Hearing Aids Communication

Integrating Social Interaction, Audiology and
User Centered Design to Improve Communication
with Hearing Loss and Hearing Technologies

Edited by Maria Egbert and Arnulf Deppermann

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Communication

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Introduction

Maria Egbert and Arnulf Deppermann

Hearing loss is a prevalent communication disability, yet to date there is almost no research on naturally occurring interaction which examines how participants handle hearing loss and the use of hearing aids in communication. In contrast, research focussing on the medical and technological dimensions has advanced tremendously. Still, the social reaction to hearing loss is frequently stress, withdrawal and isolation. Despite the enormous technological development, most people who could benefit from a hearing aid do not use it. The goal of this edited volume is to present a theoretically founded, interdisciplinary research approach geared at understanding and improving social interaction impacted by hearing loss and (non-)use of hearing technologies. Towards this end, we are integrating Conversation Analysis, audiology and User Centered Design.

The World Health Organization ("WHO") identifies hearing loss as a "global burden" with a heavy social and economic toll. Adult-onset hearing loss is estimated as "the second largest cause of Years Lost to Desease" (WHO 2009). As a physical disability, hearing loss is experienced first and foremost in social interaction. For this reason, the United Nations 2006 draft on the "Convention on the Rights of Persons with Disabilities" is particularly influential. It replaces the concept of disability as a condition of an individual, who needs to be treated, by a holistic concept of disability as a participatory socio-cultural phenomenon, which a multi-cultural society needs to address by integrating all members as full participants. This shift widens the focus from an individual with hearing loss to participation in socio-cultural interaction and opens up new perspectives to understanding and solving the enormous problems associated with hearing disability.

Although hearing loss is a condition experienced foremost in communication, the research area of social interaction has not focussed much on interaction with hearing loss, and likewise, it is not recognized as a possible contributing field by the fields of medicine and technology. A representative of the hearing aid company GN Resound (Bisgaard 2009) lists as "Hearing Industry Specific" the following research areas:

- *Auditory research*
  - *Basic psychoacoustics*
  - *Hearing impairment*
  - *Audiology/diagnostics*
  - *Linguistics*
- *Acoustics*
  - *Electro-acoustics*
  - *Transducers*
- *Signal Processing*
  - *Audibility restoration*
  - *SpeechNR improvement*

Hearing loss
- is the second most frequent disability globally
- is mostly incurable
- is experienced in communication
- affects all participants

The UN views disability as a participatory socio-cultural phenomenon.

Social interaction is a research field that needs to be included in the scope of disciplines.

- Environmental adaption
- *User profiling*
  - Psychology

In this edited volume we are exemplifying how the research field of social interaction can contribute towards understanding communication with hearing loss and the social dimensions of hearing technologies by integrating three disciplines: Conversation Analysis, audiology and User Centered Design.

The most frequent type of hearing disability, sensorineural hearing loss, develops due to ageing, exposure to noise and infections, affecting about every third adult above the age of 40 in western societies. Although sensorineural hearing loss is permanent and can only be treated by hearing aids, less than 20% of affected persons use hearing technologies (for a more detailed description of types of hearing loss and its prevalence, cf. Mourtou/ Meis, ch.2, this volume). Compliance rates around the world are low and correlate with national wealth, e.g., India and China less than 5% compared to Europe with less than 20% (Bisgaard 2009). Still, national economies are clearly not the only factor, because across western national health care systems, compliance rates also differ, e.g., Finland less than 15%, Germany and the USA less than 20%, with the highest compliance rate world-wide reported for Australia and Denmark at about 40% (Bisgaard 2009). The reasons for the discrepancies in western countries do not seem to lie in technology. Today's hearing aids are highly advanced, and a large variety of technological and design features is available. This indicates that the low compliance rate of this assistive technology needs to be understood in terms of its social and psychological dimensions (cf. Mourtou/Meis, ch.2, this volume).

Communication during medical and audiological encounters is highly relevant to successful coping with the disability and using the hearing aid, both in terms of information transfer and sociality, as shown by a large interview study (ProMatura 2007a/b). Research on medical encounters has established that communication is the key to whether or not patients follow the doctor's advice and prescriptions, yet little is known about what actually happens interactionally in audiological encounters. As these findings indicate, an important reason for the low compliance rate in hearing aid use seems to lie in the health care interactions, and likewise, a reason for the significant national differences in hearing aid use seems to lie in the ways in which the services and availability of assistive technologies are organized. The researchers in this edited volume are the first to study naturally occurring audiological interactions.

The problems associated with hearing loss are mainly social and psychological. Stigmatization, taboo, interactional cover-up and stressful emotional experiences lead to withdrawal and isolation (WHO 2001). Even in the initial stage of hearing loss, communication is impeded (Christensen 2006a/b; Kramer et al. 2006: 504), and related problems such as fatigue and mental distress affect private and work relationships. Lower quality of work, a significantly higher frequency of sick leave, and early retirement are among the consequences. The economical loss is estimated at 200,000 US Dollars to society for each person dropping out of the workplace early due to hearing loss (WHO 2001).

Both problems, the communication difficulties associated with hearing loss and the reluctance to use the help that is available, include interrelated aspects, which can be described at the micro level of social interaction, with respect to the meso level of institutions, organizations and companies providing care, and at the macro level of a country's policy on disability, health

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The goal of this edited volume is to exemplify a new interdisciplinary collaboration.

- About 80% of the persons affected by hearing loss do not use hearing aids.

- The rate differs across countries depending on income, health care system and unknown factors.

Health care encounters:

- Communication problems seem to be significant.
- Little is known how these problems arise.
- We study authentic video-taped medical and audiological encounters.

Results of not coping well with hearing loss and noncompliance:

- Stress
- Isolation
- Problems at work
- Early retirement

care system, culture and language. Beyond the macro level of nations, there are overarching global trends, in particular the wide-spread non-usage of hearing aids, stigmatization of hearing loss, and lack of research on social interaction with hearing loss in private settings, at the workplace and in health care encounters. In the network of researchers who present their initial work in this edited volume, we are integrating the micro, meso, macro and global perspectives by studying how the different dimensions of hearing loss emerge in real-life encounters. Research based on surveys, questionnaires and interviews has identified problems of communication and barriers against seeking help. Yet, to date we have almost no knowledge about how hearing impaired persons and their communication partners handle these problems in actual social interaction. While communication problems are reported routinely, there have been only few researchers who have analyzed their occurrence in video-taped authentic interactions. Exceptions are the analysis of video-taped interactions between deaf children, some of whom use hearing aids, and hearing schoolchildren (Keating/Mirus 2003b) and a collection of video-taped audiological and private interactions of persons with severe and profound hearing loss (Kaul 2003; Skelt 2006; 2007). Therefore, we need to understand better how participants in communication orient to problems associated with hearing loss of varying degrees and to the use of hearing aids.

It is most timely to bring this hitherto neglected interactional perspective on hearing loss into the focus of applied research on social interaction. This move promises to help to discover social factors of hearing impairment in more realistic detail. Thus it can open up access to new means for the improvement of hearing impaired persons' conditions of life. To locate and analyze these problems and to find points of departure for change is the motivation driving the research in this book. Our analysis includes the multimodality of interaction, i.e. the verbal conduct, nonverbal behaviors, the orientation to technology and all other characteristics of the interpersonal situation to which the interactants attribute relevance. For the first time, we are integrating Conversation Analysis ("CA"), linguistics, audiology and User Centered Design to study hearing loss and the use of hearing aids directly where it happens: in real-life, authentic interaction, which we have videotaped in private conversation, school and health care settings in Australia, Denmark, Finland, Germany and Switzerland.

To understand human interaction and the use of technologies, CA rigorously examines the participants' perspective through their actions in situ. To gain an empirical basis for technological innovation, developers in User Centered Design take as point of departure how users actually interact with technologies and other people in the flow of their work and everyday lives. Audiologists and rehabilitation specialists contribute by providing access to the professional communication situations, by integrating their perspective in the analysis of interactional data, and by participating in the innovation process.

In the social sciences and the humanities, CA has proved to be a reliable methodology yielding new insights into all kinds of everyday and institutional interaction, including medical encounters (e.g., Heritage/Clayman 2010). The conversation analysts in this edited volume are the pioneers in researching communication with hearing loss and hearing aids. These analyses of social interactions will be relevant to persons with hearing loss and their communication partners, audiological and rehabilitation professionals, as well as to representatives of macro systems, such as national health care systems, education programs for hearing health professionals, the hearing aid industry, and national economies.

Methodologies using subjective reports have identified important problems.

There is a need to study how these problems emerge and are handled in authentic interaction.

- We address this need by presenting pilot studies of naturally occurring interaction from different settings and countries.

- We innovate in international and interdisciplinary collaboration.

- We integrate Conversation Analysis, audiology and User Centered Design.

- We build on successful conversation analytical research on medical encounters and on interaction with technologies.

This applied research is geared towards change and innovation by integrating the Scandinavian approach of User Centered Design, and in particular its current evolution of Participatory Innovation (Buur/Matthews 2008). Finding possibilities for change and implementing them should then involve representatives from all stake holder groups, in particular, persons with hearing disabilities, users and non-users of hearing technologies, audiological professionals and educators, institutional administrators, industrial partners, and politicians.

- The framework for innovation is the Scandinavian approach of User Centered Design/Participatory Inovation.

The work presented in this book is the product of our interdisciplinary collaboration, rooted in the SPIRE centre for participatory innovation, a federally funded research center for innovation established at the University of Southern Denmark, funded by the Danish Council for Strategic Research. The goal of SPIRE (which stands for "Sønderborg Participatory Innovation Research Centre") is to promote the approach of User Centered Design in industry and in research (cf. Buur/Bagger 1999; Ylirisku/Buur 2007; Buur/Matthews 2008). In a pilot project we discovered that our industrial partner was expecting high-speed innovation and exclusive focus on the technology. We also realized that we needed to build a stronger bridge between conversation analysts and audiologists. Centrally, it became obvious that the process from research to innovation we envision needs to be exemplified in order to show how the different contributions, combined in this way, offer unique value.

The SPIRE centre for participatory innovation"[...] will comparatively investigate user innovation (how people innovate) and user-driven innovation (how companies innovate through various forms of collaboration with users) as a means of advancing innovation theory and developing new methods for the integration of these theories into industrial practices." (SPIRE director Jacob Buur 2007).

This edited volume addresses these needs in the following ways: Case studies of authentic interaction are analyzed from the perspective of CA and audiology, revealing that both angles need to be integrated. In addition, each case analysis is taken as a point of departure for generating ideas for change. By including data from a variety of western countries with different health care systems, the differences and their relevance for compliance generate ideas for innovation. The empirical analysis is grounded in a theory of Science, Technology and Society ("STS"), which allows for an understanding of the micro, meso, macro and global dimensions of hearing disability and the use of technology in interaction. Finally, we have asked internationally recognized scientists, practitioners and hearing aid users to comment on the book from their respective perspectives.

Approach and theory

Therefore, this edited volume consists of two parts:

Part One lays out the theoretical and methodological foundations of the contributions rooted in the perspectives of the affected persons in authentic interaction. Part One also introduces basic facts about audiology and compares the relevant health care systems.

Structure of this volume:

Part Two is the heart of this book. It consists of analyses of authentic interactions with hearing loss; some of them involve also how hearing aids are dealt with in interaction. Special emphasis is put on medical, audiological, and rehabilitational concerns and potentials for innovation to be derived by close attention to interactional practice. Studies from two other fields of impairment in interaction are added to show which directions research on hearing loss in interaction might take for innovation.

Part One opens up with Eleni Mourtou and Markus Meis, who provide *Some basics about hearing loss, hearing technologies and barriers to hearing aid use* (ch.2). This is a primer concerning hearing loss. It deals with the different degrees of hearing loss, their measurement and their relevance to communication, and it introduces the technology of hearing aids. Socio-psychological aspects related to stigma and avoidance are discussed as they can account for barriers against hearing aid use.

- Ch.2: Basics on hearing loss

In ch.3, Maria Egbert, Simone Groeber, Jette Damsø Johansen, Eila Lonka, Markus Meis, Kati Pajo, Johanna Ruusuvuori, and Louise Skelt give an overview over *Hearing health care provision in the national systems of*

- Ch.3: Comparison of health care systems

Australia, Denmark, Finland, Germany, and Switzerland. Although these countries share highly developed medical and technological provisions, they differ in the compliance rates for hearing aid usage. The authors compare the health care systems of the five countries in order to discover how properties of them (e.g., access to help, costs, support for users after fitting) may foster or rather discourage hearing aid use.

Elizabeth Keating and Pirkko Raudaskoski set the scene for a socio-interactional approach to hearing impairment and the use of hearing aids as social practice with ch.4: *Theoretical framework: Communicative technology for augmented interaction within the field of Science, Technology and Society ("STS")*. They discuss how ideological conceptions and cultural practices influence the ways technology is used and how technology impacts various areas of social life, social interaction and the users' sense of self, to name the most important factors. The greatest obstacles to the use of hearing aid technology are rooted in social practices. The authors make clear that the popular sender-receiver communication model known from kybernetics needs to be replaced by an understanding of effective communication as a collaborative endeavor of both speakers and hearers in order to arrive at a more adequate view of hearing impairment in social interaction.

Since Conversation Analysis as the study of social action is little known in audiology, Maria Egbert and Arnulf Deppermann provide an *Introduction with examples from audiology* in ch.5. Basic concepts are explained to prepare for the analytical chapters, including turn-taking, sequence, repair and the role of nonverbal conduct. In addition, transcription notations are described.

In ch.6., *User Centered Design: From understanding the hearing aid user towards understanding interaction*, Maria Egbert and Ben Matthews propose an innovatory approach with User Centered Design as the framework to integrate audiology and Conversation Analysis in order to develop solutions. Innovation may take as point of departure both interaction ('best practices') and the hearing aid as a social technology. The authors argue that innovation crucially has to include the users' perspective and to study the sites of interaction where hearing disability and hearing aids become relevant. Conversation Analysis is the methodology which gives access to interactional contexts, problems, and consequences of the everyday use of technology in authentic settings. User Centered Design and Participatory Innovation are introduced as approaches which involve both users, producers and care-givers in a collaborative process of designing and adapting products and interaction, and they report on first experiences with the collaboration of audiology, Conversation Analysis, and User Centered Design in Denmark.

Part Two examines hearing loss in video-taped authentic interactions. The chapters deal with four interactional settings which are most relevant for how hearing loss is experienced, becomes socially relevant and is treated, namely, everyday interaction, classroom interaction, doctor-patient interaction, and hearing aid fitting. The analyses draw on data from Australia, Denmark, Finland, Germany, and Switzerland.

The first section of analyses deals with hearing loss in everyday conversation and audiological encounters. Louise Skelt's ch.7, *Dealing with misunderstandings: The sensitivity of repair in hearing impaired conversation,* discusses how indicating trouble in hearing or understanding ("initiating other-repair") is avoided in interaction with hearing impaired partners. While other-repair is common in task-oriented dialogue (e.g., in audiological settings), repair directed to misunderstandings exhibited in hearing impaired persons' talk is dispreferred in more mundane contexts because other-repair is a delicate matter, which may threaten the social and cognitive status of the partner. Instead, partners let misunderstandings pass, if

- Ch.4: Theory of Science, Technology and Society

- Ch.5: Introduction to Conversation Analysis

- Ch.6: Introduction to User Centered Design

- Ch.7: Misunderstandings due to hearing loss

they do not threaten the pursuit of the main business of the talk, or they use embedded forms of correction not addressing troubles and misunderstandings explicitly. Interactants seem to orient to the heightened risk of misunderstandings by using practices of enhanced multimodal coordination, i.e. verbal, non-verbal and other contextual features, in order to pre-empt the necessity of repair.

Repair is also the topic of Kati Pajo's ch.8, *Difficulties to receive the spoken message: Analysis of a private interaction between sisters at the coffee table.* In interaction with hearing impaired partners, it remains often unclear to one or both partners, whether, or to what degree, mutual understanding has been achieved. Hearing problems can also lead to repair sequences which are much longer and more complex than usual. Pajo discusses how participants use both specific resources for signaling that a hearing problem is a trouble source and for repairing an understanding problem originating from a hearing problem. She discusses language-specific practices of repair initiation, which differ in terms of (not) attributing misunderstandings to hearing problems.

- Ch.8: How a hearing problem in conversation is avoided and pursued

Another important interactional site, where hearing impairment causes specific difficulties, is classroom interaction. In ch.9, Simone Groeber and Simona Pekarek Doehler study *Hearing impaired adolescents in a regular classroom: On the embodied accomplishment of participation and understanding.* They focus on pupils with hearing loss who are enrolled in classes where they are co-educated with nornal hearing pupils. In this setting, hearing impaired adolescents manage specific interactional demands having to do with the need to attend to two participation frameworks simultaneously, namely, the public classroom interaction with the teacher on the one hand, and supportive interaction with an assistant teacher on the other hand. The authors analyze the difficulties of coordinating participation in both contexts and show their impact on the process of repairing problems and of understanding the teacher's talk. The study displays how the hearing impaired pupils use multimodal means to signal and to disambiguate the kinds of hearing problems they experience and how embodied coordination of all participants is needed to arrive at shared meanings.

- Ch.9: A classroom with and without hearing impaired adolescents

The next four papers deal with diagnostic settings. In ch.10, Arnulf Deppermann analyzes *Negotiating hearing problems in doctor-patient interaction: Practices and problems of accomplishing shared reality*. Building on the analysis of a patient's first description of the experience of hearing loss to a medical professional, the author shows how the hearing problem poses a fundamental threat to the subjective functioning and self-perception of the patient. The patient's attempts at describing hearing problems exhibit the specific difficulties to account for subjective experiences which lie outside of the everyday, intersubjectively shared life-world and which make enhanced efforts at collaborative sense-making necessary. The chapter also shows how competing theories by doctor and patient concerning the nature of the illness affect the interaction and lead to miscommunication. From an audiological perspective, these symptom descriptions warrant immediate further examination, yet the general practitioner recommends a sick leave and does not explore the symptoms further.

- Ch.10: A patient reports hearing problems to her general physician. They fail to achieve a shared reality.

Maria Bonner reports on *Some linguistic observations on testing hearing* (ch.11). She criticizes problematic presuppositions incorporated in speech perception tests, which tend to yield biased and sometimes incorrect results. In particular, important parts of the sound system of a language are not represented in the test items, and perception problems tend to be confounded with features of production, because scoring does not take into account the possibility of alternative pronunciations which are common in regional varieties, as in the case of oral German. Bonner points out that hearing impaired

- Ch.11: A hearing test tested by a linguist

persons are bound to encounter language-specific problems because different sound inventories pose different discrimination problems for hearing impaired persons, as phonetic differences amounting to phonematic differences might be more or less easy to discern and prosody may be more or less helpful.

The next two papers deal with the interaction between hearing impaired persons and audiologists in the context of fitting an already acquired hearing aid. In ch.12, *Hearing aid adjustment: Translating symptom descriptions into treatment and dealing with expectations*, Trine Heinemann, Ben Matthews and Pirkko Raudaskoski pursue the same line of inquiry as Deppermann (ch.10), i.e., the problems to describe the subjective experience of hearing loss in a way to be understood by professionals. This is most vital for audiological consultations, because the hearing aid fitter has to make technical decisions on the basis of the patient's descriptions. The authors show how an audiologist reformulates the patient's symptom explanations in order to make it suitable to treatment decisions. The patient's reportings of the functioning of the hearing aid also bring the user's implicit expectations towards the hearing aid to the surface. The analysis can thus detect whether expectations are unrealistic. The authors argue that addressing the patient's expectations is highly important, because the patient's compliance with the audiologist's recommendations and, ultimately, the hearing aid use as such crucially depends on how the patient sees his or her expectations fulfilled.

- Ch.12: Hearing aid fitting as a translation problem

Cathrine Brouwer and Dennis Day also focus on compliance in their chapter *WHO/ICF guidelines and compliance in a hearing aid consultation.* The authors' point of departure is to ask how the World Health Organization's International Classification of Functioning Disability and Health ("ICF") and their national adaption in Denmark can be implemented in the interaction between hearing impaired patients and audiologists. Both the WHO's and the national guidelines require that the patient is actively involved in the process of medical consultations. Ch.13 shows how the uptake of patients' concerns depends on being formulated in the right place, i.e., in the context of a problem presentation early in the consultation, whereas both audiologist and patient seek a technical solution from the outset of the interaction.

- Ch.13: WHO/ICF guidelines for hearing aid fitting

In order to demonstrate how conversation analytic methods can be brought to bear fruitfully on communicative impairment, the next two chapters present results from two fields of study where this approach has already been implemented successfully. Ch.14 by Minna Laakso deals with *Aphasia as an example of how a communication disorder affects interaction*. Aphasia has been studied in depths in Conversation Analysis in the last years, and the wealth of insights gained gives an impression of what can be accomplished by adopting the CA-approach in order to analyze the social and interactional dimensions of impairment. For example, studies have yielded that aphasics use specific strategies of turn construction, which may be faulty from a linguistic point of view, but which are most efficient tools in order to take part in an ongoing conversation more effectively. Complementarily, non-aphasic co-participants actively cooperate in making the aphasics' turns interpretable, e.g., by completing utterances. Still, the aphasics' face as a competent interactional partner is saved by avoiding open acknowledgement of difficulties or by not forcing them into situations where their speaking competence is put to the test.

- Ch.14: What we can learn from applied Conversation Analysis of a different communication disorder (aphasia)

Elisabeth Gülich's ch.15, *Conversation Analysis as a new approach to the differential diagnosis of epileptic and non-epileptic seizure disorders* once again leads us into a neighboring field of research, showing how CA is used successfully to aid medical diagnosis. The author shows how linguistic and communicative properties of how people describe seizures are instrumental in diagnosis to differentiate between two types of seizures, epilepsy and

- Ch.15: What we can learn from applying Conversation Analysis to differential diagnostics (seizures)

dissociative personality disorder. Gülich shows how close observation of the patients' talk can elucidate cases which are ambiguous from a medical point of view and how conversation analytic insights can be used to develop a toolkit for differential diagnosis on linguistic and communicative grounds.

In ch.16, Arnulf Deppermann and Maria Egbert's *Conclusions and future perspectives for application and innovation* present perspectives of how the integration of User Centered Design, audiology and Conversation Analysis can lead to innovation. The chapter takes as point of departure the findings from the analyses presented in this edited volume. In this discussion, we consider the relevance to hearing impaired persons, their social network, the medical and audiological staff, but also more generally for the health care systems, legislation, and hearing aid producers. Building on the studies assembled in this book, this chapter outlines challenges for future research and it sketches opportunities how to put insights from close analysis of everyday and institutional interaction involving hearing impairment and hearing aids to innovative uses aiming at improving the communicative situation of hearing impaired persons and their interactional partners.

- Ch.16: Towards application and innovation

The book closes with comments on the approach taken in this volume by experts from various disciplines dealing with hearing loss and hearing aids, and users of hearing technologies. They point out the potentials that an interaction-oriented approach to hearing impairment promises to offer in solving long-standing problems and how it links up with their specific professional perspectives.

Experts from different disciplines and persons with hearing loss comment on this volume.

The contributors to this book do not purport to solve the complex problems associated with hearing loss and use of hearing aids; rather, our goal is to present an innovative methodological perspective with this first-time interdisciplinary collaboration, which we believe offers a new window on understanding the problem and a unique framework for possible solutions. The research in this collection takes a first step towards a larger empirical study with the goal of contributing to an improvement of the quality of life of persons with hearing loss and their social environment, to deeper insights into the interface between audiology and interaction, to a theory of the role of new technologies in shaping social interaction with disabilities (Keating 2000; Keating/Mirus 2003a), and to a better understanding of the role of culture in shaping the adoption of new technologies (Keating 2005; 2006). The empirical results will be used for identifying points of departure for change in the areas of interaction, technology, training and policy making.

The scope of this approach.

Introduction to audiology: Some basics about hearing loss, hearing technologies and barriers to hearing aid use

Eleni Mourtou and Markus Meis

This chapter provides background information for researchers who wish to become familiar with some basic medical and audiological aspects of hearing loss and the technology of hearing aids. It introduces (1) the disciplines involved in research on hearing loss, (2) the medical categories of hearing loss and their various effects on communication, (3) the different degrees of hearing loss as defined by different national and international organizations, (4) statistics on the prevalence of hearing loss worldwide, (5) some technological aspects of hearing instruments, (6) statistics on non-usage of hearing instruments worldwide, and (7) barriers to using hearing aids. Since hearing loss is a worldwide pervasive phenomenon which is likely to increase even further in the future, the authors point out that an understanding of the non-use of hearing aids is crucial.

1. Introduction

Several disciplines study the sense of hearing, hearing loss and hearing rehabilitation. Audiologists deal with the study of auditory and vestibular processes, including testing hearing, diagnosis of hearing loss, and rehabilitation. The medical aspects of hearing fall within the field of otorhinolaryngology ('oto' = ear, 'rhino' = nose, 'laryngo' = throat/ abbreviated as "ENT"). Medical research on the highly complex physical, biochemical and neurobiological aspects of hearing provides the basis for the patient's ear examination, diagnosis and treatment of hearing loss. The development of technologies for assessing and treating hearing loss is an interdisciplinary endeavor with specialists from engineering, design, medicine and audiology. Research into coping with hearing loss and hearing instruments is conducted mainly in logopedics, hearing pedagogy, social psychology, general psychology and audiology.

Contributing fields:
- audiology
- otorhinolaryngology
- engineering
- design
- rehabilitation

The multilayered aspects and implications of hearing loss on individuals and on communication require a multidisciplinary approach. Studies concerning interactional aspects of hearing loss based on video-taped authentic encounters are still a desideratum. Results from such studies may have implications for the rehabilitation of individuals with hearing loss. Describing hearing loss only in terms of medicine and audiology does not suffice to capture the problems caused by hearing loss adequately.

In the multidisciplinary approach, studies on interaction are still missing.

2. Types of hearing loss and their implication for communication

In audiology and medicine, the types of hearing loss are distinguished according to where the damage in the auditory system is located. The most frequent type of hearing disability is acquired sensorineural hearing loss. The damage occurs in the cochlea and particularly in the hair cells of the cochlea (sensory), or in the auditory nerve (neural). In 'conductive' or 'central' hearing loss, the outer or middle ear is affected so that the sound is not conducted properly. In mixed hearing loss, both conductive and sensorineural hearing loss occur, with damage in one or more of the areas of the ear or auditory nerve (Hain

Hearing loss differs according to where in the ear the damage occurs.

2010). In the US, 90% of hearing loss is sensorineural hearing loss and 0.8% conductive (Hain 2010). These figures are assumed to be similar in Europe.
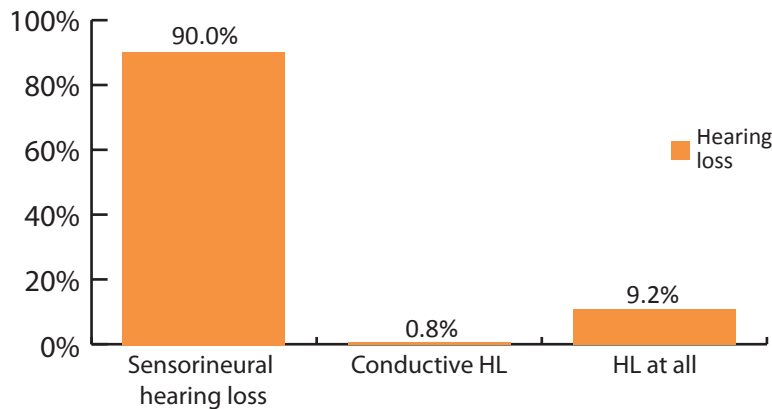
Table 1: Percentage of the types of hearing loss in the US population (adapted from Hain 2010)

Depending on the type of hearing loss, different kinds of treatment are possible, and the effects on communication differ.

    Sensorineural hearing loss is not reversible, i.e., it cannot be treated by surgery or medication. The only help is to use assistive technologies (Boenninghaus/Lenarz 2005). Acquired sensorineural hearing loss is due to aging, exposure to noise and infections. Sensorineural hearing loss can also occur congenitally mostly due to a birth trauma, viruses or genetic factors, and for persons with a genetic predisposition, exposure to noise can enhance its emergence. While sensorineural hearing loss used to be associated mostly with aging, it is now also a condition found in younger people due to the damage caused by exposure to noise and loud music (SCENIHR-Report 2008). This type of hearing loss provokes a change in the quality of hearing so that affected individuals lack the ability to perceive sounds clearly. Faint sounds and even speech at a regular conversational loudness may be perceived as unclear, muffled, and distorted (Craggs-Hinton 2007). A phenomenon peculiar to sensorineural hearing loss is the so-called 'recruitment phenomenon', when the dynamic adjustment to sounds is restricted. The affected person perceives a very sudden change from not hearing to hearing sounds very loudly and in a distorted fashion. The result for communication is that the person cannot distinguish words which sound similar (cf. Bonner, ch.11, this volume).

    In conductive hearing loss, sound is not conducted properly, and the affected person experiences sounds with a lower or fainter quality. Treatment by medication or surgery can reverse the damage and hearing aids can restore the hearing ability. Conductive hearing loss can be caused by interferences of the auditory canal, the eardrum, otosclerosis (the abnormal growth of bone in the middle ear), or infections (Boenninghaus/Lenarz 2005). With central hearing loss, the problem does not lie in the malfunction of the ears, but in the central nervous system, and more precisely in the brain (Hain 2009). In persons with normal hearing, incoming acoustic signals are identified by the brain, which gives a meaning to the received signals. Individuals with central hearing loss hear well, but have problems in filtering out competing auditory signals (Lauer 2006). Children are very often diagnosed with auditory processing disorders (Cacase/McFarland 1998). Although there are

SENSORINEURAL HEARING LOSS:

90% of the damage occurs in the cochlea (=sensorineural hearing loss).

It can only be treated by using hearing instruments.

The causes are:
- ageing
- exposure to noise
- infections
- genetic predisposition

Effects on hearing:
- loss of ability to distinguish sounds
- loss of perceiving faint sounds
- speech at regular loudness sounds are often muffled
- restriction of dynamic adjustment to sounds

CONDUCTIVE HEARING LOSS:
- caused by malfunction of the nervous system or brain
- sounds are not conducted properly
- can be treated by medication or surgery

Effects on hearing:
- loss of ability to filter competing auditory signals

adequate tests available, it is still very difficult for audiologists, surgeons and therapists to diagnose and treat these disorders (Lauer 2006).

3. Degrees of hearing loss

The degree of hearing loss indicates how much the loudness of a sound needs to be increased so that the person can perceive it. With a specially designed hearing test, an audiological professional measures the test person's hearing threshold in decibels. It can be difficult to determine the degree of hearing loss because patients are not always able to accurately report their hearing sensations (Kinkel 2005; Heinemann et al., ch.12, this volume).

Different organizations vary largely in how they define the degree and severity of hearing impairment. Some organizations use the 'Better Ear Hearing Level' ("BEHL") or 'Better Ear Average' ("BEA"), others the 'Worse Ear Hearing Level' ("WEHL") or 'Worse Ear Average' ("WEA") from the 4 M frequencies 0.5, 1, 2, and 4 kHz. Degree of hearing loss is divided into either four or five categories. As this table indicates, some organizations define mild hearing loss as starting at 20 dB, while other organizations consider a level up to 26 dB as 'normal' hearing. The definition of severe and profound hearing impairment diverges even up to 14 dB.

	Mild	Moderate	Moderate/ Severe	Severe	Profound
WHO	26-40	41-60		61-80	≥81
Euro. Com.	21-39	40-69		70-94	≥95
ANSI	27-40	41-55	56-70	71-90	≥ 91
RNID, UK	20-40	40-69		70-94	≥ 95
BSA	20-40	41-70		71-95	≥ 95
NIDCD, US		-40		≥ 75	

Table 2: Degrees of hearing impairment as categorized by different organizations (adapted from Shield 2006: 14)

Notes on Table 2:
WHO: avg. 0.5, 1, 2, 4 kHz
European Commision: avg. at 0.5, 1, 2, 4 kHz of the (BEHL)
ANSI = American National Standards Institute
RNID = Royal National Institute for Deaf and Hard of Hearing People
BSA: British Society of Audiology: avg. at 25, 5, 1, 2, 4 kHz of pure tone thresholds
NIDCD = National Institute on Deafness and Other Communication Disorders: avg. at 0.5, 1, 2, 3 kHz of pure tone thresholds

In the following, we present the definitions of the World Health Organization (WHO 2001). According to the WHO, disabling hearing impairment in adults is "a permanent unaided hearing threshold level (average for frequencies 0.5, 1, 2, 4 kHz) for the better ear of 41 dB or greater" (Shield 2006: 11). It is important to note that the WHO definition does not distinguish between symmetrical and asymmetrical hearing loss. For example, a person who is deaf in one ear, but has a 'Better Ear Average' (BEA) of 24 dB HL in the other ear, would be characterized as "normal hearing" according to the WHO, yet from an audiological perspective a hearing aid would be indicated. From a rehabilitation point of view regarding the provision of hearing aids, the WHO definition is thus not sensitive enough.

Severity of hearing loss is diagnosed in terms of the degree to which a sound has to be amplified in order to be perceived by the affected person.

International and national organizations differ slightly in how they categorize degrees of hearing loss.

Most organization use four categories:
• mild
• moderate
• severe
• profound

A hearing aid is indicated with mild hearing loss.

For treatment, it is necessary to distinguish the hearing threshold of both ears separately.

The WHO categorizes degrees of hearing ability into five degrees. The first degree describes normal hearing (0-25 dB), and the following four degrees differentiate severity of hearing loss. Communication is impeded in the following ways:

COMMUNICATION PROBLEMS:

- Individuals with mild hearing loss are able to hear and repeat words spoken at a normal sound level at a distance of about 4 feet (Grosse 2001). The affected person usually has some hearing problems, but is able to follow conversations if there is no background noise. Some soft sounds, like birds chirping or faint and distant speech may sound inarticulate or are difficult to hear at all (Craggs-Hinton 2007). Hearing aids are of great help because they amplify the low signals. Even children with mild hearing loss can achieve normal language acquisition if the hearing loss is diagnosed early and treated appropriately (Löhle 1991).

Mild:
- conversations with background sounds are problematic
- soft sounds are lost
- sounds from a distance are difficult

- Moderate hearing loss entails greater difficulties in hearing speech. Some sounds that are loud for normal hearing persons may appear very soft, and some sounds may not be heard at all. Speech can only be understood if it is loud. The so-called 'cocktail party effect' is a big challenge, i.e., in group situations, even more so with background noise, hearing is greatly impeded (Ding 1984). A hearing aid will help with most hearing difficulties if the background noise is low and the speech discrimination is good, yet hearing may still be a phenomenon in other communicative situations. If children with moderate hearing loss are not supplied with hearing aids, errors in their speech may occur, as children will not be able to monitor their own speech. Above all there may be limitations in language comprehension and usage as well as limitations in the child's vocabulary if not supervised on a regular basis by a speech therapist (Löhle 1991; Leonhardt 1999).

Moderate:
- sounds appear very soft
- some sounds are lost totally
- background sounds are highly problematic
- groups situations are very difficult

- With severe hearing loss, normal conversational speech is almost not audible anymore. What makes it even worse, speech is usually distorted, making comprehension impossible. In addition, the affected individuals may not be able to hear themselves. Sounds, which are very loud to a normal hearing person, appear very soft or cannot be heard at all by individuals with severe hearing loss. If the hearing loss is bilateral, the situation is even worse. In this case, speech comprehension is only possible with the help of lip-reading, even if hearing aids are worn. Children with severe hearing loss need special accommodations for being able to visit schools and to compensate the challenges with hearing (Leonhardt 1999; Thiel 2000).

Severe:
- normal speech cannot be heard properly
- speech sounds distorted
- loss of hearing one's own speech/voice

- Profound hearing loss is deafness, as only extremely loud sounds can be 'heard', or to be accurate, 'felt' through the vibration they produce. Hearing aids may help very little or not at all (Pelkofer 1978). In these cases, a cochlear implant is often indicated. Nowadays deaf born children are likely to receive a cochlear implant (Dittmann 2006).

Profund:
- communication is only possible with the help of lip-reading

4. Prevalence of hearing impairment among adults worldwide

Hearing disability occurs to varying degrees when surveyed for different geographic regions. In this section, we summarize statistics for Europe, Aus-

Hearing loss is a global problem

tralia/New Zealand, the USA, Latin America and Africa. It should be noted, however, that a comparison is not always accurate because statistics are sensitive to the different definitions of hearing loss, age ranges and the selection criteria of the populations as data base (Shield 2006).

