that was also made by Black (1996) – there is not even a literal "translation" for a metaphoric expression other than a lengthy complex and detailed literal description.[9]

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that mapping occurs vice versa, namely that first 'ear' is conceptualized to stand for 'attention' (metonymy) whereupon the metaphor 'catch s.o.'s ear' follows.

[9] An example is "Ich war ganz unten"/"I hit rock bottom" which is used by people to describe that they reached a lowest possible point where they were entangled in a psychologically, socially, possibly financially devastating set of circumstances and all their consequences.
Another example is "This breaks my heart": this refers to a complex composition of hurt feelings and desperation, likely disappointments, possible disbelief, etc. No similarly

As is argued by conceptual metaphor theorists, metaphoric expressions are sometimes formed on the basis of a conceptual metaphor, for example (12), repeated here:

(12) My daughter is still in the spring of her life,

as based on A LIFETIME IS A YEAR. However, it is not argued that all metaphoric expressions are based on conceptual metaphors. In addition, it is important to note that conceptual metaphors and metaphoric expressions are two clearly different phenomena. Lakoff (2006) states that a 'metaphoric expression' "refers to a linguistic expression (a word, phrase, or sentence) that is the surface realization of such a cross-domain mapping (this is what the word 'metaphor' referred to […])" (Lakoff, 2006, p. 186). Conceptual metaphors, on the other hand, are instances that structure our "normal conceptual system", which is mostly "metaphorically structured; that is, most concepts are partially understood in terms of other concepts" (Lakoff & Johnson, 1980a, p. 477). For this thesis, only metaphoric expressions are of interest.

Metaphoric expressions can be conventionalized, as many other expressions. There is a vast amount of fixed expressions that are highly common in everyday communication. They comprise a number of subtypes of fixed expressions with different characteristics. A very typical example is idioms, such as *to throw in the towel, to drink sb. under the table, to have sb.'s back* or *to start a new life*. Idioms are most commonly seen as non-literal, fixed expressions, and very often, they are indeed conventionalized metaphors and metonymies that can be used in sentences as predicates. A typical metaphoric idiom from German is

(22) eine lange Leitung haben,

where what is said *(Leitung* as in electrical connection or cable) stands for something literally unrelated (the 'connective cerebral tissue' that makes comprehension possible). This is an example of a metaphor in which one concept is structured by means of another and expresses that someone is slow-witted. A typical metonymic idiom from German is

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short literal circumscription of this state can quite capture or mirror the meaning of the 'broken heart'.
These expressions cannot be directly translated into literal language other than through lengthy, complicated elaborations, whereas listeners seem to have a very good intuitive understanding of what these expressions mean.

(23) einen Luftsprung machen,

where *Luftsprung* refers to something that is literally or immanently related, or part of the same concept (i.e. 'extreme joy'). This is an example of the synedochal form PART FOR WHOLE in which one concept, a possible physical reaction (jumping), stands for the larger concept it is an element of, namely an emotion (joy).

Idioms are a highly pervasive language phenomenon: speakers are estimated to use 7000 per week (Hoffman, 1984). Given the frequency of fixed expressions on the one hand and the need of the human language processing system to be efficient on the other, it is believed that idiomatic expressions are stored as complete units in long-term semantic memory, or that their meanings are lexicalized. Similarly in cognitive linguistics, common fixed expressions are thought to be 'entrenched', which means that through frequent occurrence, they have become established in the mind as "cognitive pattern[s]", "routine[s]", and thus stored as linguistic wholes (Evans & Green, 2006, 114, 117). This is supported by ample empirical evidence of the processing advantage of idioms and other fixed expressions over nonidiomatic language (Cronk & Schweigert, 1992; Gibbs & Gonzales, 1985; Sprenger et al., 2006; Swinney & Cutler, 1979), as long as they are equally familiar (Libben & Titone, 2008; Schweigert, 1986) or equally conventional and salient (Laurent et al., 2006) to a reader or hearer. The faster processing of idiomatic expressions indicates that idiomatic meanings are not entirely composed from their individual constituents upon being encountered (Keysar & Bly, 1999), but that their comprehension is automatized to a certain extent. Familiarity evidently has a major influence in this process: Katz and Ferretti (2001) have shown that by encountering the second word of a proverb, readers already start to differentiate between familiar and unfamiliar proverbs, and this is true of both literal and figurative[10] contexts (Katz & Ferretti, 2001).

Indeed, processing advantages are found across other fixed expressions as well, independent of their non-literalness (Carrol & Conklin, 2019; Conklin & Schmitt, 2008, 2012; Tremblay et al., 2011). Processing advantages are also found for collocations such as *to take a risk, to change the subject, to pass a test,* which only differ from idioms (in the most common definition of idiom) in that idioms are seen as non-literal: while idioms have a second, separate intended

[10] "figurative" is the term used by the authors.

non-literal meaning, collocations are literal, fixed expressions with the same syntactic form as typical idioms, and have no additional meaning other than the one that can be derived by composing the meanings of their individual constituents. Because of this single semantic difference, collocations of the kind above will henceforth be referred to as 'literal idioms'. This term is used to promote clarity, terminological and conceptual consistency, and an easily comprehensible basis on which later chapters will discuss and compare non-literalness effects.

The findings outlined above imply that mainly the fixedness and familiarity of idioms affect their processing. Yet they cannot give information on whether literalness or non-literalness have an effect on processing ease as well. It could make a difference whether an idiom has a rather complex conceptual structure, as a metaphor, or a comparably simpler conceptual structure, as a metonymy, or even a very simple conceptual structure, as a collocation or literal idiom. There is indeed evidence that despite a certain degree of automatized comprehension, idiomatic meanings are semantically or conceptually accessed upon being encountered, as has been found in priming effects between idioms and words semantically or conceptually related to the idiomatic meaning (Cacciari & Tabossi, 1988; Sprenger et al., 2006; Titone et al., 2002). Conceptual and semantic priming effects for conventional metaphors (which are often similar to idioms or can be found in idioms) suggest that metaphoric structures affect processing (Coulson & van Petten, 2002; Lai et al., 2009; Lai & Curran, 2013).

1.2.5 Nonliteralness in Idioms

Ultimately, there is no study that examines the processing of metaphoric or metonymic structures in idioms directly. However, metaphor and metonymy are suggested to be processed in idioms: as argued by Omazić (2008), metaphor and metonymy should be among the influential factors to idiom processing because

> many authors have stressed and recorded the systematic clustering of figurative expressions around conceptual metaphors and metonymies (Lakoff & Johnson 1980; Kövecses 1986; Gibbs 1995). This implies that many of these expressions have a common underlying mechanism which is activated automatically and subconsciously in real time processing. In this view, conceptual metaphors and metonymies are both available and accessible in any context and can serve as a basis for understanding figurative language. (Omazić, 2008, 70f.)

To date, there is no empirical evidence for or against this idea. It remains open whether metaphoric or metonymic structures are in fact processed in idioms or affect their processing ease. More fundamentally, it is not even clear whether native speakers can consciously differentiate between different conceptual structures in idioms. Do they perceive a metaphoric idiom as in any way different from a metonymic idiom?

Metaphor and metonymy clearly differ in conceptual structure. It is not a necessary conclusion, but very possible that they also differ in their degree of non-literalness. Given the commonness of non-literalness and the facilitated comprehension of idiomatic meanings, is varying non-literalness even perceived in idioms? In favor of this might be the fact that non-literalness is generally seen as a crucial property of idioms by both laypeople and language scientists. At any rate, this indicates that exploring non-literalness in idioms could contribute to understanding how idioms are semantically processed.

Metaphors link distinct semantic concepts while metonymies work within one semantic concept. Thus it seems that what is said is likely cognitively or semantically closer to what is meant in a metonymy than in a metaphor. This implies that there is a difference in how literal metonymies are in comparison to metaphors. Consider example (24)

(24) Jamie always swims against the current.

In this example, someone expresses that their friend Jamie has a unique sense of fashion. The 'water current' stands for the literally unrelated 'sense of fashion', and the swimming defines the event in the context of the water current. It obviously does not refer to actual swimming, but has to be chosen to be semantically congruent within a setting where a person is in a water current. It can be concluded that this idiom – when used in its idiomatic sense – is highly non-literal. Consider the speaker wanting to express that a friend has a talent for being attentive to minor things:

(25) Jamie has an eye for detail.

In this situation, the speaker uses *eye* to refer to a skill that is directly related to seeing or discovering by looking. The physical organ 'eye' – as in eyeball, eyelid, etc. – is not the strictly intended meaning in this sentence but it is the core ingredient to the mentioned skill. If 'eye' is an element within the concept of 'seeing things well', their relation is likely closer than the relation between two

clearly distinct concepts such as 'swimming against a water current' and 'turning against a trend'.

Due to this analysis and the elaborations so far, I hypothesize that (25) is more literal than (24) and more importantly, that metonymy is in tendency more literal than metaphor. To illustrate this point by means of the same source concept in varying non-literal examples: metonymies (*money changes hands*) can in fact be close to the literal pole (as the money may actually be passed from the hand or possession of one person to that of another), and it may resemble literal language (*She washes her hands with soap*) more than highly non-literal language does (*They are hand in glove with each other*). The next section discusses empirical evidence that supports this hypothesis.

1.2.6 Metaphor and Metonymy Compared: Empirical Evidence

Can the difference between metaphor and metonymy with respect to non-literalness be reflected in how language users perceive or even process idioms? Even if this were the case, we could not conclude that metaphoric idioms are semantically processed differently from metonymic idioms. On the one hand, this could be true. Metaphors differ from metonymies conceptually and their non-literalness should be higher than that of metonymic idioms.

Empirical evidence on this exact matter is very scarce: No available study has examined the perception of non-literalness in metaphoric and metonymic idioms. With regards to semantic processing, some evidence exists: studies on metaphor processing alone are abundant, studies on metonymy processing alone are much rarer (studies to be discussed in chapter 3), and very few studies have compared metaphor and metonymy directly. Comparing children of different ages and adults, Rundblad and Annaz (2010) tested how well metaphors and metonymies were comprehended in a story-telling task. Participants were visually and aurally presented short picture-stories and then had to answer in their own words questions about the events depicted in one crucial picture that favored either the figurative or the literal interpretation. The youngest participants, five years of age, performed significantly better on metonymies than on metaphors, and performance on metonymy surpassed metaphor by 21% on average across all participant groups. Metaphor

comprehension improved with increasing age. This shows that comprehension of metonymy develops earlier than comprehension of metaphor. Both developments are closely linked with actual as well as mental age and begin to develop before the age of five. Very similar patterns were found by the authors in a previous, highly similar experiment (Annaz et al., 2009). Given that the comprehension of non-literal language develops much later and more slowly in children than the comprehension of literal language (Demorest et al., 1983; Glenwright & Pexman, 2010; Prinz, 1983; Reynolds & Ortony, 1980), these findings may also suggest that metonymy is more literal than metaphor.

