

# 5



## ASPECTS OF ONTOGENY AND EVOLUTION

SINCE TINBERGEN'S famous lectures, behavioural research has to consider four core aspects. These are (1) functional aspects of a given accomplishment, (2) aspects of the mechanisms that underlie this accomplishment, (3) aspects of its individual ontogeny, and finally (4) evolutionary aspects or aspects, respectively, that refer to relationships between the adaptive value of the accomplishment and its long-term history. With this typical biological perspective as a reference, the preceding chapters have already the first two aspects. In the following I will try to treat the two remaining aspects as well.

However, there were other reasons, too, that stimulated me to ask questions about the ontogeny of whispering and also about how it may have evolved. First of all, there were the results of my study on the performance features of unvoiced speech, and these results raised questions about how and how early in life children could develop their skill in producing and their competence in using a whispering voice. Second, and not less important, there were many communicative characteristics of whispered speech, which seemed so particular that I wanted to at least theoretically investigate possible traits of their long-term history. My hypothesis on this matter was that whispering can be explained best as a ritual that has evolved from normal speech by a kind of cultural ritualisation. The hypothesis would predict social problems, for example, if the ritual would be used in normal public communications. I have examined these predictions and also other implication of the hypothesis, and will report the result in section 5.2 of this chapter.

Beforehand, however, I will describe first results collected on the ontogenetic development of whispered speech.

## 5.1 Features of Development

Language acquisition is renowned as the most complex and also as the most important mental accomplishment that the growing child has to achieve. Therefore, it is not astounding that the infant needs more than two years to reach verbal competence. And, it is not astounding as well, that 'language development' is a field of research which was and still is attracting large numbers of investigators (for reviews see e.g. Höhle et al. 2000).

Given the huge amounts of fascinating results yielded by the studies on language acquisition and development, one would expect that at least some of the investigations should have also dealt with the development of whispering. However, in contrast to some nonverbal vocalisations, namely 'crying' (see e.g. Wermke 1997), the current literature does obviously not provide reliable and data-based information about when and how children begin to produce and use whispered speech. A few commentators who mentioned 'unvoiced vocalisations' (= whispering) may have mixed up terms and were referring actually to 'voiceless vocalisations' (Hellbrügge et al. 1981).

Because of such situation, I collected data on these matters within some 'kindergartens' of the Berlin area. The first questions which I wanted to clarify by my study on developmental aspects of whispering were: At what age would children start to perform this verbal expression? And, at what age would they use it in verbal interactions? Who would be their preferred partners, then? Their peers or their parents or other adults? Which contexts did they preferentially choose? Playful situations, or situations of conflicts that required a formation of 'ingroup'-structures? A preliminary report about some first answers is given below.

## Methods

Participants were children (n=30) between 1 to 5 years of age. They were tested in a familiar environment; that is, either in their 'kindergarten' with well-known peers and a caretaker present, or when being at home together with their mother. To prepare the tests and to facilitate a familiarity with the experimenter, I visited a given 'kindergarten' or family several times and engaged in playful encounters with the children. Tests began only after such familiarity seemed to be achieved.

In the tests, children were invited to utter whispered vocalisation. Such invitations took place by playful encounters, or – in older children – by addressing them by a whispering voice. Here, the caretaker, or the mother, or I acted as an initiator. That is, we tried to use the contagion effect described in chapter 3.1. to elicit whispering. All trials were recorded by a Sony TC D5 recorder equipped with two Sennheiser Me80 microphones that were placed in a hidden position. In addition to the recordings, other data were sampled by interviewing the caretakers or parents about (a) when a given child had performed his/her first whispering, (b) in which contexts the child used this vocalisation, and especially (c) which attitude they themselves had about whispering. The analyses of data followed classical procedures.

## Results

At an age of about *one* year, children (n=6) did neither whisper themselves nor specifically respond to the whispering of their mother.

At an age of about *two* years, children (n=12) clearly paid attention to the whispering of an adult and listened to it for some time. Although all children still were in the stage of producing 'two-word-sentences', six of the eight individuals finally replied to a whispered address by whispering themselves. However, this was not for long; i.e. the 'vocal adjustments' ended after 3-4 trials.