International comparison can only rely on estimates since methods for categorization, statistics and populations differ.

In the past 25 years, there have been several European studies concerning hearing impairment in adult populations. The UK National Study of Hearing was the first large-scale investigation on hearing impairment in adults in Europe (Davis 1991; 1995). Further studies have been conducted in Italy (Quaranta et al. 1996), Denmark (Karlsmore et al. 2000), Finland (Uimonen et al. 1999), Sweden (Johansson/Arlinger 2003), Germany (Sohn 2001), France (IPSOS-Study 2001), as well as a joint report for the Nordic countries and the UK (Sorri et al. 2001).

As an overall estimate, these statistics indicate that in Europe approximately 16% of adults are affected by hearing loss, which in absolute numbers is 71 million people in Europe as a whole, among them 55 million in the EU (Shield 2006). It is expected that numbers will increase up to 25% by 2020 due to the aging population and other factors, such as greater exposure to noise (Rosenhall et al. 1999; Sorri et al. 2001). Table 3 (below) shows the estimated current prevalence of hearing impaired adults in Europe.

In Europe, it is estimated that 16% of all adults have hearing loss.

Prevalence is increasing internationally.

Mild	Moderate	Severe	Profound
16.9%	4.6%	0.7%	0.2%

Table 3: Estimated numbers of adults with hearing loss in Europe in current European classification of hearing loss (adapted from Shield 2006: 22-23, tables 3.11 & 3.12)

The various studies share the result that the severity of hearing loss and its prevalence increase with age (Shield 2006: 22, table 3.11). "In general over a lifetime hearing deteriorates at a rate of 5 to 6 dB per decade. Over the age of 55 hearing deteriorates at a rate of approximately 9 dB per decade, while under 55 the rate is about 3 dB per decade'' (Shield 2006: 32).

Prevalence increases with age.

In Germany, for example, about 19% of the population above age 14 has less than normal hearing, according to a small-scale study by Sohn (2001). In Denmark, 27% of persons age 50-64 report difficulties in following a conversation with several interactants (Christensen 2006a/b; cf. also Hear-It 2008). In France only 7% of persons age 35-44 have hearing loss, but 17% of persons age 70 and older (IPSOS-Study 2001). In Italy 3.89% of persons age 31-40 have hearing loss, but 18.73% persons age 51-60 (Shield 2006).

The growth rate of hearing impairment in adults in Europe for the years 2005 to 2025 (to nearest million) is estimated as follows (Davis 1997):

Year	≥25	≥35	≥45	≥65	≥95
2005	82	49	27	8	2
2015	91	54	30	10	2
2025	100	61	34	11	2

Table 4: Estimated increase in adults by hearing threshold to nearest million (adapted from Davis 1997).

The numbers in Australia are comparable with those of the European studies. Every sixth Australian over the age of 15 has hearing loss. It is estimated that by 2050, even every fourth Australian will have hearing loss, which equals 27% of the population. Currently, 17% of the population has hearing loss (Australian Hearing Annual Report 2010). Based on the findings of the

report, in Australia more than half of the population aged between 60 and 70 has hearing loss. In New Zealand 10.3% of the population (390.600) has hearing loss of some degree. Seven out of ten persons below age 30 show evidence of permanent hearing loss due to exposure to noise (Greville 2001). For the USA, it is estimated that there are 35 million hearing impaired people. This equals 11.3% of the whole population. Several longitudinal studies show that there has been a growth rate in hearing impairment in the US (Kochkin 2003; 2004; 2005; MarkeTrak VI-VIII). "Over the last generation, the hearing loss population grew at the rate of 160% of US population growth'' (Kochkin 2008; MarkeTrak VIII, 1).

In the USA, the rate of hearing loss has increased 160% over the last generation.
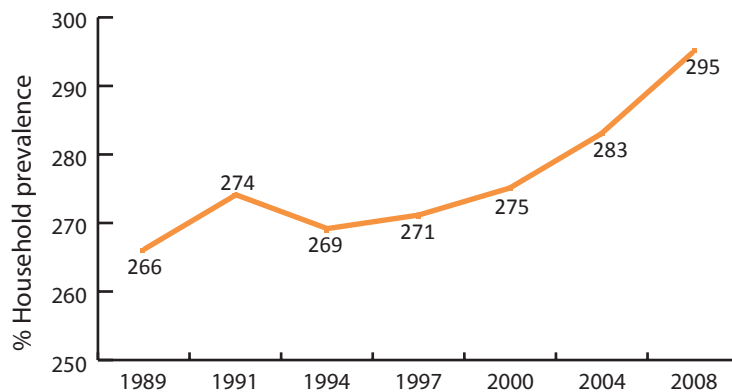
Table 5: Growth rate of hearing impairment in US households in percentage (adapted from Kochkin 2008)
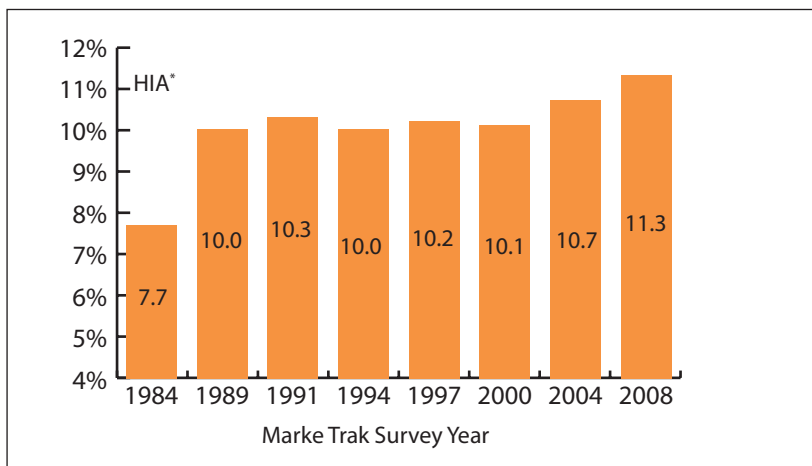
* Adjusted by +.7% to account for multiple hearing-impaired per household

Table 6: Growth rate of hearing impairment in the years 1984-2008 (adapted from Kochkin 2008)

The numbers for hearing loss within different age groups in the US are as follows (Shield 2006; Gates et al. 1990):

- Under age 18   5%
- From age 18-44   23%
- From age 45-64   29%
- Age 65 and above   30%

The increase affects adults at all age ranges.

For Latin America it is difficult to provide figures because of the different health care systems across Latin America and the varying economic conditions in some countries. However, numbers are available for Chile and Co-

lombia. The first national study on disability in Chile discovered that almost 1.5 million people have hearing loss (FONADIS 2004). In Colombia 5 million people (11%) have hearing loss. It is estimated that the rate increases up to 14% for persons at age 25-50 (Talaro-Gutierrez et al. 2011).

The few studies available on hearing loss in Africa concern the younger population and mainly children. In Sub-Saharan Africa more than 1.2 million children of age 5-14 suffer from moderate to severe hearing loss. In Nigeria approximately 14% of schoolchildren have hearing loss, in South Africa 7.5% and in Swaziland 4.1% (McPherson/Swart 1997).

In sum, these figures indicate that there is a relationship between prevalence of hearing loss and poverty. For countries with access to health care for the majority of the population, age and noise exposure increase the prevalence of hearing loss.

Internationally, there is a correlation between prevalence of hearing loss and
- age
- exposure to noise
- poverty
- access to health care

5. Hearing aids

The development of hearing aid technologies has made considerable progress, especially after the introduction of the first full-digital hearing aid in 1996. This has led to the development of various adjustable parameters of digitally programmable hearing aids by thus increasing the potentials of digital signal processing. Especially nowadays common PC-based fitting strategies and the inclusion of measurement equipment allow more complex calculations in the fitting process (Kinkel 2005). "Many advanced features like noise reduction, feedback cancellation, directional processing, and adaptation to varying sound environments are made possible with digital technology'' (Vonlanthen/Arndt 2007: 7). Frequency-dependent amplification, as used in analog hearing aids, will become more and more obsolete. "Today, three out of every four hearing instruments sold are fully digital instruments. Totally analog instruments could eventually disappear'' (Volanthen/Arndt 2007: 7). Despite considerable progress in hearing aid technology, hearing aids are still only able to compensate partially for hearing loss in most cases; they are not able to fully restore it.

As the variety of hearing aids is growing, the following brief overview is meant as an introductory orientation. Frequently, hearing aids are categorized according to the place where they are worn.

Body hearing instruments include all the important constituents, like the amplifier circuit and the microphone, as well as the user and fitter control units in a housing which is carried on the body or in a pocket. The market for body hearing instruments, though, is steadily becoming smaller, as these devices turn out to be cosmetically unappealing to most users (Volanthen/ Arndt 2007).

Behind-the-ear ("BTE") hearing instruments are the most frequently used hearing instruments in Europe. All constituents are placed in a housing worn behind the ear. The sound is carried to the ear canal via soft plastic tubing. For users of eye glasses, the hearing instrument can be attached to the side piece of the glasses.

In-the-ear ("ITE") hearing instruments fit directly into the cochlea or ear canal. Completely-in-the-canal ("CIC") hearing instruments usually fit deeply into the ear canal. The end or canal tip terminates in the bony part of the external auditory canal. "In 1993 completely-in-the-ear-canal were introduced to the market. In 1994 and 1995 they grew quickly in popularity and have leveled off to about 10-15% of hearing instrument sales in the European and North American market'' (Volanthen/Arndt 2007: 15).

The following table shows the distribution of the three most popular types of hearing aids in Europe compared to North America:

The first fully digital hearing aid was introduced in 1996.

Digital features include:
- noise reduction
- feedback cancellation
- directional processing
- adaption to different sound environments

Hearing technologies help but in most cases they are not able to bring back normal hearing.

Types of hearing aids:

- body hearing aids

- behind-the-ear hearing aids

- in-the-ear hearing aids

Region	BTE	ITE	CIC
Europe	65%	31%	4%
NA	26%	59%	15%

Table 7: Proportion of hearing instruments sold in North America and Europe (adapted from Volanthen/Arndt 2007: 18)

The costs of hearing aids vary from 420 € up to over 2,000 € per ear with different reimbursement from the health insurance providers (cf. Egbert et al., ch.3, this volume).

There are geographical differences in which type of hearing aid is preferred.

A hearing aid costs 420-2000 € per ear.

Three different classes (economy, medium, and business) are to be distinguished with different levels of performance, mainly regarding sound, noise reduction, wind and echo blocker, and additional features like multimedia or bluetooth connectivity.

The cost increases with advanced features.

Beyond hearing aids, there are also other assistive technologies which can improve sound perception in different environments. These depend on the hearing aid used, and the degree and type of hearing loss. There are external noise reductive microphones, amplifiers, FM systems, telephones with special amplifiers, visual alerting systems, and other features. It is also important to mention that other communication technologies with many uers without hearing impairment provide communication modes where hearing is not central, such as e-mail, chat and short message systems.

In addition to hearing aids, other technologies can help.

6. Non-usage of hearing instruments worldwide

The socioeconomic demand for treatment of hearing loss is enormous. Untreated hearing loss costs the European Union 168 billion Euros annually, in all of Europe 213 billion (Shield 2006), and in North America 154-186 billion Dollars annually (Mohr et al. 2000). A large number of hearing impaired individuals drop out of employment. The lost productivity costs more than an appropriate assistance would (HRF 2008).

Untreated hearing loss constitutes a high economic burden.

Despite the large variety of hearing instruments available and the ever-improving rehabilitational and medical means, a great part of the population with hearing loss remains untreated, drops out of the path through the health care system, or fails to use the hearing aids they have acquired. Considering the socio-psychological adverse effects that hearing loss has on individuals, the divergence between having hearing loss and use of hearing aids is hard to understand. Several studies in different countries discovered that only a small percentage of the individuals with hearing loss do use hearing aids. Out of the 35 million hearing impaired Americans, for example, more than 25 million do not have a hearing aid (Kochkin 2008). Thus, only one out of five of those who would benefit from a hearing aid owns one. According to the Royal National Institute for Deaf People just one out of four hearing impaired individuals in the UK has a hearing aid. Dillon (2001: 210) states that "[...] of those who consider they have hearing loss, or who objectively have a loss, only 14 to 24% own a hearing aid. That is approximately four out of five people with a hearing loss have not tried hearing aids''.

Approximately 80% of persons with hearing loss whose hearing could improve with a hearing instrument do not use it.

Percentage of Impaired Population with Hearing Aids

[Bar chart showing: Australia ~39%, USA ~16.5%, Europa ~16%, Japan ~12%, Russia ~5.5%, China ~1%, India ~1%; y-axis from 0% to 45%]
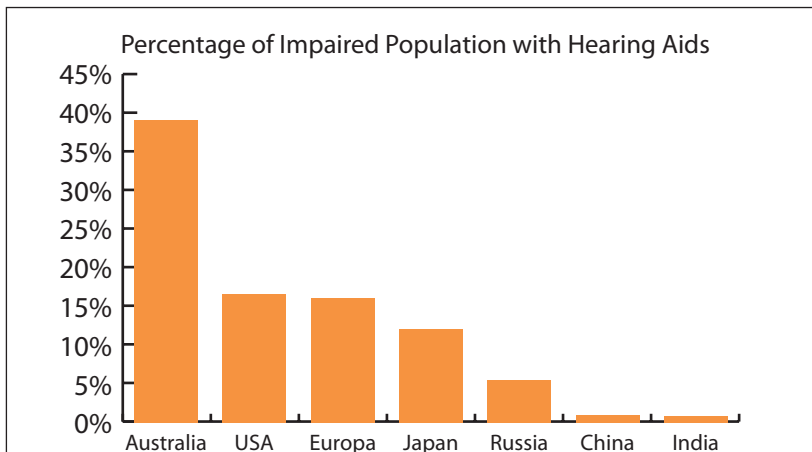
Table 8: Global market overview (adapted from Bisgaard 2009)

Sorri et al. (2001) report that "[...] of the several million hearing impaired people in Nordic countries (Denmark, Finland, Iceland, Norway, Sweden), around 60-70%, possibly up to 85%, could benefit from hearing aids. It is estimated that around 5% of the total population have a hearing loss of 45dB or above in both ears, while around 20% have a bilateral loss of 25dB or above'' (Shield 2006: 87-88). Furthermore, the above study shows that the percentages of people with hearing aids are lower in comparison to the 20% predicted to have a hearing loss of 25dB, and even very much lower to the 5% predicted to have a hearing loss of 45dB. According to Davis (2003), only one out of four of the population in Europe who would benefit from a hearing aid actually owns a hearing aid.

Interestingly, the number of ownership of hearing aids has not increased over the last 40 years, as one could have expected due to the great technological improvement (Shield 2006).

7. Barriers to using hearing aids

The most important reasons why people deny that they have hearing loss and do not seek treatment seem to be rooted in socio-psychological concerns. Many individuals with mild to moderate hearing loss do not admit or simply do not realize that they have hearing loss, because they can hear well enough in many situations (Kochkin 1993) and do not attribute the resulting stress at work to mild hearing loss (Christensen 2006a/b). Communication problems may surface in cases of misunderstandings and when the communication partner becomes impatient due to the repeated occurrence of misunderstandings. In many cases, hearing loss is slowly progressing. These may be the reasons why many individuals tend to attribute communication problems to the actions of others (Dillon 2001). The denial of a hearing problem is therefore shown to have negative effects on the personal and work-life of the affected individuals (Rezen/Hausman 2000).

Hearing loss is still accompanied by many prejudices (Pöhle 1994): "The shame that is central to the experience of hearing loss'' can lead to avoidance of social interactions and self-isolation (Hetu 1996: 19). Especially the age group from 35 to 44 years is found to be most affected by stigma-related issues. In this group, over 50% reported stigma as a reason for not purchasing a hearing aid (Kochkin 1993). People who suspect that they are having hearing loss might therefore wait for years, until they finally seek professional help.

The non-compliance rate differs even across western countries with national health care.

There is no correlation between technological progress and the use of hearing aids.

In western countries, reasons for not using hearing aids are largely socio-psychological. In particular, non-users

- deny having hearing loss
- are not aware of hearing loss
- attribute the communication problems to others

- are ashamed of their condition
- experience stigmatization

Even people who do admit their hearing loss and show interest in acquiring hearing aids may not get them due to misdirected medical guidance. Misinformation even from well-minded physicians might confuse and finally mislead the patient with hearing loss. Especially general practitioners who are not specially trained in hearing problems might advise the patient inadequately and thus not even recommend hearing aids to their patients (Kochkin 1993). For an example of such an encounter, cf. Deppermann (ch.9, this volume).

In comparison to visual impairment (the most frequent disability world-wide), wearing glasses is less stigmatized and may even be found to signal attractiveness or intelligence. The opposite is experienced with hearing impairment (the second most frequent disability world-wide). Cosmetic reasons may also be a challenge for some people with hearing loss.

Rehabilitational counseling can help people to adjust to the new experiences and finally improve their life situation through the benefit of better hearing with a hearing aid (Wilson et al. 1999). Interestingly, despite the positive effects reported on counseling and rehabilitation, there is not enough access to such counseling in most countries (cf. Egbert et al., ch.3, this volume). We can only speculate about the reasons, though the lack of governmental awareness campaigns on hearing loss might be a contributing factor. For example, many people are not even aware they can have their hearing tested for free.

Further reasons for non-compliance lie in the expectations that many people with hearing loss have with regard to hearing with hearing aids (Heinemann et al., ch.12, and Brouwer/Day, ch.13, this volume). Most of the candidates for hearing aids expect an immediate and optimal result or even the restoration of their hearing. These high expectations might be provoked by the advertising strategy used by the hearing aid companies, which try to present their products in a very appealing way or even promise high hearing results. Phonak states as their motto: "Because all people should be able to hear, understand and fully experience the life's rich landscapes of sound. Life is on" (Phonak n.d.). Siemens (n.d.) markets their hearing aid "Aquaris™" with the slogan "Enjoy life without limits", and similarly, Oticon (n.d.) describes their new product in a video commercial with the following promise: "Oticon Agile is the first ever hearing solution designed to give you the energy of understanding".

The failure of the hearing aids to meet customers' expectations may reinforce the belief that hearing aids do not help. Therefore, it is very important that hearing aid producers, dispensers and fitters communicate realistic results so that the potential hearing aid user can adjust his or her expectations accordingly.

Technical problems in hearing aid use might also be a reason for hearing aid users' withdrawal from using hearing aids. Phenomena such as feedback oscillation or occlusion are very likely to appear in hearing aid use. Feedback oscillation is the reamplification through the hearing aid of sound produced by the speaker. The hearing aid then starts to squeal very loudly. Even if it is not audible for the hearing aid user, it might be very disturbing for people in the environment. Occlusion is the perceived distortion of the own voice and resonance of the inserted plastic tube, which affects natural sound quality (Volanthen/Arndt 2007). More problems might be found in the handling of the hearing aid or the controlling of the device in case it is too tiny. Eventually the size of hearing aids is a dilemma for hearing aid designers, as on the one hand, most people wish hearing aids to be small and invisible, and, on the other hand, some people may have problems handling the hearing aid when it is very small.

Further barriers:

- misinformation by medical professionals

- Wearing eye glasses is associated with intelligence, whereas using hearing aids is not found to be attractive.

- Most health care systems do not provide for counseling and coping support as an integral part of treatment.

- Many persons with hearing loss have unrealistic expectations of hearing aids.

- Some advertisements by hearing aid producers raise unrealistic expectations.

- Some users cancel using their hearing aids because of unwanted technological side effects such as squealing.

- Some users have problems handling their hearing aids.

Most of these problems are solvable by the audiologist, if the fitting and adjustment of the hearing aid is made appropriately. This requires expertise of the audiologist and compliance and patience from the hearing aid user. However, communication does not seem to be easy between audiological professionals and laypersons (ProMatura 2007a/b; Heinemann et al., ch.12, and Brouwer/Day, ch.13, this volume). Studies on clinical encounters in other medical settings show that the better the clinical encounter was structured, the better the compliance of the patient had been (Collins et al. 2007; Stivers 2007).

Technical problems are solvable but require expertise, endurance, and successful communication.

Kochkin (1993) surveyed 2063 hearing impaired non-owners of a hearing aid concerning their reasons for non-compliance. Out of a list of 60 possible reasons for non-ownership, he asked the participants of the survey to score the importance of each reason. Furthermore, he divided the reasons into 6 categories. Table 9 shows the most important reasons, which emerged within these categories.

Results from a survey of 2063 non-users of hearing aids show the reasons for non-compliance in more detail (cf. table to the left).

Category of reasons	Total %	Reasons	Non-owners %
Hearing loss issues	96	- Loss not servere enough - Mild hearing loss - Hear well enough in most situations - Hearing loss not disruptive	43.3 40.6 39.5 26.9
Consumer/ personal issues	68	- Cannot afford - More serious priorities - Hearing not tested yet	44 43 34
Stigma	44	- Do not want to admit loss in public - Embarrassment about wearing - Hearing aids are noticeable - Hearing aids do make you look old - Hearing aids do make you look disabled	27 27 25 22 20
Hearing health care professionals	44	- Advice of ENT specialist - Distrust of hearing aid specialists - Opinion of audiologist - Opinion of family doctor	33 29 26 27
Social network	34	- Opinion of spouse - Opinion of hearing aid owner	20 20
Product feature	48	- Poor performance and low value - Amplification of background noise - Maintenance expense - Hassle to use	55 36 32 30

Table 9: Reasons for non-ownership of hearing aids (adapted from Kochkin (1993)

"Stigma is an attribute or characteristic that marks a person as different from others and that extensively discredits his or her identity" (for seminal sociological work, cf. Goffman 1963; Major 2007). Stigmatization of hearing loss and especially of deafness seems to be one of the issues with the greatest socio-psychological impact on the affected individuals (Oyer/Oyer 1979; Thomas/Herbst 1980; Rutman 1989; McKenna 2001). Its roots go far back in history. Aristotle (384 BC-322 BC), for example, considered the acquisition and accumulation of knowledge to be expressed and obtained only via the spoken word. Deaf individuals were therefore considered 'savage' human beings, not able to gain knowledge, as they lacked, according to his view,

Stigma associated with hearing loss and deafness is deeply rooted in human history.

Some philosophers viewed deaf persons as not having language, and thus not having access to knowledge.

the most important capacity of being educated (Prillwitz 1990). This belief is also found in Kant's philosophy of language. In his "Anthropologie in pragmatischer Sicht" [Anthropology in pragmatic view"] (1793), Kant expresses that the non-iconic character of oral language is the best way of describing definitions and thus "[…] that the deaf are only able to obtain an analogon of knowledge'' (1980: 49).

An even more severe belief is reported for Europe in the Middle Ages, when deaf individuals were judged as not being worthy to believe in God, or not even being humans. This view was founded on an interpretation of the Bible, where in Saint Paul's Epistle it is stated: "Whoever will call on the name of the Lord will be saved" (10: 13) and "So faith comes from hearing and hearing by the word of Christ (10: 17)." (cf. The Holy Bible 1978). The first line of the Saint John's Gospel also underlines that only the spoken word brings God closer to man and man closer to God: "In the beginning was the Word and the Word was with God, and the Word was God." Since deaf people who use sign language are not able to 'hear' they were considered to be incapable of receiving the message of God or to call upon him. For this reason, the sacraments of baptism and marriage were denied to them for a long period of time. Only much later in the Age of Enlightenment, first attempts were made to teach and educate deaf individuals (Furth 1977).

> In the Middle Ages, the Bible was interpreted as stating that deafness prevents faith because deaf people could not hear the Word of God.

Though nowadays Sign Languages are considered official languages in many countries, the belief that deafness and hearing loss is combined with inferior mental capacity is still not diminished (Prillwitz et al. 1985). The 2008 Annual report of the national Swedish association of hearing impaired people provides evidence that hearing problems are still the source of stigmatization (HRF 2008). In the same report it is also stated that because of stigmatization, many hearing impaired individuals seek to hide their hearing problems, especially at the workplace.

> People who feel stigmatized tend to hide their hearing loss.

In addition to economic concerns, unrealistic expectations and stigma, a further reason for non-compliance seems to lie in the health care encounters. In a German study by Meis and Gabriel (2006), "Barriers in the supply with hearing systems: The view of the customer," key factors of non-compliance were identified. 190 persons (average age 63 years) participated in the survey. Their hearing problems had started in the past five to six years. For a period of nine months, participants filled out a detailed questionnaire in several intervals with questions regarding different technical and non-technical aspects of the hearing system supply. In the event the participants ended up cancelling the supply, they were asked in detail for their reasons. 27% cancelled the supply with hearing systems before the visit to an ENT physician, 40% after the visit to an ENT physician, 10% after the first visit to an acoustician and 11% during the fitting with the hearing system. Only 12% were supplied with hearing systems.

> In a survey of 190 persons with hearing loss who had dropped using hearing aids, most cancelled their hearing aid after visiting the ear, nose and throat doctor.

Participants in the study were asked in the beginning of data collection to list reasons for and against a supply with hearing systems. The two main reasons against a hearing instrument were 'cosmetic reasons and stigmatization' (32%) and 'additional effort and handling' (23%). Only 15% mentioned technical and functional reasons, 7% high costs, and 6% the (low) acceptance of hearing aids of other persons using hearing systems. About 11% held the opinion that the use of hearing systems is satisfactory. 6% mentioned other reasons.

According to the quantitative analyses, the main barriers in the supply with hearing systems from the view of the customers are the price (costs of purchase and the following costs) and assumed technical and audiological problems, especially poor speech intelligibility in noisy surroundings. It can be assumed that in other health systems with governmental funding, the price will not play such an important role as in the reported study.

A very significant barrier is the lack of information about the supply of hearing systems. Nearly half of the participants did not have the basic knowledge of the hearing aids and fitting process. It might be difficult to win a customer for a product about which he or she has no basic knowledge and is likely to feel stigmatized before even considering the wide variety of assistive technologies.

Most patients do not have sufficient information.

A further barrier is the fact that ENT physicians recommend a hearing system supply only hesitantly. 44% of the test persons reported that their physician did not recommend a hearing aid, although three external experts (ENT physicians/audiologists) supported it unanimously according to the patients' files. These results indicate that ENT physicians' recommendations should be reviewed.

Many doctors do not prescribe a hearing aid for patients with mild hearing loss although a hearing aid is indicated.

8. Conclusion

Hearing loss is a world-wide pervasive phenomenon, as data on prevalence by various studies show. It is crucial to note that statistics also let expect an increase in prevalence. As a consequence, the demand for hearing aids in the future will also increase. This is due to the aging population in most countries and other factors like more exposure to noise. Hearing aids can be of great help and improve lives of people with hearing loss. The hearing aid market offers a wide variety of hearing aids and supportive technical devices.

Although there is research on non-use of hearing aids, neither the hearing aid industry nor the medical profession have succeeded in overcoming these barriers.

Despite the great progress in hearing aid technology, the barriers to using a hearing aid successfully are still immense. The reasons are multilayered and matter for the whole rehabilitational process. Although data on non-use of hearing aids by those who would benefit from them have been available for a long time, the situation has not changed. It is obvious that neither the hearing aid industry nor the medical profession have succeeded in overcoming these barriers. The hearing impaired and all of their communication partners in personal, professional and public life would benefit from a higher compliance rate of hearing aids. Studies are needed on how the stigma of hearing loss and the barriers of using hearing aids emerge in the situation where they are experienced, mainly in social encounters.

Hearing health care provision in the national systems of Australia, Denmark, Finland, Germany and Switzerland: Similarities and differences

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The five western countries represented in this volume share highly developed medical and technological provisions for hearing health, yet they differ in the compliance rates for hearing aid usage. A contributing factor may lie in the diversity of the national health care systems. We examine the similarities and differences in these five countries' health care systems in order to find features which may contribute to (non-)use of hearing instruments. After a general overview of the commonalities, we compare legal provisions, medical indication for prescription of a hearing aid, accessing health care and diagnosing hearing impairment, selection and fitting of hearing aid, costs of hearing aids, and help to learn how to live with hearing loss and using a hearing aid. Finally, we reflect on how aspects of the health care systems may contribute to hearing aid use.

1. Comparison in providing hearing health care in the national systems

Hearing loss is the second largest disability after vision impairment and affects over 20% of the adult population in western countries. Hearing impairment among adults is the most widely spread communication disability (DACEHTA et al. 2001). For most persons with hearing impairment the use of a properly fitted hearing aid is the only help, yet the compliance rate is surprisingly low, despite the highly advanced hearing technologies available. Economic factors, such as the gross national product ("GNP"), and limited access to health care are significant reasons for an extremely low compliance rate of less than 5% in countries such as China, India, and Lithuania. Even in many EU countries, where health care is available at no or little cost, the compliance rate for hearing aid use is less than 20% on average (Bisgaard 2009).

In a global study of hearing aid coverage conducted by the hearing aid company GN Resound (Bisgaard 2009), a comparison was based on the proportion of the population above age 18 in relation to the total population, the proportion of adults with hearing loss, the annual sales rates, the number of fittings on one and both ears, and the hearing aid's average life span.

According to this study, significant regional differences exist across the world and even across European countries. When viewing the hearing aid coverage in relation to other national statistics, likely explanations for differences are the nation's gross domestic product, the amount of government subsidies towards the purchase of hearing aids, and the availability and quality of hearing aid fitting.

According to Bisgaard (2009), in the countries represented in this edited volume, Denmark has the highest compliance rate with 40%, whereas in Germany and Switzerland it is less than 20% and in Finland less than 15%. Similar to Denmark, the compliance rate in Australia is almost 40%. A part of the extent of variation may be due to using specific criteria for analysis and inclusion in the study, as other research reports rather different results. For example,

Among the reasons for non-compliance are economical factors and limited access to health care.

Even in economically similar European countries with national health care systems, the rate for use of hearing aids is low.

Factors within a nation's health care system include the amount of government subsidies and the quality of hearing aid fitting.

Vuorialho (2006) states for Finland that 57% of persons who have acquired a hearing aid for the first time use it regularly. In a study initiated by the Danish government, Christensen (2006a/b) finds that 27% of persons aged 50-64 report difficulties in following a conversation with several interactants, and 5% use a hearing aid. However, drawing upon Bisgaard's results, it is reasonable to presume that national differences (whether more or less extensive) do exist, and the origins of these differences should be examined.

Differences in national health care systems may be at least one factor accounting for this diversity. As prior comparative research on national health care systems in the Nordic countries yields, too little is known about the relationship between how the services are organized and how effective they are (DACEHTA 2001: 65). In addition, cross-national comparisons are difficult because "wide variations in medical practice both within and across countries are not uncommon" (DACEHTA 2001: 41).

In this chapter we are examining the health care systems of Denmark, Finland, Germany, Switzerland and Australia in respect to the provision of hearing technologies. Hearing health care for the focal countries in this edited volume can be compared according to legal provisions, the complexity of the structure, the availability of public and private insurance, and the different steps in the path through the health care system.

Compliance rates, e.g.:

- Australia: 40%
- Denmark: 40%
- Germany: < 20%
- Switzerland: < 20%
- Finland: < 15%

Similarities:	Differences:	Points of comparison:
Legislation by the national governments concerning • the structure of the public health care system • the rights of patients and professionals • costs • the provisions for private health insurance	Public national health care systems are either financed through members' premiums (e.g. Germany, Switzerland) or through taxes (e.g. Denmark, Finland, Australia).	Legal basis
Health care provision in all five countries includes different combinations of public and private systems and funding.	The proportions and combinations of public and private systems differ in each country.	Public/private options
Public health care is available to all citizens.	There are differences in • how the system is financed • how the patient accesses it • waiting time	Public health care
In all five countries, private health care is available to citizens meeting certain conditions.	The countries differ in the types of private insurance available.	Private health care
The audiogram is used as a key 'objective' measure.	There are additional diagnostic measures available, which are used to different degrees.	Diagnosis of hearing loss
In all countries, the need for a hearing aid is evaluated case by case.	There are slight differences in the hearing threshold for when a hearing aid is indicated.	Indication of a hearing aid

Similarities:	Differences:	Points of comparison:
• A basic hearing aid is provided in all countries at no cost to the patient • Co-payment for more expensive hearing technologies is possible	• Differences in the range of hearing aids the patient can choose from • Amount of co-payment	Provision of a basic hearing aid
In all countries this is provided by a trained and certified audiology expert.	The audiometrican is trained differently in different countries. The professional labels are: AUS: Audiologist/Audiometrist DK: Audiologi assistent DE/CH: Hörgeräteakustiker FI: Audionomi, Kuulontutkija	Selection and fitting of the hearing aid
By audiological professionals or teams; Switzerland (since July 2011) allows pharmacists and other health professionals with special monitoring to dispense hearing aids.	Dispensing a hearing aid differs in that it may be in a business/shop, a clinic, a hearing center or a hearing aid company. The dispenser can earn money according to sales or can have an income as employee.	Dispenser of hearing aid
Available in all countries.	Usually, patients in public health care systems have to pay themselves, in some countries the audiological professional or ENT can indicate special needs; private insurances differ widely in their coverage.	Assistive hearing technologies beyond hearing aids
ENT	Where the ENT is located	Final decision
Rehabilitation is available in all countries.	Great differences in: • whether rehabilitation is integrated in the regular procedure • how the patient can find out • whether the patient has to initiate participation in rehabilitation • the kinds of rehabilitation	Rehabilitation and social, psychological or pedagogical support for coping

Table 10: Comparison of national health care systems

As this synopsis indicates, it takes a lot of effort to do justice to the complexity of this topic, and even within each country there is not always a simple way to compile the relevant details. With this caution in mind, we will now describe the health care systems in those areas where they differ. In this way, we can point to those aspects which may be related to the differences in compliance rate.

In sum, there is great complexity in hearing health care within and across national systems.

2. Legal provisions

Australia's public and private health care system are overseen by the Federal Department of Health and Ageing (Australian Government Department of Health and Ageing 2011). Access to the public hospital system is free of charge to all residents, and in addition the government partially subsidizes the use of the private medical and hospital system. The Office of Hearing Services ("OHS") administers the federal government's Hearing Services Program ("HSP"). The OHS issues vouchers for eligible individuals to access hearing assessments and devices from hearing service providers of their choice, including the government-run Australian Hearing and accredited private providers. Broadly speaking, those eligible for an OHS voucher are recipients of various types of government pension (aged, disability, or veteran) or participants in government rehabilitation programs. Clients choose whether to take their voucher to the public or private sector. Clients pay a small yearly fee to cover batteries, repairs and maintenance for the life of the hearing aid(s). The HSP is not universal, and some individuals, including those in the workforce and those on higher incomes, need to purchase hearing aids at their own expense through private hearing aid providers.

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In *Denmark*, the National Board of Health "is the supreme healthcare authority in Denmark" (Sundhedsstyrelsen 2009). There is a national health care system for all residents ('public'). It is possible to purchase additional coverage through private insurances, yet only one of the private insurances (called *Danmark*) covers extra costs for hearing instruments. Insurance for the public system is automatic, the use of the private system can be covered by the patient directly, by supplementary insurance plans, or, under certain conditions, treatments and aids are paid by the public system if the professional is state accredited. It is possible to get a hearing aid free via public health care or to buy one from private providers.

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In *Finland,* the Ministry of Social Affairs and Health is responsible of the legislation that regulates national health policy. The Institute of Health and Social Affairs makes recommendations and guides the provision of health care, while the local municipalities and health districts are responsible for arranging the health services, including hearing rehabilitation. The Finnish health care system can be described as follows:

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- The public health care covers the whole population and is funded by a tax-based national insurance. It is also possible to buy private insurance in order to secure rapid access to health care via the private sector. The public sector reimburses hearing aids for eligible citizens. It is also possible to get hearing aids from a private firm.
- The National Insurance Office ("NIO") subsidizes the private health care sector by reimbursing a part of the market price.
- Employers have a legal obligation to arrange a minimal occupational health care for their employees. Part of these expenses are also reimbursed by NIO.

In *Germany,* the national parliament (*Deutscher Bundestag*) legislates all matters of health care. The largest part of the population (90%) is covered by the public system (*Gesetzliche Krankenversicherung* or "*GKV*"), the remaining 10% use private insurance (Bundeszentrale für politische Bildung 2011). Civil servants, self-employed persons and those with an annual income above 46,800€ are exempt from the public insurance system and can buy private health insurance through special insurance companies. Health care is financed through citizens' insurance contributions to a variety of public and private insurances (*Krankenkassen*). The choice depends on the person's income or type of employment. Doctors can (and do) charge

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higher rates for privately insured patients, resulting in more privileged service. The provisions for hearing aids are stated in the Social Security Book V *(Sozialgesetzbuch V)*. The amount provided for hearing covers the expenses of a "necessary, functional and sufficient provisioning with hearing aid" ("*notwendige, zweckmäßige und ausreichende Hörgerätversorgung*").