A set of experiments measuring event-related brain potentials (brainwaves in response to stimuli) in a masked priming paradigm reveals very similar findings. The authors Weiland et al. (2014) compared brain wave reactions to metaphoric and metonymic sentences compared to literal control sentences presented to participants. Before the sentences, participants either received no prime words at all, or only subconsciously perceivable prime words that were non-literally or literally related to the sentences. Results overall indicate that metaphors are indeed more difficult to process than literal sentences, while for metonymy, the effort seems to depend on the type of metonymy. Findings also suggest that metonymies are indeed easier to process than metaphors and that both are more difficult than literal sentences (Weiland et al., 2014). Secondly, if reactions to metonymy are clearly similar to literal sentences and dissimilar to metaphors, this may imply that at least certain types of metonymy are clearly more literal than metaphors. In general, the findings discussed here might lead to the assumption that the processing differences will also be reflected in idioms.

A third study by Bambini et al. (2013) measured reaction speed to metaphoric, metonymic, and literal sentences by letting adult participants rate as quickly as possible whether the sentences were sensible. Their findings show that responses to the metaphors were much slower than to the literal sentences, whereas the responses to the metonymies were almost identical to the literal sentences. This indicates that the metonymies were easier to process than the metaphors, and the authors themselves suggest a “theoretical distinction” between metonymy and metaphor be adequate (Bambini et al., 2013, p. 938). Secondly, the reaction time pattern can be interpreted to mean that metonymies are also more literal than metaphors.

These studies together give empirical evidence that metonymy is more basic, easier to process and indeed treated as more literal than metaphor, and that metaphor is more difficult to process than literal sentences.

However, these studies were conducted using conventionalized forms of metaphor and metonymy, but very few types of metonymy, and most importantly, they did not use fixed idiomatic expressions. Idioms, however, are conceived of as lexical units stored as such in the mental lexicon (Sprenger et al., 2006) and their meanings seem to be retrieved automatically. This means that their non-literal structure is unlikely to be deconstructed and their meaning unlikely to be composed or constructed through mapping upon each encounter. Yet, idioms do differ in their processing advantages depending on several properties such as familiarity and transparency, although for some properties, presence or absence of effects also depend on the experimental task. This shows that language users differentiate either consciously or unconsciously among idioms according to certain idiom-typical properties. Thus there is reason to assume that they might also differentiate among idioms according to their differing non-literalness.

At this point, joining the different findings creates a chasm: in cognitive linguistic views and beyond, it is assumed that metaphor and metonymy have different conceptual structures. While semantic processing and quantitative empirical research testing theories with language users is not a focus in cognitive linguistics, it has at least been voiced that the different non-literal structures should affect the processing of idioms (Omazić, 2008). Furthermore, empirical research from psychology and psycholinguistics has shown that metaphors are more difficult to process than both metonymies and literal language, while metonymies can still be more difficult than literal language. In contrast, empirical research has shown that idiomatic expressions have a processing advantage over nonidiomatic language. One reason may be that idiomatic meanings are entrenched. Yet, idioms tend to be non-literal and are often metaphoric or metonymic. Consequentially, if idioms are equally familiar and their meanings thus equally entrenched, it is unclear whether differing non-literalness has any effect on their processing.

1.2.7 Research Questions

Given the contrasting findings discussed and the gap in empirical research, the following questions obtrude:

1. **Does the different kind and degree of non-literalness in metonymic compared to metaphoric idioms affect their processing ease – as long as the idioms are equally familiar?**
2. **Is the differing non-literalness in metonymic compared to metaphoric idioms consciously perceived?**

To answer these questions, a series of steps is necessary. First, a database of adequate metaphoric and metonymic German idioms must be found. These idioms must be comparable and thus meet several criteria. Most importantly, the idioms need to be potentially familiar to an average adult German native speaker. The second step is to let the idioms be rated on non-literalness and other influential properties that might be connected to non-literalness. This rating study will answer question 2), whether the non-literalness in metonymic and metaphoric idioms is consciously perceived. The second reason for this necessity is that the database must make it possible to select experiment material for the semantic processing experiments. The experiment material must be matched across a number of dimensions as idioms differ across a number of properties (Nunberg et al., 1994).

To answer question 1), semantic processing experiments are conducted. It is most desirable to examine the processing of idioms in context because this is closer to a natural situation, thus reading experiments with idioms embedded in sentences are an appropriate choice. Given that the degree of non-literalness is one focus of this project, comparing non-literal idioms to literal idioms gives a more comprehensive and complex insight than only comparing metonymic to metaphoric idioms. Lastly, to test whether non-literal structures affect semantic access and whether degree and kind of non-literalness cause stronger or weaker activation of literal meanings, a primed lexical decision task is a suitable method. The last section of this introductory chapter gives a detailed overview of the outline of this thesis. It also summarizes the experiments and findings.

1.3 Outline

Chapter 2 presents the conduction and findings of a large rating study which consists of four separate questionnaires successively released to different groups of participants. The goal of this study was twofold: First, there are no publically available corpora for German idioms, at least none with a suitable size and with a distinction of metaphoric and metonymic idioms. Thus, the first step was to create a collection of idioms suitable to the purposes of the present research project. The chosen idioms are substantive, grammatical, and without "pragmatic point" (Evans & Green, 2006, p. 645). The metonymic idioms are mostly based on the forms PART FOR WHOLE and WHOLE FOR PART as these are particularly frequent in idioms; the metaphoric idioms are mostly based on structural metaphors. The challenge of idioms is that they can be highly idiosyncratic and differ along a number of properties that affect their processing ease. In order to test the impact of one such property, other properties have to be controlled for to avoid their unwanted confounding effects on the processing system. Furthermore, there is no way to objectively measure and determine the degree of most properties affecting semantic processing – such as familiarity and transparency – in individual idioms. The most obvious reason is that these properties are subjective: they largely depend on how idioms are perceived and individually made sense of. In such situations and psycholinguistic settings, it is best practice to let individuals from the target group rate such properties for each individual idiom.

The second goal of this rating study was to explore how typical properties of idioms are connected to non-literalness. For example, it is imaginable that a highly comprehensible idiom is likely to be perceived as rather literal as well. Thus, non-literalness was rated alongside familiarity, comprehensibility, and closeness of relation between the literal and the idiomatic meaning of an idiom. The latter two properties together form the property of transparency which mostly sums up the variant definitions by different authors (Abel, 2003; Cacciari & Glucksberg, 1995; Citron et al., 2016; Gibbs et al., 1989; Nippold & Taylor, 1995, 2002; Nunberg et al., 1994; Zwitserlood, 1994). The rating study reveals two things: first, native speakers can capture the tendency of a higher degree of non-literalness in metaphoric idioms, and a lower degree of non-literalness in metonymic idioms. Second, non-literalness is strongly connected to

transparency, and most importantly, that metonymic idioms are perceived as considerably more literal than metaphoric idioms.

Chapter 3 explores and discusses whether the differences in perception are mirrored in reading sentences containing literal, metonymic, and metaphoric idioms. I conducted two self-paced reading experiments with the same idioms. Both investigated whether non-literalness had an effect on reading ease and speed. Experiment 1 investigated whether this was the case when the idiom occurred in a neutral context, meaning that readers could not anticipate from the beginning of the sentence the semantic content of the idiom that immediately ensued. In experiment 2, sentence beginnings prepared readers for the content of the ensuing idiom. In both cases, literal idioms and metonymic idioms were read significantly faster than control sentences, while metaphoric idioms were only read significantly faster in the preparatory context, and then, the effect was smaller than for literal idioms and metonymic idioms. This suggests than higher non-literalness is more difficult to process than higher literalness even when an idiom is well-known and expected. However, this is not a linear effect: whether the literal idioms (very literal) or the metonymic (less literal idioms) are processed fastest of all depends on the sentential context, thus on whether the idiomatic content is expected. These findings are discussed in depth in chapter 3.

In any event, effects of processing should be tested with various methods for either stronger evidence or more nuanced and complex insight. For example, a self-paced reading can only measure how fast different idiom types are read and understood, but it does not reveal whether nonliteral structures affect semantic access or whether degree and kind of non-literalness cause stronger or weaker activation of literal meanings. For this reason, I conducted two primed lexical decision experiments, presented in chapter 4. The aim was to compare automatic processing of metonymic and metaphoric idioms, assuming that higher literalness would be processed faster. Thus short prime sentences were constructed containing either a metonymic or metaphoric idiom and paired each with a word literally related, nonliterally (thus idiomatically) related, and unrelated to the idiom. Would the perception of metonymic idioms as more literal be mirrored in faster processing of metonymic idioms, and particularly in fast reactions to literally related words? This would mean that metonymic idioms would be processed as more literal even automatically, and that higher literalness would be easier to process automatically. This hypothesis could not

be borne out with either of two different groups of participants and neither in a laboratory nor in a more natural setting. An additional, different statistical analysis (Bayesian linear mixed regression) suggests that there are indeed no differences in reactions to metonymic and metaphoric idioms. This finding implies that non-literalness has no effect on automatic processing, yet details and alternative explanations are in discussed in chapter 4.

Chapter 5 compares the experimental findings and discusses them in the framework of selected idiom processing models. Findings fit with the Graded Salience Hypothesis and partly with the Configuration Hypothesis and the Hybrid Model. Moreover, it can be concluded that depending on the task, there is a trade-off in non-literalness and idiomaticity and that in early semantic processes, type and degree of non-literalness do not have an effect, yet possibly later. Chapter 5 also gives an overview of how to further pursue the question of how non-literalness affects the processing of idioms.

Chapter 2

Metonymies are more Literal than Metaphors: Evidence from Ratings of German Idioms

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Chapter 3

Speedy Metonymy, Tricky Metaphor, Irrelevant Compositionality: How Nonliteralness Affects Idioms in Reading and Rating

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pp. 56-82.

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Chapter 4

Swallowing the pill and being laid to rest: No advantage for metonymic over metaphoric idioms in primed lexical decisions?

Journal of Articles in Support of the Null Hypothesis
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https://www.jasnh.com/pdf/Vol17-No1-article2.pdf

Chapter 5

Conclusion

Several experiments were conducted to answer the questions of whether non-literalness is perceived in idioms and whether it affects their semantic processing. A rating study clearly detected whether there is a systematic difference in how non-literal different types of idioms are perceived, while four experiments yielded mixed results with regards to whether non-literalness is an influential factor in semantic processing. Results are discussed in the next section.