At an age of about *four to five* years, all children (n=12) readily entered into a whispered dialogue, if they had been addressed by an unvoiced sentence, first. There

were large differences among children, however, in terms of their engagement in this kind of verbal behaviour. After such tasks, three children continued to use whispered speech and one of them started even to whisper a longer story.

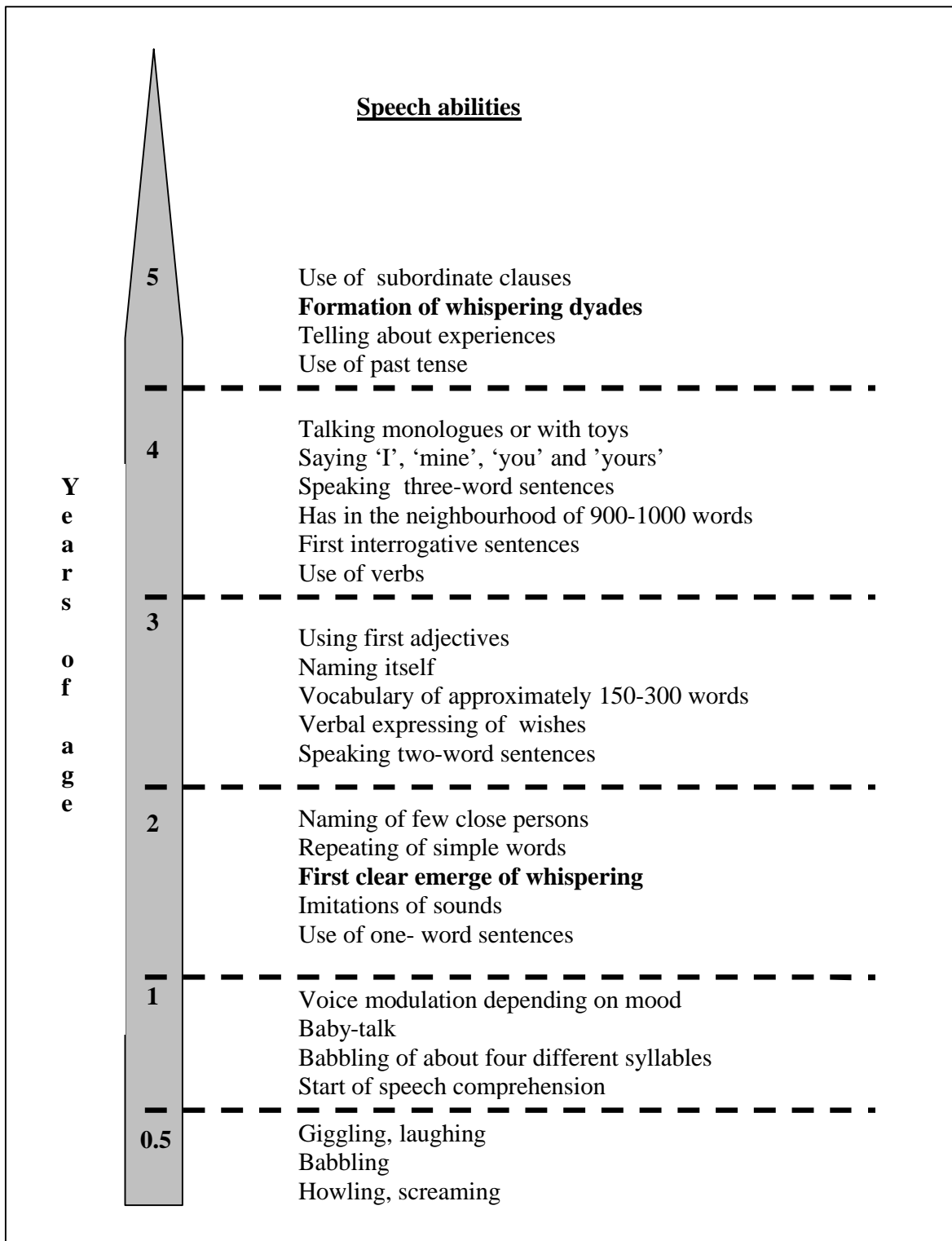
Children older than five years of age were not included in my tests. However, I collected data about them by interviewing caretakers and parents. These reported large individual differences which, however, were not gradually but discretely distributed across children. The characteristics allowed distinguishing between the following two categories:

- . (a) children who very rarely were whispering, and
- (b) children who rather frequently engaged in whispering.