In *Switzerland*, the government legislates the health care system (Bundesamt für Gesundheit 2006). It ensures that all persons living in Switzerland have access to the medical system. Basic insurance is obligatory for all persons living in Switzerland. Every inhabitant selects an insurance company, which is required to accept the application independently of the person's age or health condition. These insurance companies are private corporations. Each individual pays a premium, the amount is independent of the person's income; however, those with a low income can apply to the municipality for support. In addition to the public system, supplementary private insurance can be purchased. Within the Federal Office of Public Health ("FOPH"), the Federal Social Insurance Office ("FSIO") regulates the "policies related to old-age, invalidity and the family". Together with the Social Insurance (*Sozialversicherung*), it is responsible for financing the provision of hearing aids. The specific amount provided depends on the age of the patient. Before the age of retirement, costs are paid by the Invalidity Insurance ("IV"), whereas after this age, the costs are covered by the Old Age Insurance ("AHV"). | CH

In terms of legislation, all five countries guarantee hearing health care to their population. The systems in Denmark and Finland, for example, seem very much alike in this respect, which suggests that the difference in the legal provision of hearing aids does not provide an adequate explanation for the great difference in compliance rates. | Difference in the legal provision of hearing aids does not provide an adequate explanation for the great difference in compliance rates.

3. Medical indications for prescription of a hearing aid

On 1 July 2010, the Australian government introduced an average threshold of 23 decibels as the degree of hearing loss which will entitle eligible clients to the fitting of a hearing device under the hearing services program. Those with a hearing loss of less than 23 decibels who experience serious communication difficulties may be exempted from this requirement. | AUS

In *Denmark,* hearing loss (høerenedsættelse) is defined in accordance with the WHO ICIDH-2 International Classification of Functioning, Disability and Health (ICF) as "hearing damage to such a degree that it is the source of limitations to the persons' activities" ("*høreskade i en sådan grad, at den forårsager begrænsninger i personens aktiviteter*". Sundhedsstyrelsen 2009, Point 1). The threshold of an estimated need for a hearing aid is 25 dB or worse on the frequencies 500, 1000, 2000 and 4000 Hz (an average of or at least on two of these frequencies.) | DK

The WHO definition is also in use in Finland. The Nordic countries have established common standards regarding the quality of hearing aids and aim to standardize the measures. The following WHO classifications are commonly used as basis for diagnosis and rehabilitation: no problems <25, mild 26-40, moderate 41-60, considerable 61-80, severe >80. Hearing impairment greater than 30-40 decibel averaged over a frequency range of 0.5-4 kH< in the better ear has been considered an indication for a hearing aid (Jauhiainen 2008). However, in practice the need for a hearing aid is usually evaluated individually. | FI

In *Germany*, an audiogram result of 30 decibel or more indicates hearing loss (Brüser 2005). The ear, nose and throat doctor evaluates whether a hearing aid is necessary. Depending on the doctor's diagnosis and recommendation, a disability certificate can already be issued when the audiogram test indicates mild hearing impairment at 20-40 decibel (Brüser 2005: 197). | DE

In *Switzerland*, as in Germany, an audiogram result of 30 decibel or more indicates hearing loss (Schweizerische Eidgenossenschaft and Wettbewerbskommission WEKO 2011). Until July 2011, the eligibility to get a hearing aid (with subvention) was not only based on the result of the audiogram. There were two more criteria: the socio-emotional (what social disadvantages are due to the hearing loss) and the professional situation. The evaluation of all these criteria by a point system resulted in a categorization of a patient needing simple, complex or very complex provision (indication model). A minimum of points had to be reached in total in order to benefit from a hearing aid. Since July 2011, the criterion to benefit from a hearing aid prescription with subvention from insurances has made it more difficult; the hearing capacity must be considerably increased and the patient must be able to communicate considerably better with his or her environment. The exact audiogram criteria which are valid since the new 2011 provision have not been published yet.

The minimal official thresholds for eligibility to get a hearing aid are lowest in Australia and Germany. However, in practice, with the case-specific evaluation, the difference to other countries is minimal. There seems to be no obvious reason to suggest that differences in compliance rates would be caused by different medical indications required for eligibility.

> There seems to be no obvious reason to suggest that differences in compliance rates are caused by different medical indications required for eligibility.

4. Accessing health care and diagnosing hearing impairment

In *Australia*, an adult who suspects a hearing loss may have a test at a state-run community health center, hospital audiology department, audiologist in private practice, hearing aid dispenser, or in a workplace hearing screening. Tests are carried out by audiologists (who have a postgraduate qualification in audiology), nurse audiometrists (nurses who hold a certificate in audiometry), or audiometrists. If a hearing loss is detected, the patients will be advised to consult a general practitioner, who is able to refer them to an ENT specialist, if medically indicated, and/or the Australian government's public hearing services program, if eligible. ENT specialists in Australia do not fit hearing aids. If a patient wishes or needs to purchase a hearing aid through a private dispenser, there is no requirement for medical referral. To be tested under the Australian government's public hearing services program, eligible adults must be referred by their general practitioner or ENT specialist. Voucher recipients are provided with a list of accredited hearing centers in their area, both government and private, and directly contact the center of their choice. Assessment under the program is carried out by a qualified hearing services practitioner and may consist of case history, otoscopy, pure tone audiogram (air and bone, masked as necessary), speech reception threshold and maximum speech perception score, and impedance audiometry if relevant.

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In *Denmark,* the patient can either make an appointment with a general practitioner or directly with an ENT doctor. The diagnosis is based on a brief interview on hearing problems, medical examination of the ear with an otoscope, pure tone audiogram, test of Speech Reception Threshold ("SRT") and Discrimination Loss ("DL") or Discrimination Score ("DS"). The guidelines specify at which test results a hearing aid is indicated, however, the ear specialist decides whether a hearing aid is necessary. A referral from the ENT is necessary, no matter where the patient receives the hearing aid, and the referral is always a prerequisite for getting the hearing aids paid through the municipality. The patient may also go directly to a private hearing aid dispenser or a certified private hearing clinic. If there is no referral from the ENT doctor, the patient has to pay and cannot receive the public grant. In Denmark, audiometric testing and hearing aid fitting can be done by professionals with special training, namely medical audiologists (i.e., specialized ENT

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doctors with a background in audiology), otologists with relevant additional training in medical audiology, audiology assistants and audio-logopedics with experience in audiology.

In *Finland*, hearing can be checked at three locations: the local health care center, where a hearing test is conducted, a routine health check-up at the workplace, or a private clinic. If a hearing impairment is detected, the patient is referred to the Hearing Center ("HC"). When the referral arrives at the hearing center, the audiologist (ENT) decides whether the patient continues treatment at the hearing center or a hearing aid company. The most important professional during the fitting process is the hearing aid specialist/audiometrician, in Finnish: *audionomi/kuulontutkija,* who tests the patient using pure tone audiometry and speech audiometry. An ENT doctor (*korvalääkäri*) makes the diagnosis and drafts a rehabilitation plan with the patient. The main principle is that the patient visits the audiometrician three times during two to three months. After that, the whole process of getting a hearing aid ends. In practice, the amount of time spent on the process varies individually and regionally. Those still in the work force get their hearing aids usually from the HC, because they may need additional help in the future.

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In *Germany,* a person suspecting hearing problems can access the health care system through the general practitioner, who then writes a referral to the ENT doctor. The patient can also go directly to the ENT doctor. Many hearing aid dispensers (businesses with specialized professionals called hearing aid acousticians *Hörgeräteakustiker*) advertise free audiometric testing and can then recommend that the client makes an appointment with an ENT doctor. The ENT doctor conducts a case history, examines the ears and does audiometric testing. Standard tests are the audiogram and language audiometry. If the otorhinolaryngologist detects a hearing impairment, he or she prescribes a hearing aid. This prescription is the prerequisite for having the costs of a hearing aid covered through the public health care system. The patient also receives a yellow document ("*gelber Schein*") which entitles the hearing aid dispenser to collect the money from the insurance. Some ENT doctors also dispense hearing aids. For patients with private insurance, the coverage may vary according to the stipulations of the different insurance plans.

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In *Switzerland*, a hearing test is performed by the hearing aid dispenser, a public hearing center or general practitioner ("GP"), who then sends the person with hearing loss to the ENT doctor. Depending on the insurance type, a patient can also go directly to the GP. This is the most common model, yet insurances may differ. In order to receive financial support through the social insurance, the insurance places an order with the ENT doctor. When the ENT examination indicates a hearing aid, the ENT doctor sends a statement to the social insurance and to the hearing aid acoustician (cf. Akustika n.d.).

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The five national health care systems vary in waiting time. In Australia, the processing of the OHS voucher applications typically takes 4 to 6 weeks, after which there is a further wait for an appointment with the chosen hearing center - typically another 4 to 8 weeks. Waiting times for paying clients within the private system are usually minimal. There is also waiting time in the Danish public system, which amounts to 10-62 weeks (based on figures for 2011). Specific information on waiting time in public clinics can be found on the National Board of Health's internet page (Sundhedsstyrelsen, n.d.). There is no waiting time in the private system. Another country with waiting time is Finland, where people with 30-40 dB hearing deficit in the better ear are entitled to receive (and usually get) a hearing aid within six months from the diagnosis. In practice the waiting time is 8-24 weeks. There is no waiting time in Germany and Switzerland. Interestingly, the length of the waiting time for a hearing aid does not necessarily correlate with particularly low

Differences in waiting time do not correlate with usage rates of hearing aids.

compliance and vice versa: the compliance rate in Germany and Switzerland is lower than in Denmark and Australia, although there is no waiting time in getting a hearing aid in the former countries.

The initial access to hearing health services seems equally uncompli-cated in the participating countries. Access is possible through the normal health care service network. In Denmark, Germany and Australia the initial hearing tests can also be made by hearing aid dispensers. However, the countries differ in terms of the extent to which different service providers are integrated. A loose integration may cause some patients to drop out of the process. For the Nordic countries, "The most common route to the hear-ing services for those who have no previous history of hearing impairment is via the primary care physician." (DACEHTA 2001: 51). In all countries, a medi-cal referral or diagnosis is needed to get compensation for the treatment.

Easy initial access to health care

Differences in how the services are integrated

5. Selection and fitting of hearing aid

In *Australia*, eligible OHS clients use their vouchers to obtain one or two hearing aids at either government-run Australian hearing centers or at ac-credited private hearing aid providers, according to their preference. Assess-ment, selection and fitting of hearing aids are carried out by audiologists and audiometrists. The basic appointment schedule consists of three appoint-ments (assessment and selection, fitting, and follow-up assessment), though there is provision for further appointments if required. In addition, Austral-ian hearing centers provide more extensive hearing care and rehabilitation services at no extra cost for OHS clients who have been assessed as having more complex needs, including clients with severe and profound hearing losses or with additional disabilities, and indigenous clients.

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In *Denmark,* the patient can get a hearing aid at hearing aid dispensers, municipal centers, public clinics, and private clinics. Hearing aid companies often provide personnel as a link to dispensers for delivering and adjusting hearing aids. The professional who selects and fits the hearing aid has the same specialization as required for testing hearing: medical audiologists (i.e., specialized ENT doctors with a background in audiology), otologists with rel-evant additional training in medical audiology, audiology assistants and au-dio-logopedics with experience in audiology. In most, but not all cases, there is a consultation with the hearing aid dispenser after one to three months to find out whether the hearing aid is functioning correctly and the user is handling it optimally. The patient's hearing is tested again. There should be at least one check-up, and the results are to be registered.

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In *Finland,* after obtaining the referral, the patient gets an appointment for the selection and fitting of hearing aids either at a public hearing center or with a hearing aid company. At the hearing center, an audiologist or an ENT doctor evaluates the need for a hearing aid. A person starts with one hearing aid, although it is possible to get two. To select a suitable hearing aid takes two to three visits with the audiometrician. The time between the fit-tings varies from one to three months. It may take up to 6 months (from the referral) before the hearing aid is finally loaned to the hearing impaired.

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In *Germany,* the patient obtains the hearing aid from a dispenser, the so called 'traditional way' of provision, or, in cases under 10%, directly from the ENT doctor, the so called 'direct way' of provision. Typically a dispenser must have the technical products of more than one brand/device to ensure the comparable fitting (*vergleichende Anpassung*). Some hearing aid com-panies also have shops where they offer only their own brand. The hearing aid acoustician selects and fits the hearing aid. The legislation defines the patient's right to try two hearing aids free of co-payment. Each hearing aid can be tested one to two weeks at home and at work. If the patient chooses a hearing aid above the amount covered by the insurance, he or she has to

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pay the difference him/herself. The legislation also specifies that the patient has the right to a certain number of visits and the trial of several different hearing aids. Before the hearing aid acoustician can collect their money, an ENT doctor has to conduct an examination and certify that the hearing aid is a proper fit. If the hearing aid is damaged after that, usually the health insurance covers the costs of repair. Readjustments and checking of functions are carried out by hearing aid acousticians with no extra costs up until 6 years after purchase. Batteries are only paid for hearing impaired persons under the age of 18.

In *Switzerland*, the patient with a referral from the ENT doctor can obtain a hearing aid from a public hearing center or from a hearing aid dispenser (e.g. Acoustic Joye, Pro Surdis, Amplifon, Audition Plus). They have products from different hearing aid companies (e.g. Phonak, Siemens, Oticon, ReSound, Bernafon). Before July 2011, a hearing aid acoustician selected and fitted the hearing aid. The selection depended on the hearing loss diagnosis/categorization ('indication level'), the costs covered by the insurance and the client's willingness to pay extra. Different hearing aids could be tested, typically two to four products (Hoerenschweiz n.d.).

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When the client was satisfied, the ENT doctor performed a final examination. Based on this examination a provision was sent to the respective insurance (IV or AHV) that paid the hearing aid acoustician. The overall costs covered by the insurance depended on the age of the patient. Patients with the IV and AHV insurance benefited from free readjustments and checking of functions carried out by hearing aid acousticians. Patients within the IV received a yearly allowance (the amount depending on monaural or binaural), for the costs of batteries and reparation of the hearing aids are covered. Contrary to this, patients within the AHV model had to pay for batteries and reparations by themselves.

Since the revision of the IV in July 2011, patients with a referral by an ENT doctor get a fixed allowance from the insurance. They can obtain a hearing aid of their choice from a dispenser of their choice, even from foreign countries (Verordnung 2011; a list of allowed products will be published). In addition, a patient can now get a hearing aid not only with the acoustician, but also from doctors, at pharmacies (*Apotheken*), drug stores (*Drogerien*) and even opticians. The fitting for children is still performed by trained audiological professionals.

Hearing aid selection and fitting is performed by trained professionals in all countries. There seem to be some differences in relation to the role of the different parties in the process. In Germany and Switzerland, the ENT doctor is needed in two phases of the process: both in making the referral to hearing aid fitting and in certifying that the hearing aid fits properly, while in other countries the referral to the fitter suffices. This may have an effect on whether the patients follow the process all the way through.

All countries require professional standards.

Having to obtain more than one referral in the overall process may create a barrier.

In a comparative study of the Nordic countries, DACEHTA et al. (2001: 55) report: "In principle it seems that each National Hearing Service has access to all types of hearing aids. However in practice, due to funding constraints, it is often the case that patients are not provided with the hearing aid which is likely to benefit the most."

In most countries, dispensers do not have all models from all hearing aid companies available.

6. Costs of hearing aids

In *Australia*, within the OHS voucher system, the provision and fitting of one or two basic hearing aids is free, although it is possible for clients to make a co-payment of up to several thousand dollars to receive hearing aids with additional features. People who are ineligible for an OHS voucher purchase their hearing aids directly from private providers at a cost of up to A$ 10,000

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or more. Those with private health insurance receive a small rebate on the cost of their aids, but there is no government subsidy. Those on lower incomes are eligible for the services of Hearing Aid Banks run by state government services, hospitals and not-for-profit support groups, which fit new and reconditioned aids at low cost.

In the public *Danish* system, hearing aids and fitting is free. Maintenance, repair and exchange through the public system are at no cost to the patient. The patients get the hearing aid they need, but not always the one they want. The hearing aid is public property and must be returned when it is no longer in use. Batteries are free of charge. In the private Danish sector, a public grant covers expenses for test, hearing aid, fitting, services and guarantee. There is a public grant of DKK 6,010 (810 Euro) per hearing aid for persons aged 18 and older. In 2011 the amount was reduced to 5,607 DKK and frozen until the end of 2013. Expenses exceeding the amount of the public grant must be paid by the patient. When paid privately, the patients get the hearing aid they want. Usually after 4 years the patients may get a new grant for a hearing aid. If the hearing aid is broken or lost, the patients pay for repair or replacement if it was bought privately. The patients own their hearing aid and are therefore not obliged to return it after use. Batteries are free of charge.

As in Denmark, in *Finland*, hearing aids are loaned to the persons who use them, and should be returned if no longer needed. If a person wants to have the newest model of a hearing aid, he or she can buy it with their own money from the companies. Almost everyone gets their hearing aids free of charge through clinics. The average price for a hearing aid is difficult to estimate, as the prices usually include the hearing aid with the hearing test, and the manufacturing and fitting of the hearing aid. An estimate by ENT experts was 500€ on average in 2004 (Mäki-Torkko et al. 2004). The normal service and upkeep are also for free for a hearing aid user. It is possible to get insurance to pay 'the whole package' (e.g.,hearing aid and also batteries), if there is a special reason (e.g., an accident or an occupational hearing loss) for the haring impairment.

The fixed amount the *German* health insurance pays for hearing aids is 421.28 Euro for the first hearing aid (one ear), an additional aid is subsidized with 337.02 Euro (second ear), amounting to a total of 758.30 Euro (figures from 2005). This fixed amount covers the expenses of a "necessary, functional and sufficient provisioning with hearing aid" (*notwendige, zweckmäßige und ausreichende Hörgerätversorgung*, Sozialgesetzbuch V). The patient is required to cover a co-payment between 5-10 Euros, depending on the cost of the hearing aid. If a patient wishes a more technologically sophisticated hearing aid, he or she has to pay the difference. Since the definition of what a hearing aid should achieve is open to interpretation, some patients sue their insurances to cover higher costs.

In *Switzerland*, before July 2011, hearing aids were loaned for use within the IV model (Schweizerische ORL-Gesellschaft n.d.). The costs covered depended on the indication level. Within the AHV model, hearing aids were owned by the patient. The total costs for a monaural or a binaural hearing aid were covered by the IV insurance and 75% of the costs by the AHV insurance respectively. Maintenance and batteries were covered by the insurance. There were three indication levels, and in each there is a differentiation between monaural and binaural hearing aid provision. The amounts range from approximately 1240-3200 Euros (figures from 2006). The difference between the subsidized amount and a more costly hearing technology had to be covered by the person with hearing loss.

A new regulation since July 2011 reduces the allowance to 840 Swiss Franks for a monaural or 1650 Swiss Franks for a binaural hearing aid for

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patients older than 18 years by the IV. The AHV still pays 75% for a monaural provision, amounting to an allowance of 630 Franks. Another allowance is given for battery costs (40 respectively 80 Franks). Repairs are paid up to 200 Franks depending on the nature of failure.

In all participating countries except for Australia, the costs for a hearing aid are subsidized for the whole population, either by the government directly or by obligatory health insurance. However, the subsidies usually only cover basic equipment. | Subsidies usually only cover basic equipment.

7. Help to learn how to live with hearing loss and using a hearing aid

In *Australia*, hearing centers and OHS provide contact details for self-help groups (including Better Hearing Australia or Self-help for Hard of Hearing People) and state government advisory services for people with hearing loss (including HEAR Service in Victoria, Deafness Resources in ACT). Governmental information on hearing is provided by the Australian Government Hearing Service Program (n.d.). | AUS

Regardless of whether the patient has used the public or the private sector in *Denmark*, the hearing aid dispenser informs the patient about possibilities for assistance with the hearing aid. The municipalities offer free instruction in how to use a hearing aid, for example through a center for medical technological aids and communication. It provides instruction in how to use the hearing aid, maintenance, hearing and coping strategies, information on additional technical devices, conferences, training, and networking. The Danish National Board of Health provides guidance to citizens in a short and in a comprehensive brochure (Sundhedsstyrelsen 2007; 2009). | DK

When in the *Finnish system* the hearing aid has been loaned, the hearing aid user is invited to participate in one afternoon session in the hearing center. In this session, the hearing aid user meets other people who have an aid, and the work team in the hearing center is presented. Those hearing aid users who still work do not often participate, because they need to take a day off from work. An important resource for people with hearing problems is *Kuuloliitto* (The Federation of Hard of Hearing). This is a government supported third sector association. It provides services, such as net-based information, and training to people with hearing problems. There is a possibility to take part in 'coping courses' (country wide), if there are some problems to adjust; Doctor's recommendation is needed. | FI

In *Germany,* there is no automatic check-up for socio-psychological coping or for help in using the hearing technology. Patients with advanced hearing loss can apply to their public or private health insurance for participation in rehabilitation programs. Many self-help groups offer assistance in negotiating with insurances because rejection rates are high. There is a large number of local and regional self-help groups which have organized themselves nationally under the umbrella of the *Deutsche Gesellschaft der Hörgeschädigten*: www.deutsche-gesellschaft.de/. Among the major organizations are German Association of the Hearing Impaired (*Deutscher Schwerhörigenbund*), Hearing Advisor (*Gehörratgeber*), German Hear It, Hearing Today Online (*Hören Heute*), and Week of Hearing (*Woche des Hörens*). | DE

In *Switzerland,* the government information brochures and websites do not mention rehabilitation measures for persons with hearing impairment. Information on how to obtain a hearing aid is provided as part of the disability insurance by the *Bundesamt für Gesundheit*. | CH

In all countries the help focuses on the person with hearing impairment, not on the contexts of communication in private, work, or public settings. Furthermore, in some countries access to rehabilitation seems easier and more integrated than in others.

Focus on the individual, not on the communication or the context

8. Reflections on the relationship between health care systems and hearing aid use

This chapter has briefly outlined some differences and similarities of health care provision in hearing impairment. Our aim has been to discuss on possible factors influencing the differences in national compliance rates with regard to hearing aid use in each country. This comparison is intended to provide a starting point for a comparative research effort to understand the outlined problem and to improve hearing aid use. To achieve this, we have focused on some key areas of hearing aid rehabilitation, such as legal provisions, medical indication for prescription of a hearing aid, accessing health care and diagnosing hearing impairment, selection and fitting of hearing aid, costs of hearing aids, and help to learn how to live with hearing loss and using a hearing aid.

Our main observations drawing upon the preliminary comparison indicate the following:

Possible factors:

- The differences in compliance rates between the countries can neither be explained by differences in legal provision nor by the medical indication for eligibility for hearing health care. To get to the root of problems in compliance we need to focus on the process of getting a hearing aid.

- the process of getting a hearing aid

- The national health care systems differ in the degree to which the facilities (general physician, hearing aid dispenser, ENT doctor, and rehabilitation) are integrated. This may be one factor that complicates hearing impairment rehabilitation.

- how the different services are integrated

- Only basic hearing technology is provided, other assistive technologies are not integrated systematically. This may be due to poor integration of the health care system and other relevant parties, such as occupational health care or employers. The problem is conceived to be individual hearing impairment while much of the difficulties it causes could be solved by environmental changes, such as acoustic solutions and induction technologies at the workplace.

- how hearing health care is integrated in contexts, e.g. workplace, spread of acoustic solutions in public

- In rehabilitation, health care providers also tend to focus on the individual with hearing loss, not on family, workplace or environmental factors. The social aspects of rehabilitation are taken into account to different degrees in different countries.

- how much rehabilitation focuses on the individual in relation to contexts

- The countries differ much in access to hearing rehabilitation in terms of coping, practical help with technologies, etc. It is an integral provision in Australia, Denmark and Finland, whereas in Germany and Switzerland, it can be costly and/or complicated to participate in social, psychological or technological help.

- how much the system provides for socio-psychological help

- For a large proportion of persons with hearing loss, a complex and sometimes costly path through the health care system does not seem to yield the planned results of reducing the problems caused by hearing impairment.

- the path through the health care systems seems complex and sometimes costly

Drawing upon our brief overview of national differences, we need further research in the following ares:

Need for more research on:

- The different pathways of patients in acquiring a hearing aid in different health care systems needs to be examined. This is necessary to describe and analyze the specific barriers patients meet as well as advances they make in testing and using the equipment as an integral part of their everyday life in the rehabilitation process. This way, we hope to be able to tease out processes that amount to best practices in the field.

- best practices

- The stakeholders implicated in this area of hearing health care are politicians and policy makers, institutions for educating hearing professionals, and potential hearing aid users. To stakeholders in politics, the low compliance rate in using hearing aids has both direct and indirect consequences for the effectiveness of health care provision. The low compliance rate adds unnecessary costs, when hearing aids which are (co-)financed by the health care provider are not used. In addition, the costs of services by professionals involved in diagnosing hearing loss and fitting hearing aids are unproductive. Furthermore, indirect consequences of poor compliance in hearing aid use are costly: Inadequate performance at the work place and early retirement reduce possibilities to maintain a healthy workforce. Other illnesses accompanying hearing loss, such as depression, add further to the increasing health care costs.

- stakeholder analyses

- Even trained hearing professionals often have insufficient knowledge about the actual process of acquiring a hearing aid from the patients' point of view of and of the many complications that may occur on the path. This may result in inadequate or restricted professional competence of the care providers.

- information deficits among professionals

In this chapter we have discussed the health care systems at the macro and meso level in regard to the overall field of communication with hearing loss and hearing aids. Our synopsis provides arguments for researching how at the micro level of actual interaction in health care encounters characteristics of the health care systems emerge as relevant to the interactants. Such insights would then provide indications for where and how change could be implemented.

We would also like to connect our synopsis of national health care systems to the global dimension of hearing loss by relating this topic to the United Nations' (2006) draft on the "Convention on the Rights of Persons with Disabilities". This convention introduces a legally binding paradigm shift in the conceptualization of disability. Australia, Denmark, Finland and Germany signed the convention in 2007; Switzerland is still in the consultation phase. Once fully ratified, these countries legally bind themselves to implement the UN convention. Given that the health care systems focus almost solely on the person with disability as a target of medical treatment or care, the national health care systems will have to consider how to broaden this perspective towards the interactions and environments in which hearing loss is experienced.

The UN Convention of the Rights of Persons with Disabilities pursues integration and focuses not only on the individual but shifts the focus to interaction and society.

Theoretical framework: Communicative technology for augmented interaction within the field of Science, Technology and Society ("STS")

Elizabeth Keating and Pirkko Raudaskoski

The interdisciplinary approach presented in this edited volume is located in the field of Science, Technology and Society ("STS"). Its theoretical foundation conceives of technologically augmented interaction as a social achievement. The hearing aid industry and health care providers tend to conceive of assistive hearing technologies as instruments which improve information transfer. Empirical analyses, however, clearly show that in authentic communication, the socio-psychological dimension of hearing aid usage is highly relevant to the interactants. For this reason, innovation and application need to be based on a theory covering all aspects relevant to the interactants in order to address how users adopt or fail to adopt technology.

1. Technology and sociality

The role of technology in shaping human interaction and human relationships has captured the interest of scholars of cognition (e.g. Vygotsky 1978; Scribner/Cole 1981; Goody 1995), those interested in human adaptation (e.g. Keating/Mirus 2003), including new machine-human boundaries (e.g. Haraway 1989; Suchman 2007), scholars interested in societal impacts of STS (e.g. Latour 1987; Lynch 1993; Knorr-Cetina 1999), communication, disability studies, and others.

Technologies can enhance, enable, and amplify human physical and mental abilities, and often have starring roles in utopian imaginaries and technology-as-progress narratives. This can mask inequalities in access to technologies and economic and other cultural impacts on individuals. The rate of technological and scientific discovery threatens to exceed our ability to model and plan for possible negative social impacts. This volume aims to contribute by understanding impacts of technology, exploring knowledge and theories about how users adopt or fail to adopt technology. We focus on a health-related, assistive technology useful to almost all adults as they age, but which has a unique and puzzling history of problematic adoption and adaptation, the hearing aid. Responding to a need to better understand relationships between decisions in design and distribution, impacts on humans and unexpected or emergent uses of technology (Woolgar 2005), we base our exploration of this assistive technology on new ethnographically informed research into daily life in multiple countries. Clearly, a hearing aid is not 'just' a thing, an object to do something with or to wear. Its meaning arises in use and usability and through cultural systems, not from its inherent properties – how or whether it is used depends on a range of situational properties that are highly different from the audiologist's typical point of view.

Interdisciplinary interest, e.g.,
- cognition
- human adaption
- machine-human boundaries
- impact on society
- communication studies
- disability studies

Hearing aids as social objects

2. How STS can contribute to an understanding of hearing technologies

We are particularly interested in promoting an understanding of hearing as a social phenomenon, looking at diagnostic situations (with or without hearing aids) as embodied social encounters, studying the role of communication ideologies in hearing aid implementation, as well as the role of the device for others in everyday family and workplace interaction. Studies with technology have shown that material surroundings can have a significant impact on interaction (Raudaskoski 1999; 2001), and have begun to define 'interactivity' in new ways in relation to new convergent media (Raudaskoski 2001). As technologies that assist humans become ever more ubiquitous and grow in scope, such as in the case of "smart houses", which can be designed to do things automatically for inhabitants, the importance of studying activities with technology grows. Even technologies worn by people as private augmentation devices can interact with a smart environment.

Material surroundings can have a significant impact on interaction.

The investigation into the everyday lives of those for whom technological interventions for hearing loss are relevant illustrates a number of key issues and challenges in designing for humans, not only understanding biological systems, but understanding sociological ones. As humans are increasingly linked to devices, notions of competence, age appropriate behavior, and being human in a digital world have an impact on ideologies about self and society, as well as on communication. The differential ramifications of sensory impairments within diverse cultural or national contexts, and the effect on the hearing impaired person based on the cultural priority of hearing is better understood when the diagnosis and the treatment of hearing impairment is embedded within discourses which vary cross culturally (Keating/Hadder 2010). Cultural discourses about impairment reflect a range of causal and adaptive mechanisms including workplace noise, genetic inheritance, retribution for wrongs, sorcery, etc. Tools, such as hearing and communication aids, are transformed during the development of activities, and become associated with aspects of cultural practice (Engeström 1991).

Designing for humans with disabilites needs to consider cultural practices.

Gradual loss of hearing is a frequent effect of aging and impacts more older adults than any other chronic condition. If we count the impact on family members and colleagues of the hearing impaired person, the impact is even larger. The origin of high frequency hearing loss for many older adults is a sensorineural deficit that affects the perception of high-pitched sounds and distorts the understanding of speech. Even a slight hearing loss can jeopardize communication and social relationships. Sounds are selectively, rather than uniformly, diminished so that words are partially heard and as a result often misinterpreted. In a survey of 2,300 hearing impaired adults in the U.S., the National Council on the Aging (www.ncoa.org) found that untreated hearing loss leads to anxiety and a decrease in social activities, emotional distress and social isolation, leading in turn to stress for friends and family of the hearing impaired. Furthermore, three out of five hearing impaired adults do not use hearing aids, and six out of seven middle-aged adults who need hearing aids do not use them (cf. Mourtou/Meis, ch.3, this volume).

Other studies about those with disabilities reference common elements of oppression felt by those who are categorized by others as disabled in some way (Shakespeare 1994; Marks 1999; Davis 2000). This oppression happens in moment-by-moment interactions where the everyday means for creating and maintaining notions of personhood and the presentation of self are affected. Where a person fits into society is an active process mediated by cultural conventions about age, gender, ability, and other indications of status. How a person acts in accordance with norms in interactions with

Disability is associated with elements of oppression.

other people is the way they "show to others who they are and where they fit into society" (Fortes 1987: 282), and these signals are also continually interpreted and acted on by others. Personal identities are susceptible to face threats and protecting self-esteem or face by the avoidance of shame and its weaker form embarrassment underpins much of social interaction (Goffman 1959; Billig 2001). A person who is transformed from a normal hearing person to one with a hearing loss often experiences embarrassment due to adjustments to the new condition. Some report efforts to pass as normal by not signaling any trouble in hearing or understanding or choosing a form of repairing a breakdown in communication that is ambiguous in terms of its relation to an underlying condition. This avoids the membership category of 'disabled' and is consistent with ethnomethodologists' findings that people in their everyday practices typically orient to what is considered 'normal' to do. Passing as 'normal' apparently does not include the use of any visible aid to achieve that normalcy which is regarded as a visual display of disability. Choices to avoid the possible stigmata associated with hearing loss, by not identifying as hearing impaired, however, means those who have hearing loss lose the opportunity to have their interlocutor orient to their condition. Unlike vision impairments, hearing impairments are not easily recognized by others, and consequently can result in lack of adaptation and accommodation by others. This leads to impaired empathy and understanding on the part of co-participants. By passing as normal, the hearing impaired person becomes subject to certain expectations by others. When expectations are not met or people fail to cooperate in maintaining social interaction as expected, they typically encounter a surprising amount of moral outrage from interlocutors at their perceived unwillingness to cooperate (Garfinkel 1967). Those with unrecognized hearing impairments can be targets of this indignation.

> To avoid using hearing aids is a strategy to not display hearing loss to communication partners. Paradoxically, this makes communication even more difficult.

The studies in this volume are influenced by ethnomethodology, with its focus on practical, everyday reasoning and qualitative approaches (see e.g., Lynch 1993). Ethnomethodology provides a framework for analyzing the embodied accomplishment of action (Garfinkel et al. 1981; Goodwin et al. forthcoming). As interaction analysis and Conversation Analysis ("CA") have shown, how people construct and show various types of understandings of what is going on (Schegloff 1984) has much to add to our theorizing about the creation and maintenance of social life and attitudes, identities, membership categories and social institutions. Charles Goodwin with his background in communication was among the first to combine detailed CA analyses of talk with studies of participants' orientations in material and cultural environments, as equally important features of constituting what is going on in a specific situation, and to investigate the role of objects in meaningful action. For instance, in his research on scientists' work on an oceanographic research vessel (Goodwin 1995), he demonstrates how coordination of sample taking means sharing in practice different perceptions of the 'same thing'. Similarly in medical situations, analysts have shown the importance of attending to the use of language and the development of patients' sense making strategies (Maynard 2005; Boyd/Heritage 2006). Augmentation affects seeing, hearing, speaking or being mobile, and in turn perception and meaningful actions.

> Ethnomethodology, interaction analysis and Conversation Analysis contribute to studying how people construct and maintain attitudes, identities, membership categories and social institutions.

> People make sense of disability and augmentation through communication.

When a person with a hearing loss is fitted with a hearing aid, they do not, despite the often misleading messages of hearing aid advertisements, simply become technologically enhanced fully-fledged participants in ensuing interactions. The audiologist's office where a piece of equipment is checked and sometimes re-programmed is one of the few scenes for the wearer of a hearing aid in which the gadget and its ability to enhance hearing is the focus and in which the partial knowledge (Suchman 2002) of the

> In audiological encounters, partial knowledge of the technology is negotiated.

participants about the use of the device is negotiated through talk-in-inter-action. When a person is fitted with a hearing aid device, not only must he or she learn how the device works in terms of care and implementation, but, and this is hardly ever, if ever covered in the fitting session, how the device impacts communication with others. The former is overwhelmingly the focus of a new hearing aid fitting and follow-up care. Though new hearing aid users experience new challenges in the management of their social personae and their responsibilities to behave in certain ways towards others, this aspect of using the technology is rarely addressed in any systematic way. In this volume, a number of researchers look at important aspects of the social context of technologies, including metalinguistic and metabehavioral discussions, which describe the disruption of pragmatic conventions and a perceived need for better understanding them. A hearing aid is a (progressively smaller) material manifestation of the cultural assumptions implicit in hearing aid research and design. Working together with researchers of hearing aid interactions leads to a richer understanding of hearing as a lived phenomenon, rather than the idea that to hear is to be able to receive and amplify packages of information.

> New hearing aid users experience new challenges in the management of their social personae and their responsibilities to behave in certain ways towards others. This is rarely addressed in any systematic way.