5.1 Results

In sum, most of the results provide evidence that metonymies are easier to process and more basic to cognition than metaphors, even in idioms. The rating study shows that metonymic idioms are indeed perceived as more literal than metaphoric idioms, some even as extremely literal. This could not only be shown in the descriptive statistics, but also by the fact that non-literalness is the one variable than can clearly predict idiom type. Specifically, when an idiom has been rated as highly literal, it is many times more likely to be a metonymic than a metaphoric idiom. Vice versa, when an idiom is rated as highly non-literal, it is many times more likely to be a metaphoric than a metonymic idiom. Given that non-literalness strongly correlates with the closeness of relation between literal and non-literal meaning of an idiom, it might be assumed that relation is an equally good or possibly even better predictor for idiom type. This is not the case, however. The regression models show that non-literalness is a stronger and more exact predictor that also fits the data much better.[22] We can clearly conclude that metonymic idioms are perceived as more literal than metaphoric idioms. It could also be shown that familiarity and non-literalness do not correlate, meaning that familiar idioms are not likely to be rated as more literal than barely familiar idioms.

[22] This has also been confirmed in a number of bootstraps which check for stability and robustness of the results.

Findings are less straight-forward in the processing experiments, especially combined. The reading experiments show that a number of factors affect reading times. First, all idioms have some processing advantage over non-idiomatic control sentences, which is a well-established finding. Second, we found that the reading speed of the idioms partly depends on the sentential context. Both literal and metonymic idioms had clear processing advantages, whether the semantic content of the idiom was expected or not. However, in a neutral context, metonymic idioms were read fastest of all, closely followed by the literal idioms, while in the biasing context, literal idioms were processed fastest. Metaphoric idioms, on the other hand, were only read significantly faster when their semantic content was expected. In a neutral context, their processing advantage was too small to be significant. Together, these findings indicate an effect of non-literalness, namely a limited processing advantage for higher literalness. The experiments give evidence that higher non-literalness in familiar idioms causes more processing difficulty. However, the third factor that influences processing is idiomaticity. Given that idioms are mostly seen as non-literal and a great number of them actually are, extreme literalness might lower their idiomaticity. This would mean that only those idioms have the greatest processing advantage that are both highly idiomatic and comparably (not extremely) literal. The findings suggest that these two properties complement each other best in metonymic idioms. Metaphoric idioms (highly non-literal, highly idiomatic) have smaller advantages, while literal idioms (extremely literal, not very idiomatic) at least have a smaller advantage than metonymic idioms in the neutral context. For the nonsignificant finding for the metaphoric idioms in neutral context, it should be noted that they might be a false negative, caused by a comparably large standard error and possibly not enough participants for a small effect.

The primed lexical decision tasks reveal no processing differences for metonymic compared to metaphoric idioms. Findings also include the well-documented semantic priming effect that leads to fastest reactions to the most closely related words. These are the non-literally, i.e. idiomatically, related words. As reactions to the literally related words are only faster than unrelated words in one of two experiments and across both idiom types, we cannot safely conclude that literal meanings of the idioms are activated in this task. If metonymic idioms were indeed processed as more literal, reactions to the literally related words should have been faster when preceded by a metonymic

idiom than when preceded by a metaphoric idiom. This expectation could not be borne out. Given that at an interstimulus interval of 200ms, only automatic but not controlled processing has begun, we can conclude from these findings that processing the higher or lower non-literalness or a different idiomatic structure is not included in automatic processing. It should be borne in mind that in interpreting the results of the lexical decisions, I defined all effects between -10 and 10ms as null effects because they are too small to allow robust conclusions as to the existence of a true effect.

5.2 Evidence for Idiom Processing Models

Discussing the findings in the frameworks of existing idiom processing models is somewhat challenging because none of them consider different kind and degree of non-literalness a determining factor to the processing of idioms. In addition, the sum of my findings does not lend absolute support to one particular model, but supports several hybrid accounts partially. Differences between compositional, noncompositional, and hybrid accounts are explained in Chapter 3.5.

5.2.1 The Graded Salience Hypothesis

Taken together, the findings from the processing experiments support the Graded Salience Hypothesis (Giora, 1997, 2003) partially. This theory is not an idiom processing model, but a more general theory of efficient processing and comprehension that explicitly does not assume different processing mechanisms between or approaches to literal and non-literal language, as is sometimes done in linguistics. Rather, it is based on the observation that all utterances have multiple meanings because all language is ambiguous, and that an utterance is determined by *meaning salience*. The most salient meaning is "the most conventional, popular, frequent, familiar, or predictable, or (...) the most probable interpretation" (Giora, 1997, p. 186). Meaning salience is thus a matter of degree and is also to some extent driven by the context, although Giora (1999) has also shown that the salience of idiomatic meanings takes priority even in contexts that would rather bias a nonidiomatic interpretation. Results of both self-paced readings are in line with these findings in that they

also show faster processing for idioms, because they are recognized as familiar linguistic units and their idiomatic meanings are thus the most salient.

Giora (1997) concedes that context also contributes to salience, but that its influence is limited. The different processing patterns in the neutral and the facilitating contexts found in the present experiments are rather in line with the idea that context does affect salience. Thus the present findings do support the Graded Salience Hypothesis, but they go beyond what it can address. In the neutral context, a combination of rather high idiomaticity and rather high (but not extreme) literalness lead to the greatest processing advantage, while the highly non-literal idioms still had a processing advantage which was very small in comparison. With a facilitating context, a more linear effect of non-literalness could be detected within the idioms, suggesting that extreme literalness is processed fastest and extreme non-literalness is processed slowest.

Results of the primed lexical decision experiments also support the Graded Salience Hypothesis. It would support the well-known semantic priming effect which holds that the word most relevant to the prime should be activated the most strongly and thus evoke the fastest reaction. In lexical decisions with idiom primes, reactions to words non-literally related to the idiom should be faster than to words related in other fashions. According to my hypothesis that the higher literalness of metonymic idioms could be mirrored in this task, literally related words preceded by a metonymic idiom should not only be processed faster than unrelated words, but also faster than literally related words preceded by a metaphoric idiom. This is probably not the case, however.

But are the reactions to literally related words generally in line with the Graded Salience Hypothesis? It does not explicitly predict a faster reaction to literal compared to unrelated words when they are preceded by neutrally presented idioms, but it does build on the findings by Gernsbacher and Faust (1991a) and Gernsbacher and Faust (1991b) that information irrelevant to the intended meaning is inhibited by the processing system. Thus reactions to literally related words might be either slightly faster or possibly even equally fast than unrelated words. Results from the present experiments are inconclusive: Findings in lexical decision 1 suggest literal and unrelated words to be processed equally fast, whereas findings in lexical decision 2 suggest a small processing advantage for literally related words. It is clear, however, that at least at this very early stage of semantic processing metonymic idioms are not processed as more literal, but rather as any other highly familiar idiom.

5.2.2 The Configuration Hypothesis

Our findings from the self-paced readings also partly support the Configuration Hypothesis (Cacciari & Glucksberg, 1991; Cacciari & Tabossi, 1988). This model of idiom storage and processing is a hybrid account, as opposed to compositional and noncompositional accounts. The following excerpts are taken from (Michl, 2019b) or chapter 3 and reworded:

The Configuration Hypothesis holds that idioms are represented by their single constituents and as configurations of meaning which arise from the links between their constituents. Idiomatic meaning is comprised of a distributed representation associated with the idiom. At first pass, an idiom is interpreted unidiomatically and the literal meanings of the individual words are activated until it is recognized as a familiar idiom at the so-called 'idiomatic key'. Upon recognition, comprehension mechanisms switch to idiomatic interpretation. Recognition and activation of the idiomatic interpretation only occurs once a sufficient portion of the idiom has been encountered (Cacciari & Glucksberg, 1995; Cacciari & Tabossi, 1988).

However, our results cannot be explained merely within the paradigm of the Configuration Hypothesis, but only if processing costs from the interpretation switch are assumed. From the results at hand, it has to be assumed that the change to a different interpretation path comes at a cost and leads to a slackening of processing speed, the more non-literal an idiom is. In a biasing context, an idiom can be recognized sooner (Cacciari & Tabossi, 1988; Cacciari & Zardon, 1993) and the effect of slowing processing speed through switching interpretation paths should be smaller, as results from the biasing-context condition indicate. All idioms at first seem to be processed significantly faster than controls, but the small advantage for literal compared to metonymic and, respectively, metonymic compared to metaphoric idioms indicate that non-literalness still has a small effect even when the semantic content is expected. Bootstraps confirm this pattern, but suggest the processing advantage for metaphoric idioms to be unreliable, support this effect.

While the Configuration Hypothesis makes no specific predictions about non-literalness in idioms, it can account for most of our findings—with the

addendum that a shift from a literal to a highly non-literal interpretation comes at a cost and increases processing load.

Findings from the lexical decisions are in line with the Configuration Hypothesis. It predicts that once idioms are recognized, reactions to non-literally related words are faster than to literally related words. The fast reactions to non-literally related words and slower reactions to literally related words indicate that the idioms were easily and reliably recognizable – or that the idiomatic key occurred early. Importantly, the (nonexistent) finding that non-literalness should affect processing in the lexical decision as executed here would be difficult to interpret within the framework of the Configuration Hypothesis because it would indicate that the position or recognition of the idiomatic key were determined by the non-literalness of an idiom.

5.2.3 The Hybrid Model

The Hybrid Model of idiom comprehension (Titone & Connine, 1999) is based on the Configuration Hypothesis. It also characterizes idiomatic expressions both as single units AND compositional word sequences, whose meanings are, however, both directly retrieved and literally analyzed during comprehension. It is also partially supported by the present results from the self-paced readings. Similarly, it proposes that all idioms undergo both compositional analysis and direct retrieval of the idiomatic meaning. While the Hypbrid Model does not explicitly address literal idioms, findings on these can also be interpreted within its framework.

Titone and Connine (1999) suggest that processing is facilitated when the products of a literal analysis overlap with the idiomatic meaning, while processing is more difficult if the literal interpretation is distinct from the idiomatic meaning. If conventionality (as driven by familiarity and likely comprehensibility) of idioms is constant and compositionality has no effect, increasing transparency is the only facilitator. This would once again predict that literal idioms be processed fastest, followed by metonymic, and metaphoric idioms, due to the increasing disparity between literal and idiomatic meaning. Within a neutral context, the present results meet this prediction partly in the comparably large processing advantage for metonymic compared to metaphoric idioms. Within a biasing context, the results at hand meet this prediction in the

tenuous tendency for a hierarchical processing advantage from literal over metonymic to metaphoric idioms as the least advantageous.

