



## GENERAL INTRODUCTION

WHISPERING, like laughing, crying and screaming, is a well-known signal component of obviously many human cultures, and thus regarded as an universal form of vocalisation (Jensen 1958). However, unlike laughing, crying and screaming that can be found in some non-human primates, too, (for citations see Kipper 2002; Vettin 2003), whispering is unique to us, similarly to our other kinds of verbal accomplishments (Pinker 1995, Weissenborn & Höhle 2000; Todt & Kipper 2003). On the other hand, the use of whispering is not very frequent in our daily life, and mostly restricted to specific situations or contexts only. It was one of the aims of my thesis to explore 'why?' this is so. That is, I examined particularly the reasons and the causative factors of such use-related characteristics of whispered speech.

Whispered speech is a major topic in physiological research, e.g. audiology or phoniatriy, where investigations have concentrated on either its production or its perception. In contrast to normal speech, whispering is produced by completely preventing the vocal fold from vibration (Tsunoda et al. 1997). Thus, the passing air does not generate any fundamental frequency, but just a turbulent noise. This maneuver is under voluntary control (Monson & Zemlin 1984; Tsunoda et al. 1994). During the subsequent phonation processes, the noise is used to generate vowels and consonants (Mansell 1973), which as well as the whispering voice itself can get raised in pitch, as compared to a normal voice (Kallai & Emanuel 1985; Traunmuller & Eriksson 2000).

Studies on perception indicated that a whispering voice, in principle, is as well understandable as a normal voice, and - as shown by tests with English, German and Japanese sentences - this effect seems to be independent of language specificity (Higashikawa 1994). Nevertheless, problems may arise for a discrimination of some vowels, e.g. 'a' and 'o' in a few languages. This has been traced-back to a shift of the first and the second formant that typically are raised in pitch (Tartter 1991; Higashikawa & Minifie 1999). - In my thesis, I have re-investigated this issue and conducted experiments that were designed to clarify

especially which signal properties of whispered speech would affect the probability of correct decodings.

Whispering can encode also prosodic information, and thereby mediate e.g. clues about a signaler's emotional state. This was first documented by Knowler (1941), and later shown by Hultsch et al. (1992). On the other hand, problems in discriminating special emotions, namely 'joy' and 'fear', were reported later on (Tartter & Braun 1994). As similar problems can occur, with emotions encoded by normal speech (Scherer & Kappas 1988; Sobin & Alpert 1999), I decided to re-investigate this issue. The results of this study have been published already (Cirillo & Todt 2002). But they will be incorporated in my thesis, as well. Here, they will serve as groundwork for major sections which deal with significant social and psychobiological aspects of whispering.

Compared to the huge amount of studies that investigated the communicative role of normal speech (see e.g. Pinker 1999) the number of studies which addressed this role in regard to whispered speech, remained extremely small (Miller 1934; Panconcelli-Calzia 1955; Hultsch et al 1992). In particular, the social and the psychobiological aspects of whispering were clearly neglected. Instead of being treated as genuine research issues, these aspects were handled only as side-effects of psychologically interesting issues, such as the concepts of 'secrecy' and 'privacy' (Meares & Orly 1988; Fine et al.1996). Citations of these concepts mentioned, for instance, a relation to whispered communications only, but did not provide any detailed data. Aside of this, I noticed that almost all people seem to have a personal opinion about whispering, and most of these opinions suffered from just appearing plausible. On the other hand, however, I could not find any published study that treated the communicative role of whispering in an empirical manner.

Given this scientifically unsatisfactory situation, I concentrated the main part of my thesis on the social aspects of whispering or aspects of its communicative use, respectively. As a framework, I referred to the so-called 'ingroup-outgroup' concept that, in the past, had an immense impact on sociopsychological research (see e.g. Tajfel 1970; Tajfel & Turner 1979). The term 'ingroup' was proposed by Sumner (1906) and designates 'an exclusive group of loyal members who tend to treat one another preferentially as compared to outsiders' (=members of the 'outgroup'; see also Sutherland 1989). According to a suggestion of Todt (1986) whispering as well as human laughter can be regarded as vocal displays that normally have positive 'ingroup' effects, but at the same time also negative 'outgroup' effects. Based on this suggestion, I developed a research program which then guided the main part of my thesis.

To prepare this part, I examined some signal properties of whispering, which I considered to be relevant for an understanding of its social role. The research objectives included, for example, basic performance features of the signal, and also perceptual matters, such as typical constraints in the decoding of verbal or emotional information. The results of these studies are described in chapter 2.

Chapter 3, then, will outline my results on the social characteristics of whispered speech. It begins with a report about a general inquiry that served as a foundation for my subsequent experiments on this issue. In short, the approach supported the hypothesis that whispering can be explained now as a typical 'ingroup' signal. In addition, the findings uncovered also two other interesting aspects. One of them concerned a psychobiologically relevant role of whispering and suggested especially that exposure to this display can raise the auditory vigilance of listeners. The other one concerned properties of whispering, which suggested, that the social role of this verbal display would be explained best, if being interpreted as a ritualized form of normal speech. Since either aspect provided an essential supplement to my thesis, I decided to investigate each of them in a separate line of study. The results of these two approaches will reported in chapter 4 and 5.

Terminological note: Until here, I used the terms 'whispering' or 'whispered speech' synonymous, and distinguished them from 'normal speech'. In the following, however, for a more enjoyable reading, I will extend my terms and as a synonym of 'whispered speech' also use 'unvoiced speech'. And, as synonyms of 'normal speech', I will use the terms 'voiced speech' or 'phonated speech'.