The latter behaviour was preferentially playful and always linked with a social use. That is, it took place only among particular peers who were regarded to be close friends. Most caretakers admitted that they actually did not like such interactions, and thus often tried to constrain them, just because 'they were disturbing'.

## Conclusions

The results of this study are preliminary, and thus should be complemented by additional research, before being interpreted in a comprehensive manner. However, they can provide an appropriate framework for subsequent studies that hopefully will answer more of the questions listed in the introduction. In addition, I feel that three of the findings may serve as a reference for speculations about a possible evolution of whispering. These are: (1) Whispering did not develop independently of language and emerged only after children were competent enough to speak normally. (2) Whispered words were not mixed with words uttered spoken by a normal (=phonated) voice, but rather as a 'special system' of signals. (3) The use of whispering was clearly linked to private or 'ingroup' interactions that had seemed to play a positive role, here. Implications of these statements will be treated in the next section.



**Figure 5.1 :** List of accomplishments that sketch steps in the development of language and also whispering in children. Information was taken from publications of Szagun (1996) and Butzkamm (1999). However, since developmental data can vary remarkably, the figure can be taken for orientation, only. Information referring to my results on whispering is inserted in bold letters.

## 5.2 Hints to a Ritualisation

In behavioural biology the term 'ritual' stands for a signal pattern that has evolved from an other pattern, either a signal that has evolved earlier, or an action pattern that serves a concrete, but non-communicative function. This definition has been created by Huxley (1923) who observed the courtship behaviour of Red-throated Divers (*Colymbus stellatus*) and detected that it contained movements which in a similar form were typical for the feeding behaviour of this species. Huxley classed these movements as signals, or 'rituals', respectively, and called them 'courtship-feeding'. Concurrently and most important: he hypothesized that the rituals had evolved from the original feeding behaviours, namely via a process which he termed 'ritualisation'. Today, many different examples of 'ritualisation' have been documented, and there is an overwhelming amount of evidence that this process is the preferred mode of signal generation in both animals and man (citations in Todt 2003).

Taken together, the various studies on ritualisation have shown that this process is characterized by a set of rules which relate to the structural properties of a ritual and also predict specific differences between a ritual and its precursor; i.e. the pattern from which it originated. Interestingly, these rules are the same in the biological ritualisation of animals and the cultural ritualisation in man (Huxley 1966; Koenig 1970). With this congruence as a reference, I will use the rules to develop test criteria which then can be taken to examine whether my hypothesis that whispering is a ritualized form of normal speech can be supported. This manoeuvre can abandon most methods that are used to identify traits of biological ritualisation. As announced earlier, however, I will refer to Haeckel's rule first and than employ methods that are appropriate to check for clues of a cultural ritualisation of whispering.

### **Developmental Aspects**

To recall: Haeckel's well-known rule states that 'ontogeny re-capitulates phylogeny'. In biology, this rule is applied mostly to explain developmental phenomena that appear puzzling, but in the light of an evolutionary perspective can be better understood. Here

and now, I will use the rule in a reversed direction; that is, to speculate about the history of whispering.

According to my hypothesis I formulate three expectations. First, if whispering is a ritual, it should emerge not before, but only after the skill and competence to speak normally has developed. Second, if whispering is a ritual, it should be performed as a 'special system' of signals, but not mixed with words uttered spoken by a normal voice. Third, if whispering is a ritual, it should develop as an 'ingroup'-signal with a positive attitude.

My results reported in subchapter 5.1 were completely in line with these expectations. And, there were hints which even indicated that a change in the attitude and use of whispering conversations is a matter of influences from adults who obviously put taboos on its performance. However, the results of my study were preliminary, and thus need to be proven on a larger scale, before a final valuation of their implications is expedient.