Interpretation of the lexical decision results is interesting in the framework of the Hybrid Model. It does not consider non-literalness to be a determining factor in the processing of idioms, but it does assume transparency to determine idiom processing. Given that idioms in our lexical decisions were equally conventional, transparency should have an effect, as is also found in their eye-tracking experiment (Titone & Connine, 1999). As their definition of transparency equals our definition of relation, and relation and non-literalness were found to correlate negatively (chapter 2), we might expect reactions to metonymic idioms to be faster than to metaphoric idioms, for both non-literal and literally related words. This was not found, however. There are several potential reasons for this. One, Titone and Connine (1999) also suggest that decomposability may determine idiom processing, and decomposability was not controlled for in the lexical decisions at hand. On the other hand, an effect of decomposability was found at an ISI of 1000ms (Libben & Titone, 2008) which is five times longer than in our case. Second, even a strong correlation does not mean that values of non-literalness can exactly be interpreted as inversed values of relation ratings. Thus, transparency cannot simply be concluded to have had no effect in the present experiments, because it was not measured. Third, the authors of the model tested it with a reading task in an eye-tracking experiment (Titone & Connine, 1999). Conclusions from this highly different method, design, and materials are not suitable to be transferred directly to a lexical decision testing for automatic processing. For these reasons, our findings cannot be interpreted conclusively within the framework of this model.

5.3 Answers to the Research Questions

Does differing non-literalness determine semantic processing of idioms? Secondly, are different types of idioms, however common and lexicalized, perceived as differently non-literal?

From the results found so far, the second answer is affirmative: metaphoric idioms are indeed perceived as distinctly more non-literal than metonymic idioms. The first question cannot be answered exhaustively from the present studies; each individual method of testing can only answer it partially. The

answer to the second question is that it depends on the exact mode of semantic processing. Non-literalness impacts semantic processing even in the reading of highly familiar idioms that are also easily comprehensible. Yet at least in self-paced reading, the factor of idiomaticity also interferes with the effect on non-literalness, so there seems to be a trade-off at least when idioms are presented in neutral context. On the other hand, in a facilitating context, it seems that the effect of non-literalness is weaker, but more linear. However, non-literalness does not affect automatic semantic processing of familiar, easily comprehensible idioms: it seems that at very early stages of processing, metonymic and metaphoric idioms pose the same challenges to the system, independent of how literal or non-literal they are. This can at least be concluded when idioms are presented aurally in otherwise neutral short sentences. It cannot be concluded beyond any doubt whether literal meanings are activated at this early stage. Beyond the results themselves, however, a persistent question of empirical research is the scope of the validity of its findings.

5.4 Generalizability

Normally, it is an important and desirable goal to be able to generalize experimental findings to reality and from the participants tested to the general public of interest. With the means available, I have attempted to achieve this to the best of my abilities, as the population of interest was monolingual German native speakers who had spent most of their upbringing in Germany. Evidently, the familiar rule that results are representative of the general public if $n = 1000$ carefully diversified participants cannot be approximated by the numbers that can be tested in psycholinguistic experiments. However, it is possible even with very limited resources to achieve more variety in the population than is often accomplished in psycholinguistics where the tested populations frequently comprise up to 32 undergraduate students of psychology at a particular university. Some diversification within residence, age, and professional background of the participants could be achieved in the present project: In the studies, German native speakers are represented from all federal states, from the ages from 17 to over 86, with extremely different professional backgrounds and educational degrees ranging from a 9-year school diploma (Hauptschulabschluss) to ‘PhD and higher’. In the reaction time experiments, age

ranges were intentionally more restricted because increasing age leads to slower reactions. Moreover, there is a clear bias towards participants with successful A-levels or even a university degree. This population is much easier to reach and responds the most positive to scientific experiments as conducted here. In terms of residence, some degree of bias exists for Berlin-Brandenburg and Baden-Württemberg for the lab-based experiments. As laboratories are topographically bound, this is unavoidable. On the other hand, the strength of testing in these two areas is the great geographical distance and thus dialectal difference between them. In the rating study, there was some residential bias for Berlin-Brandenburg, Baden-Württemberg and Bavaria, but given that Southern Germany contains a high percentage of national residents, this may in fact be partly representative of the citizens of Germany. In the end, it should be noted that neither residency nor educational nor professional background actually affected idioms ratings or semantic processing.

Within the confines of restricted temporal, financial, and other means, I could still recruit over 700 participants altogether (plus around 40 pre-testers and idiom classifiers in addition to myself). Second, the experimental series also includes two runs of the same experiment which is good practice to strengthen previous findings.[23] Third, the Bayesian regression analyses for the last experiment clearly increases generalizability by allowing inferences from experimental findings to reality. It follows that although the research situation was typical of psycholinguistic research settings which are clearly not ideal, the measures taken here should somewhat increase generalizability to well beyond what is typical of many psycholinguistic findings.

5.5 Challenges

Further challenges can arise in testing metonymic and metaphoric idioms. One issue might be that kind and degree of non-literalness cannot be separated for the idioms of interest. As shown in the introduction theoretically, metonymies should be more literal in nature than metaphors. In chapter 2, it was shown that native speakers agree with this analysis and tend to perceive

[23] More repetitions of an experiment would be better, but are very challenging to conduct in the face of very restricted means, pressure to publish novel and positive findings, and the pressure of today's scientific mindset to discover new things rather than confirm or refute previous findings.

metonymies as more literal than metaphors as well. Metonymies and metaphors are, however, different KINDS of non-literal language or figures of non-literal speech, depending on the tradition of the scientific field. No theory or analysis has doubted that metonymy and metaphor are two kinds of non-literal language. If they differ in their DEGREE of non-literalness as well, then degree and kind cannot be separated: an idiom (or possibly even nonidiomatic utterance) is either metonymic and rather literal or metaphoric and rather non-literal. While there may evidently be single metonymic idioms that are more non-literal than single metaphoric idioms, metonymic idioms as a group are more literal than metaphoric idioms as a group. This leads to the problem that any experiment finding processing differences between the two groups might be able to ascribe these differences to the factor of differing non-literalness – but it cannot determine whether the KIND or the DEGREE of non-literalness causes that difference.

To test only the degree of non-literalness, it would be necessary to test only one idiom type (for example either only metonymic or only metaphoric idioms), of which one finds enough rather literal and rather non-literal cases. As kind and degree of non-literalness correlate strongly, it might prove to be difficult to find enough items, that is idioms for a high-powered experiment. Alternatively, one might compare different idiom types that all prove to have the same degree of non-literalness, as could be rated by native speakers. The difficulty here might be that if the amount of items is high enough, they might differ along other properties that have to be controlled to avoid confounding variables. At any rate, it stands to reason that in other types of idioms, kind and degree of non-literalness are also inseparable and strongly correlate.

A second caveat was already hinted in the chapter 1.2.3: boundaries between metaphor and metonymy can be fuzzy. It should be borne in mind that despite distinguishing definitions, certain idioms could be classified as either metonymic or metaphoric where no final universally decisive analysis seems possible. One example from both German and English is *da stimmt die Chemie/the chemistry is right* between or among humans. This idiom can be seen as metaphoric in that a well-working mix of chemicals or elements is likened to a harmoniously interacting group of humans. Thus, a metaphor arises through an analogy or similarity between two distinct concepts, ‘chemistry’ and ‘human relationships’. In contrast, *the chemistry is right* can also be defined as metonymic because actual chemical reactions take place between interacting

humans. The most well-known example is that pheromones are emitted by humans and subconsciously perceived by others whose pleasure or displeasure has a powerful impact on whether they like the other person. From this point of view, the 'right chemistry' is part of the greater concept of 'harmoniously relating group of humans'. A person's classification of this idiom as metaphoric or metonymic likely depends on their, if only momentary, awareness of the existence of chemical reactions among humans.

Other cases where opinions were divided within my database were idioms built on the concept of 'way': *keinen Ausweg sehen* (to see no way out), *seinen eigenen Weg gehen* (go one's own way), and *etwas in die Wege leiten* (set sth. in motion).[24] These idioms can be seen as metonymic if, for example, 'Ausweg' is seen as akin to 'Lösung' which would match the metonymic form PART FOR PART; if 'eigener Weg' is seen as including 'eigene Vorstellungen', and if 'Wege' in *in die Wege leiten* is seen as 'Entwicklungsmöglichkeiten', which conforms to the metonymic form WHOLE FOR PART. In these interpretations, mapping between what is said and what is meant occurs within the same semantic concept. From this point of departure, one might argue that literal ways are not just topographically constructed connections between locations, but are also, still LITERALLY, processes in life such as developments, decisions, or strings of actions.

On the other hand, especially under a Lakoffian view, one might also say that all 'ways' that designate processes and are not literal topographical connections between locations are intended metaphorically. Under this interpretation, 'Weg' is one concept mapped onto another distinct, unrelated concept such as 'Lösung', 'Vorstellungen', and 'Entwicklungsmöglichkeiten' which are each individually linked to 'Weg' by a common feature. As straightforwardly classifiable as many idioms may be at first and second sight, there are a few cases where good arguments can be made for either classification and the final decision depends on an individual perspective.

A third challenge in investigating the effect of non-literalness by psycholinguistic means is that literal idioms – often referred to as collocations – cannot always be tested in an identical fashion to metonymic and metaphoric idioms, depending on the experimental method. It was assumed in chapters 1 and 3 that the literal idioms used only differed from the non-literal idioms in

[24] In both *keinen Ausweg sehen* und *seinen eigenen Weg gehen*, 2 classifications were in favor of metaphoric, 4 metonymic; in *etwas in die Wege leiten,* votes were divided 3:3.

one respect: they had no non-literal meaning in addition to their literal meaning, instead, their literal and idiomatic meanings were one and the same. In investigating the degree of non-literalness, it is strongly advisable to also test extremely literal cases to gain insight of the full extent of the property of interest, and to be able to compare these to the more non-literal cases. This indeed revealed very interesting findings in the self-paced readings. The complex interplay of sentential context, idiomaticity, and the capped, non-linear facilitatory effect of high literalness could not have been discovered had literal idioms been excluded from the material. While the design of the self-paced reading studies is very capable of testing literal idioms, the design of the lexical decision for idioms is unsuitable for them. While the dichotomy of literal/non-literal meaning and speakers' reaction to them can well be observed in an 'idiom prime – literal word / idiom prime – non-literalword' paradigm, literal idioms do not have this dichotomy. In the design of the lexical decision as used here, only uninformative and thus redundant comparisons are possible, such as 'literal idiom prime – literal word' vs. 'literal idiom prime – unrelated word', or 'literal idiom prime – literal word' vs. 'literal idiom prime – alternative literal word'.

A method to compare processing ease of literal to non-literal idioms could be time-sensitive sensicality judgments (Bambini et al., 2013) which also measure reaction times and are very similar to lexical decisions. In this task, participants would indicate by key press as quickly and correctly as possible whether a presented idiom is a sensible utterance. If all other idiomatic properties influential to semantic processing are matched except the property of interest, non-literalness, then differences in the reaction times between literal, metonymic, and metaphoric idioms should be caused by the varying non-literalness. A problem within this task might be, however, that literal idioms seem to have lower idiomaticity (as discussed above and in chapter 3.5) and might thus trigger slower responses. A researcher would have to attempt to tackle this problem through the mode of presentation of the materials. At any rate, s/he will face the problem of methodological limitations of testing the effect of non-literalness when using literal idioms in comparison to non-literal idioms.