While young people are recognized to be early adopters of many personal communication technologies, and new practices often reflect this age group (cf. Ito et al. 2005), elderly populations conversely are often slow to adopt new communication technologies and hence learn new algorithms for problem solving to maximize a device's potential or personalize its use (Keating/Ngai 2006). When new communication technologies are introduced, discourses about the behaviors of self and others emerge. These discourses might be expressed as problems in managing to be a polite interactant or how to manage relationships of, for example, autonomy and dependence, access and privacy (Keating/Nagai 2005). The similarity of problems encountered across societies with assistive devices suggests that the management of technologies which enhance communication can become problematic in similar ways. There are many effects of new technological devices on activity organization, for example. These include the organization of participation for maximizing hearing, planning for interaction, language use, embodied actions, the role of objects, the workplace, learning and innovation. Mobile phones, another example of communication technology, have impacted interaction, and users innovate by using the phones in ways not anticipated by designers. In Finland, the birth country of Nokia mobile phones, the first user group to embrace text messaging was the Deaf Community. Participants are active in this process and are explicitly negotiating stance, appropriate conduct, the production and interpretation of act sequences and their consequences.

> The similarity of problems encountered across societies with assistive devices suggests that the management of technologies which enhance communication can become problematic in similar ways.

3. Social impact of understanding hearing loss and hearing technologies

From STS studies a set of possible social impacts guide our efforts to understand the hearing aid in its cultural and interactional context. New technologies can impact work-life, as hearing loss reduces effectiveness on the job in many types of job categories and skills. Technologies impact education opportunities, and health, in the case of being exposed to new types of environments. Home-life can be affected with the incorporation of new devices into routines, and the formation of new communities. New technologically-mediated communication practices must be learned, such as how to focus on sound in crowded environments and principles of contexts for sound. Political processes (e.g., relationships of self to society), healthcare policy, representation, and empowerment are impacted by new technologies. Reli-

> The use of hearing aids in their cultural and interactional context

> Empowerment

gion and ethics can contribute to quality of life discussions, for example, how to care for individuals or how to distribute expensive assistive technologies. Legal issues (e.g., access to care and treatment, local practices vs. global practices) are relevant, as well as decisions about short vs. long term impacts, short term (3-5 years), medium term (5 to 20 years), and long term (over 20 years) planning and policy processes. New technologies have encouraged new forms of entrepreneurship (specific ways of innovation or new applications can be fostered and influence the role of users in the development and deployment of new technologies in unexpected and unintended ways). The role of personal and group aesthetics is an important component in discussions of impacts of technology and the incorporation of new technologies; artists can play an important role in the adoption of new technologies, and there is a role for new technologies in health (cf. McGinn 1991).

Policy

4. A simplistic theory of communication

One of the issues influencing our poor understanding of hearing aid use is not only lack of research but reliance on a sender-receiver model of communication (e.g., Shannon/Weaver 1949). This model treats communication as successful if information is transferred and treats problems in communication as resulting from noise. As Hutchby (2001) points out, theories of communication have been influenced by technological advances, for example, information transfer models of communication resemble an electronic circuit with one-way traffic sometimes disturbed by noise. Research on talk-in-interaction shows that one of the principal goals of language users is not to refer or give information but to accomplish things in the world. Instead of focusing on language as principally fulfilling an informational function, we look at communication as multifunctional (Jakobson 1962), including aspects such as emotion, acts, relationship maintenance, art, and collaborative work. We consider building meaning collaboratively as a "process of negotiation in which participants reflexively examine the discourse as it is emerging, embedding assessments of its structure and significance in the speech itself" (Bauman/Briggs 1990: 69). Certain grammatical categories and utterances depend on the immediate speech situation for their understanding. Hearers play an active role, even as audiences (Duranti/Brenneis 1986). We treat the utterance as a social phenomenon (Volosinov 1973) and the communicative interaction as a primordial site of sociality. We treat technologies the same way we treat language and embodiment: as potential communicative resources to accomplish social interaction (cf. Raudaskoski 1999). We look at how technical objects impact the history of specific material relations between people. In the present volume communication is considered to be a collaborative process between speaker and hearer, and a process which is constitutive of actions and activities (and in which 'noise' could be used for gain, for example, when a hard of hearing person can claim they did not hear something they did not want to hear). Therefore, we examine hearing aids used in conversations in everyday institutional and private settings, material-semiotic settings in which information exchange involves far more than lexical content, and in which coordinated activity with others is a central feature of sociality and of people engaging with each other.

Many researchers, engineers, medical experts and audiologists operate on the underlying assumption that communication happens between a 'sender' and a 'receiver'.

The social aspect of moment-to-moment relationship shaping is ignored, yet is is crucial to the communicators.

We treat technologies the same way we treat language and embodiment: as potential communicative resources to accomplish social interaction.

Introduction to Conversation Analysis with examples from audiology

Maria Egbert and Arnulf Deppermann

In this brief presentation of Conversation Analysis ("CA"), we take up some of the communication problems associated with hearing loss and link them to conversation analytic concepts. We explain how attempts to control the conversation, embarrassment and miscommunication can be analyzed as interactional achievements in the areas of turn-taking, repair and nonverbal actions. The chapter also explains which kinds of data are used in CA, how the participants' perspective is analyzed and some of the theoretical assumptions underlying the analysis. Examples of transcribed interactional sequences with hearing loss illustrate how turn-taking, eye gaze and trouble in hearing/understanding ("repair") are sensitive to this communication disorder.

1. Introduction

In the fields of audiology and hearing rehabilitation, studies on social interaction of adults with acquired hearing loss are scarce compared to the large body of research on testing and technology (but see Kaul 2003; Skelt 2006; 2007; 2010). Data used to gain insights into communication behavior consist of simulations, of real-life communication and of post-hoc reports collected through interviews, surveys, focus groups and questionnaires. These studies have found a number of interactional characteristics in hearing loss communication, yet little is known about the actual emergence and handling of these phenomena in naturally occurring interaction.

Research on communication with hearing loss and hearing aids is largely based on experiments, simulations and subjective reports.

In audiology, the motivation to study communication with hearing loss lies in developing and improving intervention and rehabilitation (e.g., Caissie et al. 2005). Therefore, it is necessary to understand the problems in real-life situations. In this edited volume we propose to study interaction with hearing loss as directly and as closely as possible where it happens, in naturally occurring interaction taped on video, and by analyzing the participants' perspectives.

For realistic innovation and rehabilitation, research on authentic interaction is needed.

We exemplify how this can be achieved.

After a short presentation of assumptions concerning data, analysis and theoretical foundations of CA, we introduce the following basic concepts. The turn-taking mechanism is important in order to understand how persons with hearing loss try to avoid being in the position of the hearer by using longer turns and by interruptions to gain the floor. The organization of repair as the mechanism of dealing with trouble in speaking, hearing and understanding is crucial to how hearing problems are covered up or create miscommunication. Especially in hearing loss communication, a multimodal analysis is needed which includes nonverbal behavior, aspects of spatial arrangements as well as the handling of tools and technologies because problems due to hearing loss may be compensated, for example, by eye gaze, body constellation and the avoidance of rooms with echo effect and background noise.

This chapter introduces

- data, analysis and theory

- analysis of basic mechanisms and organization principles of interaction
  - turn-taking
  - repair
  - nonverbal conduct
  - contextual features

2. Conversation Analysis and related fields

One of the experiences in interdisciplinary projects has been that there is a tendency to view the 'other' discipline(s) as somewhat monolythic. In the scientific landscape, CA is not the only discipline working with naturally occurring interaction. CA has grown out of sociology and focuses on social order (Sacks 1992; Jefferson 2004; Schegloff 2007). In comparison, interactional linguistics locates itself in linguistics and pursues the analysis of language structures in naturally occurring interaction (e.g., Selting/Couper-Kuhlen 2001). The object of discursive psychology is to understand psychological and cognitive states and processes in observable interactional conduct (e.g., Edwards/Potter 1992). In linguistic anthropology, social interaction is studied to describe ethnographically cultural and ethnic communities of practice (e.g., Duranti 2004). The boundaries between CA and the above-mentioned disciplines are somewhat fluent, whereas there are clearer boundaries to discourse analysis, speech act theory, and sociolinguistics. Some, but not all researchers will agree that "pragmatics", for example as layed out in Levinson (1983), can serve as an umbrella term.

Related fields:
- interactional linguistics
- discursive psychology
- linguistic anthropology

"Pragmatics" is often used as an umbrella term.

3. Key criteria of conversation analytic research

CA adheres to certain principles concerning the type of data used, transcription, analysis and theoretical assumptions.

Data: Most of the previous studies on communicative behavior with hearing loss are based on data of simulated interaction, and reports are elicited in interviews, questionnaires, surveys and focus groups. Research on the same phenomenon yields different results when different types of data are collected. For example, Tye-Murray/Purdy/Woodworth (1992) and Tye-Murray/Knutson/Lemke (1993) investigated whether persons with hearing loss are more likely to use requests for clarification if the conversation partner is familiar than if he or she is unfamiliar. They found different results when using a questionnaire compared to video-taped samples of simulated conversation. CA analyzes naturally occurring social interaction, i.e., interaction which is not arranged for scientific concerns. Interactions are taped on video or on audio, the latter in the case of telephone calls or sensitive data. We thus take authentic samples from real life, which allow the observation of interaction repeatedly and as closely as possible. Sometimes, the data are supplemented with ethnographic observations obtained through participant observation or interviews.

Data are video- or audio-taped naturally occurring interactions.

Transcripts: The data are transcribed using a highly detailed notation system. Talk is represented in terms of what is uttered and how it is produced. Since the focus is on the interaction and not only on the person with a hearing problem, transcripts include the detailed representation of who speaks when, including such features as pauses, overlaps, and re-starts. In addition, relevant nonverbal actions (e.g., eye gaze, gesture, body position) are noted. For communication with hearing loss, the organization of eye gaze has been shown to be sensitive to this disability. Other aspects of the situation (e.g., use of technologies, physical shape and acoustic properties of the environment) can also be taken into account. For example, the arrangement set up for an audiogram changes the conditions for social interaction (cf. Egbert to appear 2012). The combination of all facets of social conduct is called "multimodality". For the examples in this chapter, the basic transcription conventions are explained in the appendix, and special notations are explained where they are used.

The verbal and nonverbal aspects of communication are transcribed.

Analysis: The observable conduct of participants is examined with the goal to describe order in interaction. CA systematically analyzes the participants' perspective. The analysis focuses on what interactants signal to one another as relevant. Thus, the uptake of an action by one interactant is a dis-

The analysis focuses on how participants in interaction display to one another what is relevant to them.

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play of how the prior action(s) is (are) understood. Since every action is both context-shaped and context-renewing (cf. Heritage 1984), a basic tenet of CA is to analyze data always with respect to the context they occur in. In particular, this means that the most important method is sequential analysis, i.e, the detailed analysis of how participants react to one another turn-by-turn as the interaction unfolds. This methodological credo grounds all analytical claims in the data. For example, it is not sufficient for the researcher to know that a participant in interaction is hearing impaired, it needs to be shown that hearing impairment is oriented to and in what way the participant(s) indicate its relevance.

Theory: Human interaction is shaped by social norms. Examples of social norms are the "preference for agreement and contiguity" (Sacks 1973/1987) and the preference to signal trouble in hearing or understanding immediately after the turn in which it has occurred (Schegloff et al. 1977). Still, people's actions are not determined by social norms. Interactants orient to norms with respect to the current situation, use them flexibly and sometimes creatively. CA is interested precisely in how people manage to adapt their behavior to the changing contexts of social life in interaction. Language and nonverbal actions are the means by which people shape their social relationships. In interaction, participants show the status of their relationship in their behavior from moment to moment. CA focuses on the linguistic and interactional practices people use to organize their exchanges and to deal with tasks and problems they are faced with in interaction. Thus, CA's outlook on hearing impairment does not only focus on how problems arise in interaction; it equally pays attention to how participants try to solve problems (i.e., their interactional coping strategies). It also takes account of how dealing with hearing problems is a collaborative enterprise, which requires contributions from all participants in the interaction.

Research design: Most of current research uses data of interaction with hearing loss where the conduct of the person with hearing loss is compared to the person with normal hearing. Initial CA research shows, however, that all participants orient to hearing loss, and therefore it would make more sense to have a comparison with a control group consisting of only normal hearing persons (Caissie et al. 1998: 48). In CA we have this opportunity because there exists a substantial body of research on interaction with normal-hearing persons in many languages and settings. As noted by Caissie et al. (1998: 48), "Studies that have compared the behaviors of adults with a hearing loss to those of their conversational partners have not accounted for the fact that the communicative behaviors of normally hearing partners may be influenced by the fact that they are interacting with someone who has hearing loss." CA does not use experimental methods or settings and quantifies only after the phenomenon is understood qualitatively. Still, in the research process, detailed single case analysis is combined with the analysis of collections, i.e., instances of interaction where participants use the same or closely related interactional practices or deal with comparable problems. Working with collections makes sure to identify the generic structure of interactional practices and problems, probing into how they depend on contextual features and analyzing what their abstract, formal features are which are deployed in a context-sensitive fashion in the individual cases (cf. Egbert 1996; Deppermann 2008). It is only by this process of working through a collection that a robust interaction analysis yields analytical categories which are demonstrably relevant to the data. Quantification in the pursuit of identifying distributions and causal patterns may only be tried afterwards (Schegloff 1993).

Human interaction is a social activity structured by social norms, e.g.,
- preference for agreement
- preference for contiguity
- sequential position contributes to meaning

Overarching research question:
- How do people adapt their behavior to the changing contexts of social life in interaction, e.g., when a disability makes itself felt or a technology is introduced?

The focus of analysis is not on the individual with hearing loss but on interaction with hearing loss.

Prior research on hearing loss in communication has been based on experiments and simulations.

A qualitative understanding of the phenomenon is a prerequisite for quantification.

The statements in this précis will now be elaborated and exemplified in relation to some of the results of communication with hearing loss based on other methodologies.

4. Turn-taking and hearing loss

A recurring result in prior studies is that persons with hearing loss control the floor by speaking more (Caissie et al. 1993; 1994; 1998; Tye-Murray et al. 1995) and by interrupting more (Tye-Murray/Witt 1996), thus reducing time of hearing and the likelihood for problems in hearing to occur. Control of the floor is measured as "words per speaking turn" (Tye-Murray et al. 1995), or calculated by the "average number of words per turn", resulting in the measure "mean length of turn (MLT)" (Caissie et al. 1998: 50). While "number of words in a turn" is an etic category, we will now demonstrate that CA's categories are emic. With attention to the participants' relevancies, a more detailed and systematic result can be achieved.

Do persons with hearing loss have a tendency to 'control' the floor to avoid being in the hearer position?

The seminal conversation analytical paper on turn-taking (Sacks et al. 1974) shows that once a participant has obtained the floor, he or she has the right to one turn-constructional unit. A turn-constructional unit ("TCU") is the smallest unit which in itself can constitute a turn. When a speaker intends to keep the floor for longer than one TCU, special work is necessary, because co-participants monitor for the upcoming ending of a TCU as a place where turn-transition becomes relevant. In negotiating turn-transition, co-participants make use of structural features of the TCU (e.g., syntax), intonation, changes in speed, eye gaze, and body posture. A turn can thus consist of a single or of multiple TCUs.

Do persons with hearing loss build longer turns to control the floor?

We will now turn to a data segment from naturally occurring conversation where the phenomenon of long turns by the person with hearing loss is exemplified. We will show how instead of measuring turn length by the number of words, interactants orient to TCU boundaries in managing speaking rights. Data and analysis are taken from Skelt (ms.).

The talk is between Kay, an interactant with hearing loss, and her friend Jan with normal hearing. The transcript shows a multi-unit turn produced by Kay. Note that Jan comes in briefly at lines 003 and 007. The overlapping talk is marked with square brackets [ ], silences are measured in tenths of a second, and speech is represented in terms of what is said and how it is said. Underlining indicates emphasis, a colon ':' lengthening, a hyphen '-' a cut-off, a comma continuing intonation, and a period downward intonation.

#1a Transcript from Skelt (ms.) ("Dyad 3 327-332"; formatting adapted)

```
001 Kay:  but- he didn't harm (1.0) any of

002       er- her family or[he:r],
                           [    ]
003 Jan:                   [no, ] no,

004 Kay:  a:a-and a couple of other families.

005       (0.3)

006 Kay:  [which] had been good to him an- an his w-
          [     ]
007 Jan:  [mmm, ]
```

Kay = participant with hearing loss

When we examine this segment for turn-transition relevant places, Kay's first TCU is possibly complete in line 002 with *family*, and indeed, the co-participant comes in only a beat later with *no, no,* (line 003). Note that both words are delivered with continuing intonation (indicated by a comma in the

transcript). Similarly, Kay's intonation on *he:r,* (line 002) signals continuation. It is however Kay in line 002 who drops out, while Jan produces her second *no,* (line 003) in the clear. Despite Jan's continuation, Kay resumes speaking and adds an increment which recompletes the turn in line 004. Given that a "no," in this context projects more details, yielding the floor to Jan would indeed place Kay into a position where hearing is relevant. At the end of line 004 the turn-transition relevance space opens up again for 0.3 seconds. Then Kay and Jan start in overlap, Jan utters a *mmm,* (line 007) with continuing intonation, and Kay adds yet a further increment.

Noticeable in this segment is that both times Jan takes the floor, her contributions are delivered with continuing intonation, and both times Kay continues talking and Jan drops out. The analysis yields that Kay not only produces a long turn, but that both Kay and Jan orient to turn-transition relevance places. Kay's long turn is achieved by talking, and moreover by continuing her talk when her conversation partner accesses the floor. Thus it is not the fact that Kay produces a long turn which might be perceived as being problematic as such, because long turns also emerge when both partners orient to the production of a multi-unit turn by one speaker, as in the case of jokes or personal narratives. The long turn in this example is also an interactional achievement, but quite differently, because Jan drops out rather than continuing her talk. It takes the collaboration of the person with normal hearing to yield to the controlling actions by the person with hearing loss (Skelt ms.).

It is thus relevant to analyze turn length in terms of what the interactants do in turn-transition relevance places. When the normal hearing participant repeatedly faces competition when he or she tries to take the turn, this may lead to irritation. On the other hand, if the participant with hearing loss is telling a story, and the other interactants have aligned as story recipients, they will most likely use continuers (e.g. "mhm") and nods at TCU boundaries to signal listenership (Schegloff 1982; Stivers 2008). Thus, length of turn counted by numbers of words may be misleading as an index of problems in interaction, because the action type of the utterance and the conduct of the normal hearing partners also need to be considered.

5. Eye gaze

Let us include eye gaze in the analysis of turn-taking, analyzed in Skelt (ms.). Through shifts in eye gaze, Kay, the participant with hearing loss, signals non-listenership in exactly those places where Jan signals upcoming speakership. The same segment as above is now displayed with eye gaze shifts, using the following notation:

XXXXX   gaze at the other participant
- - - - -   gaze away from the other participant
, , , , ,   transitions between gaze constellations, either from or to partner

Kay's eye gaze is marked below her speaker's line tied to the stretch of talk where is occurs. Note that when Jan (with normal hearing) comes in, Kay (with hearing loss) starts to withdraw her gaze (marked in red color).

Kay's long turn
- is a collaborative achievement to which she herself and her communication partner contribute
- is achieved in that Kay continues talking when Jan accesses the floor, and that Jan stops talking.

The interactional conduct of all participants - with normal hearing and with hearing loss - needs to be analyzed.

The role of eye gaze in turn-taking is of particular importance in communication with hearing loss.

#1b Transcript from Skelt (ms.) ("Dyad 3 327-332"; formatting adapted)

```
001 Kay:  but- he didn't harm (1.0) any of
          ------------------------------

002       er- her family or[he:r],
          ----,,, xxxxxxxxx,,,,,,,,---

003 Jan:                  [no, ] no,

004 Kay:  a:a-and a couple of other families.
          ----------------------------------

005       (0.3)
          ------

006 Kay:  [which] had been good to him an- an his w-
          ----,,,,,,,,,,,,,xxxxxxxxxxx,,,,xxx------
          [     ]
007 Jan:  [mmm, ]
```

Skelt's analysis shows that in line 002, Kay shifts from gazing at Jan to looking away from her as soon as Jan takes the floor. Kay continues looking away when her turn is complete, even 0.3 seconds beyond, and during the renewed uptake of her turn. When Jan comes in simultaneously at line 007, Kay slowly shifts her gaze towards Jan, continues speaking, and Jan drops out. While gazing at the partner at the end of a TCU is a signal to hand the turn over, the withdrawal of gaze at places where turn-transition as far as only the talk is concerned would be due acts to signal that the speaker still keeps the turn (Goodwin 1980). We can thus see that Kay's gaze is finely coordinated with the way she holds the turn beyond possible transition relevance places ("TRP"), signaling Jan that she is not available as a recipient of his incipient talk.

When overlap occurs, usually one speaker drops out within two to three beats (Sacks et al. 1974). We see here that Jan drops out twice while Kay continues. In the first instance Kay withdraws her gaze. This example demonstrates that when a hearing impaired speaker withholds gaze at TRPs, he or she potentially 'controls' turn exchange. "It appears that the gaze direction of the hearing impaired interactant plays a significant role in the regulation of turn exchange in at least some of these interactions." (Skelt ms.)

Eye gaze rule:
• A speaker who wants to hand over the floor <u>gazes at</u> the communication partner in turn-transition.
• A speaker intending to hold the floor <u>gazes away</u> in turn-transition.

Kay (with hearing loss) gazes away from Jan during turn-transition. Kay drops out.

6. Trouble in hearing and understanding (repair initiated by 'others')

More studies are needed on sequences where trouble emerges in hearing impaired communication (Caissie et al. 1998).

When a listener in a conversation experiences trouble in hearing or understanding an ongoing turn, he or she usually signals this by a repair initiation in the next turn (Schegloff et al. 1977; Egbert 2009). Usually, the sequence ensuing the trouble-source turn consists of only two turns, the signal of trouble (repair initiation) and the fixing of the trouble (repair operation) by the trouble-source turn speaker. Frequently, a short gap emerges before repair is initiated in order to allow for a chance that the trouble-source turn speaker may amend the trouble on his/her own account.

When a listener has trouble in hearing or understanding a current turn, she can signal this in next turn with a repair initiation.

#2 On an oil rig before the morning meeting (Egbert 2004)

```
001 Tho:  the newspapers are wet

002       (0.5)
```

Elements of a typical sequence with trouble in hearing or understanding:

```
trouble-source turn

gap
```

```
003 Rob:  sorry?                              repair initiation

004 Tho:  the newspapers are wet              repair operation

005 Rob:  yeah, there was a:: hole in the     answer to trouble-source
                                              turn displays trouble
006       mail bag mine was soaked as well    resolution
```

Departures from this sequence structure have been shown in connection with non-native speakers, where highly complex and long repair work is necessary to re-establish intersubjectivity (Egbert et al. 2004; Egbert 2004).

What may be the differences in hearing loss communication? Initial results indicate at least four features. When a repair initiation is produced without a prior gap it may indicate a problem in hearing rather than in understanding (Svennevig 2008). The normal hearing participants use strategies not to call attention to an apparent hearing problem (Skelt 2007), long and complex repair sequences (Pajo, ch. 8, this volume), explicit accounting for the trouble with references to hearing loss (Kaul 2003), and adjustments in speech delivery, such as slower speed, clearer articulation and louder volume (Kaul 2003).

Hearing loss can manifest in repair sequences in special ways:
- no gap before repair initiation
- a hearing problem is suppressed
- complex repair sequence
- accounting for hearing loss
- adjustments by normal hearing partner

7. Avoidance as orientation to stigma and taboo

When in conversation among normal hearing interactants one participant notices his or her utterance was not heard or understood in the way it was meant, he or she corrects her prior utterance, for example by a turn structure like "I don't mean X, I mean Y" (Schegloff 1987; Schegloff 1992; Egbert 1997).

The following example from a private conversation with hearing loss shows how the normal hearing partner avoids drawing attention to the hearing problem (from Skelt 2007). Isa has profound hearing loss and uses a cochlear implant. Isa and Dot are friends and neighbors. They are talking about whose turn it is among the neighbors to host a gathering.

Exemplification of how a normal hearing participant avoids calling attention to a hearing problem.

#3 Avoidance (Skelt 2007)

```
001 Dot:  I don't know whose turn it is next time,

002 Isa:  mm,

003 Dot:  maybe it's Laura's is [it or-]
                                [
004 Isa:                        [no I']ve had mine,

005 Dot:  Laura would it be?

006 Isa:  =Laura it might be,
```

Isa is profoundly hearing impaired.

Isa mishears *Laura's* for *yours*.

Instead of correcting the mishearing, Dot continues and covers the mishearing.

Dot neither corrects Isa's mishearing nor her own turn. Instead of repairing with *I didn't mean yours I meant Laura's*, she avoids a proper repair initiation. Dot does not show that Isa's response was inappropriate. Instead she re-presents the content in a new question like it was not a re-instatement of a prior one, but produced for a first time. Exposed repair is avoided since it may present a threat to perceived competence and face (cf. Skelt 2007). We can see in this example that stigma is not only managed by persons with hearing problems themselves, but that interaction partners also cooperate in saving their interlocutor's face by covering up problems. A major task for CA studies in hearing loss thus will be to analyze how both persons with hearing problems and their partners orient to the possibility of stigmatiza-

Exposed repair is avoided, since it may pose a threat to perceived competence and face.

tion, how they try to evade this problem and how they might run into dilem-mata, e.g., of choosing between stigmatization, pretense, loss of informa-tion, coherence and progressivity in the interaction.

In this way stigma may be con-ceived as an interaction phenom-enon.

9. Conclusions

This chapter has introduced basic methodological tenets of research in CA and basic structures of interaction which also crucially matter to hearing loss in interaction. The assets of a CA approach lie in

Research on hearing loss using CA will contribute to:

- attending to the linguistic and behavioral details of interactional con-duct which are not noticed and not captured methodically by other approaches, but which may be crucial in order to understand how prob-lems arise and how to cope with them behaviorally and linguistically;

- the phenomenology of hear-ing loss communication

- dealing with everyday data, thus warranting maximal ecological validity of conclusions and allowing for (perhaps surprising) findings, which may not have been imagined by prior research when, e.g., setting up an experimental design or a questionnaire.

- the analysis of problems 'in situ'

We tried to point out how research in CA can link up with prior research on hearing loss, which has relied on other methods from the social sciences.

A combination of CA with existing methodologies can be fruitful.

Studies in CA

- can flesh out 'abstract' findings which are still opaque with respect to the precise ways the phenomena come off in interaction;

- may show that research categories and findings are in need of refine-ment, in particular to do justice to the collaborative production of inter-actional structure and to the practices used by participants;

- may draw our attention to participants' practices and problems which where hitherto unnoticed.

Research on how hearing impairment manifests and is dealt with in interac-tion surely is an object of research in its own right. In terms of basic research, it enhances our knowledge about prerequisites and processes of the accom-plishment of intersubjectivity, which may well be hidden in 'normal inter-actions', where certain types of problems do not routinely occur. In terms of findings which are relevant to applied sciences like audiology, rehabilita-tion, and User Centered Design, a CA approach to hearing impairment will provide more detailed knowledge about how everyday problems related to hearing impairment arise and how they are dealt with. Close attention to linguistic and interactional practices in detail, to their contextual, sequential embeddedness and their consequences and to the collaborative nature of dealing with hearing loss in interaction will be most valuable for finding new points of departure for patients' support and counseling, and for the design of hearing aids.

CA on hearing loss communica-tion contributes to knowledge about larger issues of the organi-zation of social action:
- intersubjectivity
- multimodality
- applying CA to change inter-actional practices

User Centered Design: From understanding hearing loss and hearing aids towards understanding interaction

Maria Egbert and Ben Matthews

The interdisciplinary approach of User Centered Design is presented here with a focus on innovation in the design and use of hearing technologies as well as on the potential of innovation in interaction. This approach is geared towards developing new products, systems, technologies and practices based on an understanding of why so few persons with hearing loss use the highly advanced hearing technologies. In integrating Conversation Analysis ("CA"), audiology and User Centered Design, three disciplines which are collaborating together for the first time, we are addressing the following questions: Who is the user? What are the interactional situations in which hearing loss and hearing aids are relevant? How can Conversation Analysis contribute to innovation? What are the challenges in such a collaboration?

1. User Centered Design

A multidisciplinary approach to communication with hearing loss and hearing aids is needed which systematically explores the user in interaction in order to understand why so few use hearing aids successfully while many reject them. Industry and health care providers have focused on technological progress, while the persons with hearing loss as potential, frustrated or successful users have been neglected, and there has been too little attention to interactional and contextual characteristics of the situations in which hearing loss is experienced. This chapter provides an introduction to an approach to innovation which systematically integrates the user perspective.

> Some of the reasons for the problems due to hearing loss and hearing technologies could be traced to a lack of understanding the persons who are affected.

The approach of User Centered Design, refined over the past twenty years, focuses on and involves the user in design and innovation processes (cf. Schuler/Namioka 1993; Buur/Bagger 1999; Buur 2007; Buur/Matthews 2008; Bogers et al. 2010). User Centered Design is an umbrella term that glosses a range of methods for the development of technologies. Although there are various 'schools' of User Centered Design, they all share a commitment to developing new technology based on an understanding of the issues and concerns of the people who encounter the technology in their everyday lives. Approaches differ is in their particular take on precisely how to do this best: Some are more analytic, some more participatory, some more pragmatic, some more theoretical, some more critical, and some more political. Recent years have also seen the application of User Centered (or Human Centered) Design practices to the development of medical technologies, as represented by the emergence of the idea of 'patient centered design' (Tran et al. 2005; Rodriguez et al. 2007), although to our knowledge, no work in this vein has yet been done with hearing impairment.

> In User Centered Design, innovation includes studying and involving the users.

User Centered Design is highly compatible with the empirical research in the field of CA. The goal of CA is to understand social order as it is displayed in observable human interaction, including the use of technologies. CA rigorously examines the participants' perspective through their actions in situ based on recordings of authentic interaction. Likewise, to gain an empirical basis for

> User Centered Design and Conversation Analysis have been shown to be highly compatible over the last 20 years.

technological innovation, developers in User Centered Design take as point of departure how users actually interact with technologies and other people in the flow of their work and everyday lives. Pioneering work conducted at Xerox PARC (Suchman 1983; 1987) was a watershed in the development of User Centered Design in collaboration with ethnography and CA. Prior to Suchman's seminal research, the predominant approach to User Centered Design was to work with cognitive and behavioral models of users (borrowed from psychology and cognitive science) as a means of rationalizing people's observed behavior with technology (see, e.g., Norman/Draper 1986). Such-man's work significantly contributed to the development of a different kind of (the participant's own) perspective on what users do with technology and why they do it. Her analyses were grounded in the theoretical and analytic orientation of CA. This analytic approach was coupled with the development of a range of novel design practices that were worked out amongst herself and her colleagues at Xerox.

> This approach was pioneered at the Palo Alto Research Center (first "Xerox PARC", later "PARC"), an interdisciplinary center established by Xerox in 1970 for technological innovation geared towards business enterprises.

This work at Xerox inspired a rapidly growing body of interdisciplinary research and application involving conversation analysts, ethnographers and designers working in technology innovation (e.g., Bentley et al. 1992; Heath/Luff 1992; Andersen 1997; Crabtree et al. 1998; Suchman et al. 1999; Heath et al. 2002; Szymanski et al. 2006). The kinds of practices developed include a spectrum of recommendations for the integration of Ethnomethodology and design (Dourish/Button 1998), the establishment of multidisciplinary in-teraction analysis laboratories (Jordan/Henderson 1995) and the innovative use of video data as a means of inspiring reflection in design teams on the workings of their own practices (Suchman/Trigg 1991; Blomberg et al. 1996). For an recent overview of this work, see Matthews (2012). The interdisci-plinary compatibility of CA and User Centered Design is rooted in a shared methodological credo.

> Characteristics of this approach include
> - interdisciplinary research
> - integration of CA and ethnography in design
> - innovative use of video
> - research on the design process

2. From User Centered Design to Participatory Innovation

User Centered Design has since become best practice in industry; there is now an international standard for Human Centered Design (ISO 13407). Yet many technologies continue to be developed either without the study and involvement of users in design and development processes, or without the means to actually implement recommended changes to these technologies. This is partly on account of the fact that Human Centered Design practices are often found to be insensitive to the ever-present temporal, economic and material constraints on industrial development cycles. As such, in order to implement the research results for advancement and innovation, we work within the general framework of Participatory Innovation (Buur/Matthews 2008). Participatory Innovation is an emerging framework for the organiza-tion of innovation processes that creates opportunities to involve the con-tributions of various stakeholders. Participants include, for instance, policy makers, shareholders, manufacturers, suppliers, distributors, and end users.

> User Centered Design has become best practive in industry (ISO 13407), yet mainstream design is still governed by other principles.
>
> Barriers to UCD:
> - time pressure
> - economic constraints
> - material constraints
>
> UCD creates opportunities for involving all stakeholders.

In innovation research, it is widely held that up to 80% of the ultimate cost of producing a new product or delivering a new service is fixed in the earliest stages of design during which the nature of the product/service is being decided (Clark/Fujimoto 1991). Yet many important constraints are frequently not encountered until much later in the process - limitations of manufacturing processes and material properties are encountered during negotiations with production departments; technical difficulties are not discovered until prototyping, etc. And above all, many problems with the successful functioning of the technologies remain undiscovered prior to the product actually being sold and used. In response to such mundane realities of industrial development processes, Participatory Innovation was proposed as a means of opening up the entire innovation process to involvement with

> Barrier to UCD:
> - 80% of investments are made in the early stages of inno-vation, thus fixing the new service or product. Many constraints are discovered only later in the process.
>
> UCD wants to open up the inno-vation process for more flexibility and a more secure foundation.

all kinds of stakeholders in order to establish a more secure foundation for the resultant success of products and services.

While Participatory Innovation is not a step-by-step recipe for success-ful innovation, it is an evolving and heuristic set of practices that strive to keep the process of innovation as open and flexible as possible throughout its course, with a sustained concern for the users. It is founded on the disci-plines of Participatory Design (e.g., Greenbaum/Kyng 1991), Design Anthro-pology's exploration of people's social experiences and rituals (e.g., Clarke 2011) and Innovation Management. Its innovation process is organized with sensitivity to the importance of the different contexts of production (e.g. company settings) and use (e.g., family homes). To this end, it has combined activities such as field studies of use contexts, cooperative video analysis with input from multiple academic and lay disciplines of expertise, the fa-cilitation of co-ideation events with users and other stakeholders, tangible business modeling with industrial colleagues where artifacts are used as a communication tool to model management processes, and co-design and implementation with various participants (Buur/Matthews 2008). In this way, it is envisaged that all stages of an innovation process, from initial idea sketches through to production and distribution, can be inclusive of many different parties.

Participatory Innovation is an evolving process.

Its innovation process is organized with sensitivity to the importance of the different contexts of production and use.

3. Users and end-users of hearing instruments and contributing technologies

The answer to who exactly 'the users' are may vary depending on the per-spective. When discussing assistive hearing technologies, the focal 'user' is the person with hearing loss. In the process of making the hearing aid avail-able to the person with hearing loss, a number of other stakeholders play a role in that they have different interests in the constitution of the tech-nology. For example, those who develop, sell, install or deliver technologies frequently have different requirements than those who use them on a daily basis. Before a hearing aid is dispensed, varieties of other technologies be-yond the hearing aid are used, for example, to develop, manufacture, and fit hearing aids. Within the complex of stakeholders, each of the persons, com-panies or organizations can thus be considered a particular kind of 'user' of a variety of technologies necessary to bring the hearing aid to the person with hearing loss. For example, other technological products are used to program the hearing aid in order to adapt it to the individual user. Depending on the national health care system, it is the audiology assistant, hearing aid fitter or the ear, nose and throat doctor who uses specialized diagnostic technol-ogy to assess the kind and degree of hearing loss. Within this complex, the person with hearing loss who could benefit from using hearing technology is 'the end-user' in a system of other actors. Given that hearing instruments are assistive technologies used in social interaction, another set of stake-holders are all communication partners.

Conceptualizing the person with hearing loss as 'the user' is misleading because many different stakeholders are involved in the overall issue of hearing loss and assistive technologies.

In this book we focus on the end-users because they are not only inter-acting with the technology itself, but most importantly to them, they use it to interact with family and friends, at the workplace, with institutions and in public. In line with the World Health Organization's conceptualization of dis-ability (2001) we view hearing loss as a social phenomenon which involves what all communication partners bring to the interaction as well as features of the physical context, such as possibility of eye contact, background noise, the use of artifacts in the environment and the physical set-up of the com-munication space. In other words, our focus is on how hearing loss figures as an aspect of the sites of interaction, how these sites are connected, how mi-cro phenomena of interaction are interrelated with the role of hearing loss in society and how the resistance to using hearing aids is a socio-cultural,

This edited volume focusses on the 'end-users' in their various contexts.

societal and economic phenomenon which is experienced first and foremost in interaction, and which can be identified in these interactions as relevant to the participants.