### **Structural Aspects**

To recall: Studies on the structural relationships between a ritual and its precursor have uncovered several characteristics which showed a general validity. These are distinguished by the terms (a) reference, (b) contrast, (c) specificity and (d) diversity. In the following, I will briefly explain them first, and then check whether and how good they are matched by properties of the 'voiced/unvoiced speech' paradigm.

(a) Reference: A ritual and its precursor show a number of structural similarities which are considered to play a role in the implementation of the ritual. Such similarities are interpreted in a referential manner; i.e. they indicate that the ritual – at least originally – refers to certain properties of the precursor. To give an example: A wide-spread class of rituals symbolizes particular kinds of locomotion. In birds, e.g. the so-called 'display flights' show a

structural reference to normal flights, and in man, e.g. the parades show several similarities of normal marching (review in Todt 2003).

(b) Contrast: A ritual and its precursor show a number of structural differences which are considered to guarantee their clear-cut perceptual distinction. This property was stressed as important already by Darwin's principle of 'antithesis' (1872). In most cases, the contrasting is achieved by the same strategy. That is, the ritual is built on a particular 'focal component' of its precursor, and this focal component is displayed then in a clearly exaggerated manner. To explain this: In the 'display flights' of birds, several components, e.g. wing movements, are exaggerated in amplitude, and in the parades of man, similar exaggerations concern e.g. the amplitude of leg movements, or even other parameters of marching (review in Todt 2003).

(c) Specificity: A ritual shows a number of structural specificities which are *not* related to its precursor, but reflect specific adaptations to its particular communicative role. To explain this: The 'display flights' of birds, which are used to repel territorial intruders, encode two specific components: They sign the center of the territory, and indicate additionally to whom an attack may be addressed. The latter is symbolized by repeatedly directing a flight towards the intruder. In the parades of man, there are specific signal components as well. Their expression depends on whether they serve e.g. to celebrate a special event, or to warn a given enemy (review in Todt 2003).

(d) Diversity: As a side-effect of their structural specificities and as consequence of their adaptive development, rituals that have evolved in different populations may differ in specific structural details. This can lead to a certain diversity in the forms of a given class of ritual. Such diversity can be tested by comparative studies. To explain this: The 'display flights' of birds can differ e.g. in the ornaments of wings or tails which the different bird species exhibit during their ritualized flights. In the parades of man,



there is much specificity, too, which usually documents a cultural diversity of the ritual (review in Todt 2003).

Now, what about an occurrence of these characteristics in the paradigm 'voiced/unvoiced speech'? According to the properties of whispering treated in the preceding chapters, one can draw the following conclusions: First, the criterion 'reference' is fulfilled, if one considers that whispering, in each language, contains many essential properties of normal speech. Second, the criterion 'contrast' is fulfilled, if one considers that whispering, in each language, does not built on a fundamental frequency, but just on 'turbulent noise' which then provides a 'focal component' for the subsequent phonation processes. Third, the criterion 'specificity' is fulfilled, if one considers that whispering, in each language, differs quite distinctly from normal speech in many other properties, too. Finally, the question whether the criterion 'diversity' also could be fulfilled is difficult to answer. Currently, there are no data that document a clear cultural diversity in the performance or use of whispering.

### **Functional Aspects**

The study of ritualisation has uncovered some characteristics that appeared to be related to functional aspects of rituals. These can subdivided into properties that document (a) a role specificity of a given ritual, that - in regard to its precursors - can not be reversed, and (b) the so-called honesty of a ritual. In the following, I will briefly treat these aspects and then again check how good properties of the 'voiced/unvoiced speech' paradigm would match them.

- (a) Role specificity: An essential characteristic of rituals concerns the fact that their functional relation to their particular precursors can not be reversed. In other words, a given ritual can not fulfill the role of its precursor. To give an example: Neither the 'display flights' of birds nor the parades of man can be used for effective locomotion.
  