5.6 Directions of further Research

The second research question can be answered partially at this point. A number of means might be used to further pursue an exhaustive answer. First, as discussed in chapter 4.4, non-literalness effects might well be found by tweaking a methodological criterion in the primed lexical decision task. Given that non-literalness of idioms could be a factor in their controlled processing, a longer interstimulus interval between prime and probe could be chosen. At an ISI of at least 400ms instead of 200ms, controlled, conscious processing sets in which has been linked to expectancy-based strategies (Carter et al., 2011; Hutchison et al., 2013; Spencer & Wiley, 2008). It is theoretically possible that the greater literalness of metonymic idioms only affects semantic processing in the controlled processing phase.

In addition to the offline experiments conducted so far, a further step could be to conduct online experiments such as an ERP experiment measuring the N400 component. The N400 is a negativity effect that occurs in the brain 300 to 500ms after presentation of a stimulus or target word. Large N400 amplitudes are associated with factors determining high semantic processing difficulty, particularly unexpectedness (Kutas & Hillyard, 1980). For an N400 measurement, the materials from the lexical decisions could be used, and an ISI of about 400ms between prime and target should be employed. A large N400 amplitude after a presented target word would indicate its high unexpectedness. For literal words followed by metonymic idioms and literally related words, then, the N400 component should be smaller than for literally related words preceded by metaphoric idioms. This is expected because as per the semantic priming effect and the fact that metonymic idioms are more literal, the literally related words should be activated more strongly which would be reflected by a small N400 component. The ERP-method is suitable to show windows of the time course of semantic processing as it can reveal what happens in the brain at precise latencies.

Another possible online method is pupillometry. Pupil contraction or dilation in response to a stimulus can indicate lower or higher processing load, thus processing difficulty. Pupillary responses are also driven by other psychological, mental, and physiological factors and the pupil is known to react with a delay of up to 1000 milliseconds or reach its peak dilation at about 1000 to 1200ms after stimulus display in cognitive tasks (Beatty & Lucero-Wagoner, 2007). Despite these facts, the lexical decision material could be used in a

pupillometry.[25] Once again, strong pupil dilation in response to a word would indicate greater processing difficulty of that word. For example, if different non-literalness in idioms and its effect on the processing system can be measured in this task, we might see weaker pupil dilation when participants read a literally related word preceded by a metonymic idiom than when they read a literally related word preceded by a metaphoric idiom.

Beyond this research project, the findings concerning the effect of non-literalness have been constrained to familiar idioms only. To get a more encompassing idea as to how non-literalness affects the semantic processing of idioms, it would be helpful to test less familiar and less comprehensible idioms in psycholinguistic experiments. There is reason to assume that non-literalness may have a stronger effect: less familiar idioms tend to be less lexicalized and their processing less automatized as they are less entrenched. As reliance on the lexicon cannot be as strong, other idiomatic properties may be needed to retrieve their meaning. Testing less familiar idioms might have the advantage that an idiomaticity effect is less interfering because idiomaticity is lower. Despite this advantage, less or barely familiar idioms might be more challenging to test: there is a chance that they are entirely unfamiliar which means that they are not recognized or lexicalized as idioms, or that participants either do not know their meaning or are unconsciously mistaken about it. In addition, there may be reasons why rather unfamiliar idioms are rather unfamiliar: they could be tied to certain situations, social groups, registers, or geographical/political regions, contain rare words, be dated, or require specific knowledge to be understood. In summary, rather unfamiliar idioms are more likely to be difficult to match on certain properties, thus more difficult to test and compare in experiments as conducted and discussed here.

5.7 Outlook

Until today, quite a few idiom-specific properties have been researched as to their effect on semantic processing, not of all of which were discussed in this thesis. It seems that idiom processing research is still in its collection phase: properties are still being "discovered", re-visited and their effects re-tested in varying experiments and languages. It is clear that some properties impact

[25] I have conducted this experiment; final results are pending.

semantic processing, but the findings often depend on the specific methodological details. It would be very helpful to unite all findings and create a comprehensive picture of which of these properties truly have robust effects, to what degree, under what circumstances, and especially, whether there is a hierarchy in their importance. This is without doubt an extremely challenging task, but would be a worthy step to advance this research field. Years and decades coming will show whether it may enter a – goal-worthy – clarification phase: whether additional findings will make it possible to bundle some properties to fewer umbrella properties whose effects and significance are very clear, or whether some properties will be discovered to be more important to semantic processing than others even BEYOND methodological causes. Non-literalness seems a promising property to explore further in this regard: Not only has it received undeservedly little attention, but it also comes in many more shapes and shades than the already complex metaphor or metonymy. On this note, it is time to keep our noses to grindstone, be prepared to pull our socks up with empirical research, and keep our eyes on the ball.

Lastly, I would also like to point out that I have proven in this thesis that it is possible to write about idioms without using the examples “kick the bucket” or “spill the beans”.

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Appendix

A. Chapter 2 – Effect of Familiarity on other Ratings by Self-Report

Our study also had participants self-report how strongly they felt their comprehensibility, relation, and nonliteralness ratings were influenced by how familiar the idiom was to them. The findings somewhat mirror the absence or weakness of correlations between familiarity and the other properties. In the comprehensibility survey, only 31% feel their rating was very strongly or strongly influenced by how familiar the idiom was to them, 17% report some influence, while 52% report no or very weak influence.

In rating the relation between idiom and meaning, 26% of participants felt (very) strongly influenced by how familiar the idiom was to them, 28% report some, while 46% report no or very weak influence.

In rating nonliteralness, 36% of participants felt (very) strongly influenced by how familiar the idiom was to them, 30% report some, while 34% report no or very weak influence.

It is unclear how difficult it is to block influence by familiarity, whether it occurs subconsciously and whether its effect can be adequately gauged by participants themselves. These three surveys contained the help instruction to not let familiarity influence the ratings. So on the one hand, participants likely tried their best to follow and could then gauge the influence on a scale of 1 to 5 (“none” to “very strong influence”). Usage of the full scale in all surveys at least indicates large individual differences in how successful blocking the influence worked, or at least how participants perceived it. As the comparably large shares of ratings on the low end (“no/very weak influence”) of the scale shows, it seemed possible for over one third to over one half of participants to largely block influence by familiarity. Although no rewards or sanctions were tied to succeeding in this respect, answers in favor of the instruction cannot be ruled out.

B. Chapter 3 – Theoretical Alternative for Building Matching Control Sentences

In building control sentences, constraints well-known to idiom experimenters arise: idioms require a fixedness of word choice such that synonyms or semantic neighbors can rarely replace words without rendering the idiom unrecognizable, marked, or changing the meaning. Some idioms require certain contexts to be understandable or unambiguous, some contain words rather rare in absolute terms yet very common within the idiomatic use, while the idioms themselves are actually very common or well-known themselves. However, exact overall match of length and frequency was done wherever possible. While it is most common to match control items as closely as possible to the test items by using as many of the same words in the same order as possible, this kind of "formal matching" causes an unavoidable difference in the meanings of sentences, which cannot be quantified. Size and effect of divergence or even fundamental difference in meanings of items remain unobservable and unmeasurable in par-ticipants' minds. The problem of this "black box of meanings" could be dissolved by matching sentences for meaning. This would be especially profitable in the case of idioms as they can be translated into a fairly exact non-idiomatic meaning. Consequently, it could be argued that for idioms, it makes sense to form control sentences that are matched by meaning only. For example, the item *For two hours, Marie's stomach has been growling* would be matched by *For two hours, Marie has been very hungry*. The advantage of matching by meaning is that it enables a direct comparison between the processing difficulty of an idiom and its meaning which in theory provides a more precise and pointed answer as to whether a fixed expression is indeed easier to process than its non-idiomatic sentence expressing the identical meaning. This matching, however, poses many challenges and leads to serious unavoidable differences in construction and word forms between sentence pairs: syntax, word categories, word number, and other grammatical differences can diverge to a degree where a control sentence cannot actually serve as true control anymore. Length and frequency matching become even more difficult as words from the idiom can hardly be repeated in its control. At the same time, the choice of potential words is automatically very constrained when the control sentence is meant to express a very particular meaning. Occasionally, an idiom's meaning may be too ambiguous or complex to

be fully captured in a control sentence with a fairly fixed required number of words. In sum, practical emerging difficulties and resulting differences between idiom and control sentences make matching by meaning very problematic and offer too many potential confounds, despite the undeniable advantage of a matched and controlled meaning and the theoretical strength of a very pointed answer to the question whether idioms are cognitively and semantically easier to process than non-idiomatic sentences. We conclude that "formal matching" is the sounder choice because it controls for more possible confounds, but matching by meaning could be valuable for a complementary study serving as a direct comparison for the current study.

C. Chapter 3 – Prestudy on Nonliteralness Ratings of Literal Idioms

Nonliteralness ratings on literal, metonymic, and metaphoric idioms were collected in two separate studies for two reasons: one, to test whether results from one study could be repeated for literal idioms, thus to decrease the chance of chance findings; second, it was attempted to make the studies as simple and outcomes as clear as possible by only demarcating two different types of idioms each time.

To check for significance of the effect of idiom type and to account for random individual differences of items and participants, an ordinal mixed effects regression was performed. Literalness ratings were fitted as a function of idiom type as a categorical fixed effect, random intercepts for items and random slopes for type by participant. Both studies revealed idiom type to have a significant effect. In study 1 containing the metaphoric idioms, the effect was stronger ($b = -2.11$, $z = -14.43$, $p < 0.001$ as opposed to $b = -0.53$, $z = -4.56$, $p < 0.001$ in study 2), which is expected, given that metaphoric idioms were rated as much more nonliteral than metonymic idioms. This indicates that literal idioms are indeed perceived as substantially more literal than both metonymic and metaphoric idioms. Furthermore, the difference in nonliteralness between these two groups confirm the results of the initial rating study (Michl, 2019a) on the nonliteralness of metonymic compared to metaphoric idioms and show that the effect can also be found on a less detailed rating scale.