4. Sites of interaction where hearing disability and hearing aids are relevant

We do not yet know much about what actually happens in most encounters where hearing loss is experienced and hearing aids are used, but we have indications of which situations are problematic. Studies using questionnaires, interviews, surveys, and focus groups indicate that there may be different difficulties depending on the situation, such as family, workplace, health care, and being in public. A recurrent finding points to the fact that hearing loss is first experienced not by the person with the condition but rather by their spouse, and most frequently by wives (Engelund 2006). The Danish Ministry of Health (Christensen 2006a/b) identifies the workplace as highly stressful for employees with initial mild hearing loss because compensation strategies can lead to miscommunication which may negatively affect internal or external company outcomes. In Germany, a questionnaire study reveals that the biggest barrier towards hearing aid use is the ear, nose and throat doctor, as indicated by the phase in the path through the health care system where most persons with hearing loss drop out (Meis/Gabriel 2006). Beyond knowing that this situation is problematic we can only hypothesize about the reasons. An extensive interview study conducted in the USA shows that frequently the client and the audiologist do not 'speak the same language', and that the communication is difficult both at the level of information transfer and in respect to the social relationship (ProMatura 2007 a/b). The interaction in a family doctor's practice is a further site of interest. A questionnaire study indicates that at least in Germany, family doctors themselves report that they know too little about hearing loss, and thus may miss a chance to diagnose and to refer the patient appropriately (Blaschke 2006). National health care systems differ in whether they offer coping counseling. In Denmark hearing pedagogues are employed by the national health care system. At the Odense University Hospital, a hearing pedagogue routinely calls patients in order to follow up on their visit. This may be one reason why the compliance rate in Denmark is higher than in many other European countries. A more opaque area is whether hearing loss may be part of a person's subconscious strategy to cope with an overload of sounds in daily life, thus 'gaining' protection from stressful noise and other overtaxing auditory input. A further problem is that research on all of the origins of hearing loss is not yet conclusive.

Thus prior research locates problematic sites; yet little is known about what actually transpires during the interactions in these settings. Given that for the person with hearing loss, these sites are connected in that they form a path through the health care system, it is even more important to understand their interconnection. In the interdisciplinary approach presented in this edited volume the researchers examine interactional sites where hearing loss is relevant in order to gain knowledge about what happens inside these encounters. This understanding is sought to provide a basis for innovation. In this way, studies in audiology using qualitative and quantitative methods are here for the first time combined with conversation analytic research on authentic interaction within the overall framework of User Centered Design as an approach to innovation.

Science has little knowledge about what exactly happens during encounters with hearing loss and hearing technologies. However, the following sites have been identified:
- the normal hearing spouse/family members notice hearing loss
- workplace interaction is highly stressful with hearing loss
- the encounter with the ear, nose and throat doctor constitutes a high barrier

Frequently, the client and the audiologist do not 'speak the same language'.

Institutional follow-up seems to be a favorable factor.

Prior research locates problematic sites. Conversation Analysis can shed light into the 'black boxes' by analyzing the sites from the inside.

Such analyses provide unique insights for innovation.

5. Analyzing authentic interaction

User research has as its aim to understand users' behavior better. It can be conducted based on different kinds of data, including interviews, questionnaires, focus groups, demographic statistics and video-tapings of authentic interaction. CA as the study of naturally occurring interaction has hardly been used in audiology. In this book, we strongly promote adding this methodology, because it opens up new perspectives which other methodologies leave undiscovered. CA examines how each participant shapes the interaction and how the outcome of an interaction is collaboratively achieved. Interviews and surveys can handle larger amounts of informants, and the results can point to issues where a microanalysis will be informative. Informants' retrospective reports are important, for example, in order to learn how people justify not using a hearing aid. Yet such studies need to be understood as shaped by the data collection method (Suchman/Jordan 1990; Houtkoop-Steenstra 1997; 2000; Maynard et al. 2002). To a larger extent than other approaches, CA research usually shows how problems emerge from moment to moment in the interaction. Video-tapes allow for repeated viewings of data without distorting it. This differs from other data in which interactants are asked to report their behavior post hoc. We therefore favor a combination of data collection methods. In this edited volume, Conversation Analysis constitutes the core methodology in order to demonstrate its strengths.

> CA research usually shows how problems emerge from moment to moment in the interaction.

A large body of CA work on doctor-patient interaction has led to improvements in practices (cf. collection edited by Antaki 2011; conference panel organized by Ford 2011). In comparison, almost nothing is known about interaction in hearing health encounters. These encounters are unique for several reasons. First, distinctive to audiological encounters is the role of technologies. In addition to hearing aids, we see in the consultations that other technologies come into play, such as the diagnostic instruments or the audiologist's configuration software. Second, in many western countries, hearing aid fitters and sometimes ear, nose and throat doctors are also sellers of hearing aids and offer only the products of one or two hearing aid manufacturers. Since hearing aids from certain companies are known for special qualities (e.g. for listening to music or for ease in outdoor sports), a dispenser representing the products of just one or two companies has an interest in selling those companies' products. Third, in the consultations, ear, nose and throat doctors are much more reliant on the patient's description of the complaint than many other medical specialists. In audiology the patient has to do a very different job of description than by other medical conditions; patient 'expertise' comes in differently because it is more subjective. Both the doctor and the patient know the problematic condition is a hearing problem, yet to diagnose it specifically is a much more interactional process than for many other conditions, and more probing is involved. Thus the specifics of audiological encounters often differ from issues reported for other medical encounters, and similar issues may play out in different ways.

> This approach has been successful in other medical fields.

6. 'Fields of study' and 'fields of application'

'Innovation' is a term that is increasingly applied to a vast range of phenomena, perhaps so much so that it now borders on being meaningless. Innovation is used as a descriptor to refer equally to product, process, system, service, relationship, curriculum, organization, collectivity, technology, institution, and government. For our understanding of innovation in the context of this project, it is important to differentiate between the 'fields of study' and the 'fields of application'.

> What is meant by innovation

The fields of study are typically sites of social interaction, such as clinical consultations with a medical professional, meetings with a hearing peda-

> Fields of study are usually sites of interaction.

gogue or interaction in other social settings where hearing loss or unfavorable acoustic environments emerge as a relevant difficulty. In relating the results of such interactional studies to 'innovation', it needs to be considered that the potential fields of application for innovation might be the site where the problem was identified, however, the solution of a problem may also be implemented in a different site. It is frequently the case that ethnographic or CA studies of institutional settings (such as clinical sites) can inform the practice of clinical professionals (e.g. Stivers 2007; Heritage 2011). In such a case the field of study and field of application coincide. Yet, real world studies are also likely to be relevant to the design of many other things: new public health policies, new clinical training procedures, new means of technology delivery, new forms of access to public services, new organizational partnerships, new financial provisions, or new kinds of devices. In the case of hearing aids communication, we are looking at, but also beyond, the field of study as a potential field of application. With Conversation Analysis, the participants' relevancies can be examined in situ. Such knowledge provides us with criteria for what issues to select for advancement.

> In the first stage it is useful to understand who the different stakeholders involved are and how they are interconnected.

The goal of this interdisciplinary approach in this first stage is to create a catalogue that includes the relevant participants (individual and collective), public systems, national policies, bodies, institutions and organizations, their selective interests and their interrelations. This will be useful as an aid to form an initial understanding of how and where change might be initiated. The particularly relevant sites for potential change that are emerging from the studies in the current edited volume are the initial contacts with the health care providers (cf. Deppermann, ch.10, this volume). Diagnosis of hearing loss and the initial encounter with the hearing aid expert seem to be highly problematic because many patients/clients already drop out in the initial stages. We acknowledge that research on the entire complex of stakeholders will doubtlessly be a large and multifaceted picture. Therefore, research will necessarily be selective and partial in scope, and must evolve over time. Yet it is only as a portrait of these issues emerges from the fields of study that we are able to develop an understanding of how innovation and intervention might be pursued. Some of the first examples of such research and their potentials for application as we envision in this network comprise the substance of this book.

> Initial encounters with the health care providers are problematic.

7. Report of a pilot study with a hearing aid producer

To sketch out the kinds of activities and results of a Participatory Innovation process, we will now provide an example. Between April and September 2008, a Participatory Innovation pilot project (in which both authors of this chapter participated) was conducted in collaboration with Oticon A/S, a Danish company that designs and manufactures hearing aids. In the course of this short project, entitled Hearing in Transition ("HinT"), we engaged with Oticon company employees to undertake various kinds of fieldwork, including interviews with hearing aid users (or potential users), analyses of episodes (stories) that users told about vivid 'hearing experiences', interviews with audiologists, collaborative video analysis of audiological consultations, and co-design of conceptual technologies that addressed some of the themes that had emerged over the course of this project.

> We conducted a pilot study with the Danish hearing aid producer Oticon.

One such theme that first emerged in interviews conducted with users (and later reaffirmed by two audiologists involved in the work) was the contrast between users' ordinary non-technical experience of having difficulties with hearing versus audiologists' technical understanding of the hearing problem in terms of various ranges of frequency at which the user's hearing threshold is diminished. Several users who had undergone hearing tests and been diagnosed with hearing difficulties were unable to understand

> There is a wide gap between the knowledge of the audiologist (expertise) and the client (experience). Frequently, this gap is not bridged.

or explain the audiogram they had been presented by the audiologist, which charted the particular characteristics of their hearing curve in hertz and decibels. A closely related issue of one manifestation of the difference between ordinary describable experience and professional diagnosis is one that surfaces in Deppermann, ch. 10, Bonner ch. 11 and Heinemann et al., ch. 12, this volume.

During the HinT project, we pursued this experience vs. expertise issue in a co-design workshop with Oticon. One of the conceptual products that were mocked-up in that workshop was the Living Audiogram ("LA"), a pocket-sized device with a four-inch screen and a microphone. The device simply registered the ambient noise in an environment and published that noise on the screen in audiological measurements (i.e., in hertz and decibels). The idea was that users could live with the device in order to gradually become more accustomed to living with and experiencing sound in audiological terms. With the LA, a squeaky door, elevator music, or a ringing telephone can be seen for the sounds it produces, since these are represented visually on the screen. Over time, users might be able to notice what registers of sound they frequently mishear (or cannot hear at all); if so, such a device might become a new resource which might aid them in explaining the particular hearing difficulties they encounter to an audiologist who is attempting to determine what kinds of technical settings he or she might recommend for this user's hearing aid. Although this is a very simple example, it is in this way that we anticipate that the detailed investigation of sites of use can be integrated with product innovation.

Innovation idea: "The Living Audiogram"

8. Potential challenges in implementing User Centered Design

In the initial stage of this interdisciplinary collaboration we have encountered an array of challenges, which we are mentioning here for the sake of transparency and experienced reality. In the HinT pilot project with Oticon, we discovered only in a late stage that different groups were operating under two different assumptions of who 'the user' was (Egbert 2011). To the Oticon representatives, 'the user' was the hearing aid dispenser, while to the researchers, 'the user' was the person with hearing loss.

We experienced interdisciplinary challenges in the following issues:

- *Who is 'the user'?*

Another set of interdisciplinary hurdles concerns the degree to which knowledge of the respective other disciplines is necessary. It has been a fear voiced by CA researchers that they know nothing about audiology and hearing technologies, raising the issue of how much knowledge beyond CA may be needed in order to analyze the interactions with hearing loss and hearing instruments. Similarly, CA researchers have not always been successful to communicate the specifics of their methodology to audiologists, partially because for audiologists, the range of methods used for studying communication is unclear. In general, there is a certain tendency to see the respective other discipline as monolithic, whereas there is a high awareness of how the 'home' discipline is different from similar methodologies.

- *To what degree is knowledge of the other disciplines necessary?*

A further significant challenge lies in varying expectations of what an appropriate time line is. A thorough CA analysis takes 2-5 years. Such a time span is long for industry where a certain pressure exists because the same people, the same money and the same company conditions may not be around for so long; the momentum dies at a different time frame than in the university. Finally, the collaboration in this edited volume will have to face the practical problem in creating formats of interdisciplinary work in which representatives from the various stakeholder groups can participate in a common project. In sum, we have experienced that it takes courage, tolerance for ambiguity, creativity, and a certain willingness to suspend disbelief and suspicion for long enough to see results and meaning emerge.

- *What are the expectations of an appropriate time line from research to application?*

- *What formats are feasible in involving the different stakeholder groups?*

When different disciplines meet for the first time, each researcher brings in his or her concepts of validity, reliability, at what point an analysis is sufficient for application, and other considerations for what constitutes a standard for good research, i.e., partners need to convene on a common concept of best practice, which is not yet available, because the research is unprecedented. To lessen these hurdles, the research in this book provides examples of the high success potential of the interdisciplinary collaboration.

To conclude this chapter, we propose that once the narrow focus of innovation on hearing technologies is widened to social interaction, institutions and society, ideas for change can be generated around the social implications of the technology. Ch.16 in this edited volume discusses this point in relation to the empirical work presented.

Most importantly, we propose to widen the focus on hearing technologies to social interaction.

Dealing with misunderstandings: The sensitivity of repair in hearing impaired conversation

Louise Skelt

Hearing loss carries with it the risk of mishearings and misunderstandings. Despite recent advances in hearing technology, some people with hearing loss, particularly those with severe and profound losses, still experience recurrent problems of hearing and understanding. In the course of their interactions, they and their conversational partners need to decide how to deal with these problems. This chapter examines three such problems arising in clinical and everyday interaction and explores the ways in which the participants deal with them.

1. Introduction

In interactions involving participants with hearing loss, repairs of problems of hearing and understanding arise more frequently, and are sometimes more disruptive, than in other interactions. A study of the overall incidence of repair in two-party interactions involving appropriately-aided participants with a severe or profound hearing loss (Lind et al. 2004) found that hearing impaired participants initiated significantly more repair sequences than their conversational partners. Furthermore, some of these repair sequences extend beyond the standard 'minimum' repair sequence of two turns. Caissie/Gibson (1997) found that 12% of repair sequences in two-party conversations with hearing impaired participants extended beyond two turns.

In addition, repair attempts in conversations with hearing impaired interactants may ultimately be unsuccessful. Caissie/Gibson (1997) found an overall repair "success rate" of only 83% to 86%. Given the frequency of problems of hearing and understanding in these conversations, the repeated insertion of sometimes lengthy and occasionally unsuccessful repair sequences is likely to be perceived as highly disruptive to conversational fluency. It is perhaps not surprising, therefore, that a certain number of identifiable problems are left unrepaired in these interactions. In the interactions examined by Caissie and Gibson, 23% of identifiable problems of hearing and understanding passed without repair initiation by either interactant. Certainly, as noted below, Schegloff et al. (1977) observe that repair is not initiated in response to all troubles in talk. Nevertheless, the non-repair of almost a quarter of the observable problems of hearing and understanding in Caissie and Gibson's data raises the possibility that in these interactions there may be additional pressure to let problems pass.

Because of the strong association between hearing loss and repairable problems, and also because of the disruptiveness of frequent and potentially lengthy repair sequences, audiologists have directed considerable attention towards the phenomenon of repair. In audiological research, the frequency, appropriateness, specificity and success of hearing impaired interactants'

Research question:
- How do persons with hearing loss and their conversational partners deal with hearing problems?

Repair attempts are less successful in communication with hearing loss than among normal hearing participants.

Lengthy repair attempts disturb the progressivity of interaction.

repair initiations have been examined extensively, for example, by Caissie/ Gibson (1994; 1997) and Tye-Murray/Witt (1996).

In rehabilitation programs, audiologists have advised their hearing impaired clients and their frequent communication partners on the best ways to achieve efficient and effective repair. Indeed the author herself, as a rehabilitation audiologist in Australia, took part in such programs. Few if any of these rehabilitation programs or studies were informed by conversation analytic work on the organisation of repair. One of the major motivations of the study from which this chapter is drawn (Skelt 2006) was to examine from a conversation analytic perspective the ways in which people with hearing loss and their conversation partners actually deal with problems in authentic interaction.

Professional advice about repair strategies is not informed by Conversation Analysis.

2. Background

Problems of hearing and understanding can arise in any interactional setting. The most important and far-reaching study of the conversational mechanisms for repair of problems of hearing, understanding and speaking (Schegloff et al. 1977) identifies a preference for self-repair and for self-initiation of repair (that is, repair initiation and repair completion by the speaker of the trouble-source turn), over other-repair and other-initiation of repair (that is, repair initiation and repair completion by the recipient of the trouble-source turn). Schegloff et al. observe that other-initiation of repair is frequently withheld or delayed, which provides an extended opportunity for self-initiation. In other words, the other-initiation of repair may show similar patterns of delay or withholding to those observed in dispreferred actions such as disagreement (Pomerantz 1984; Sacks 1987).

In conversation, self-repair is preferred over other-repair.

Occasionally, a speaker's turn-at-talk displays a faulty understanding (that is, a misunderstanding) of a prior turn. Schegloff (1992) describes the processes of 'third position repair', by which the speaker of that misunderstood prior turn can deal with a displayed faulty understanding. Schegloff (1992: 1325) says of third position repair that "the major job that is served (…) is the retrieval of 'next turn position', so as to allow another, better 'fitted' next turn to be done".

However, an alternative to repair is to let the displayed misunderstanding pass altogether. Schegloff et al. (1977) note that repair, though recurrently potentially relevant, is not initiated in response to all troubles in talk. Schegloff (1992: 1329) points out that:

> If "next turn" is understood as indeed displaying a misunderstanding of its prior, then speaker of that prior – of the trouble-source turn – need not initiate repair, but can "let it go," in other words, he or she can treat the responsive turn as if it were sequentially appropriate and correct.

When trouble in hearing or understanding occurs, instead of initiating repair, conversationalists may 'let it pass'.

Drummond/Hopper (1991: 306) propose that "repair is always risky, a violation of 'let it pass', and in general likely to cause trouble". In interaction involving participants with hearing loss the risk associated with repair is even greater. Repair initiations risk possibly lengthy and disruptive repair sequences, or even unsuccessful repair attempts. Moreover, any initiation of repair on a hearing impaired participant's misunderstanding of prior talk may draw attention to the problem of perception which caused it, and hence foreground the hearing loss in a potentially undesirable way. It can be argued, therefore, that such repair is interactionally sensitive.

Repair is an interactively sensitive action and may draw attention to hearing loss.

This chapter shows three examples of misunderstandings in three different dyadic interactions between participants with severe and profound hearing losses and experienced communication partners, two in clinical settings, with audiologists, and one at home, with a friend. These examples are

Data description

drawn from a larger study of seven interactions involving hearing impaired participants (Skelt 2006). In each of the three examples below, a turn-at-talk by a participant with a hearing loss displays a faulty understanding of prior talk by the partner. In each case, the partner deals with that misunderstanding in a different way, but in a way that is consistent with the sensitivity of repair in these interactions.

3. Analysis of three misunderstandings

In example #1, an apparently unproblematic other-initiation of other-repair (or correction) occurs in the course of an audiology appointment. Lil, the audiologist, is explaining the procedure for obtaining a cochlear implant to Col, who wears two hearing aids and has a severe bilateral hearing loss and very poor speech discrimination.

#1 Audiologist and client talking about cochlear implant clinics

```
001 Lil:  so that's their addresses.=

002       =there's two implant centres.=

003       =there's two implant centres,

004       (1.0)

005 Lil:  there's one, two. okay?

006 Col:  (thanks Lily.)

007 Lil:  they- tho- ↑both those places do cochlear implants.

008 Col:  well I suppose the next thing though will be-

          ((31 lines not displayed))

039 Lil:  [thi-]
          [
040 Col:  [prob]ably have to see him first will I? (C points)

041 Col:  an go on to this-

042 Lil:  no no no,    ((L waves finger))

043       either or.  ((L shakes head and waves finger))

044       either- or. ((C looks puzzled))

045 Col:  mm?

046 Lil:  these are two different places= ((L points at paper))

047       =they're two ↑different places,

048 Col:  oh I see:.

049 Lil:  you either go to this one,    ((L points at paper))

050 Col:  one or the other.

051 Lil:  o:r that one. that's right.
```

The early part of this example shows Lil explaining that there are two alternative implant centres from which Col can choose. She has written their details on a piece of paper, and is showing it to Col. Col does not explicitly initiate repair on Lil's turn-at-talk in line 002, *there's two implant centres*, but

Lil is the audiologist
Col has severe hearing loss

Lines 1-3:
Lil explains option of two implantation centres Col can use.

Line 4:
Col neither claims understanding via acknowledgement, nor attempts repair.

Line 8:
Col's question displays faulty understanding of Lil's talk.

Line 42:
Lil's initial repair attempt (in the form of a third position repair) is unsuccessful.

after her *two* he leans forward, and after her *implant* he moves his gaze from the piece of paper to Lil's face. Lil engages in 'pre-emptive' self-repair; in line 003 she latches a repetition of her turn-at-talk in line 002. However, unlike that in line 002, her talk in line 003 does not have a potentially complete final intonation, which leaves open the possibility of further talk. Towards the end of Lil's line 003, the gaze of both participants returns to the piece of paper, and remains there during the ensuing one second gap of silence (line 004). In line 005 Lil, faced with the absence of any overt claim of understanding by Col, specifically and selectively deals with the repairable, that is, the number of centres. She does so by using an enumeration which embodies the process of counting (*there's one, two.* Line 005), thus making the repairable more salient and working out its specifics by the analogical procedure of counting. (This counting out of numerical information is a repair technique which is both taught and employed by rehabilitation audiologists.) She highlights the numbers with stress and with two finger points, making them perceptually more salient.

By her actions here, Lil orients to the ever-present possibility of problems of hearing and understanding, given the severity of Col's loss and his known speech perception problems. Lil also leaves gaps (line 004) and gives prompts (*okay*, line 005) for claims of understanding or repair initiations by Col. Col neither claims understanding via acknowledgement, nor attempts repair; Col's utterance in line 006 does not explicitly display his understanding of Lil's talk, and in line 008 Col initiates a new segment. This absence of clear response to her talk may 'flag' this segment for Lil as a possible source of problems. She does not, however, challenge or test Col's understanding at this point. To do so would be potentially sensitive, calling into question his interactional competence.

Some lines of talk later, in line 040, Col asks whether he needs to attend one clinic and then go on to the other (*probably have to see him first will I? an go on to this*-), signalling his uncertainty in understanding Lil's prior talk in lines 002 to 007. Col has not understood that the two clinics are alternatives. Lil cuts off Col's talk with a raised and waving finger and a clear *no no no*, followed by a repeated *either or.* (lines 042-043), which targets the basis of Col's misunderstanding, using a contrastive construction (*either or*) and contrastive stress to increase the perceptual salience of her repair.

This initial repair attempt by Lil is unsuccessful, and after an other-initiation of repair in line 045 by Col (*mm?*), Lil's talk in lines 046 and 047 of this excerpt (*These are two different places= they're two ↑different places*) retrieves her prior talk in lines 002-008: (*there's two implant centres, there's one, two. okay? They-tho- both those places do cochlear implants.*). Once again Lil employs contrastive stress to enhance the perceptual salience of her repair, increasing and changing the location of the stress in her second repetition to lend further prominence to the repairable - that the two centres are *different*. Lil has retrieved next-turn position for her earlier turn-at-talk, increased the perceptual salience of her repair during the course of the sequence, and thereby "allow(ed) another, better 'fitted' next turn to be done" (Schegloff 1992: 1325), that is, an *oh* which marks a change in the state of Col's understanding (Heritage 1984), as well as an explicit statement of his new, correct understanding (line 050, *one or the other*).

This sequence takes the form of a third position repair (Schegloff 1992). Schegloff (1992: 1317-1319) notes that third position repair does not always occur in 'serially' third turn, and that displacement from this third turn position can occur. He proposes that third position repairs occur "in the turn after a turn containing an utterance analyzably built to be 'next' to some prior", and that "although most turns respond to the immediately preced-

The audiologist orients to the ever-present possibility of problems in hearing and understanding.

ing talk, speakers can construct turns to address themselves to much earlier talk".

However, Col's construction of his 'misunderstanding-displaying' turn as a question shows it to be an understanding check, which, while arguably constructed for confirmation, nevertheless invites correction. Lil's turn-at-talk here takes the form of an unmodulated other-correction. Schegloff et al. (1977: 378) observe that "when other-corrections are done, they are frequently modulated in form"; for example, by a downgrading of certainty, which orients to the dispreferred status of other-correction. In the case of unmodulated corrections like Lil's, Schegloff et al. (1977: 378) note that "a very large proportion occur in the turn after an understanding check", that "they take the form *No plus correction*" (as Lil's does) and "in view of their occurrence after understanding checks, etc., in typically question and correction-invitation format, are (…) invited". Col initiates an understanding check which explicitly invites Lil to repair a problematic understanding of which she is most likely already aware. Col's invitation mitigates the sensitivity of Lil's repair.

The complex and extended repair sequence shown here illustrates the repair work in which Lil and Col collaborate in order to achieve both the interactional and the institutional goals of this encouter. Because Col's understanding of the discussion is important, both Col and Lil need to be certain that he has 'got it right'. In other situations and contexts, however, this successful achievement of mutual understanding or "intersubjectivity" (Schegloff 1992) may not take precedence over the progressivity of the interaction in the same way.

> The complex repair illustrates the work in which Lil and Col collaborate in order to achieve the interactional and institutional goals.

Clark/Wilkes-Gibbs (1986: 33) propose that "participants in a conversation try to establish, roughly by the initiation of each contribution, the mutual belief that the listeners have understood what the speaker meant in the last utterance to a criterion sufficient for current purposes". They point out that in different situations that criterion, with regard to propositional content at least, may be high (as when giving directions, or in the institutional clinical context of Col and Lil's interaction) or low. The type of explicit corrective repair shown above, which is invited by Col and undertaken by Lil in the course of an audiology appointment, may have its basis in the high understanding criterion applying in this clinical situation.

> The understanding criterion in interaction is that the level of understanding should be sufficient for current purposes.

Conversely, when the understanding criterion (that is, the level of understanding sufficient for current purposes) is lower, as it may be in everyday interaction between friends, there may be a pressure to "tolerate a certain lack of understanding" (Clark/Wilkes-Gibbs 1986: 34). This in turn may affect patterns of repair initiation. Example #2, below, shows an instance of everyday interaction between friends in which an apparent problem of hearing and understanding is dealt with in a very different way from that shown in example #1 above. Schegloff et al. (1977: 380) note a tendency for the production of a "sequentially implicated next turn" to take precedence where possible over other-initiation of repair following turns displaying misunderstandings. In view of the dispreferred status of both other-initiation and other-repair, it is not entirely surprising that where the sequential and interactional consequences of a displayed misunderstanding are likely to be less significant, alternatives to its explicit repair may be sought.

Example #2, below, shows an absence of third position repair at a point where a problem of understanding arising from a problem of hearing is clearly displayed by a hearing impaired participant. In this example, Isa is a woman with a profound hearing loss, who wears two hearing aids, and Dot is a friend, who has come to her house for morning coffee.

#2 Friends talking about possessions

```
001 Isa:  [ an  we-]
           [
002 Dot:  [↑that's u]nusual

003 Dot:  wh[ere'd]you get that.
             [
004 Isa:    [(   )]

005       (0.3)

006 Isa:  mine,

007 Isa:  er:, I got it when I was five

008 Isa:  [years old that's a long time  ago,]
          [
009 Dot:  [o:h you got it when you were five.]
```

Isa has hearing loss,
Dot has normal hearing.

Dot inquires about an ornament
on the sideboard.

Isa responds with a non-fitting
answer, displaying her faulty
understanding.

Dot does not treat Isa's answer
as problematic.

Dot has been admiring ornaments placed on a sideboard near the table at which she and Isa are seated. In line 002, Dot is gazing at one of these, and in line 003 she asks *where'd you get that.*, returning her gaze to Isa as she does so. During a brief gap of silence (line 005), both she and Dot move their gaze to the object. Isa then answers Dot's question, but her answer proves sequentially non-implicated – in line 006, she states that the ornament is *mine*, displaying her faulty understanding of Dot's question. This sequence closely follows another, in which Dot has asked whether a statue on the sideboard had belonged to Isa or to her mother, *that yours, or your mum's*. It seems likely from Isa's reply here that she assumes that Dot has asked a similar question about this next object.

Dot does not treat Isa's response as problematic, and makes no attempt to repair Isa's displayed misunderstanding. Both Dot and Isa continue to gaze at the object, and Dot's facial expression and body position do not change. However, perhaps some aspect of Dot's apparent lack of response to Isa's brief reply causes Isa herself to doubt its appropriateness, and following a slightly lengthened *er:* in line 007, Isa adds that *I got it when I was five years old that's a long time ago,*. Dot, in overlap, responds with *o:h* (line 009), a change-of-state token (Heritage 1984) which treats Isa's reply as an answer to her question. She then repeats Isa's answer in overlap with Isa's continuing talk. Dot does not attempt third position repair. Instead, she lets Isa's faulty understanding pass; indeed, she treats Isa's information about when she got the ornament as a completely adequate answer to her query about where she got them from, using an 'oh' change-of-state token and a repetition to index the significance and relevance of Isa's response. Not only does she let Isa's faulty understanding pass, she actively minimises that faulty understanding by displaying her interest in and understanding of Isa's 'unfitted' answer. The 'understanding criterion' (in Clark and Wilkes-Gibb's terms) is likely to be lower in this interaction than in the clinical interaction shown in example #1. Letting Isa's faulty understanding pass here, arguably has less serious consequences for the interaction than repair initiation, which would disrupt the progressivity of the interaction, overtly call Dot's faulty understanding into question, and foreground her hearing loss.

The 'understanding criterion'
is likely to be lower in this
conversation than in the clinical
interaction shown in example #1
above.

Another way of dealing with a displayed misunderstanding is to shape subsequent talk in such a way that it 'bridges the gap' between the displayed misunderstanding and the earlier turn referenced by that understanding, again avoiding an explicit third position repair. In example #3 below, Cath, an audiologist, is seeing Nell, a woman with a profound hearing loss, who wears one hearing aid. Some information about Nell's gaze is included in the transcript, as it shows how the misunderstanding arises.

XXXXX denotes Nell's gaze at Cath
-----   denotes Nell's gaze away from Cath
,,,,,   denotes movement between the two.

#3 Audiologist and client talking about an unfamiliar device

```
001 Cat:  no::w you need- the little sho:e,°yep,°

002          (0.5)

003 Cat:                                      [ .hhh- ]
                                              [
004 Nel:  you're familiar with this device[by the-]

005 Nel:  I can see,

006 Cat:  [yhhehh,]
          [
007 Nel:  [because]when I remember-

008 Nel:  I remember showing it to someone

009 Nel:  the first time'n they-

010 Nel:  I had no idea really what it was about.

011 Cat:  [n:-]
          [
012 Nel:  [.hh]an I had to try and tell them

013 Cat:  [y:::e::s,.hh]
          [
014 Nel:  [and uh-(.) m↑:]↓:m.
    Ng:  --------------------

015 Cat:  we don't uh-(.)we don't fit a LOT
    Ng:  -------------------,,,,,XXXXXXXXX
    Co:          pointing:▼      ▼       ▼

016 Cat:  of them so I'm probably a [bit rusty]
                                    [
017 Nel:                            [↑o:::::oh]
    Ng:      XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

018 Cat:  [©but I will u::m,© ]
019 Nel:  [↑↑really? ↑o::::::h] really.
    Ng:       XXXXXXXXXXX,,,,,-------------

020 Nel: o:oh that's good.
    Ng:      ,,,XXXXXXXXXXXXX

021 Cat:  [ ye:::s. ][°that's righ-°]
          [
022 Nel:  [(ye:::s,)][(cos)this is a]wonderful thing.
    Ng:       ,,,,,,,-----,,,,,XXXXXXXXXXXXXXXXXXXXXXXXX

023 Cat:  it i::s.=we ↑fit a lot to children,[.hh]
                                             [
024 Nel:                                     [°m°]
    Ng:      XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
    No:                          [eyebrows up

025 Cat:  but u::m often not this: type.=
    Ng:      XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
    No:                       [small nod

026 Cat:  uh they have a bigger type¿=
```

Cat = audiologist
Nell = client with profound
     hearing loss

Nell is attending this appoint-
ment to be reinstructed in the
use of a particular piece of hear-
ing equipment. Cat informs her
that she is not very familiar with
this device.

Lines 15-16:
- Cath attempts to correct the
  impression Nell has gained
  of her familiarity with the
  device.
- Nell's gaze only reaches Cath
  after Cath's *don't* (line 15).

Line 20:
Nell's response displays that she
failed to hear Cath's *don't*.

Cath's talk constitutes neither
an overt correction of a possible
faulty understanding by Nell, nor
an overt retrieval of her own ear-
lier misunderstood turn-at-talk.

```
028 Cat:       [ be]ca:use u::m
                   [
029 Nel:    ↑o:::[oh.]

030 Cat:  [it's:s(.)]a problem with such a
                   [
031 Nel:  [↑↑o:::oh,]

032 Cat:  small shoe that- the

033 Cat:  [children sometimes  lose it an-]
                   [
034 Nel:  [that's ri:ght.ye:::es. ye:::es.]

035 Cat:      [(u:um)]
                   [
036 Nel:  .hh [ye:es,]-u:::h should the battery-
```

Nell has attended this appointment to be reinstructed in the use of a par-
ticular piece of hearing equipment, a small FM receiver contained in a 'shoe'
which can be clipped to the end of her hearing aid and used in conjunction
with an FM transmitter and microphone to enhance speech perception. Dur-
ing this sequence, Cath is checking that the receiver and transmitter are still
functioning. In line 004, Nell comments on Cath's familiarity with the device,
and continues with a telling of her own early problems with explaining what
it does. In fact, Nell's device is not fitted all that frequently, and Cath has a
limited (though entirely adequate) familiarity with it. Cath's intake of breath
in line 003, at the first point of syntactic completion in Nell's turn-at-talk of
line 004 (after *you're familiar with this device,*), is possible early evidence of
Cath's intention to 'set the record straight'.

    In lines 015-016, Cath attempts to correct the impression Nell has
gained of her familiarity with the device and warrant that correction, saying
that *we don't fit a lot of them so I'm probably a bit rusty*. However, at the be-
ginning of Cath's utterance, Nell is not gazing at her. Cath cuts off and restarts
her utterance, probably in a bid to solicit Nell's gaze-based recipiency (Good-
win 1980). Despite this, Nell's gaze does not begin to move towards Cath
until Cath's first pointing gesture, another likely bid for recipiency (Good-
win 1981), which coincides with Cath's *don't* (line 015). Nell's gaze does not
reach Cath until after Cath's *don't* is complete.

    Nell's profound hearing loss and her poor speech discrimination (even
with her hearing aid) make it extremely likely at this point that Nell has failed
to perceive the important *don't*, not having seen it, that is, not having moni-
tored Cath's lip movements, and hence has misperceived the first part of
Cath's turn-at-talk as *fit a lot of them* (lines 015-016). Nell's subsequent re-
sponse makes it clear that this is indeed the case. Cath herself may be aware
of the possibility of Nell's misperception, and this may be why she persists in
overlap with Nell's responding talk in lines 017 and 019 until Nell withdraws
her gaze. (Skelt (2006) shows that the partners of participants with hearing
loss rarely persist in overlapping talk in the absence of gaze by the hearing
impaired participant.)

    Nell's overlapping response (line 017) to Cath's talk is a loud, high-
pitched, extended and repeated *oh really?*. At this stage, however, it is not
entirely clear that a misunderstanding has occurred – Nell's rather extreme
reception of this 'news' may result simply from surprise that not many of
these devices are fitted. Her assessment in line 020, *oh that's good*, is more
consistent with a misunderstanding, and Nell's *(cos) this is a wonderful thing*
(line 022) confirms that misunderstanding and makes it fully explicit (for it
could not be good that such a *wonderful thing* is so rarely made available).

Cath's response to Nell's *oh that's good* (line 020) is an agreement (*yes. that's righ-*, line 020). At this stage, Cath appears to let Nell's possible, but not yet explicit, misunderstanding pass. In any case, Nell's talk continues (*(cos) this is a wonderful thing.*, line 022), and Cath cuts off her *that's righ-* to drop out of overlap. Shortly after, Nell's apparent misunderstanding is clear. Cath's *it is.*, (line 023) agrees with Nell's assessment of the device itself as being wonderful. Then Cath continues her turn-at-talk with *we fit a lot to children but u:m often not this type.* (lines 023-025).

Cath's *we fit a lot to children* here appears to endorse and follow in a sequentially-appropriate manner from Nell's displayed (mis)understanding of Cath's earlier talk (*fit a lot of them*), yet her addition of *but often not this type* constitutes a repair of the false claim of familiarity implicit in Nell's understanding of that earlier talk. By downplaying any claim to great familiarity with this particular device, this qualification shows another effort by Cath to set the record straight.