- (b) Honesty: According to the 'Handicap Principle' (Zahavi & Zahavi 1997) ritualisation is characterized by a selection of honest signals. It has shown that this process favors

especially a development of rituals which are 'costly', and thus allow for a more spectacular 'show-off' than cheap signals. Although, this line of signal evolution was first documented for animals, it has been verified for our cultural domain, too (review in Zahavi & Zahavi 1997). To explain this: In their 'display flights', birds usually risk more than during normal flights, and in most parades the 'show-off' component requires that they should be spectacular, but not be constraint by economical restrictions.

To clarify whether the paradigm 'voiced/unvoiced speech' would meet these two functional aspects of rituals, it seems expedient to refer to the properties of whispering treated in the preceding chapters. Based on this, one can draw the following conclusions: First, the criterion 'role specificity' is fulfilled, because whispering was found to be useful for specific purposes only, but not at all appropriate to replace a language spoken in a normal, i.e. a phonated manner. As shown in chapter 2.3, for instance, whispering can be applied close contact only, and if the level of environmental noise is really low. Second, the criterion 'honesty' is fulfilled, too, because a performance of whispered speech was found to be more 'costly' and also to require a more advanced skill than a performance of normal speech. As shown in chapter 2.3, speaking by whispering voice can need more air and usually is more arduous than speaking by a normal voice. Thus, from a functional perspective whispering can be regarded as a ritualized form of normal speech as well.

## Conclusions

The approach designed to test my hypothesis predicting that whispering is an 'ingroup'-ritual which has evolved from normal speech, was completely theoretical. Nevertheless, I conclude that the results can be taken as a clear support of the hypothesis. This holds especially for the general prediction that whispering is a ritualized form of normal speech. Support for the more specific prediction, that this ritual was developed particularly for 'ingroup'-communication can be derived from my results on the ontogeny of whispering and, in an indirect manner, also from the results of my projects on the social aspects of whispering (chapter 4). As shown, these approaches had confirmed my hypothesis that this display is an 'ingroup'-signal. To supplement this aspect, I will briefly supplement it by two additional, but more general views.

First, the study of rituals has shown that they, in almost all cases, play a role in the field of social matters, where they appear adapted to serve very specific functions. If a ritual is not used in a functionally correct manner, this can cause problems. I conclude that the problematic consequences precedingly reported for a public use of whispering, can be taken as evidence for its adaptation to 'ingroup' matters.

Second, the functions of a given ritual are reflected by typical structural properties. Given the signal properties of whispering, one can predict that these are not at all appropriate to be used in agonistic interactions, but excellently suitable for socially positive communications. This can be concluded from the reported statement that whispering is applied best, if directly addressed into a partner's ear. In addition, it can be concluded from both the low volume and the spectral characteristics of whispering, e.g. its raised pitch level. Such signal properties are regarded to provide auditory icons of tenderness, or to simulate the voice of a young individual, respectively (Morton 1977). Taken together, these different arguments suggest that whispering should indeed be regarded as a valuable 'ingroup'-ritual.

### 5.3 Summary

For reasons explained earlier, this chapter has treated developmental aspects and evolutionary of whispering together. The results can be summarised as follows:

First, a study conducted in both families and 'kindergartens' provided some preliminary evidence on the development of whispering. The data revealed that first utterances of whispered words or two-word-phrases, respectively, can occur at an age of about 2 years. They could be elicited when a person who was familiar to a given child addressed her/him by a whispering voice. Typical self-induced whisper interactions, however, were found only in children who had reached an age of about 4 to 5 years. In the young, such instances played a clearly positive role. Nevertheless, adult caretakers usually declared such whispering as being disturbing and therefore often tabooed it, later on.

Second, the results on the ontogeny of whispering and, in addition, also results from other chapters of this thesis study confirmed a hypothesis predicting that this verbal display can be interpreted as a ritualised form of normal speech. It was assumed as well that this ritual was originally developed for very private functions, e.g. as a 'courtship-ritual'. In the light of this evolutionary perspective, the cited cases of whispering in public, which were reported as problematic, can be explained as instances of a false use of the 'ingroup'-ritual.