D. Chapter 3 – Effect of Transparency Ratings on Reading Times

Given that transparency can influence processing ease depending on the task, metonymic and metaphoric idioms were also rated on it by adult German native speakers (see Michl, 2019a). Transparency is defined as the closeness of relation between what is said and what is meant (or the literal and the idiomatic meaning) in an idiom (see also Nippold & Taylor, 2002; Titone & Connine, 1999). 111 participants rated it on a 5-point Likert scale on which 5 indicated "completely transparent". Metonymic idioms received a mean rating of 3.8 (*SD* = 0.18), metaphoric idioms received a mean rating of 2.8 (*SD* = 0.13). To control for potential transparency effects in the present reading experiments, median ratings for each idiom were once included in the final models. Results remained largely the same. Transparency itself was completely irrelevant in a non-biasing context (**Table 5-1a**, experiment 1), yet turned out to be a significant predictor when idioms were presented in a biasing context (**Table 5-1b**, experiment 2). One caveat needs to be borne in mind: literal idioms were not rated on transparency by multiple participants. Instead, literal idioms received ratings of "completely transparent" by the author. This was decided because literal idioms have only one meaning, so their literal and the idiomatic meaning are the same, so they should be completely transparent by definition. Due to this difference in data collection and for the sake of simplicity, transparency ratings are not considered in the final data analysis.

Table 5-1

Log-transformed reading times with transparency rating, lmer coefficients and standard error, t-value, confidence intervals, and p-value

a) self-paced reading experiment 1

	β (SE)	t-value	CI-lower	CI-upper	Pr(> t)
controls (intercept)	7.26 (0.06)	112.05	7.131	7.388	< 0.001 ***
literal	-0.05 (0.02)	-3.07	-0.08	-0.018	0.002 ***
metonymic	-0.06 (0.02)	-4.3	-0.094	-0.035	< 0.001 ***
metaphoric	-0.02 (0.01)	-1.33	-0.04	0.008	0.183
length	0.03 (0.01)	3.94	0.014	0.042	< 0.001 ***
transparency rating	0 (0.01)	0.02	-0.017	0.018	0.983

b) self-paced reading experiment 2

	β (SE)	t-value	CI-lower	CI-upper	Pr(> t)
controls (intercept)	7.08 (0.05)	151.57	6.983	7.167	< 0.001 ***
literal	-0.05 (0.01)	-3.72	-0.074	-0.023	< 0.001 ***
metonymic	-0.03 (0.01)	-2.4	-0.052	-0.005	0.017 *
metaphoric	-0.03 (0.01)	-2.79	-0.045	-0.008	0.005 **
length	0.07 (0.01)	9.76	0.059	0.089	< 0.001 ***
transparency rating	-0.02 (0.01)	-2.57	-0.038	-0.005	0.012 *

E. Chapter 4 – Examples of Materials Used, with Translations

		auditory prime sentence		visual target		
Item no.	**Idiom type**	**Beginning**	**Idiom**	**Target**	***Translation***	**Condition**
1)	metonymic	Bei der Nachricht	macht Michael einen Luftsprung.	freudig	*joyous*	**N**onliteral
		At the news	*makes Michael an air jump.*	hüpfend	*jumping*	**L**iteral
			jump for joy	flüchtig	*transient*	**U**nrelated
				knosslich		**N**onword
2)	meton.	Beim Lügen	fühlt Eva sich nicht wohl in ihrer Haut.	unzufrieden	*discontent*	N
		When lying	*feels Eva not well in her skin.*	pickelig	*pimply*	L
			feel rather unsettled	begreiflich	*comprehensible*	U
				maubahaft		NW
3)	meton.	Seit diesem Jahr	sind alle Töchter aus dem Haus.	erwachsen	*grown-up*	N
		Since this year	*are all daughters out of the house.*	auswärts	*outside*	L
				universell	*universal*	U
				darbolich		NW
4)	meton.	Auf der Schaukel	schlägt Anna das Herz bis zum Hals.	aufgeregt	*anxious*	N
		On the swing	*beats Anna her heart to the neck.*	klopfend	*pounding*	L
			sb's heart is pounding like mad	aufopfernd	*sacrificing*	U
				lurelhaft		NW
5)	meton.	Beim Anblick der Wurst	Wurst rümpft Lisa die Nase.	angewidert	*disgusted*	N
		Seeing the sausage	*wrinkles Lisa her nose.*	niesend	*sneezing*	L
			give a sniff at sth.	farblos	*colourless*	U
				topelhaft		NW
6)	meton.	Bei Diskussionen	Katrin immer das letzte Wort.	hartnäckig	*persistent*	N
		In discussions	*has Katrin always the last word.*	sprechend	*speaking*	L
				magisch	*magic*	U
				spettlich		NW

7)	meton.	Unter Künstlern	Elisabeth schon einen Namen.	prominent	*prominent*	N
		Among artists	*has Elisabeth already a name*	gewöhnlich	*usual*	L
			bear a famous name	aufsässig	*truculent*	U
				karttalos		NW
8)	meton.	Um sieben Uhr	ist Stefan bereits auf den Beinen.	geschäftig	*busy*	N
		At seven o'clock	*is Stefan already on his legs.*	gehend	*walking*	L
			be on one's feet	gigantisch	*gigantic*	U
				bokartich		NW
9)	meton.	Viele Themen	bespricht das Paar unter vier Augen.	vertraulich	*confidential*	N
		Many topics	*discuss the couple under four eyes.*	blickend	*gazing*	L
			discuss sth. in private	juristisch	*juridical*	U
				schrull		NW
10)	meton.	Zu dieser Feier	kommt Katrin mit leeren Händen.	knauserig	*stingy*	N
		To this celebration	*comes Katrin with empty hands.*	eintreffend	*arriving*	L
			come empty-handed	besinnlich	*tranquil*	U
				trägelich		NW
11)	meton.	Mit seinem Umzug	beginnt Thomas ein neues Leben.	wandelbar	*convertible*	N
		With his move	*starts Thomas a new life.*	täglich	*daily*	L
				duftend	*scented*	U
				zarbolich		NW
12)	meton.	In der Lehrzeit	hat Marie ihre eigenen vier Wände.	eigenständig	*independent*	N
		During her apprenticeship	*has Marie her own four walls.*	räumlich	*spatial*	L
			live in one's own four walls	gefühllos	*insensitive*	U
				wopelhaft		NW
13)	meton.	Nach der Schicht	legt sich Florian meist aufs Ohr.	schläfrig	*drowsy*	N
		After the shift	*lays Florian himself usually onto his ear.*	hörend	*hearing*	L
			take a nap	entzückt	*entranced*	U
				ronnelich		NW

14)	meton.	Ihren Schmuck	lässt Katrin nicht aus den Augen.	achtsam	*observant*	N
		Her jewelry	*lets Katrin not out of the eyes.*	starrend	*staring*	L
			not let sth. out of one's sight	geringfügig	*slightly*	
				niebschig		NW
15)	meton.	Bei dem Lied	läuft Eva ein Schauer über den Rücken.	empfindsam	*sensitive*	N
		At the song	*runs Eva a shiver across the back.*	kribbelig	*tingly*	L
			a shiver runs down one's spine	ironisch	*ironic*	U
				bemmerlig		NW
16)	meton.	All ihre Bücher	bezahlt Julia aus eigener Tasche.	kostspielig	*costly*	N
		All her books	*pays Julia out of own pocket.*	geräumig	*spacious*	L
			pay sth. from one's own pocket	drollig	*droll*	U
				lussohaft		NW
17)	meton.	Seit April	ist die Schuhfabrik in den roten Zahlen.	verschuldet	*indebted*	N
		Since April	*is the shoe factory in the red digits.*	logisch	*logical*	L
			be in the red	glitschig	*slick*	U
				fruderhaft		NW
18)	meton.	Vom Kuchenbacken	lässt Sarah lieber die Finger.	vermeidend	*evading*	N
		Off cake baking	*keeps Sarah preferably her fingers.*	anfassend	*grabbing*	L
			stay away from sth.	blödsinnig	*idiotic*	U
				seiberhaft		NW
19)	meton.	Seit der Kindheit	hat Johannes ein großes Mundwerk.	vorlaut	*pert*	N
		Since childhood	*has Johannes a big mouth.*	redend	*talking*	L
				luxuriös	*luxurious*	U
				wrüsslich		NW
20)	meton.	Bei der Verabredung	spielt Lisa mit ihren Reizen.	berechnend	*calculating*	N
		At the date	*plays Lisa with her charms.*	einwirkend	*appealing*	L
			roughly: turn on one's charm	schaurig	*gruesome*	U
				verrefflert		NW

21)	meton.	Seit zwei Stunden	knurrt Marie bereits der Magen.	hungrig	*hungry*	N
		For two hours	*is Marie already growling the stomach.*	nüchtern	*empty (stomach)*	L
			one's stomach is growling	fehlerhaft	*faulty*	U
				temmerlos		NW
22)	meton.	Das akute Problem	erwähnt Markus mit keiner Silbe.	schweigsam	*silent*	N
		The acute problem	*mentions Markus with no syllable.*	wörtlich	*wordlike*	L
			not breathe a word	zielstrebig	*determined*	U
				wannerlos		NW
23)	meton.	Mittlerweile	ist der Häftling wieder auf freiem Fuß.	entlassen	*released*	N
		Meanwhile	*is the prisoner again on the free foot.*	beweglich	*mobile*	L
			be on the loose	bankrott	*bankrupt*	U
				jaserlich		NW
24)	meton.	An diesem Abend	legt sich der Patient unters Messer.	ärztlich	*medical*	N
		On this evening	*puts the patient under the knife.*	schneidend	*cutting*	L
			go under the knife	mehrdeutig	*ambiguous*	U
				kreserlich		NW
25)	meton.	Nach zwanzig Minuten	ist der Dieb über alle Berge.	verschwunden	*disappeared*	N
		After twenty minutes	*is the thief over all mountains.*	hügelig	*hilly*	L
			be miles away	anständig	*decent*	U
				ponchelig		NW
26)	meton.	Durch einen Fehler	gerät die Waffe in falsche Hände.	bedrohlich	*threatening*	N
		Through a mistake	*falls the weapon into the wrong hands.*	greifend	*snatching*	L
				entzündlich	*inflammatory*	U
				zermerselt		NW
27)	metaphoric	Dieses Gedicht	kann Tim mittlerweile im Schlaf.	auswändig	*by heart*	N
		This poem	*can Tim already in sleep*	träumend	*dreaming*	L
			know sth. by heart	stündlich	*hourly*	U
				baberhaft		NW