This talk by Cath presents information which may conceivably lead Nell to infer Cath's original point – that she is not entirely familiar with this type of device. Yet Cath's talk constitutes neither an overt correction of a possible faulty understanding by Nell, nor an overt retrieval of her own earlier misunderstood turn-at-talk. It can be viewed as a type of embedded third position repair. Jefferson (1987: 100, fn 4), in her discussion of "exposed and embedded correction in conversation", notes that embedded correction can be a way "of keeping such issues as incompetence and/or impropriety off the conversational surface". She further states that "to initiate embedded correction is to bestow discretion upon a prior speaker's demonstrated incompetence". The same may be said of Cath's embedded third position repair here; it attempts repair without bringing either Nell's misunderstanding or the hearing loss, which caused it, to emerge at the conversational surface.

> Embedded correction is used to avoid attribution of incompetence to the communication partner.

Nell gives acknowledgement responses during Cath's subsequent talk in lines 023-025: an *m* and eyebrow lift at the end of line 023, and a small nod at the end of line 025, both of which claim understanding. Cath's subsequent talk builds on earlier talk by giving the reasons for fitting a different type of device to children. However, Nell's change-of-state information-receipting *oh*'s (Heritage 1984) in lines 029 and 031, and her potentially closure-implicative agreement in lines 034 and 036, (*that's right. yes. yes.*), while claiming understanding, do not demonstrate it.

Cath cuts (or trails) off her overlapped talk in line 033, and Nell moves into a new sequence with a question about the battery used by the device. (For further discussion of sequence closings in these data, see Skelt 2007). Cath's embedded repair appears not to be ultimately successful, but neither has she completely let pass a faulty understanding which is at odds with both her earlier misperceived turn-at-talk and with the truth. To do so would be inconsistent with the higher understanding criterion that might be assumed to apply in this clinical interaction.

> Cath's reaction to the faulty understanding neither lets it pass nor clears it up completely.
>
> This is consistent with the higher understanding criterion.

4. Summary and conclusions

When turns at talk by interactants with hearing loss display a misunderstanding resulting from a mishearing of prior talk, they may be constructed as an understanding check, which explicitly invites correction, as in example #1 above. Such understanding checks may be more likely to occur in clinical interaction than in everyday interaction, first, because of the higher understanding criterion that applies, and second, because of the audiologist's professional identity as 'somebody who knows about my hearing loss in particular and understands hearing loss in general'. Other turns-at-talk in which hearing impaired interactants display clearly non-sequential misunderstandings of earlier turns-at-talk are recurrently either allowed to pass or dealt

> Normal hearing interactants use different actions when the participant with hearing loss displays problematic hearing/understanding.
>
> These reactions orient to the situationally appropriate higher understanding criterion.

with "without the apparatus of repair" (Jefferson 1987), as in examples #2 and #3 above.

To utilise the 'apparatus of repair' in these situations would be to do a dispreferred correction of the hearing impaired interactant's hearing of prior talk, and to draw attention to the hearing loss which caused that misperception and the issues of interactional competence associated with it. Moreover, the repair sequences generated by attempts at correction in these interactions can become lengthy and complex, as seen in examples one and three above. Given the overall dispreferred status of other-initiation and other-repair, the potential for disruptive expansion and complexity, and the sensitivity of third position repair in these hearing impaired interactions, it is not surprising that the partners of interactants with hearing loss may refrain from overt other-initiation of third position repair.

Utilising the regular repair mechanism would draw attention to the hearing loss.

Indeed, the study from which these examples are taken (Skelt 2006) demonstrates that much work may go into the prevention and pre-emption of the need for other-initiation of repair by hearing impaired participants, suggesting that it, too, is potentially sensitive. The gaze and attention of hearing impaired participants in these interactions is often vital to their success, given the importance of supplementary visual speech information (including lip reading) to many people with hearing loss. Some partners can be seen to refrain from initiating or continuing talk in the absence of recipient gaze, or alternatively to utilise recipiency-soliciting dysfluency or gesture in order to synchronise their talk with recipient gaze (as seen in example #3 above). These partners may also monitor for gaze-based signals of incipient response, and modify their turns-at-talk by adding increments or further units in the absence of such signals. For their own part, hearing impaired co-interactants may make these strategies possible by giving clear gaze-based signals of their interactional intentions: withholding gaze at otherwise transition-relevant points to discourage turn exchange, and withdrawing from gaze at partner well before their own turn initiations.

Much interactional work goes into prevention and pre-emption of repair.

Most of these strategies appear not to be markedly different from those occurring in everyday interaction. The use of phrasal breaks and gesture to solicit recipiency in everyday interaction has previously been described (Goodwin 1980; 1981; Heath 1984; 1986), and Kendon (1967) and others (Duncan 1974; Psathas 1990; Ford et al. 1996; Stivers/Rossano 2010) have speculated on the possible significance of gaze for turn exchange and response. Indeed, it is possibly in the very 'normality' of these strategies that their strength for these interactants lies; they achieve the necessary levels of synchronisation between gaze and talk without overtly drawing attention to the problem which necessitates such synchronisation – that is, the hearing loss of one of the participants.

Audiologists have sometimes tended to gloss over the sensitivity of repair and of hearing loss itself. Hetu (1996: 19) suggests that "because audiologists have developed means of resolving listening and communication difficulties, they often concentrate on those effects of hearing loss. In doing so, they tend to ignore the shame that is central to the experience of hearing loss." With some notable exceptions (including Johnson/Pichora-Fuller 1994; Hallberg 1996; Stephens et al. 1999), much audiological research on repair by interactants with hearing loss has treated the 'failure' to undertake 'appropriate' repair as a problem of logic, or as evidence of a lack of assertiveness, rather than as a response to the threat to face or identity, which repair may present by exposing hearing loss.

In order to understand communication problems due to hearing loss, it is crucial to include the dimensions of threats to face and identity.

Audiological rehabilitation programs targeting interactional skills, including those associated with repair, must be based on a foundation of understanding of the face and identity implications of hearing loss. Noble (1983: 335) states that "unless we grasp the social location of hearing

Relevance to rehabilitation

impaired actors as being more continually in a circumstance of managing spoiled identities, we are not going to get very far in trying to assist them". Perhaps few have expressed the sense of spoiled identity felt by some individuals with hearing loss better than Beethoven, in what came to be known as his "Heiligenstadt Testament" (1802):

> Though endowed with a passionate and lively temperament and even fond of the distractions of society I was soon obliged to seclude myself and live in solitude. If at times I decided just to ignore my infirmity, alas! how cruelly was I then driven back by the intensified sad experience of my poor hearing. Yet I could not bring myself to say to people: 'Speak up, shout, for I am deaf.' Alas! how could I possibly refer to the impairing of a sense which in me should be more perfectly developed than in other people… If I appear in company I am overcome by a burning anxiety, a fear that I am running the risk of letting people notice my condition…
> From *The Letters of Beethoven*, translated by Emily Anderson (Grant 1987: 71-72)

In many circumstances, the initiation of repair may be viewed as a matter of choice – clinicians, their hearing impaired clients and frequent communication partners need to be aware of the many factors affecting that choice, including those relating to identity. Audiologists should emphasize to their clients the interpersonal aspects of communication. It is vital for hard-of-hearing people to realize that communicative fluency, even at the expense of equal participation in conversation, may increase their social acceptance and wellbeing (Stephens/Jaworski 1998: 76). The study from which the examples shown in this chapter are drawn (Skelt 2006) reveals the extent of the fluency-enhancing work undertaken by participants in order to achieve what passes as a normal conversation. One aspect of that is letting misunderstandings pass where the consequences of doing so are not serious.

Conversation Analysis can be used both to reveal the strategies utilised to achieve 'successful' hearing impaired interaction and to analyse the interaction of those who are dissatisfied with their conversational performance, with a view to clinical and rehabilitative intervention. In the field of speech and language therapy, Conversation Analysis has already provided the basis of successful programs for people with aphasia and their significant others (Wilkinson et al. 2003; Wilkinson 2004). In the past, rehabilitation audiologists have tended to recommend an 'all-purpose' set of repair strategies to clients and their communication partners. Wilkinson (2004: 501) points out that "any a priori assumption that we have 'the ultimate correct strategy suitable to all individuals' might miss the interactional issues and difficulties in that particular type of interaction for those particular participants".

CA of talk which takes place in problematic contexts can reveal those interactional issues and difficulties and form a strong theoretical basis for useful and successful intervention. Clinic-based conversation training is already a feature of some audiological rehabilitation programs. As a basis for such programs, Conversation Analysis of recordings of the everyday interactions of the program participants may allow more appropriately-focussed, and hence more effective intervention.

Beethoven's description of how his hearing loss implicated his social life:
- seclusion
- solitude
- cruel
- burning anxiety
- fear of letting people notice

To let a misunderstanding pass when the consequences are not serious
- increases a sense of normalcy
- avoids drawing attention to hearing loss
- enhances progression of the conversation

Application:

Conversation Analysis can be applied to clinical and rehabilitative intervention
- to reveal the strategies utilised to achieve 'successful' hearing impaired interaction
- to analyse the interaction of those who are dissatisfied with their conversational performance

Clinic-based conversation training is already a feature of some audiological rehabilitation programs.

Difficulty to receive a spoken message due to hearing loss: Analysis of a private interaction between two sisters at a coffee table

Kati Pajo

The analysis of one interactional moment reveals how trouble due to hearing loss is dealt with in a conversation. Two sisters, one with a severe hearing loss, are having a conversation at a coffee table when the problem in hearing arises. The analysis reveals differences to repair in ordinary conversation in situational, nonverbal, sequential and turn-constructional features. In addition, familiarity and shared knowledge of the participants play a role. A further feature in this repair is a lexical characteristic of the use of Finnish. Implications for applying the findings to clinical rehabilitation are proposed.

A problem to hear what has just been said can cause a break in an ongoing conversation. It can happen to anyone, especially when the talk is soft, fast or when there is background noise. A person with severe hearing impairment encounters breaks in the flow of a conversation even in quiet surroundings and with normal talk. The familiar conversational partner faces these problematic situations as well. To signal and solve such problems ("repair"), both conversation partners need to collaborate. The organization of repair is described in Conversation Analysis in the seminal study by Schegloff, Jefferson and Sacks (1977; see also Egbert/Deppermann ch.5, this volume; and Skelt, ch.7, this volume).

> A person with severe hearing impairment encounters breaks in the flow of a conversation even in quiet surroundings and with normal talk.

When one conversation partner experiences difficulty in receiving a spoken message, he or she usually signals this problem immediately by initiating repair. The contingent next action is that the previous speaker tries to fix the trouble. Following the trouble-source turn, the core sequence consists of the repair initiation and the subsequent repair operation. Since the repair initiation locates the trouble in the talk of the prior 'other' speaker, this type of repair is called "other-initiated repair". It is also crucial to see the difference between the problematic utterance, the "trouble-source turn" ("TS") and the "basis of trouble" (Sidnell 2007: 290-291). This means that the reason why the TS is targetted as problematic by the recipient is to be analyzed as a phenomenon in its own right. A repair initiation does not necessarily implicate hearing difficulties, but potentially also problems in understanding, in memory or in appropriateness (Schegloff et al. 1977; Drew 1997; Svennevig 2008). In analyzing repair in conversation with hearing loss, it is of particular interest to find out whether the exact nature of the trouble lies in hearing or in other kinds of trouble.

> When a recipient initiates repair, the trouble source may be hearing, understanding, recall problems or lack of appropriateness.

In the present article, a repair case is analyzed to show how trouble to hear due to hearing impairment constitutes the source underlying the repair sequence. This can be observed in a variety of features of the activities by both interlocutors prior to and during the repair sequence. The repair activi-

> This case to be analyzed is from a larger data set with nine hours of video-taped conversation.

ties stretch over several turns including a check-question from the familiar partner. The ensuing analysis shows in detail how hearing loss constitutes the basis for this case of repair.

The motive to study this topic has its origin in my MA-thesis (Pajo 1998) where a communication therapy program for hearing impaired persons and their familiar partners was developed. The study included patients' self-assessments and the use of compensation strategies such as repair. The results from the MA-thesis and my experience working as a speech therapist at a hearing center for adults indicated the need to study repair in more detail.

The analysis presented here is part of my dissertation study, which focuses on repair sequences initiated by the hearing impaired participant. With the method and theory of CA, the study approaches the recurrent features of the repair process in their local interactive surroundings. The example presented in the present article is not a typical sequence in the larger data base, in that it brings hearing problems more to the surface than usual (cf. Skelt, ch.7, this volume). However, the uniqueness of this case offers an opportunity to focus also on the lexicon used in Finnish everyday conversation when problems in hearing are at issue. Following the analysis, the application of the findings to clinical work is discussed.

1. The case

The conversation is held between two sisters, Kerttu and Pirkko, who meet weekly. They are both retired and over 60 years old. Kerttu has had hearing difficulties for over 15 years. An additional sudden hearing loss made her severely hearing impaired just a few months before the collection of the data. She uses a hearing aid, but still hears poorly. She can have only one hearing aid because she has had an acusticus neurinoma operation on the other ear. The video recording is filmed at Kerttu's home. Kerttu and Pirkko are sitting at a coffee table in a position where mutual gaze is possible. Pirkko does not have problems in hearing. From Kerttu's part, eye contact is obligatory because she relies strongly on lip-reading. For Pirkko, gaze is a way to consider Kerttu's needs and to monitor Kerttu's ability to follow her talk (about gaze in hearing loss interaction, see Skelt 2010; and Skelt, ch.7, this volume).

Two sisters at the coffee table

2. Context of the repair sequence

Pirkko has been telling a story about her dog. The dog passed away some time ago in the middle of the winter and was put into the freezer to wait for the spring burial because of the frost in the ground. After the burial, the freezer was left empty and without use. Pirkko has explained that she cannot put anything into the freezer because it was a coffin. The topic is dealt with certain lightness and laughter from both participants. The repair sequence to be analyzed in the next section starts at line 005; when Pirkko nonverbally indicates trouble of hearing, repair is initiated at line 006, and mutual under-standing is achieved again after several repair activities.

Kerttu is severely hearing impaired and uses a hearing aid. Her hearing is nevertheless poor.

The transcript is now shown in full with key observations noted in the margin, followed by the in-depth analysis. For readers interested in the lin-guistic structures of Finnish, a morpheme-by-morpheme gloss is provided in a line inserted between the original Finnish and the more idiomatic English translation. Descriptions of nonverbal actions are marked IN CAPS, and the person performing these actions is indicated also IN CAPS in the speaker code column.

The transcripts shows nonverbal actions and provides a morpheme-by-morpheme gloss.

#1 Specifics of trouble in hearing

```
001 Ker: Mut mut se on      tietysti    kyllä
         But but it be-3SG of course  yes
         But yes it is of course

002 Ker: kyl-hän sen   ihan  ymmärrettävä-stä   sy-i-stä,
         yes-CLI  it-GEN quite  understandable-ELA reason-PL-ELA
         the reasons are quite understandable

003 Ker: En (0.8) en     minä-kään oikein tiedä(h)heh
         Not-1SG  not-1SG I-CLI      really  know(h)hah
         Even I don't really know hah

004 Ker: [he he
         ha ha
         [
     PIR:                              *NODS
005 Pir: [Et  laitta-isi-t-ko sinne *ruokaa *sen  jälk#een#.
     KER:                             *SLIGHT HEAD MOVEMENT
                                      TOWARDS PIRKO
         That put-COND-2SG-Q there food-PAR  it-GEN after
         That could you put food in there after it

         *FROWNS AND BENDS HER BODY STRONGLY TOWARDS PIRKKO
006 Ker: >°A°-mitä,<
         O-what
```

Kerttu is telling a story about keeping her dead dog in the freezer because the winter freeze made the soil too hard to bury the dog. After the spring burial she could no longer use the freezer.

Overlapping talk may impede hearing.

Hearing impaired participant signals trouble by
• head movement
• facial expression
• body movement
• verbally
There is no gap before the repair initiation.

Figure 1: Analysis of a private interaction. Screenshot from transcript: Specifics of trouble in hearing. This sketch depicts Kerttu (on the right), the frowning facial expression and her bending towards Pirkko.

```
                                            *NODS
007 Pir: <Laitta-isi-t-ko ↑ruoka-a sen jälkeen kun koira
         on ollut sie°lä°.>
         Put-COND-2SG-Q food-PAR it-GEN afterwhen dog
         be 3SG-PRF there
         Could you put food after the dog has been there

008      (0.7)

         *NODS
009 Ker: Nii.
         Yeah

010      (0.5)

011 Pir: Sa-i-t(s)-ko selvä-n,
         Get-PST-2SG-Q clear-GEN
         You got that
```

Normal hearing partner produces repair operation.

Hearing impaired participant disguises continued hearing problem.

Conversation partner explicitly checks hearing.

```
                              *STRAIGHTENS HER POSTURE
012 Ker:  En  tiedä. [ en     oikein.
          Not-1SG know not-1SG really
          I don't know not really
                         [
013 Pir:                 [E-

    PIR:   *   MOVES HER HANDS AGAINST HER THIGHS
014 Pir:  Nii et <vo-isi-t-ko laittaa pakastime-en ruoka-a>,
    KER:                      * BENDS HER BODY SLIGHTLY TOWARDS
                                PIRKKO

          So  that can-COND-2SG-Q  put  freezer-ILL   food-PAR
          So could you put food into the freezer

015 Ker:  Nii jos on [ollu
          Yeah if be-3SG-PRF
          Yeah if (there) has been
                     [
016 Pir:             [oot   oot otta-nu  koira-n sielt pois;
                     be-2SG take-2SG-PRF  dog-GEN  there out
                     you have you have taken a dog out of there

017 Pir:  [koira-n ruumii-n he he
          dog-GEN corpse-GEN ha ha
          a dog's corpse ha ha
          [
018 Ker:  [No  sitä   juuri miet-i-n
          et (.) et (.)e# voi-n-ko laittaa=
          Well it-PAR just  think-PST-1SG
          that  that   can-1SG-Q  put
          Well I was just thinking about that that can I put

019 Pir:  =mm mm=

020 Ker:  =vähän pel- epäile-n  et   en.
          little afr- doubt-1SG that not-1SG
          I'm a little afr- I doubt that I would.
```

<div style="float: right">Hearing impaired participant admits trouble.</div>

<div style="float: right">Partner produces renewed repair operation.</div>

<div style="float: right">Hearing impaired participant clearly signals trouble resolution.</div>

<div style="float: right">Mutual understanding is re-established and conversation continues.</div>

3. The auditory risk of overlapping speech as a local context for trouble

In the beginning of the example (lines 001-002), Kerttu comments that she understands the situation Pirkko has been talking about. Kerttu's turn at line 003 ends with laughter. Pirkko's turn beginning (line 004) overlaps that laughter. Pirkko is anticipating Kerttu's meaning, and she is orienting to the same topic. Her turn is a relevant next action but nevertheless Kerttu is having problems given the overlap, an environment which can lead to problems in speech reception (Drew 1997; Haakana 2011). Kerttu's own laughter can be seen as sounds which disturb her being able to hear what is said in overlap. Any auditory signal that competes with speech is definitely a risk for progressivity in conversations with a person who has a severe hearing impairment. Overlapping talk, especially without gaze, often causes even experienced partners to withdraw from their turn (Skelt 2010). In Kerttu's case, the auditory difficulty caused by an overlap is enough to create a problem. However, another underlying reason needs to be analyzed: Kerttu's lack of orientation to her partner can be seen as part of the reason why intersubjectivity breaks down. Her continued laughter means that she is still concerned with her own turn (line 003). It is highly important where Kerttu's focus is, because due to her hearing loss, she needs to concentrate if she is to receive the spoken message.

<div style="float: right">Overlapping talk can increase hearing trouble.</div>

<div style="float: right">Kerttu lacks orientation to her partner.</div>

4. The specifics of the repair initiation display a hearing problem

In CA, the repair initiation produced by the recipient of the TS is called "other-initiation" ("OI") (Schegloff et al. 1977). Signaling trouble and the subsequent turn to fix it, form a two part insertion sequence to the ongoing conversation. Kerttu, the participant with hearing loss in the given example, is a very efficient conversational partner in that she gives a lot of feedback. Part of that is Kerttu's habit to signal problems nonverbally already during the trouble source turn ("TS"). This can be seen in line 005. At the end of Pirkko's turn, Kerttu's orientation changes from laughter and smile to a more serious face combined with a very small head movement towards Pirkko. This nonverbal action can be interpreted as a sign of trouble, which is soon verbalized by the OI-action *mitä* ('what', line 006). OI-actions differ, e.g., in their linguistic content and they target the troublesome part in the previous turn more or less specifically. In this example the targeting is "open" (Drew 1997), only signaling the need to repair without specifying the trouble source or the kind of trouble (a more specific repair initiation would be, for example, 'put what?'). To use an open-class repair initiator is a very typical "repair-strategy" to hearing impaired people in general (see also as a sociolinguistic approach Tye-Murray et al. 1995).

In repair initiation, prosody and nonverbal actions can play a significant part in specifying the trouble. Kerttu's turn in line 006 is produced with a fast speech rate and a slight final rising intonation. The accompanying nonverbal behavior signals trouble in hearing. The head movement that began during the trouble-source turn grows into a frown, accompanied by a strong bend of the whole upper body towards the speaker. These features in connection with repair initiation are typical for Kerttu throughout the collected data; and for that reason, they support the assumption of hearing problems. Neither the nonverbal part of the OI-content nor the prosodic rise at the end of the turn support the interpretation of the repair initiation as expressing other cognitive states - such as surprise - because this lexical format in combination with other intonation contours is usually associated with surprise (Selting 1996; see also Haakana 2011).

> Prosody, head movement and facial expression are also components of the repair initiation and signal trouble in hearing.

The utterance *mitä* ('what') shifts the turn back to Pirkko, the speaker of the TS. Pirkko forms her repair operation by taking into account the content of Kerttu's OI (cf. closer analysis in the next section). Kerttu stays immobile while receiving the repair operation from Pirkko. It can be seen from the transcript that at line 012, Kerttu's posture changes. Before that, Kerttu had slightly nodded her head, but stayed in a bended position. The bended position recurs during the new repair turn from Pirkko (line 014).

This example serves to show that all relevant characteristics of the repair initiation, including the overall context, need to be taken into account in order to reveal its action. Beyond signaling trouble in hearing or understanding, an open OI may also indicate pre-disagreement (Schegloff 2007: 151). Between native speakers and learners of Finnish, Lilja (2010: 235) shows how repair initiation can be used for teasing and joking. Similar to the example given above, Seo and Koshik (2010) report on native/non-native speaker interaction that when an OI is delivered with a frown and head tilt or posture change, it is treated as signaling a problem in understanding. Given these comparative considerations, all features in their combination need to be analyzed in order to make sure that a hearing problem is at issue.

In previous CA research, it has been noticed that a repair initiation is regularly delayed, i.e., a small gap emerges after the trouble source turn (Schegloff et al. 1977). This is not the case in our example. Kerttu's OI occurs immediately after the previous turn. Svennevig (2008) reports that a lack of such a gap is associated with a problem in hearing. The longer a gap the more the possibility increases that there is some other problem than hearing,

e.g., of understanding. However, the absence or length of a gap prior to the OI can only be an indication that the trouble lies in hearing, and needs to be considered along with other factors. It can be assumed that a hearing impaired person knows that the speaker cannot surmise what the hearing impaired recipient has heard, or when the message was misperceived. It is up to the hearing impaired participant to alert the speaker of the trouble because the trouble arises from his or her disability and not necessarily from the interaction. In this way, the person with hearing impairment takes an assertive role in the conversation (with a familiar person) to break the conversation precisely after the troublesome segment. This on-the-spot OI timing resource can be crucial for the maintenance of intersubjectivity, because otherwise the amount of misunderstandings could become more frequent (see also Lind et al. 2006).

5. Repair operations are specifically designed for a hearing impaired partner

Pirkko uses several repair operations (lines 007, 014 and 016-017) before mutual understanding is re-established. They consist of repetitions of the trouble-source turn and increments. Pirkko does not produce a word-by-word repetition, which is typically thought to be a response to a person who has not heard properly (e.g. Svennevig 2008). In the first repair operation, Pirkko makes the reference of *sen jälkeen* ('after that', line 007) explicit by adding a temporal subclause, *kun koira on ollu siellä* ('when the dog has been there', line 007), to the repetition. The repair is partly repetitive and does not include an account as in repair turns produced to problems of understanding (Lilja 2010; Seo/Koshik 2010). A further indication that she is orienting to a hearing problem is the distinct prosody: Pirkko uses slower speech rate and accentuates the first syllables of her words (in Finnish word stress is always on the first syllable, but here it is part of the prosodic rhythm): *ruokaa* ('food') and *koira* ('dog'). She also nods her head when saying the word *koira* ('dog') (she nods also in line 005 when introducing a new word). In this way, Pirkko highlights certain words of her turn.

> Several repair operations are needed.

> The first repair operation orients to the trouble as hearing in its formulation, prosody and non-verbal actions.

In the second repair, Pirkko does not rely as much on contextual inferencing. The increments: *pakastimeen* ('into the freezer', line 014) and *koiran ruumiin* ('dogs corpse', line 017) bring the broader context explicitly to bear on her utterance. Prosodically, Pirkko's second repair turn is even slower than the first, and she uses heavily accented syllables.

> The second repair operation is even more explicit and the prosody even more distinct.

All in all, the repair is not about repeating, it is about making the message as clear as possible both lexically, syntactically, semantically, auditorily and visually (lip-reading). This shows that the content of the repair turn needs to be analyzed in its versatility. Pirkko is patient but also determined in her repair. This becomes apparent in the way she moves her hands against her thighs (as if concentrating or putting stronger effort into the utterance) and the way she continues her turn even though Kerttu starts to show (line 015) that she could come in (and eventually she does so in line 018).

> Repair is designed as to achieve maximum clarification.

6. Disguising the hearing problem, revealing it and jointly creating mutual understanding

In lines 011 and 012, the only adjacency pair in the extract occurs. Pirkko asks Kerttu: *saitko selvän* ('you got that'), and Kerttu says: *en tiedä en oikein* ('I don't know not really'). What happens here is that Pirkko brings up the topic of hearing problems. This is the most explicit metalinguistic check of hearing problems which Pirkko produces during the whole one hour conversation. Pirkko aligns with Kerttu's active role in bringing up the problem. As the analysis in the next paragraph shows, she has a reason to doubt Kerttu's

> Conversation partner explicitly checks hearing.

ability to get her turns and she is right in her doubt. Kerttu admits that she did not hear. This sequence exemplifies well how the participants cooperate. When the one is having a 'bad moment', the other one does not let that be the end of it. 'The bad moment' in Kerttu's interactional work occurs in line 009 when she gives a minimal response *nii* ('yeah') to Pirkko's first repair turn, although she still has not managed to get what Pirkko had been saying. The verbal turn is accompanied by a nod.

Hearing impaired participant acknowledges hearing problem despite her prior signal of understanding.

What makes Pirkko suspicious? Of course one reason is the fact that Pirkko, as a sister to Kerttu, is an experienced ,partner, but the sequential context adds other reasons. First of all, the *nii* turn is produced after a gap. As noted earlier (already by Schegloff et al. 1977; but see also Svennevig 2008), a delayed turn-beginning can indicate trouble. This is particularly true in my data where confirming responses to a repair turn can be overlapping (also, the gaze shifts away from the speaker as a signal of 'getting it'; see Skelt 2006). The hearing impaired participant seems to show his or her ability to continue as soon as possible and not delayed. Secondly, the *nii*-turn is only a weak token of understanding. It ends with falling intonation, thus signaling no intention to continue. Taking the larger context into consideration a *nii* with a 'pale' prosody is odd and not enough. The fitting emphasis to Kerttu's utterance comes after the second repair turn (line 015), when Kerttu adds to her *nii* the part *jos on ollu* ('if (there) has been'). Only now Kerttu is really showing that she has heard.

The hearing impaired recipient's claim was very weak. This may be the reason why her interlocutor surmised the cover-up.

The question then is: Why is Kerttu nodding and saying *nii* ('yeah') in the first place, if she did not hear? *Nii* has been shown to be used as a claim of just 'getting it' (Sorjonen 2001). A claim is a representation of alignment. Kerttu is never indifferent, she usually reacts, but now she does it in a subdued fashion. It may be that Kerttu's action, the subdued *nii*, is produced to prefer sequential progressivity over solving hearing problems. It is a delicate matter to hold the conversation and delay its progress. More than that, Kerttu does not use a metalinguistic account of her hearing problems. Actions to signal problems in my larger data base are usually nonintrusive, such as quick repair initiations or nonverbal devices. The delicateness of the matter also shows up at the very end of the extract. Kerttu's turn on line 020 could be the sequel to the turn on line 003. Kerttu shifts the problem to the pondering (or thinking, as transcribed in line 018), and kind of signals that she had been doing that before Pirkko had come in with her anticipating turn (line 004). As Skelt (2007) shows, a repair initiation is only one way to deal with problems. Another way for both participants could be to let go of the situation and to start a new topic.

The reason for the cover-up may lie in progressing the flow of conversation and to divert from hearing problems as a delicate matter.

7. A language-specific resource to handle hearing trouble in Finnish

What kind of lexicon is used in the example to make the hearing problems a public event? Kerttu uses *mitä* ('what') and Pirkko asks *saitko selvän*, which roughly translates as *'got clear'.* All these words are typically used in Finnish when a person has not shown that he or she has adequately heard a speaker's turn-at-talk. The word 'what' is of course a common word for a number of languages to signal that there is a problem. When we focus on *saitko selvän*, ('(did you) get clear (of that)'), we might open up an interesting discussion about differences between languages. It is often found (see, e.g., Skelt 2006; 2007) that the verb 'to understand' is used in English, at least in written language, when the topic is auditory ability. However, it is not unproblematic to use the word 'understand'. As Drew (1997) indicates, understanding often goes beyond a word or previous turn. Contrary to that, problems in hearing or lip-reading tend to be more local, and to question a person with hearing impairment about cognition (understanding) when the

To initiate repair with 'Do you get it clearly?' orients to hearing loss and lip-reading while at the same time it makes no inference to cognitive states.

problem is due to a dysfunction of the cochlea or other parts of the hearing track may be problematic. In a speech therapy session between me and a client, a conversation with a hearing impaired person has shown that it is important not to question understanding if the conversation breaks down or to inquire, 'Do you understand what your neighbour says*?'*. In Finnish, it is perhaps better to ask *saatko selvää* that could be translated to: 'Do you get it clearly?'. This formulation does not point to understanding but rather stays at the level of perception, both auditory and visual (lip-reading). *To get the spoken message* means for a hearing impaired recipient to put these two senses together (and add other support, e.g. linguistic reasoning). One other hypothetical check-up question could be: 'Did you hear?' in Finnish *Kuulit sä?* This question obviously leaves lip-reading out and focusses merely on hearing. During the one hour video, Pirkko never asks: *Kuulit sä?* ('Did you hear?') even though repair sequences are frequent. As mentioned before, repair due to a hearing problem is not emphasized, even if it is the source of the trouble.

8. Implications for rehabilitation

An obvious effect of hearing loss in conversation (with familiar partners) is that the frequency of repair increases and the conversational style may need to be somewhat altered (see special issue in Seminars in Hearing 31, 2, 2010). The possibility of prolonged repair sequences and the underlying possibility that trouble resolution may be problematic is a face-threat to the hearing impaired participant, but also to the partner who experiences failure if not succeeding in repair. Especially in challenging situations (background noise, soft talking, groups), the hearing impaired participant may need to strain his or her whole concentration and as a result feel fatigued. The familiar partner may need to 'translate' the conversation either ongoingly or by a summary later on. The interactional work, as it happens, and the overall maintenance of connection to social life are a joint effort.

> Research on repair can result in recommendations of how conversation partners can treat trouble due to hearing loss best.

In audiological rehabilitation, the open "request for clarification" (Caissie et al. 1998) is considered as the "poorer choice" (but see, however, Lind et al. 2006), whereas versatile use and more frequent use of specific "repair strategies" (Tye-Murray et al. 1995) is recommended. This recommendation builds on effectiveness without involving the sequential position of the repair initiation or the action type in the trouble-source turn. It does not consider, for example, that certain sequential surroundings may be prone to specific forms of repair initiation and others may not. Also, the gradual targeting in a prolonged repair sequence ("multiples", Schegloff 2000: 212) is not discussed sufficiently. If we now once more take a look at the example and line 012, we can see a fundamental feature (and a sequence revealing distinct hearing problems) of the affect of hearing loss on conversation.

#2 Display of trouble due to hearing loss

```
011 Pir:  Sa-i-t(s)-ko selvä-n,
          Get-pst-2sg-q clear-gen
          You got that

012 Ker:  En  tiedä.  en    oikein.
          Not-1sg know not-1sg really
          I don't know not really
```

Kerttu's utterance *en tiedä en oikein* ('I don't know not really', line 012) is the core of the problem: Hearing loss creates uncertainty. Often, no clear cut alternative between to hear or not to hear is available. It is often expressed by clients in a clinical speech therapy setting that they hear something of the

> A particular problem for the interlocutor with hearing loss is the high degree of uncertainty.

troublesome part, but feel the need to guess in order to construct the full meaning. To build a conversation on guessing is an ordeal. In an uncertain situation, the selection can also be 'bluffing' (as Kerttu with *nii* in line 009) or very often an open repair initiation, just for the sake of progressivity.

There is a lack of knowledge among audiological clinicians about repair organization (see preface by Lind 2010). As a speech therapist working in the field of audiology, it is obvious for me that there is a need to know and understand repair in everyday conversation. With CA research on natural conversation, the connection from daily life to clinical application (counseling) is possible to achieve. The findings can tell, e.g., which features (linguistic, prosodic, nonverbal, contextual), in which sequential surroundings, are used to index the problem in the conversation and which to solve the problem. By informing, for example, that shared knowledge is an important factor in how a nonverbal act of frowning and head bending is interpreted, the hearing impaired person might not hide the problem but be more motivated to tell conversational partners about it. This way, the partners can focus on overall clarity and not on accounting, as it might happen if the nonverbal act was interpreted as exhibiting understanding, mental problems. The information involving repairing and maintaining intersubjectivity can develop conversational rehabilitation into more acceptable directions by the hearing impaired person and their familiar partners.

There is a lack of knowledge among audiological clinicians about the contextual, social and linguistic organization of repair.

The information involving repairing and maintaining intersubjectivity can develop conversational rehabilitation into a more acceptable direction by the hearing impaired person and their familiar partners.

Hearing impaired adolescents in a regular classroom: On the embodied accomplishment of participation and understanding

Simone Groeber and Simona Pekarek Doehler

In schools for adolescents with co-enrollment, students with hearing impairment are instructed together with normal hearing students. To help the students with hearing disability, a teaching assistant is employed. This chapter explores the interactional organization of such a classroom during a phase where one of the hearing impaired students solicits the assistant's help. The analysis reveals how the student handles two conflicting constraints. On the one hand, he needs to mobilize the assistant's attention to solve his understanding problem, on the other hand this action needs to be launched in such a way that the ongoing plenary teaching activity can continue simultaneously. Given the difficulties in achieving intersubjectivity under these conditions, the authors recommend that teaching assistants employed to help with integration of hearing impaired students should have sign language competence.

1. Introduction

Co-enrollment of hearing impaired students in a regular classroom is a widely adopted educational measure designed to favor the (language) socialization of these students within the hearing majority of the local community. This co-enrollment and the organization of classroom interaction that it involves put specific constraints on the hearing impaired students' possibilities and means for participating, and ultimately for learning. In this chapter, we explore the interactional organization of such a classroom where a teaching assistant is employed to support the students with hearing impairment.

Researchers interested in the socially situated nature of learning emphasize that it is through active participation in social interactions that participants (including language learners) can become increasingly competent members of a given community (Lave/Wenger 1991; Firth/Wagner 2007). Interactants put to work a set of resources (lexicon, grammar, gesture, gaze, material artifacts, etc.) for organizing social interaction so as to achieve mutual understanding and the coordination of joint actions. But how are these resources deployed in an educational setting where the establishment of mutual understanding is a particularly delicate issue that can impinge on participants' opportunities for both participating and learning?

In order to exemplify a recurrent problem and to address a possible solution, we present an analysis of a problematic situation in a classroom in German-speaking Switzerland in which three hearing impaired adolescents are co-enrolled. One key feature of the interactional organization is that it involves not only students and a teacher, but also a teaching assistant whose purpose it is to mediate interaction and understanding between the hearing teacher and students on the one hand and the hearing impaired students on the other hand. The regular arrangement is that the assistant uses time with the hearing impaired students during pauses of the regular classroom activities; however, when a student cannot follow due to hearing/understanding problems, immediate action may be necessary to resolve the trouble so that the student can re-engage in the classroom agenda.

Joint school participation of students with and without hearing loss fosters socialization.

Language competency and integration are largely achieved in social interaction.

Research question:
- How do participants deal with trouble in intersubjectivity?

Exemplary analysis of a recurrent problematic situation
- yields insights into what is problematic
- provides a basis for solving the problem

Teaching assistant helps students with hearing impairment during pauses and in acute problem situations.

For the hearing impaired students, participation in classroom activities involves, for instance, the need to monitor simultaneously the teacher's and the teaching assistant's doings, to catch the assistant's attention while he or she is orienting toward the teacher or another student, and to negotiate understanding with the assistant in a way that does not disrupt the public space of teacher-whole-class interaction. Focusing on the participation of one hearing impaired student (Jacob), we show how the student deals with these issues by means of a range of verbal and non-verbal resources that are finely synchronized with other participants' conduct.

We are also interested in how the overtly displayed problem in understanding on the part of the hearing impaired student occasions the talking into being of the category 'hearing impaired', and thereby becomes part of how participants in the interaction install 'hearing/not-hearing person' as a relevant membership categorization device (Sacks 1972a/b; Schegloff 2007) for this particular setting. Understanding is in some sense an ever-latent problematic issue in interactions involving hearing impaired participants (Lind et al. 2004; Skelt 2006). In principle, problems in understanding may be oriented to either as problems in grasping some conceptual content, or as auditory problems. In the analysis we show what kind of action may make such categorizations relevant by the assistant. In doing so, we discuss how difficult it may be, for participants and also for the researcher, to localize the very nature of the problem in understanding (Fiehler 2002).

2. Interactional challenges for hearing impaired participants

Research on interactions involving deaf or hearing impaired participants has shown that hearing impaired persons, but also their hearing communication partners, 'let pass' a lot of non-understanding by avoiding the initiation of repair (Skelt 2006; see also Pajo, ch.8, this volume). The avoidance of repair initiation is not unique to interactions involving hearing impaired participants. It has also been reported for ordinary conversation, and has been explained in terms of participants' orientation to maintaining the progressivity of talk (Schegloff 1979; Heritage 2007). However, while contributing to maximize the progressivity of talk, 'let it pass' may leave problems of mutual understanding unresolved, and may hence interfere with the need to maintain intersubjectivity (cf. Deppermann 2010: 367).

Several studies have shown that signaling and overcoming problems in understanding represents a particular challenge for hearing impaired persons (e.g., Caissie/Wilson 1995; Jeanes et al. 2000; Ibertsson et al. 2008). These persons may struggle with clearly indicating what exactly they do not understand in a given stretch of talk, and therefore have difficulties to efficiently ask for help (e.g., Audeoud/Lienhard 2006, based on semi-structured interviews). Also, repair sequences in interactions involving hearing impaired participants tend to be long (e.g., Pajo, ch.8, this volume) and often remain unresolved (Lind et al. 2004).

These and other issues have been documented in several studies on repair in interactions involving hearing impaired participants. While most of the existing work focuses on repair-initiation on the part of the hearing impaired, Lind et al. (2004) and Skelt (2006), both working within the framework of Conversation Analysis, provide a more encompassing picture by exploring repair of talk-in-interaction by both parties, hearing and hearing impaired. Lind et al. (2004) call attention to the fact that problems encountered by a hearing impaired participant are not necessarily auditory (mishearings): They can also be due to pragmatic or linguistic problems, just as can be the case for hearing persons. This may be of particular importance when studying prelingually deaf children/adolescents, as they are also late

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To follow the classroom activities, students with hearing impairment handle a complex participation framework with the main plenary teaching activity and the subordinate solicitation of the teaching assistant's help.

In a problematic situation, the categorization as 'hearing/not-hearing' becomes relevant. A differentiation is necessary between
- auditory hearing
- understanding the talk
- grasping the conceptual content of the teaching

'Letting pass' to avoid dealing with trouble in hearing/understanding is even more problematic in classrooms than in ordinary conversation.

Not every instance of trouble in hearing/understanding is necessarily due to hearing loss.

first language learners[1], and therefore may struggle more intensely with linguistic and pragmatic difficulties than their hearing workmates. Skelt (2006) further mentions that the quantity of repair cannot be univocally related to the hearing impairment in itself, but depends on several other factors such as familiarity among the communicative partners and their interactional goals.

The abovementioned points boil down to the fact that problems of understanding often cannot be defined clearly (neither by participants nor by the researcher) and have to be negotiated in the course of interaction. A problem of understanding may be a matter of hearing (i.e. auditory), a matter of grasping the meaning (i.e. 'meaning making') or it may be due to partial hearing.

3. Data and methodology

The data presented in this chapter stem from a corpus of 33 hours of classroom interactions, video-recorded in German-speaking Switzerland, that involve a small number of hearing impaired students along with a majority of hearing students. We focus on a co-enrollment German class in the first year of secondary school involving three hearing impaired students. The students are on average 12 years old. In addition to the hearing students, the following people participate in the classroom:

The problematic situation is an example of a recurrent problem observed in 33 hours of classroom interaction.

- Mr. Roth is the main teacher of the regular classroom. He is normal hearing and has no training in sign language. He is a native speaker of Swiss German and teaches in Standard German (which is the regular language of classroom interaction in German-speaking Switzerland).

Teacher: Mr. Roth
- no competency in sign language

- Silvia Micheli is an assistant teacher. Her institutional task is to help the hearing impaired students to follow the regular classroom lessons. She is of German origin, is normal hearing and has a rudimentary knowledge of Swiss German Sign Language (*Deutschschweizerische Gebärdensprache,* "DSGS").

Assistant teacher: Silvia Micheli
- rudimentary knowledge of sign language

- Jacob, Nora and Nikolas are hearing impaired students co-enrolled in this regular class. They are bilingual in the sense of using spoken (Swiss) German as well as Swiss German Sign Language on a regular basis. Our analysis focuses on Jacob, a 13 year-old Swiss German boy. Jacob was diagnosed as prelingually deaf at age 2. He first used hearing aids, until he received cochlear implant at age 10.[2]

Jacob, focal student with hearing loss:
- competent user of sign language; uses cochlear implant

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[1] Persons born deaf or having had hearing loss before the natural acquisition of a spoken language are called prelingually deaf. Many prelingually deaf children are diagnosed late (after age 2), which implies that their first language acquisition is delayed. In addition, as 90% of deaf children have hearing parents, sign language is only rarely accessible as an early first language. Consequently, most deaf children are late first language learners.

[2] A cochlear implant is an electronic device that is designed to restore hearing in severely and profoundly deaf persons. In contrast to conventional hearing aids, part of the device (receiver) is surgically implanted into the bone (cf. Mourtou/Meis, ch.2, this volume).

The classroom was video-taped from two angles simultanously. The following picture shows the classroom from two perspectives.

Figure 2: Hearing impaired adolescents in a co-enrolled classroom. (Corpus SG, JNV_IN_100603)

- Camera 1 (picture on left) shows students with hearing impairment and assistant teacher sitting in front of the students's desks
- Camera 2 (picture on right) is directed at the main teacher

The analysis explores a stretch of interaction of 1:28 minute length. It illustrates characteristic features of this setting as they occur in the rest of our data during teacher-fronted classroom interaction. We have divided the focal segment of interaction into three excerpts that we discuss in chronological order, i.e., as they unfold in real time during the course of the interaction.

4. The local enactment of the co-enrollment classroom order: On the embodied accomplishment of participation and understanding

We now explore how participants' dealing with a comprehension problem on the part of a hearing impaired student is deployed contingently, on a moment-to-moment basis, in a way that responds to, and at the same time accomplishes, the specific constraints of the co-enrollment classroom. In the segment of interaction, a problem of understanding arises for Jacob as the teacher is providing instructions to the classroom as a whole. We first outline the specific participation frameworks at stake (4.1), and then show that the interactional management of the problem of understanding between the teaching assistant and the hearing impaired student rests on a close synchronization of verbal and non-verbal resources among the participants (4.2). The actions employed towards re-establishing mutual understanding involve negotiating what kind of understanding ('hearing', 'grasping') is at stake for the student. We document how this negotiation occasions the talking-into-being of the membership category 'non-hearing', and we discuss the consequences of such interactions to the possible ongoing participation of the students (4.3).

The problem occurs when the teacher provides work instructions.

Analysis:
- specifics of the participation framework
- student's and teaching assistant's use of verbal and non-verbal resources to manage an understanding problem
- talking-into-being of the category 'non-hearing' as relevant

4.1. A dual participation framework with conflicting constraints

The presence of an assistant teacher in the co-enrollment classroom implies that in addition to interacting with the main teacher or with the other students, the hearing-impaired students are recurrently involved in interactions with the assistant teacher. When during the plenary classroom activities a hearing-impaired student and the assistant split off and establish a second simultaneous interactional strand and thus transition into two parallel interactional strands or "schisming" (Egbert 1993; 1997), this results in complex participation frameworks where shifts from one strand to another are negotiated and accomplished.

The main participation framework is the plenary where the teacher addresses the class as a whole. Examples of such activities are explaining a task or conducting an exercise. Subsequent to plenary activities, the teach-

Dual participation framework ("schisming")

Main strand (plenary):
- Teacher addresses class as a whole

ing assistant spends time with the hearing impaired students to re-explain, if necessary, the information given in the plenary.

However, a recurrent organizational feature of the co-enrollment classroom are occurrences where not subsequently, but rather parallel to the plenary activities, the more 'private' space between one or more of the hearing impaired students or with the assistant is opened. This occurs when students initiate an interaction with the assistant to comment on something, to ask questions or more generally to call for help, thereby relating to what is going on in plenary or not. This is facilitated by the assistant sitting near (in front of or beside) the hearing impaired students (cf. figure 2 above). The case to be analyzed consists of such a parallel involvement, induced by one of the hearing impaired students in order to solicit help from the assistant.

Shifting between these two participation frameworks rests on a close parallel monitoring of both frameworks on the part of the hearing impaired students as well as of the assistant teacher; this is done by means of minute mutual synchronization of talk, gaze and body movements. In this way, participants seem to check for 'engagement displays' (Goodwin 1981) as a basis for organizing their conduct in relation to one another.

Interestingly, a newly configured participation framework does not suppress the preceding one; rather, each of the aforementioned frameworks remains available for re-actualization at any moment in time. For example, after a shift from student-assistant interaction to student-main-teacher interaction, the hearing impaired students and the assistant continue to finely monitor each other's actions so as to re-establish their interaction if needed. While doing so, they make use of their peripheral vision: As evidenced most clearly through the orientation of their gaze and synchronization of body movements, the hearing impaired students simultaneously monitor the assistant's and the main teacher's conduct, and likewise, the assistant simultaneously monitors the conduct of the main teacher and of 'her' students. This simultaneous orientation to two (incipient) participation frameworks is a pervasive feature of the co-enrollment classroom order. Navigating between these frameworks puts specific interactional demands on the hearing impaired students, as opposed to their hearing peers, but is at the same time instrumental for their successful participation in the co-enrollment classroom.

4.2 The hearing impaired student's contingent use of resources for displaying 'I do not understand'

When trouble in hearing or understanding emerges, it is a delicate matter for a hearing impaired student to target the assistant to solicit help because this may disrupt the plenary activity. The analysis we are about to present shows how Jacob handles the conflicting constraints of summoning the assistant's attention to deal with trouble in intersubjectivity on the one hand, and attending to the sequential contiguity of the plenary on the other hand.

4.2.1 The hearing impaired student's first attempt to summon the assistant's attention (failure)

The segment to be analyzed begins with the main teacher, Mr. Roth, addressing the class as a whole. He is assigning a spelling exercise where the students are asked to underline 20 words which they are not certain how to spell (lines 001-009 below). The teacher's instruction is the source of Jacob's problem in understanding. In order to signal this to the assistant, Jacob faces the task of first attracting the assistant's attention, then signaling his lack of understanding, and then making recognizable what exactly the problem of

Subordinate strand in parallel to main strand:
- hearing impaired student and teaching assistant interact when problems emerge

When both strands are active, the participants monitor both.

Navigating between both strands requires specific interactional work.

When trouble in understanding occurs:
- student with hearing loss needs to handle two conflicting constraints: the progressivity of the main strand and establishing the subordinate strand with the teaching assistant.

Jacob's trouble source lies in the teacher's instruction.

understanding consists of. Although he does not succeed in mobilizing the assistant's attention, he nonetheless initiates repair.

#1 Teacher explains assignment

```
001 Rot:  es heisst bei der aufgabe man muss zwanzig
          in the assignment it is said one needs to

002       wörter unterstreichen bei (die:) (.)
          underline twenty words (which)

003       bei denen man schwierigkeiten haben könnte.
          with which one could have difficulties.

004       .hh müsst ihr euch folgendes vorstellen.
             you have to imagine the following

005       .hh euer nachbar oder eure nachbarin
             your neighbor (masc.) or neighbor (fem.)

006       diktiert euch diesen text (2.8) und
          dictates this text to you        and

007       bei welchem wort seid ihr hundertprozentig
          with which word are you a hundred percent

008       sicher dass ihr keinen schreibfehler
          sure that you (pl.) don't make a spelling

009       macht
          error
```

After line 009, the teacher (marked with a circle in the screen shot below) halts his talk while displaying nonverbal orientation through eye gaze direction to the deaf students and to the assistant Micheli. Micheli (rectangle) raises her eye brows, and Jacob (triangle) gazes at Roth.

```
010 Rot:  ((gazes to Micheli/Jacob))

011 Mic:  ((raises eyebrows))
```

Figure 3: Screenshot of constellation during trouble-source turn

By means of his gaze (figure 3) and halting his speech, Roth possibly tags to Micheli and the hearing impaired students that his talk has provided key information. Also note the teacher's multiple accentuations (see the underlined syllables lines 002, 004, 007, 008). Micheli's eyebrow raise (figure 3) displays her hightened attention.

The teacher then turns his gaze back to the class and continues explaining the assignment. Shortly after his turn beginning (line 012 below), Jacob attempts to solicit Micheli's attention by turning his gaze to her. She is not reciprocating his gaze. With his eyes opened widely, Jacob then leans towards Micheli and rapidly signs *WAS* ('what', line 015 below).

```
            *gazes at the class
012 Rot: *dieses wort
          this word

013 Jac:  ((Gazes at Micheli who gazes at teacher))

014 Rot:  [sch- übermalt ihr oder schreibt ihr nicht auf.
          [you do not underline or you do not write down
          [
          [*bends to Micheli, then back and shifts gazs to
            teacher
015 Jac:  [*WAS ((signing))
          [What?
```

While teacher continues,

- Jacob solicits the attention of the teaching assistant,

- Micheli does not react, then

- Jacob initiates repair.

Jacob's signing of the repair initiation "WAS" ('what?') is shown below.
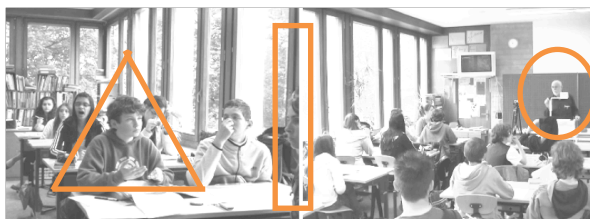
Figure 4: Jacob's gaze at assistant and signed repair initiation

To display his trouble, Jacob uses resources resembling open-class repair initiators (Drew 1997). Open-class initiators like 'what?' or 'huh?' do not specify the kind of trouble or the exact source of trouble in the preceding talk (Schegloff et al. 1977, replicated for German by Egbert 2008, for German *was*, cf. Selting 1987a/b/c; 1988; 1992; Egbert et al. 2009), yet it has been shown for English open-class repair initiators that they signal sequential problems possibly stretching further back than the immediately prior turn-constructional unit (Drew 1997). Studies on communication with hearing loss have also noted that the participant with hearing impairment has a tendency to use "non-specific requests for clarification" (e.g., Caissie/Wilson 1995; Jeanes et al. 2000). The sequential placement of Jacob's display after what is presented by the teacher, and oriented to by Micheli as a peak statement in his explanation, suggests that Jacob's trouble is related to the teacher's preceding explanation of the assignment. However, it is unclear at this point what kind of problem Jacob encounters: Is it an auditory problem or a problem in 'grasping' the teacher-provided instructions?

Jacob employs multimodal resources:
- sequential placement in relation to teacher's actions
- moving into teaching assistant's visual field
- eye gaze shift
- signed open-class repair initiator

Clearly, Jacob is attempting to move into Micheli's visual field (cf. Goodwin 1986). The combination of Jacob's shift in eye gaze, body movements and signed repair initiation are resources to solicit Micheli's attention and to establish a new participation framework (for related arguments, see Goodwin 1986; 2003; 2007; Egbert 1993; 1997).

Jacob does not succeed to mobilize Micheli's attention. While the assistant remains oriented towards the teacher, Jacob momentarily abandons his summons for help. He leans back in his chair, gazes at the main teacher and then into the air. Jacob's bodily actions of summoning and retracting are displays of his understanding of Michaelis's attention to the teacher and failure to respond to him. As Goodwin observes on coordination among interactants:

Jacob does not succeed in mobilizing the teaching assistant's attention.

> Each party's body thus displays an analysis of what the other is doing and by that very display constrains what the other can or should be doing if he is to organize his body in terms of similar analysis. (1981: 96)

Two important points emerge from these observations. First, Jacob's choice of non-vocal resources to solicit attention and signal his trouble minimizes disruption of the plenary teaching. This suggests that he is orienting to the normative order of classrooms with normal hearing participants, where interrupting a plenary activity may be sanctioned (McHoul 1978). This situation at hand presents a conflict for the hearing impaired student: His use of non-vocal resources warrants the maintenance of the classroom order, but at the same time makes it particularly challenging to attract the assistant's attention and to signal his trouble; such non-vocal resources inevitably presuppose the prior establishment of mutual eye gaze to be recognized. In the quoted excerpt, Jacob's attempt to engage with the assistant fails possibly due to its sequential placement at a moment when her recipiency was not assured; in the further course of actions, Jacob launches a second attempt to solicit Micheli's help, this time deploying a different sequential organization of his course of action - with success. This exemplifies the delicacy for the hearing impaired student to navigate between different participation frameworks both in terms of the resources deployed, and in terms of the mutual synchronization of verbal and non-verbal conduct.

> Jacob's actions fail because he orients to the progressivity of the main classroom activity, thus minimizing disruption.

4.2.2 The hearing impaired student's second attempt to attract the assistant's attention (success)

Immediately after his failed attempt, Jacob tries again to mobilize the assistant's attention. This time, before initiating repair, he first secures her attention. Jacob's embodied actions (gaze, head shake, sign language, hand movement), which finally succeed in soliciting her eye gaze, are marked in red above the line of talk by the teacher in the transcript below.

> Jacob's second attempt to resolve his trouble orients more strongly to establishing a parallel strand with the teaching assistant.

#2 Jacob solicits assistant's attention

> Jacob employs more multimodal resources and sequences them differently:

```
016 Rot:   alle wörter bei denen die gefahr besteht
           all words with which there is the danger

           *Jacob glancing at Micheli from here onwards
017        *(1.1)

018 Rot:   dass ihr beim diktat das wort falsch könnt,
           that at a dictation you write the word wrong,

019        (   ) schreiben könntet,
           (   ) could write it wrong,

020        (2.3)

021 Rot:   das müsst ihr übermalen.
           that you have to underline.

022        und ich denke da kommt ihr rasch auf
           and I think you will quickly reach

           *Micheli looking down, nodding
023 Rot:   *zwanzig wörter
            twenty words

           *Micheli looking down, nodding
024 Rot:   *seid ihr schnell bei zwanzig wörtern hä?
            you will soon reach twenty words right?
```

> - eye-gaze shift and sustained gaze at Micheli

In addition to his continued eye gaze directed at the assistant, the next actions Jacob employs are head shaking (line 025 below), a signed *NICHT* ('not')

and a wave movement with his right hand, which is commonly used among
signers to solicit attention (line 028). For reasons of readability in the ensuing
transcript excerpts, we have omitted the teacher's simultaneoulsy ongoing
plenary talk where he continues to explain the assignment.

```
        *Micheli looking down
025 Jac: *((shaking head while gazing at Micheli))

026     (.)

028 Jac: NICHT (WAVE)((right hand))
        not
```

- head shake

- signed 'not' and hand wave

Figure 5: Jacob: *NICHT* ('not'), no mutual gaze (line 028)

As Jacob's adds the wave with his right hand, the assistant turns her gaze
to him (line 29 below). Simultaneously, Jacob procudes a wave with his left
hand and employs his right hand to touch his head, possibly his ear. He then
signals his problem by signing *NICHT VERSTEHEN* ('not understand', line 30
below), in parallel to a voiceless articulation (mouthing[3]) of part of the word
fragment *ve(r)sta* ('understoo', line 30 below).

```
        *Jacob touching right side of his head
029 Jac: *(WAVE) ((left hand))
         not

        *versta ((voiceless mouthing))
030 Jac: *NICHT VERSTANDEN ((right hand))
         not understand
```

- hand movement

Jacob's wave solicits teaching
assistant's attention. He now
launches
- a repair initiation through
  voiceless mouthing and
  signing

Figure 6: Hearing impaired student initiates repair through signing and voice-
less mouthing (line 030)

Jacob here resorts to a serial cumulation of embodied means (gaze, head
shake, wave, sign language, hand movement) in order to attract Micheli's
attention and to display a problem in understanding. The sequential organi-
zation of this endeavor clearly differs from what we have seen in excerpt
#1. This time, Jacob's signaling of the problem in understanding sequentially
follows the establishment of mutual orientation between him and Micheli.
Consequently, Jacob here succeeds in displaying a problem of understand-
ing in a way that is oriented to by Micheli: Micheli responds by suggesting

---

[3] In sign language talk, participants make regular use of mouthings, which are ar-
ticulations of words or parts of words without voice. For an overview of functions of
mouthings in sign languages, see Boyes Braem/Sutton-Spence (2001).

that Jacob consult (or recall) the paper that the teacher has displayed on the overhead projector (line 033 below).

```
031 Mic:  jac

032       (...)

          *pointing to overhead projector
033 Mic:  *°es ist ein (   ))blatt (vorne°) (     )
           there is a sheet over there

034 Jac:  ((head shake))
```

By means of a head shake (line 034 above), Jacob explicitly refuses the assistant's suggestion for him to achieve clarification. Although Jacob's so laborious efforts were successful in getting the assistant's attention to signal his trouble, the assistant's response is not sufficient to resolve the trouble, in fact, her suggestion is the source of further trouble, as the next analytical step yields.

4.3. The talking-into-being of the categories 'hearing' vs. 'non-hearing'

In the ensuing attempt to resolve the trouble, a further aspect of the inter-action is analyzed because it attributes the trouble to Jacob being hearing impaired. In this respect, it is important to note that the sign language sign for *VERSTEHEN* ('understand'), as quoted in excerpt #2, does not refer to au-ditory understanding but means 'grasping'. By contrast, the verbalization of 'verstehen' (done without voice by Jacob, ex. #2) lends itself to two interpre-tations: 'hear' or 'grasp' (see section 2 above). However, Jacob's subsequent touching of the side of his head (where the transmitter of his implant is lo-cated) may create some ambiguity as to the nature of his trouble in under-standing. Micheli's first interpretation of Jacob's problem seems to be of the 'grasping' kind: As we have just seen, she refers Jacob to the information on the overhead projector, a suggestion that is not ratified by Jacob as resolving his trouble. Her second interpretation, in contrast, is cast in terms of a prob-lem of hearing. Up to this point in the interaction, Jacob's display of non-understanding, as documented in the preceding excerpts, did not give any cue as to what exactly the nature of the problem is. Excerpt #3 starts with Jacob's and Micheli's gaze shifting between each other and the main teacher (line 038), while their interaction is shortly suspended. At line 039, Micheli offers a second reaction to Jacob's display of difficulties in understanding: She whispers *hörst du nicht* ('don't you hear', line 039), which she backs up by pointing to her ear and signing *NEIN* ('no').

#3 Micheli and Jacob alternating between mutual gaze and gaze to the teacher; teacher talk not displayed

```
          *pointing to her ear and then signing "no"
039 Mic:  *°hörst du nicht?°
           don't you hear?

          *Micheli nods
040 Jac:  *do:::(ch)- ((voiceless))
           sure I do!

041 Jac:  hab(e) (habe) nich(t) verstand(en) ((voiceless))
           I did not understand

042 Jac:  NICHT  VERSTEHEN ((sign language))
           not understand
```

To help Jacob, the teaching assistant refers Jacob to a piece of paper.

Jacob rejects teaching assistant's suggestion; trouble not resolved.

Trouble in 'hearing' or 'under-standing/grasping'?

Jacob's embodied repair initiations differ:
- sign language 'understand' means 'grasping' (problem is not auditory)
- voicing 'understand' can mean 'hearing' or 'grasping'

Teaching assistant's reaction in excerpt #2 above orients to Jacob having a problem in 'grasping'.

In exerpt #3 below, the teaching assistant orients to Jacob having a problem in 'hearing'.

Negotiating the nature of Jacob's trouble

- teaching assistant uses present tense form for 'hear'.

- Jacob signals he 'hears' but 'did not understand'.

Figure 7: Manual signs for the utterance 'I did not understand' (line 41)

Figure 8: Jacob signs *NICHT* ('not') (line 42)

```
043 Mic:  ((nods and gazes to teacher))

          *gazes to Jacob
044 Mic:  *okay ((voiceless))
```

Jacob uses a combination of embodied action to vehemently signal that his trouble is not in hearing but in understanding.

In contrast to other occurrences where teachers and teaching assistants ask *hast du nicht(s) gehört* ('didn't you hear'), the present tense form of the verb here suggests that Micheli makes reference to Jacob's general ability to perceive sounds. This question is relevant insofar as hearing impaired students regularly have problems in perceiving sounds, e.g. due to empty batteries of their hearing aids/implants. At this moment, then, we see how negotiating the nature of a trouble in understanding occasions the talking-into-being, by the assistant, of the category 'non-hearing' attributed to Jacob.

In negotiating the nature of the trouble, the teaching assistant talks into being the category of 'non-hearing' and attributes it to Jacob.

Jacob, however, vehemently refuses the relevance of that category for this precise moment of interaction. His reaction comes in immediately and strongly (line 040): He articulates without voice *do:::(ch)*, – a marker of disagreement that can be read in this context as corresponding to English 'sure I do'. The expressive character of Jacob's mouth movement (prolonged and accentuated) and facial expression, as shown in figure 7/#6, contribute to augment his disagreeing stance. His resistance to the interpretation offered by Micheli is further enhanced by his recasting of his initial statement of non-understanding: *hab(e) (habe) nich(t) verstand(en)-* ('I did not understand' line 040), again done by mouthing, accompanied by *NICHT VERSTEHEN* ('not understand') in sign language (in capitals). Recall that the manual sign *VERSTEHEN* ('understand') of Swiss German sign language univocally refers to understanding as 'grasping', and cannot be read as 'hearing'. Jacob's use of sign language, along with (voiceless) oral language, can be read here as an attempt at clarifying what the problem is. Here again, Jacob uses embodied expressive means to highlight the saliency and determination of his *I did not understand* (i.e., 'get it'): The manual signs are accentuated, as shown in figure 8 above. Micheli, on her part, starts to align with Jacob from line 043 on, where she nods and then makes her alignment explicit by means of *okay* (line 044). In the further course of the interaction, Micheli will explain to

The sign *VERSTEHEN* ('understand') of Swiss German sign language means 'understanding' as 'grasping', and cannot be read as 'hearing'.

Jacob what to do; as it turns out, Jacob did not understand what exactly the assignment provided by the teacher called for.

Taken together, excerpts #1 and #2 show that during teacher-fronted interactions, the mutual monitoring and synchronization of gaze and body movements between the hearing impaired student and the assistant is key to installing a participant framework within which issues of understanding can be dealt with. The excerpts further evidence how delicate navigating between the two strands 'teacher-classroom' and 'assistant-student' may be for the student, both in terms of the resources deployed to do so and in terms of the identification of sequentially appropriate moments for action. This is so because, as part of their orientation to the normative order of the regular classroom, the hearing impaired student and his assistant rely on silent non-vocal means so as to minimize the disruption of the teacher-fronted classroom interaction. In this situation, gaze orientation on the part of the recipient toward the current speaker is a conditio sine qua non for the recognizability by the recipient and of the current speaker's action. Excerpt #3 shows how the breaking away into a subgroup is done with orientation to the hearing disability, potentially already by the hearing impaired student (touching his head at ear level), and overtly by the assistant, whose candidate understanding of the student's trouble focusses on hearing problems.

In sum, it requires special interactional work and handling of contradictory constraints for a student with hearing impairment to get help from the teaching assistant.

5. Discussion: Participation and understanding in the co-enrollment classroom

In the preceding analysis we have shown that the co-enrollment classroom requires hearing impaired students to continually navigate between two main foci of attention: the public space of the teacher-classroom interaction and the more intimate space of student-assistant interaction. This navigation provides the basis for the hearing impaired students' negotiating and securing understanding with the help of the assistant teacher.

Because understanding may often be problematic for the hearing impaired students, the assistant's support is needed frequently. The very institutional role of the assistant is to provide such support. Regularly, his or her help is offered spontaneously *after* plenary talk by the main teacher. However, students may need to initiate repair during the plenary. Drummond/Hopper (1991), in an analysis of repair in telephone conversations, show that the later repair is initiated, the more difficult it is for participants to univocally localize the trouble source. For the hearing impaired student, to wait for the end of the plenary may therefore diminish his or her chance of obtaining successful repair or clarification, or of following the plenary teaching/learning activities.

The practical solution that the hearing impaired students deploy in the face of this issue is to subtly navigate within what we have called an ever-latent dual participation framework - ever-latent in the sense that the hearing impaired students' participation in either the teacher-fronted or the student-assistant participation framework may in principle be implemented whenever participants choose to do so, as part of the normative order of the co-enrollment classroom, as displayed by the seating arrangement. However, in this context, the establishment of recipiency is often a tricky issue. In particular, shifting from the public space of teacher-classroom interaction toward the more intimate space of individual student-assistant-teacher interaction presupposes mutual attention among those participants that are to be part of the new framework to be installed, and hence calls for the parties concerned to deploy parallel monitoring of the different actors in both frameworks. For the hearing impaired student this asks that he or she orients, at least to some degree, toward both the main teacher and the assis-

The major facets of the problem:

- The help of the teaching assistant is needed frequently.

- This entails that hearing impaired students need to frequently disattend the main teaching activity.

- The later repair is initiated, the more difficult it is to localize the trouble source. Therefore, immediate action is required.

- Mobilizing the teaching assistant's attention is no easy task and delays repair initiation.

tant teacher. Furthermore, for the assistant teacher, it implies that he or she orients toward both the main teacher and the hearing impaired students.

However, because recipiency on the part of the assistant teacher needs to be secured *before* a problem can be usefully signaled, the hearing impaired student's call for help is often delayed as regards the trouble source. Also, during teacher talk, this is done tacitly, most typically through gaze, and body movement, and occasionally the use of sign language. Delays and 'tacit' indexing of problems in understanding may contribute to explaining the uncertainty often observed in our data as to what exactly the problem is. This issue is enhanced in those cases where the assistant has only rudimentary (or no) mastery of sign language, as is the exemplary case presented here. In this sense, the precise interactional setting under analysis presents a dilemma for the hearing impaired student who encounters a problem of understanding during teacher-fronted classroom interaction: The need to minimize disruption of the teacher-classroom interaction calls for the use of non-vocal (and often non-verbal) resources, but the restriction to 'tacit' resources limits the possibilities at hand for establishing recipiency and signaling the precise nature of the problem at hand.

We have seen Jacob, the hearing impaired student we focused on in this paper, deploy a range of resources to secure recipiency on the part of the assistant as a basis for actively initiating a new participation framework - and we have indicated that this deployment is done in a way that is acutely tuned to the local circumstances of actions. For one thing, Jacob's use of non-vocal resources (gaze, body, head, sign language) can be interpreted as indexing his orientation to the normative order of the co-enrollment classroom, where the hearing impaired students' and the assistant teacher's interacting with each other is part of their institutionally designed roles, but where their interaction is at the same time typically accomplished in a way so as not to disrupt the teacher-fronted classroom interaction. For another thing, we have seen that the hearing impaired students' very participation in this co-enrollment classroom rests on and calls for the deployment of a subtle interactional competence - a set of methods for organizing social interaction (Hall/Pekarek Doehler 2011) - , based on their use of multiple resources and the minute synchronization of these with other participants' conduct. In this light, we observe that the hearing impaired students behave as highly competent members of the co-enrollment classroom – highly competent because they manage to juggle, for all practical purposes, with multiple resources for action in order to actively co-organize the classroom interaction in a way so as to mediate their own participation and understanding, based on calling for the assistant's occasional support, while simultaneously following the main teacher's talk.

6. Conclusion and implications for application

In this paper we have set out to identify some of the specific interactional constraints that the co-enrollment classroom puts on the hearing impaired students. Hearing impaired students orient to the classroom norms in that they display their engagement with the plenary by means of gaze and body orientation toward the teacher, and recurrently face the challenging endeavor of efficiently signaling a problem in understanding to the assistant teacher without disrupting the classroom order. One task for them is to establish the assistant's recipiency and thereby operate a shift in participation frameworks from the public space of the plenary to the more intimate space of student-assistant interaction: The students in our data struggle with this issue but often manage it successfully. A second difficulty for them is to display in a recognizable way the precise source of the trouble they are encountering: this issue is more tricky, and often remains unresolved during teacher's

The dilemma:
• When hearing impaired students orient to the classroom norm of not disrupting the plenary, they reduce their chances of mobilizing the teaching assistant's attention to solicit help when trouble in hearing/understanding emerges.

plenary talk. Finally, overtly displayed problems in understanding on the part of the hearing impaired student may be an interpersonally delicate issue: They may occasion the talking-into-being of the category 'hearing impaired', and thereby become part of how participants in the interaction install and/ or refuse 'hearing/not-hearing person' as a relevant membership categorization device (Sacks 1972a/b; Schegloff 2007) for the particular setting under analysis.

The analysis presented in this paper has practical implications on how we can assess and possibly optimize the conditions under which hearing impaired students can participate and (possibly) learn in regular classroom settings. The excerpts quoted in this paper clearly show that the co-enrollment classroom presents a rich interactional environment for the hearing impaired student, asking him or her to put to work, for all practical purposes, verbal resources (spoken language and sign language) along with other embodied resources so as to secure understanding and participation. This play on different resources for interaction may in itself represent a key element for the hearing impaired student's socialization as a *bilingual person* - a person who uses both spoken language and sign language (along with other embodied tools for action) and is able to navigate between these two semiotic systems.

The excerpts, as examples illustrating a larger corpus, suggest that the presence of an assistant teacher in the co-enrollment classroom is a valid institutional measure for facilitating the hearing impaired student's understanding by mediating their possibilities for participating in the classroom activities. However, this facilitating role is not a given one. Rather, it is actively co-constructed in the course of the very interaction between hearing impaired student and assistant teacher. A key issue here is the hearing impaired student's possibility to index in a recognizable way what exactly he or she needs help with. In the light of the empirical observations presented in this paper, the intervention of assistant teachers who have a *good mastery of sign language* may be an important step toward optimizing the conditions for the hearing impaired students' participation in the co-enrollment classroom. This is not only because the access to a shared language of mediation may enhance the efficacy in resolving problems in understanding, but also because it allows for 'tacit' negotiations of understanding that do not disrupt the normative order of the classroom during teacher-fronted interactions. In this sense, we hope that the observations presented in this paper will be completed by detailed analysis of co-enrollment classroom interactions involving assistants that are competent in sign language, as well as classroom settings where hearing impaired students are accompanied by an official interpreter in sign language.

- How can the situation in the co-enrolled classroom be improved to reduce the extra burden on the students with hearing impairment?

Towards improving the situation in co-enrolled classrooms:

- Ensure that the teaching assistant is competent in sign language.

- Develop participation structures which make it easy for the students with hearing impairment to get help.

- Develop ways for the hearing impaired students to be able to signal what their specific source of trouble is and the kind of help they need.

- Appreciate that the students with hearing impairment are socialized as bilinguals in a setting where the majority of students uses only one language.

- Conduct more user-centered studies such as multimodal Conversation Analysis to gain a differentiated understanding of the problem.