28)	meta.	Diese Pläne	leitet der Manager gerne in die Wege.	anbahnend	*initiating*	N
		These plans	*likes the manager to put on their ways.*	gepflastert	*cobbled*	L
			initiate sth.	wöchentlich	*weekly*	U
				brucklich		NW
29)	meta.	Beim Einkaufen	macht Anna diesmal einen guten Fang.	glücklich	*happy*	N
		At shopping	*makes Anna this time a good catch.*	angelnd	*fishing*	L
			be a great catch	fragwürdig	*questionable*	U
				sprocklos		NW
30)	meta.	Wieder einmal	sprengt Simons Vorhaben den Rahmen.	ausufernd	*sprawling*	N
		Once again	*bursts Simon's project the frame.*	entzwei	*broken*	L
			go beyond the scope	genüsslich	*relishing*	U
				beiterlich		NW
31)	meta.	Mit diesem Spruch	schießt Michael ein Eigentor.	unbedacht	*inconsiderate*	N
		With this line	*shoots Michael an own goal.*	unsportlich	*unathletic*	L
			backfire on sb.	schlüssig	*coherent*	U
				pauterlich		NW
32)	meta.	Bei Modefragen	schwimmt Anna gern gegen den Strom.	eigenwillig	*maverick*	N
		In fashion terms	*swims Anna preferably against the current.*	wässerig	*watery*	L
				gelehrig	*teachable*	U
				strucklos		NW
33)	meta.	Mit ihrer Behauptung	begibt sich Julia auf Glatteis.	riskant	*risky*	N
		With her statement	*goes Julia on slippery ice.*	rutschig	*slippery*	L
			roughly: walk on thin ice	sympathisch	*likeable*	U
				keiterreich		NW
34)	meta.	Ausgerechnet Tim	traut Florian nicht über den Weg.	argwöhnisch	*suspicious*	N
		Of all people Tim	*does Florian trusts not Tim across the way.*	spazierend	*strolling*	L
			not trust sb. an inch	hygienisch	*hygienic*	U
				schwumlig		NW

35)	meta.	Mit der Zeit	kommt die Wahrheit noch ans Licht.	aufklärend	*illuminative*	N
		Over time	*comes the truth to light.*	angestrahlt	*spotlighted*	L
				abschüssig	*slanting*	U
				kraschlig		NW
36)	meta.	In dieser Gruppe	ist Sarah längst ein hohes Tier.	mächtig	*powerful*	N
		In this group	*is Sarah long a high animal.*	triebhaft	*instinctive*	L
			be high up in the hierarchy	kompakt	*compact*	U
				schodelig		NW
37)	meta.	Dieses Argument	rückt Johannes ins rechte Licht.	berichtigend	*correcting*	N
		This argument	*puts John in the right light.*	blendend	*blinding*	L
			put sth. in perspective	gescheit	*clever*	U
				woderlich		NW
38)	meta.	Trotz seiner Strenge	hat Tim einen weichen Kern.	gutmütig	*good-natured*	N
		Despite his rigor	*has Tim a soft core.*	verfault	*putrid*	L
			roughly: be soft-hearted	dreieckig	*triangular*	U
				schettrig		NW
39)	meta.	Vor lauter Arbeit	sieht Stefan überhaupt kein Land.	überfordert	*overwhelmed*	N
		Because of much work	*sees Stefan no land at all.*	entfernt	*distant*	L
			be in over one's head	kurzsichtig	*short-sighted*	U
				detterlos		NW
40)	meta.	Mit dem Tadel	gießt Michael auch noch Öl ins Feuer.	anstachelnd	*inciting*	N
		With the reprimand	*pours Michael even more oil in the fire.*	lodernd	*blazing*	L
			add fuel to the fire	geborgen	*snug*	U
				drammlich		NW
41)	meta.	Für die Freundin	ist Julia ein Fels in der Brandung.	unerschütterlich	*steadfast*	N
		For the girlfriend	*is Julia a rock in the surge.*	gewaltig	*mighty*	L
			be a tower of strength	elegant	*elegant*	U
				tackelhaft		NW

42)	meta.	Für diese Definition	hat Sarah eine Eselsbrücke.	hilfreich	*helpful*	N
		For this definition	*has Sarah a donkey bridge.*	überquerend	*crossing*	L
			have a mnemonic aid	zaghaft	*timid*	U
				schrosshaft		NW
43)	meta.	Bei diesem Kommentar	geht Elisabeth in die Luft.	aufbrausend	*quick-tempered*	N
		At this comment	*goes Elisabeth into the air.*	fliegend	*flying*	L
			explode (with anger)	käuflich	*purchasable*	U
				zweschelig		NW
44)	meta.	Wahrscheinlich	hat dieser Streit ein Nachspiel.	folgenreich	*momentous*	N
		Probably	*has this dispute an aftermath.*	verlängert	*extended*	L
				schüchtern	*shy*	U
				heifellos		NW
45)	meta.	In ihrer Affäre	spielt Marie ständig mit dem Feuer.	leichtsinnig	*reckless*	N
		In her affair	*plays Marie constantly with the fire.*	zündelnd	*kindling*	L
				vielsagend	*suggestive*	U
				hugartich		NW
46)	meta.	Vor dem Einschlafen	hat Elisabeth eine Erleuchtung.	kreativ	*creative*	N
		Before falling asleep	*has Elisabeth an enlightenment.*	glimmend	*smouldering*	L
			roughly: have an epiphany	lautlos	*inaudible*	U
				gaburlich		NW
47)	meta.	Diese Debatte	erstickt der Politiker schon im Keim.	hemmend	*obstructive*	N
		This debate	*stifles the politician in the bud.*	dreckig	*dirty*	L
			nip sth. in the bud	schlüpfrig	*saucy*	U
				seugelich		NW
48)	meta.	Mit dem Auftritt	macht Simon sich völlig zum Affen.	lächerlich	*ridiculous*	N
		With the appearance	*makes Simon himself completely a monkey.*	tierisch	*animal*	L
			make a spectacle out of oneself	geduldig	*patient*	U
				zarbovoll		NW

49)	meta.	Seit heute	die Vorbereitungen auf Hochtouren.	leistungsfähig	*effective*	N
		Since today	*run preparations at full blast.*	erhitzend	*heating*	L
			be in full swing	bucklig	*hunched*	U
				wopelvoll		NW
50)	meta.	Bei dem Plan	steckt Eva mit Tim unter einer Decke.	verschworen	*conspired*	N
		In the plan	*is Eva with Tim under a blanket.*	kuschelig	*cuddly*	L
			be hand in glove with sb.	gravierend	*grave*	U
				rahnelich		NW
51)	meta.	Bei seinen Blumen	hat Florian einen grünen Daumen.	pflegend	*caring*	N
		For his flowers	*has Florian a green thumb.*	verschmiert	*smeared*	L
			have green fingers	stürmisch	*stormy*	U
				uhrlegatet		NW
52)	meta.				*on one's own*	
		Statt nachzufragen	handelt Markus auf eigene Faust.	eigenmächtig	*authority*	N
		Instead of asking	*acts Markus at his own fist.*	geballt	*clenched*	L
			on one's own account	schmutzig	*filthy*	U
				quatenlos		NW
53)	meta.	Aus Gewohnheit	wickelt Eva den Freund um den Finger.	verführerisch	*alluring*	N
		Out of habit	*wraps Eva her friend around the finger.*	befestigend	*fixating*	L
				schlampig	*slovenly*	U
				knäselhart		NW
54)	meta.	Bis zur Pause	macht Sarah der Arbeitsgruppe Dampf.	antreibend	*driving*	N
		Until the break	*makes Sarah the working group steam.*	nebelig	*foggy*	L
			chase sb. to do sth.	irrtümlich	*erroneous*	U
				schwintig		NW
55)	meta.	Auf die Antwort	hin kommt Markus richtig in Fahrt.	wütend	*furious*	N
		At this answer	*gets Markus really into stride.*	beschleunigend	*accelerating*	L
			get into one's stride	verletzend	*hurtful*	U
				schamwelig		NW

56)	meta.	Bei dieser Vorlesung	platzt Julia noch der Kopf.	überreizt	*overwrought*	N
		At this lecture	*is Julia bursting the head.*	explosiv	*explosive*	L
			one's head explodes	beflissen	*officious*	U
				jangrolang		NW
57)	meta.	Bei der Begrüßung	bricht Florian gleich das Eis.	auflockernd	*loosening*	N
		At the welcome	*breaks Florian immediately the ice.*	splitternd	*splintering*	L
				vergnügt	*jolly*	U
				schrondig		NW
58)	meta.	In mancher Hinsicht	hat Johannes eine lange Leitung.	langsam	*slowly*	N
		In some respect	*has John a long lead.*	verkabelt	*wired*	L
			be slow on the uptake	zulässig	*permissible*	U
				pöllend		NW
59)	meta.	Meist	zieht der Kritiker die Filme durch den Kakao.	spöttisch	*scornful*	N
		Mostly	*pulls the critic the films through the cocoa.*	schmackhaft	*tasty*	L
			spoof	überfällig	*overdue*	U
				brahlfend		NW
60)	meta.	Bei diesem Chef	hat Simon häufig schlechte Karten.	chancenlos	*chanceless*	N
		With this boss	*often Simon has bad cards.*	spielend	*playing*	L
			the cards are stacked against sb.	erfreulich	*gratifying*	U
				schülgend		NW
61)	meta.	Für die Kinder	beißt Katrin in den sauren Apfel.	zwingend	*compelling*	N
		For the kids	*bites Katrin into the sour apple.*	fruchtig	*fruity*	L
			swallow the pill	gruselig	*creepy*	U
				scheupend		NW
62)	meta.	An dem Tag	kommt das Unglück aus heiterem Himmel.	plötzlich	*suddenly*	N
		On the day	*comes the misfortune out of the bright sky.*	regnerisch	*rainy*	L
			come out of the blue	herzlos	*heartless*	U
				ohligend		NW

63)	meta.	Die Woche über	steht Michael stets unter Strom.	angespannt	*tense*	N
		During the week	*is Michael always under electricity.*	elektrisch	*electrical*	L
			[be under stress]	fröhlich	*cheerful*	U
				kirrlenhaft		NW
64)	meta.	Beim Gespräch	findet man einen gemeinsamen Nenner.	gleichgesinnt	*like-minded*	N
		At the dialogue	*find people a common denominator.*	rechnend	*calculating*	L
				schamlos	*shameless*	U
				pluhnhaft		NW
65)	meta.	Die Entscheidung ist	ist für Florian ein Griff ins Klo.	enttäuschend	*disappointing*	N
		The decision	*is for Florian a grab in the loo.*	ekelhaft	*disgusting*	L
			[be a bad choice]	zärtlich	*tender*	U
				vergravlet		NW
66)	meta.	In dieser Firma	sitzt Florian am längeren Hebel.	überlegen	*superior*	N
		In this company	*sits Florian on the longer lever.*	mechanisch	*mechanical*	L
			hold the whip hand	leuchtend	*bright*	U
				leuselich		NW
67)	meta.	Als Musikerin	hält sich Anna halbwegs über Wasser.	ausreichend	*sufficient*	N
		As musician	*holds herself Anna halfway over water.*	zappelnd	*wriggly*	L
			keep oneself above water	knusprig	*crispy*	U
				frockelig		NW
68)	meta.	Trotz ihrer Müdigkeit	reißt Lisa sich am Riemen.	kontrolliert	*controlled*	N
		Despite her fatigue	*tears Lisa herself on the belt.*	schnürend	*lacing*	L
			get a grip on oneself	erblich	*hereditary*	U
				jichelnd		NW
69)	meta.	Nach kurzer Beziehung	gibt Simon Lisa den Laufpass.	trennend	*separating*	N
		After short relationship	*gives Simon Lisa the running pass.*	rennend	*running*	L
			[break up with sb.]	einsichtig	*understandable*	U
				kaubreulig		NW

70)	meta.	Ohne Gewißheit	hängt Florian völlig in der Luft.	ungewiss	*uncertain*	N
		Without certainty	*hangs Florian completely in the air.*	erhöht	*elevated*	L
			hang in limbo	bleiern	*leaden*	U
				nodtrend		NW
71)	meta.	In der Liebe	ist Lisa ein unbeschriebenes Blatt.	unerfahren	*inexperienced*	N
		In love	*is Lisa a blank page.*	ungebraucht	*unused*	L
			[be inexperienced]	jähzornig	*irascible*	U
				jefflisch		NW
72)	meta.	Nach der Party	hat Marie einen kompletten Filmriss.	ahnungslos	*clueless*	N
		After the party	*has Marie a complete film tear.*	flimmernd	*flickering*	L
			[have a mental blackout]	anziehend	*attractive*	U
				gebrambigt		NW

Published and Accepted Articles

Published in peer-reviewed scientific journals:

- Michl, D. (2019). Metonymies are more literal than metaphors: evidence from ratings of German idioms. *Language and Cognition, 11(1)*, 98–124. https://doi.org/10.1017/langcog.2019.7

- Michl, D. (2019). Speedy Metonymy, Tricky Metaphor, Irrelevant Compositionality: How Nonliteralness Affects Idioms in Reading and Rating. *Journal of Psycholinguistic Research, 2(1)*, 56–82. https://doi.org/10.1007/s10936-019-09658-7

Accepted for publication in a peer-reviewed scientific journal:

- Michl, D. (2020). Swallowing the pill and being laid to rest: No advantage for metonymic over metaphoric idioms in primed lexical decisions? *Journal of Articles in Support of the Null Hypothesis*

Abstract

In this thesis, I investigate the semantic processing of the differential non-literalness in idioms. Specifically, the question is whether the common non-literal phenomena of metonymy and metaphor are processed in idioms, given that idioms are often metonymic or metaphoric (but can also be literal). So far, there is empirical research on the semantic processing of idioms on the one hand, and on the semantic processing of metaphors and metonymies on the other. However, the findings of these separate strands of research have not been brought together. In addition, the property of non-literalness and its impact on semantic processing has not been investigated in any complexity yet. To partially bridge this gap, I conducted one rating study to test the hypothesis that metonymic idioms are perceived as more literal than metaphoric idioms, and to explore how non-literalness is related to other idiom-specific properties. In the next step, I conducted several experiments to examine whether there is any difference in how metonymic and metaphoric idioms are semantically processed. Where possible, literal idioms are also included as non-literalness effects can be understood best if investigated in comparison to the absence of non-literalness. Chapters 2-4 outlined below are individually published or accepted for publication in scientific journals.

In chapter 2, I present the large rating study which consists of four separate questionnaires for separate groups of participants. Each idiom was rated on its degree of non-literalness, familiarity, comprehensibility, and on how closely related its literal and its idiomatic meaning were. Most importantly, the rating study reveals that metonymic idioms are perceived as considerably more literal than metaphoric idioms.

In chapter 3, I explore and discuss whether these differences in non-literalness also affect the difficulty of reading sentences which contain literal, metonymic, metaphoric, or no idioms. In this manner, highly non-literal (metaphoric) idioms can be compared to less non-literal (metonymic) idioms and completely literal idioms. The findings show that literal and metonymic idioms are read faster than metaphoric idioms, independent of whether the idioms were semantically expected from the sentence or not. Metaphoric idioms were only read faster than sentences without idioms if they were expected. Overall, all idioms are easier to read when expected than sentences without idioms, but only the idioms with higher literalness

are also read faster when they are not expected. Thus, non-literalness has a partial effect: It can be harder to process depending on context.

In chapter 4, I discuss whether the processing system automatically differentiates between (rather literal) metonymic and (rather non-literal) metaphoric idioms, that is, from the first milliseconds upon having heard them. A primed lexical decision experiment was conducted twice to this aim. Again, the reaction speed to stimuli is measured in this paradigm. If the reaction speed metaphoric idioms were slower, it would mean that higher non-literalness is more difficult even in automatic (i.e. initial) processing. However, no such effect could be found in either version of the experiment. In fact, there is actual evidence that different non-literalness does not or only minimally affect automatic processing. Thus, non-literalness effects are likely not essential to recognition and automatic processing but come into play at a later time frame of the processing course.

In chapter 5, I compare the experimental findings and discuss them in the framework of selected (idiom) processing models. Findings fit with the Graded Salience Hypothesis and partly with the Configuration Hypothesis and the Hybrid Model. Moreover, it seems that depending on the experimental task, there is a trade-off between non-literalness and idiomaticity. Chapter 5 also discusses generalizability of the results and gives incentives of how to further pursue the question of how non-literalness affects the processing of idioms.

Zusammenfassung

In dieser Arbeit untersuche ich die semantische Verarbeitung verschiedenartiger Nichtwörtlichkeit in Idiomen. Die Frage lautet, ob die überaus häufigen und bekannten nichtwörtlichen Phänomene Metonymie und Metapher in Idiomen verarbeitet werden – vor dem Hintergrund, dass Idiome oft metonymisch or metaphorisch sind (jedoch auch wörtlich sein können). Bis heute gibt es empirische Forschung zur semantischen Verarbeitung von Idiomen einerseits, und jener von Metaphern und Metonymien andererseits. Jedoch wurden die Befunde dieser getrennten Forschungsfelder bisher nicht zusammengeführt. Darüber hinaus wurde die Eigenschaft „Nichtwörtlichkeit" und ihr Einfluss auf die semantische Verarbeitung noch nicht in ihrer Komplexität untersucht. Mit dem Ziel, diese Lücke teilweise zu schließen, habe ich zunächst eine Bewertungsstudie durchgeführt. Erstens sollte diese die Hypothese testen, dass metonymische Idiome als wörtlicher wahrgenommen werden als metaphorische Idiome, zweitens sollte sie erforschen, wie Nichtwörtlichkeit mit anderen idiom-typischen Eigenschaften zusammenhängt. Als nächstes habe ich mehrere Experimente durchgeführt um zu untersuchen, ob es in der semantischen Verarbeitung metonymischer und metaphorischer Idiome Unterschiede gibt. Wo möglich, wurden auch wörtliche Idiome in die Testungen aufgenommen, da Nichtwörtlichkeitseffekte am besten zu verstehen sind, wenn auch das Fehlen jeglicher Nichtwörtlichkeit mituntersucht wird. Die unten skizzierten Kapitel 2-4 sind in Fachzeitschriften als Artikel publiziert oder zur Veröffentlichung angenommen.

In Kapitel 2 präsentiere ich die Bewertungsstudie, bestehend aus vier einzelnen Fragebögen für getrennte Gruppen von Teilnehmer*Innen. Jedes Idiom wurde auf seinen Grad von Nichtwörtlichkeit, Bekanntheit, Verständlichkeit sowie Verwandtschaftsenge zwischen wörtlicher und idiomatischer Bedeutung hin bewertet. Der wichtigste Befund der Bewertungsstudie lautet: Metonymische Idiome werden als deutlich wörtlicher wahrgenommen als metaphorische Idiome.

In Kapitel 3 erforsche und diskutiere ich, ob diese Unterschiede in Nichtwörtlichkeit sich auf die Leseschwierigkeit von Sätzen auswirken, die wörtliche, metonymische, metaphorische, bzw. zum Vergleich gar keine Idiome enthalten. Auf diese Weise können sehr nichtwörtliche (metaphorische) Idiome mit weniger nichtwörtlichen (metonymischen) Idiomen und völlig wörtlichen Idiomen

verglichen werden. Die Befunde sind, dass wörtliche und metonymische Idiome schneller gelesen werden als metaphorische Idiome, unabhängig davon, ob die Idiome aus dem Satz semantisch zu erwarten waren oder nicht. Metaphorische Idiome wurden nur dann schneller gelesen als Sätze ohne Idiome, wenn sie erwartet wurden. Insgesamt sind unter Erwartbarkeit alle Idiome leichter zu lesen als Sätze ohne Idiome, doch nur die Idiome mit höherer Wörtlichkeit sind auch dann schneller, wenn sie nicht erwartbar sind. Folglich hat Nichtwörtlichkeit einen Teileffekt: Sie kann je nach Kontext schwerer zu verarbeiten sein.

In Kapitel 4 diskutiere ich, ob das Verarbeitungssystem zwischen (eher wörtlichen) metonymischen und (eher nichtwörtlich) metaphorischen Idiomen automatisch unterscheidet, d.h. ab den ersten Millisekunden nach dem Hören. Zweimal wurde zu dieser Frage eine gebahnte lexikalische Entscheidung durchgeführt, wobei bei dieser Experimentmethode erneut die Reaktionsgeschwindigkeit auf Stimuli gemessen wird. Sollte die Reaktion auf metaphorische Idiome langsamer sein als auf metonymische, hieße dies, dass höhere Nichtwörtlichkeit auch in automatischer (i.e. initialer) Verarbeitung schwieriger ist. Jedoch wurde in keinem der beiden Experimentdurchgänge ein solcher Effekt gefunden. Im Gegenteil gibt es Evidenz, dass verschiedenartige Nichtwörtlichkeit die automatische Verarbeitung nicht oder nur minimal betrifft. Daher sind Nichtwörtlichkeitseffekte für das Erkennen der Idiome und ihre automatische Verarbeitung wahrscheinlich nicht essentiell und kommen erst später im Verarbeitungsverlauf ins Spiel.

In Kapitel 5 vergleiche ich die Experimentbefunde und diskutiere sie im Rahmen bekannter, mehr oder weniger passender (Idiom-)Verarbeitungsmodelle. Die Ergebnisse sind vereinbar mit der Abgestuften Salienzhypothese, teilweise mit der Konfigurationshypothese sowie dem Hybridmodell. Zudem scheint es abhängig von der Experimentaufgabe im Verarbeitungsverlauf einen Wechsel der priorisierten Eigenschaft zwischen Nichtwörtlichkeit und Idiomatizität zu geben. Kapitel 5 diskutiert außerdem die Generalisierbarkeit der Ergebnisse und gibt Anregungen, wie die Forschungsfrage weiteruntersucht werden könnte.