Negotiating hearing problems in doctor-patient interaction: Practices and problems of accomplishing shared reality

Arnulf Deppermann

This paper deals with a case study of a first visit of a person with hearing loss to her family doctor. In the first part of the paper, basic properties of doctor-patient interaction, which are also relevant for treatment of hearing loss, are outlined: the relevance of institutional conditions for interaction, asymmetries between the participants, goal-orientation, specific conditions of trust, and the relevance of the specific genre of doctor-patient interaction. The second part of the paper presents a case study, which focuses on three interactional phenomena: a) the negotiation of the hearing loss as an existential threat to the patient and her identity; b) the discrepancy of illness theories between doctor and patient; c) the collaborative work of negotiating an intersubjectively viable description of the experience of hearing loss.

1. Introduction

In the last two decades, doctor-patient interaction ("DPI") has become a very prosperous field of Conversation Analysis ("CA"), as evidenced by large bibliographies on English and German speaking research specialized in this field.[1] This is also evidenced by the seminal volume edited by Heritage/Maynard (2006) and the important contributions by e.g., Brünner/Gülich (2002), Stivers (2007); Neises/Ditz/Spranz-Fogasy (2005) and Thompson/Ruusuvuori/Britten/Collins (2007). Among more than 3500 studies on doctor-patient interaction included in the bibliography assembled by Nowak/Spranz-Fogasy, only one study from nursing research deals with experiences of hearing loss in interaction (Lilgenau 2007).

This lack evidences the need for basic research concerning the interactive tasks, processes, and problems specific to medical interactions dealing with hearing problems. Still, it will be useful first to consider the general specifics of doctor-patient interactions, which also matter to interaction concerning hearing problems. Therefore, I will give a short summary of some major properties which are relevant for virtually every instance of DPI and then deal with the most pervasive genre of DPI, 'history-taking', in more detail. This will set the scene for data from a medical encounter in which a patient discloses a hearing problem to her family physician. The analysis will focus on two problems of accomplishing intersubjectivity and mutual understanding between doctor and patient: The problem of conveying the subjective experience of hearing loss by description and the problem of competing theories of illness, which impede interactional progression.

- Doctor-patient communication has been researched extensively,

  however,

- there is not a single conversation analytic study on ear, nose and throat doctors on hearing loss in medical interaction.

Research questions:
- How do a family doctor and a patient reporting a hearing problem negotiate mutual understanding?
- How does the patient describe her subjective hearing experience?

---

[1] See the comprehensive bibliography of research in this field gathered by Peter Nowak and Thomas Spranz-Fogasy, the searchable data-base on studies on doctor-patient interaction in German language published by Florian Menz and Peter Nowak, and the bibliography on English-speaking research collected by Paul ten Have.

2. General properties of doctor-patient interaction

DPIs are a variety of institutional interaction. As such, they exhibit several features which are different from everyday conversations and which are more or less direct repercussions of institutional goals, restrictions and preconditions. Therefore, it would be wrong to evaluate DPI by standards derived from everyday conversation. There are at least four aspects which distinguish DPI from other types of interaction:

1. The relevance of institutional conditions for interaction
2. Asymmetries between the participants
3. Goal-orientation
4. Specific conditions of trust

General characteristics of doctor-patient interaction (DPI)

2.1 Institutional conditions

The most basic institutional restrictions and demands on DPI are:

Institutional characteristics include

- Legal requirements which doctors have to observe.
- Organisational aspects: DPIs are conducted under conditions of time-pressure. First visits (as the case in this chapter) are only the first step in a series of medical interactions in which the patient will be involved (Strauss et al. 1985: "arc of work".)
- Economical aspects: How much time the doctor may reserve for the patient also depends on his/her possibilities to get time for talk compensated by the health insurance. Because of this, private patients have much better chances for extensive talk with a doctor than regularly insurenced patients have (Nowak 2010). However, rates for medical service delivered by talk are in general paid much less than for bodily examination or for the use of technically aided diagnoses.
- Written documents: Requirements for written documentation inform talk-in-interaction and need to be coordinated with face-to-face interaction.

- legal aspects
- time restraints
- economical concerns
- necessity for talk and written documentation

2.2 Asymmetries

If participants in communicative encounters are not equal in terms of rights and obligations, knowledge or other features which directly impinge on their communicative conduct or which are brought about by different ways of participating in interaction, this is captured by the term 'asymmetry'. There are five sources of asymmetry in DPI (cf. Heritage/Manyard 2006; Thompson et al. 2007):

Communication is characterized by how the doctor and the patient orient to their asymmetrical relationship:

a) Asymmetries of professional knowledge
DPIs are interactions between professional experts and laypersons seeking help, which they cannot provide for themselves. Since help is dependent on professional procedures, the doctor is the one who structures the interaction: He or she needs to ask for relevant anamnestic information, explain findings and diagnoses, and propose treatments. For the patient, this structuring often is neither obvious nor motivated. The medical relevance of questions and information remains opaque, because the patient lacks rules of inference and relevant knowledge about terminology and stocks of professional knowledge, which applies to local questions and statements. As a consequence, he or she does not always understand why which examinations take place and how diagnostic and treatment decisions are arrived at.

- expert-layperson relationships with asymmetrical knowledge

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b) Institutional asymmetries
The doctor knows institutional routines of how to deal with medical prob-
lems. For him/her, they are predictable and transparent, while the patient
often cannot anticipate them, e.g., the kind and the sequence of steps to be
taken, or the efforts and restrictions they entail for him/her.

- asymmetrical distribution of access and transparency

c) Asymmetry of existential and experiential relevance
The patient (from Latin *patiens*, 'sufferer') experiences physical and emo-
tional and often also social and economical troubles. Illness and impairment
are experiences which produce a breach of expectations about a normal life
and a possible and probable future. They thus threaten basic structures of
identity and the future biography, e.g., regarding work, social integration,
sexual attraction, physical integrity. For the patient, illness and impairment
are critical life-events with a unique biographical impact, which may entail a
thorough restructuration of identity and everyday practices.

- for the patient there are different things at stake than for the doctor

   For the doctor, however, the patient is an instance of a type of illness/
impairment, who is to be treated according to what applies to the type in
general. Dealing with the patient's illness for him/her is not an exceptional
existential situation as it is for the patient, but rather professional routine.

- health issues are routine for doctors and 'exceptional' for patients

   These asymmetries of relevance may lead to discrepancies in the pa-
tient's and the doctor's expectations about the display and uptake of emo-
tions regarding the illness. There are different approaches to deal with this
problem, ranging from a purely biomedical, which discards all other life-
world matters, to a psychosomatic approach, which at first focuses on psy-
chological causes and consequences. As we will see when turning to our case
study of an interaction between a general physician and a patient reporting
hearing problems, competing theories of illness can also be a major source
of interactional problems.

d) Asymmetries of power
Because of his/her professional and institutional knowledge, the doctor is
basically in a more powerful position than the patient. According to the clas-
sical paternalistic conception of medical treatment, the doctor orients to
professional and ethical standards, which he or she uses to decide on behalf
of the patient. This stance has come under pressure by approaches of evi-
dence-based medicine and shared decision making. According to these lat-
ter concepts, the patient is empowered, because the doctor is accountable
for his/her decisions on the basis of scientific research, and decisions about
treatment are not made by the doctor alone, but in an interactional process.
Consequently, clarification, argumentation, and explanation increasingly be-
come core activities in DPI, i.e., securing mutual understanding and gaining a
common view of what the problem is and what is to be done. However, since
many possible treatments are not paid by insurance companies, professional
ethics and economic rationalities can become confounded in a set of mixed
motives, which are rather opaque for the patient.

- power is distributed differently

e) Asymmetries of participation
The four asymmetries outlined above are observable in the participation
structures in DPI. The doctor structures the interaction by defining the
amount of time available for talk, by guiding the interaction and by initiat-
ing transitions to new phases. There is also an asymmetry of role-related
contributions: While doctors ask questions, instruct, explain and require pa-
tients to do things, patients deliver requested information, tell stories, and
are asked for consent.

- differential participation is due to these asymmetries

2.3 Goal-orientation

In contrast to everyday conversation, DPI are not conducted for their own sake (i.e., for entertainment, self-presentation, sharing news, becoming acquainted, etc.), but they are instrumental for arriving at diagnoses and treatment decisions. Therefore, a DPI is only successful, if it is successful in fulfilling these tasks.

- the interaction pattern is geared towards diagnosis and treatment

2.4 Conditions of trust

DPI should convince the patient to comply with the treatment (see also Heinemann et al., ch.12, and Brouwer/Day, ch.13, this volume). This can only be achieved if the patient trusts the doctor both as a person and as an expert. The establishment of trust thus is a major task to be fulfilled during DPI by the doctor, e.g., by displays of competence, showing interest and respect without moral evaluation, attending to the patient's emotions, and warranting confidential treatment.

- the patient's trust in the doctor is crucial for compliance

The above described features of 'the DPI' are rough generalizations. We need to take into consideration that there are different types of DPI, which can be distinguished in terms of

- genre: history taking, bodily examination, delivering diagnoses, prescription, therapy planning, follow-up checks, etc.;
- specific tasks and problems relating to disciplines such as family doctor, ear, nose and throat doctor and specific syndromes such as hearing loss;
- participation frameworks: in addition to the dyadic constellation, there are pediatric DPIs with children and parents, interpreter-mediated DPIs with immigrants, ward rounds with several doctors, nurses, and other medical staff, etc..

There is variation in DPI depending on the task, doctor's specialization, the patient's illness and whether other persons participate.

The following graph provides a schematic representation of the core sequences and interactional achievements of DPIs:

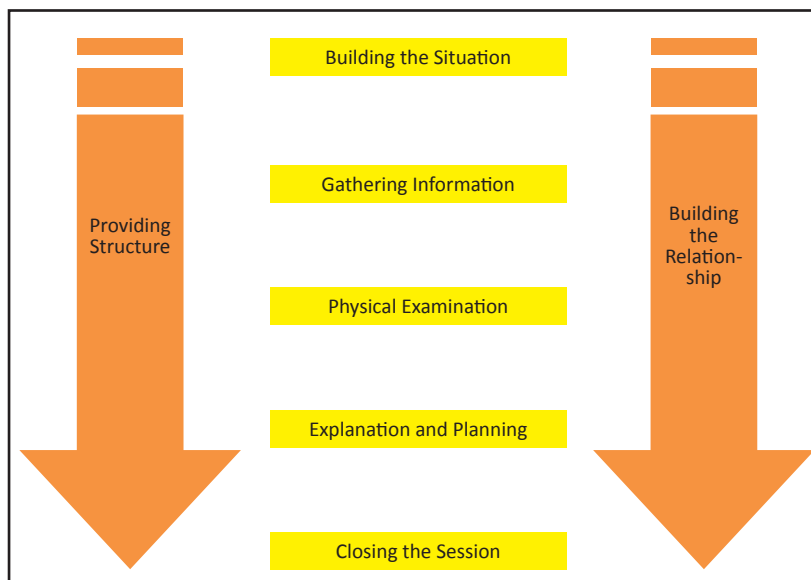In all phases of the interaction, the dimensions of providing structure and relationship building are relevant.

Figure 9: Schematic presentation of the sequence of phases in DPI (adapted from Kurtz et al. 2003)

3. The genre 'history-taking' and the data to be analyzed

The data to be analyzed below come from the most pervasive genre of DPI, namely 'history-taking'. It comprises the inquiry into the history of the problem and its relevant preconditions in terms of prior illnesses and related problems in the patient's family's history, the anamnesis of the patient's life conditions and prior attempts at treatment. History-taking is guided by the doctor's questions (see Spranz-Fogasy 2005; 2010).

Doctors may orient to an agenda of questioning which is derived from some pre-established question-schema. Questions are geared to diagnostic ends in terms of identifying and excluding possible causes of the symptoms reported. Agenda-based questions can lead to misunderstandings and engender fragmented and insufficient reports from the patient's side, because he or she does not understand the function of the question. The strategy in our case is more patient-oriented. The doctor starts with an open question, encouraging the patient to use conversational narrative practices to represent his/her problems in the context of his/her everyday life. Only after the patient has told his/her story, the doctor turns to aspects of the history which have not been dealt with sufficiently in the patient's report.

Basic tasks for the doctor during the whole process of history-taking are active listening in terms of acknowledging the patient's turns at talk, displaying his/her understanding of them and structuring the interaction by providing summaries and concluding upshots in order to secure common ground for next steps.

<div style="float:right">History-taking is the most pervasive genre of DPI.</div>

3.1. First symptom description

We now turn to an extract of a medical encounter in which a patient reports on hearing problems to her family doctor for the first time. The patient has already known the doctor for a long time and they have a very informal relationship, as can be seen by the reciprocal use of the informal second-person address term *du* (informal 'you'). The first extract shows the beginning of history-taking. It occurs after the opening, where the doctor informed the patient about the fact that the encounter is being recorded (not displayed in transcript). Then the patient self-initiatedly presents the reason for the appointment and describes the problem.

#1 (AA_HD_ 01_02:21 – 02:57) First description of symptoms[2]

```
050 P: und zwar ich komm weil=s mir im moment,
        and I come here because

051    (0.2) °also.°
             well

052    (0.3) seit drei tagen,
             for three days

053    (0.2) °tota↑° komisch geht.
              I've been feeling absolutely weird

054    (0.5)°dass ich° nämlich (-) ↑ähm:.
             namely that I uhm

055    (2.1) so die stimmen >so weiter< weg höre,
             hear the voices kind of further away

056    und (selber so.)
        and my self like
```

Characteristics how the patient describes her reason for the visit:

- vague expressions

- difficulty in describing the problem

Symptom description
- hearing loss impairs participating in social relationships
- threat to cognitive functioning

```
057     (1.5)

058 D: ↑hmhm?
          uhum

059 P: (0.2) also. h. ähm: wie wenn ich schlafe,
             well     uhm like when I am asleep

060 D: [mHM,]
          uhum
          [
061 P: [und ] (a) so am: aufwachen bin
        and I am about to wake up

062     (0.2) .h (und dann) hört man ja auch so:_n.
                and then one hears PRT also kind of a

063     (.) so=n hall,
           kind of a reverb

064     (...) wie (.) wenn jemand redet im raum,
              like    when someone talks in the room

065     °das hört man dann so°
         then one hears it like that

066     (0.2) im unterbewuss:tsein (noch so=n bisschen.)
              subconsciously still a little bit

067     oder kurz vorm einschlafen.
        or just before you fall asleep

068     hh (0.2) °(und/is)° irgendwie (.) so (0.4) uah.
                  and somehow like ((horrified sound))

069 D: (0.8) das [macht dir angst] dann.
             it frightens you
                 [
070 P:          [schrecklich.   ]
                 horrible

071 P: ja:.
       yes

072 D: °hm,°
         uhum

073     (1.6)

074 P: un: (0.2) d ↑ähm:.
       and        uhm

075     h (1.0) am freitagabend hat=s angefangen,
               friday evening it started

076     (0.3) abends °auf so=ner° fete?
              in the evening at kind of a party [...]
```

metaphorical symptom description
• altered state of consciousness

Doctor attributes an emotional state of anxiety to the patient.

Patient does not expand much more on her psychological state.

The patient is obviously at a loss of how to describe her problems. She starts with a very vague expression *weils mir (…) total komisch geht* ('I feel absolutely weird', lines 050-053). This expression refers to the fact that her condition departs from what is normal, but, just by using it, the expression indexes that she has difficulties in describing the precise nature of the difference. She then goes on to mention a first more definite symptom: She hears voices as if produced from a distance (lines 055-056). In focusing on voices, this first symptom report exhibits an orientation to the impairment of participating in social relationships. At the ensuing turn transition relevance place, the

doctor does not take the turn, and, as the patient does not continue, he produces an acknowledgement token serving as a continuer for her to expand. The patient then compares her state of mind to an altered state of mind (line 061), i.e., when waking up and hearing with some kind of reverb (line 063) like in an almost subconscious state of mind (line 066).

The hearing problem thus is not categorized in terms of a disorder of peripheral sensory perception, but as an altered state of mind, remote from the usual state of awareness and akin to a reduced and even dream-like state of consciousness. We can infer from this description that the hearing problem threatens the most basic foundations of everyday experience, cognitive functioning, and reflexive identity, i.e., the ability to act in routine ways, the confidence to perceive correctly, and to take part in social interactions. While the patient does not make these inferences explicit, she adumbrates the emotional relevance of her situation by a sound expressing horror (line 068) and categorizing her experience as *schrecklich* ('horrible', line 070). The doctor reacts to this expressive display with an explicit attribution of an emotional state *das macht dir angst* ('this frightens you', line 069).

> In general, the hearing problem is described more in its mental, social and psychological repercussion than in its auditory aspects.

Interestingly, the patient responds only minimally (line 071), and, after a pause, in line 074, she instead resumes the factual description of her problems by telling the history about when the problem started. So, while the patient clearly showed how much she is emotionally upset by the state she is in, she does not take up the doctor's offer to expand on its psychological import. This is a notable observation, because it stands in contrast to a lot of research on DPI. While it is often criticized in the literature that doctors do not attend to psychological and life-world concerns in their patients' reports (cf. Mishler 1984), in the data analyzed in Deppermann/Spranz-Fogasy (accepted), patients regularly do not align with doctors' shifts of the agenda from the report on symptoms and biomedical aspects of problems to the psychological plane. In the case above, the patient has initiated talk about her emotional state herself, but she does not expand on her feelings. This may be due to several reasons, which would have to be explored in more detail in a larger data corpus:

- patients might consider the doctor's move as no serious offer for expanding on psychosocial aspects,
- they might regard doctors as not competent in psychological treatment,
- there might be limitations of trust,
- talk about psycho-social aspects might be avoided due to pain or fear of stigma.

However, there is an affinity between the doctor's initial focus on the patient's feelings, instead of other diagnostic questions, on the one hand, and his final diagnostic hypothesis of a psycho-somatic stress syndrome on the other hand.

As a summary of the first extract we can note that the patient has problems in describing her hearing problems directly and that she resorts to analogy. She reveals that the hearing problem touches the core of her mental state. Thus, the hearing problem has a much wider scope than only being a problem of sensory perception. The extract also shows how the doctor provides opportunities for the patient to expand her account. Indeed, the doctor not taking the turn, the patient produces a more detailed description of her state of mind, which provides important insight into the nature of the symptoms and their psychological relevance.

> For the patient, the hearing problem has a much wider scope than only a problem of sensory perception.

3. 2. A clash of theories of illness: Arguing about possible causes of the hearing problem

After #1, the patient tells the story of how the symptoms have developed during the last three days and mentions a cardiovascular problem as a possible explanation. The doctor neither deals with this hypothesis nor does he himself formulate assumptions about possible causes. Instead, he produces continuers and follow-up questions focusing on the precise description of the patient's state of mind and the pragmatic contexts she is in. Finally, the patient states her hypothesis again, namely, that the cause might lie in the cardiovascular system, displayed in excerpt #2 (lines 226-229) below.

#2 (AA_HD_ 01_05: 30-06: 06) Illness theory

```
226 P: (5.9) und es is irgend[wie denk] ich (0.2)
           and I think it is somehow
                             [
227 D:                       [mhm.    ]
                              uhum

228 P: ähm (.) also vielleicht is es äh wirklich was
       uhm so maybe it is really something with

       mi=m kreislauf ne?
       my circulation

229    (0.6) also des is eigentlich so meine erklärung
            so this is actually kind of my explanation

230    ((D writes 4.6 sec.))

231 D: mit=m kreislauf dass der abgesackt [is] (.)
       with the circulation that it subsided
                                          [
232 P:                                    [ja]
                                            yes

233 D: oder so was.
       or something like that

234 P: ähem.
       uhum

235    (-) oder was kann es sonst sein?
           or what else can it be?

       ((D writes 3.1. sec.))

236 D: ((low)) für mich hört sich das so wie so ne
            to me it sounds like a

237    stresssymptomatik an=wie son
       stress syndrome like kind of

238 P: (0.7) mh[m:]
            uhum
              [
239 D:        [ich hab=s] selber mal erlebt äh
               I once experienced it

240    (.) äh vorm examen
           uh before the exam

241 D: so[n zu]stand
       such a condition
         [
242 P:   [mhm.]
          umhm
```

Patient's explanation: Hearing problems are due to the patient's blood circulation

Patient asks for an alternative explanation.

Doctor backs his explanation 'stress syndrom' by reference to personal experience.

```
243 P: m=ja
       m=yes

244    (0.7) °ja das (.) das hab ich mir halt auch gedacht
             yes that that's what I also thought

245    weil ich frag mich dann
       because I ask myself then

246    ja wo ist bei mir der stress ne? (.)
       well where is the stress as far as I am concerned right?

247    also ich hatte jetzt° .hh
       so I just had

248 D: ja
       yes

249 P: ne woche ((lacht))
       one week ((laughs))
```

Patient reports not being stressed.

The doctor reformulates the patient's assumption (line 231), but then he produces the competing explanation that the problem might be a symptom of a stress disorder (line 236-237). The doctor does not give an account why he rejects the patient's theory. Instead, he argues for his competing explanation 'stress disorder' saying that the patient's condition reminds him of something he experienced himself before his exams (line 239-241). This explanation, however, does not fit the patient's prior report of her current conditions of life, which she had given between #1 and #2 (she has just returned from holidays), so it does not work to convince her (lines 244-249). After this extract, the doctor goes on to insist that there might be still other factors which can cause a stress disorder. Only much later after #2 the doctor deals with reasons which rule out the patient's candidate explanation 'cardiovascular problem'.

Doctor and patient do not arrive at a shared explanation.

We can see in extract #2 that the patient comes to the medical encounter with her own theory of her problems, which she formulates as part of her report. The doctor repeatedly does not respond to that theory. The patient, however, is not willing to deal in more depths with the doctor's competing theory. Thus, a problem of cooperation arises, because the patient's own theory of her problems is not taken up by the doctor, having as a consequence that the patient is not ready to cooperate in a collaborative construction of probing the relevance of the doctor's competing hypothesis. Obviously, the patient needed some explanation first, why her theory could not apply, before being ready to reflect on other possible causes.

The doctor does not address the patient's explanation.

In addition to that, the patient seems to expect the doctor to orient more straightforwardly to finding a diagnosis. The doctor's attempts at staying with the patient's report in order to get a broader view of the phenomenology and the context of the hearing problems in the patient's life-world are not taken up enthusiastically by producing a narrative, but only with incremental responses by the patient.

3.3. Working out a collaborative description of the subjective experience of hearing loss

As was already observed earlier, the patient has problems describing her illness. These problems continue. In the segment below, she is at pains how to describe her subjective experience. This is evidenced by various phenomena such as word searches (lines 351-352), the search for telling metaphors by various reformulations and the search for enhancing precision by adding experiential properties (see below).

#3 (AA_HD_ 01_07: 31_09: 19) Second symptom description

```
350 P: aber ich bin wieder hoch und
       but i got up again and

351    (0.5) o::h da fällt wieder dieser hh.
             oh there falls again  this

352    (0.5) wie son sone'
             like such such a

353 D: (0.2) son vorhang?=
             such a curtain

354 P: =son vorhang oder irgend son
        such a curtain or some such a

355    block vorm kopp oder irgend °so°
       block before the head or some

356 A: so wie jalousien oder wie: (.) irgendwas (.) °'so so°
       just like blinds or like something kind of kind of

357 P: (0.6) sone mauer oder so[n gl]as
             kind of a wall or kind of a glass
                                [
358 D:                         [mh  ]
                                 uhu

359 D: oder [was?]
       or    what
            [
360 P:      [°ja°] tchh (0.5)
             yes

361 P: JA ich (.) ja ich fühl mich eigentlich wie im glas
       yes I      yes I feel in fact like I am in a glass

362    (0.8) weil weil=s so schwierig is <so die::>
             because because it is so difficult just the

363    (0.2) die sachen die von außen auf mich
             the things which from outside to me

364 D: hmhm.
       uhum

366 P: die so richtig zu hören
       to hear them properly

367    also so scharf halt ne?
       well simply kind of distinctly

368    (0.4) ich hör auch wenn jemand was leises sacht (.)
             i also hear it when someone says something softly

369    aber nur ganz=
       but just quite like

370    =also (.) wie so watte? (0.3) dazwischen
             like there was some cotton wool in between

371    (0.3) .hhh=

372 D: =so als ob es von ganz weit entfernt kommt,
        as if it comes from very far away
```

In the continuation of her sympton description, the patient displays further formulation problems:

- word searches

- reformulations

- metaphor 'curtain'

- metaphor 'head block'

- metaphor 'blinds'

- metaphor 'wall'
- metaphor 'glass'

- reports difficulty to hear clearly

- reports difficulty to hear soft speech

- metaphor 'cotton wool'

```
373 P: mhmh
       uhum

374 D: (0.7) die distanz viel größer ist als du sie (.) weißt
             the distance is much bigger than you know

375    [dass sie in wirklichkeit ist]
        that it is in reality
       [
376 P: [mhmh          mhmh          ]
        uhum           uhum

377 D: geht es dir jetzt auch so?
       does it nevertheless

378 P: bisschen
       a little bit

379    (0.2) also wie gesagt (1.2) also nich so wie immer
             well as I said        well not like usually

380 D: hmhm (3.0)  nich so (.) <natürlich>
       uhum        not so natural

381    also sozusagen alles is gewiss
       so as it were everything is certain

382    (.) d (.) ((high)) die gewissheiten sind weg
                           the certainties have gone

383 P: [hmhm      ]
        hmhm
       [
384 D: [kann man ] (.) kann man so auch sagen?
        can one       can one say too

385 P: hmm ja? (2.5)
       hum yes
```

386 D: des so ne phantasie von mir nich? des (--) könnt ja auch sein so
      that is a fantasy of mine right? it could also be like

Doctor interprets symptoms as psychotic.

```
387    (.) is das jetzt wirklich alles noch realität was läuft?
           is that really still all reality what's going on

388 P: (0.7) ach so ja
             oh I see yes

389 D: so was ist nicht der fall=
       something like this is not the case

390 P: =hm=nee (-) also (-) nee eigentlich
        hm well actually no
```

Patient rejects doctor's interpretation.

```
391    also mir macht es am meisten schwierigkeiten eben
       what just most difficult for me me most is that

392    (0.4) so (0.7) die dass ich mich so konzentrieren
       muss um:
           like     that I have to concentrate so hard to
```

```
393 P: um was (.) rich[tig ja    ]
       in order to something right
                     [
394 D:          [was um zu] funktio[nieren]
                in order to function
                                   [
395 P:                             [ja::h.]
                                    yes

396 D: mhmhm (1.5) ZUSAMMENREIßEN kann man auch sagen (0.2)
       uhum to pull yourself together can one also say

397 P: [ja ja                      ]
        yes yes
       [
398 D: [dass dich zusammenreißen musst]
        that you have to pull yourself together

399 P: [ja]
        yes
       [
400 D: [um] ja:: jetzt nicht
        in order now not to

401    (-) um (.) ((low)) wer weiß was könnt passieren
                           who knows what could happen

402    (1.9)

403 P: tja ich krieg wichtige sachen nich mit
       well I do not perceive important things
```

The doctor deals with the patient's formulation problems by providing candidate completions (*vorhang*, 'curtain', line 353, 393) and alternative descriptions at various points (lines 356, 372, 374-375, 382, 393, 395), which he presents for confirmation. Doctor and patient collectively produce a series of reformulations (see Gülich/Schöndienst 1999) of metaphors to describe the altered hearing experience (*vorhang*, 'curtain', lines 353-354; *block vorm kopf,* 'block before the head', line 355; *jalousien*, 'blinds', line 356; *mauer*, 'wall', line 357; *glas*, 'glass', line 357; *watte*, 'cotton wool', line 370). The doctor thus displays empathy by demonstrating that he is able to complete the patient's unfinished turns and to reformulate her experience in his own words. By this, he simultaneously supports her in finding ways to speak about experiences which are new to her and which she has probably never before put into words. The doctor assures the patient that it is both possible and worthwhile to formulate the extraordinary experience and to arrive at descriptions and categorizations which manage to accomplish an intersubjectively shared sense of what imposes on the patient as a bewildering subjective experience, which separates her from both her (social) surroundings and her taken-for-granted identity as an inhabitant of an intersubjective lifeworld (cf. Schütz 1962).

All metaphors used here center around the experience of some impediment which compromises the perception of the environment. The metaphors come from the visual domain, being spatial metaphors of separating one (subjective) area from another (objective) one. The ordinary, taken-for-granted, direct mode of being-in-the-world (Heidegger 1962[1927]) is disturbed, giving way to the feeling of being secluded and only indirectly connected to the environment (*ich fühl mich eigentlich wie im glas*, 'I feel like I am in a glass', line 361). Interestingly, the sounds which are hard to perceive are characterized as coming *von außen* ('from the outside', line 363) and *von ganz weit entfernt* ('from very far away', line 372), thus highlighting the separation of the experiencing subject from the world as an object, which

Doctor's completion of patient's turn is syntactically mismatched and moves the focus from the patient's perception of the outer world to the patient's agency herself.

Doctor pursues psychosomatic problems of agency whereas patient pursues perceptual problems.

The patient's metaphors
• pertain to the perception of the environment
• come from the visual domain
• address her sense of separation from the outer world

is perceived as clearly distinct from the self and which is a recalcitrant matter demanding efforts of deciphering. The patient does a lot of formulation work in order to clarify the nature of her experience. She points out that her perception of quiet sounds is still intact (line 367), while she has troubles in distinguishing sounds (line 368).

The collaborative thread, however, breaks as the patient, responding to the doctor's question of her momentary perceptions, repeats that her hearing is not as usual and not natural as it used to be (lines 379-380). It gets increasingly clear that the doctor interprets the patient's experience in terms of a psychotic syndrome, culminating in line 387, where he asks the patient if she doubts whether her experiences still represent reality. It is only at that point that the patient recognizes her line of reasoning and rejects it (change-of-state token in line 388, cf. Golato 2010). The patient clarifies that the most troublesome property of her perceptual condition is that she has to make an effort to concentrate on what she hears (lines 391-392). As the patient runs into problems how to define precisely what she is aiming at when concentrating, the doctor completes her unfinished turn with a candidate continuation, which does not match the syntactic projections the patient had established (line 392 vs. lines 394/396): While the patient had started a transitive clause, locating the object of her efforts outside of herself (*was*, 'something', line 392), the doctor completes the patient's turn by an intransitive verb (*funktionieren*, 'to function', line 394), adding *zusammenreißen* ('to pull (oneself) together', line 306) as an alternative. The difference between the transitive syntax projected by the patient and the intransitive rsp. reflexive syntax of the doctor's completion amounts to more than just a linguistic clash. While in the patient's turn, the object which needs to be treated with enhanced concentration is the outer world, in the doctor's turn, it is the patient herself. Thus, he still sticks to a psycho-somatic hypothesis, which interprets the patient's symptoms as evidence of a psychological disorder, i.e., of reduced agency or cognitive control (*wer weiß was könnt passieren*, 'who knows what could happen', line 401), i.e., again, as an emotionally caused stress syndrome leading to reduced self-management. The patient, however, holds back ratification (cf. lines 385, 396, 402) and finally makes again clear that the problem lies in her perception of the world (line 403). The doctor's reformulations seem to be guided by his own theory of illness already asserted much earlier (cf. #2, line 236) and the analogy he draws to his own past experiences (cf. #2, lines 239-241), which provide for his *phantasie* ('fantasy', line 386) concerning the patient's problem, rather than by close attention to the details of the patient's descriptions and her uptake of his interpretations.

While the doctor effectively manages to collaborate with the patient in bringing about a more comprehensive and detailed intersubjectively viable description of the patient's experience in lines 350-376 using his imagination, we can see how his claims to formulate details of the epistemic realm of the patient fail to match the patient's turns and do not receive her acclaim anymore starting with line 382. Henceforward, displays of empathy, which were successful hitherto, turn into unsuccessful and unsolicited enforcements of the doctor's perspective on the patient's experience. Still, and this seems to be a most general finding, the patient does not overtly contradict, but rather displays disaffiliation more indirectly by lack or delay of uptake, refusal to expand on the doctor's cues or by reformulating her own prior statements.

Although the doctor afterwards tests the patient's hearing by basic audiometrical measures, he stays with his psychological hypothesis, which became already palpable in the first extract. The doctor does not specifically use keywords like 'curtain' and 'cotton' as diagnostic hints which indicate a severe hearing problem calling for a more comprehensive audiometric ex-

The doctor and the patient pursue two different, and mutually exclusive, lines of interpretation.

In encouraging the patient to provide more details, the doctor takes up her line of interpretation and then turns it into his line of interpretation.

Outcome:
• Doctor prescribes a week's sick leave.

amination or for referral to an ear, nose and throat doctor. He signs her off sick for one week, asking the patient to return, if symptoms have not disappeared after that period.

4. Conclusion

The case study shows how the description of a hearing problem, being a new and bewildering experience to the patient, requires the uptake and cooperation of the doctor to become describable. Collaboration is needed in order to share and elaborate on the individual experience and to make it an intersubjective fact, which can be categorized, described and understood. Still, the study shows that the need for the doctor's active collaboration and empathy in bringing off an intersubjectively viable description also implies the danger that the doctor may prematurely or wrongly assume to know and to take on epistemic authority, which, in fact, intrudes unduly into the patient's territory of self-knowledge. It is important for doctors to become sensitive to subtle signs of disconfirmation and disaffiliation from the patient, because patients tend to be rather indirect in refusing doctors' perspectives. As regards the medical examination, the example shows how doctors may adhere to a specific theory of illness from early on in the encounter, leading them to selectively process and subsume the patient's accounts consistently with their illness theory and to disregard important information speaking to competing diagnoses. This may especially be the case with doctors who are not specialized in audiometry and the treatment of hearing loss and who might not be trained to attend to cardinal symptoms of hearing loss as they figure linguistically in patient's accounts. With respect to audiology and medical training, the case analyzed raises the issue that the patient's description of the sudden change in her hearing sensation warrants a referral to the ear, nose and throat doctor in order to check for a sudden hearing loss or a brain tumor. The case therefore is also indicative for a shortcoming in the curriculum in medical education, where general practitioners themselves have voiced a need for improved knowledge about hearing loss.

Interactional achievements:
- doctor insists and uses asymmetrial relationship to pursue his line of action
- no final agreement is reached

Need for collaboration is not met.

The patient's symptoms warrant an examination by specialists, yet the doctor does not provide a referral.

Application of this kind of analysis to
- medical training
- communication training

Some linguistic observations on testing hearing

Maria Bonner

Diagnostic testing of a person's hearing is central to the selection and fitting of hearing aids. In addition to the pure tone audiogram based on sounds, hearing loss can also be diagnosed by speech perception tests. While the audiogram does not use language and thus tests auditory perception exclusively, it is more difficult to restrict language-based testing to hearing alone. Two central issues observable in current language-based testing for hearing loss may render the test results inaccurate, namely the selection of language materials and the differences between standard and regional varieties of the test's language. These problems need to be addressed in test development by integrating more detailed linguistic knowledge and by considering cross-linguistic differences of the sound inventories of different languages.

1. Hearing, listening, understanding

Hearing means to be able to perceive sounds: "A prerequisite for speech perception is that a sufficient part of the speech signal is above the threshold of hearing" (Fant 2005: 216). In order to test a person's hearing, different audiometry tests using pure tones can be administered to determine, e.g., the threshold of audibility, and the range of frequencies that can be heard. What these tests do not predict, however, is how affected a person's speech perception is by a potential hearing loss. Therefore, speech perception tests have been developed to refine the results from pure tone audiometry tests. (For a survey on the relationship between pure tone audiograms and speech cf. section. 5.2 in Fant 2005). Constructing speech perception tests is not an easy task and I do not claim to have an answer to the question how speech perception tests need to be constructed. Yet what I would like to achieve is, from a linguist's point of view, to draw attention to some of the potential issues related to testing speech perception based on the material in a German speech perception test.

In everyday conversation, the question "Did you hear me?" is a chameleon. It might refer to a person's ability to hear, i.e. the ability to perceive an acoustic event, to the person's attention, i.e., inquire whether the person was actually listening, or it might be uttered to find out whether the person has understood the message. Unless we have reason to believe otherwise, we assume that problems in conversation are based on lack of attention or lack of understanding. Not having heard correctly is only one of the reasons. (A more complex discussion of misunderstanding in conversation is provided by Schegloff 1992.)

Understanding as a complex process involves different types of knowledge. We need world/encyclopaedic knowledge (on how things are, and on how things work), contextual knowledge (regarding a specific situation), and linguistic knowledge (being able to decode an utterance). Trouble in the sense-making process at any of these layers of understanding can, if a discrepancy in meaning becomes overt, lead to what is commonly labelled

Speech tests address the problem that pure tone audiometric testing does not predict how a person's speech perception is affected by hearing loss.

Linguistic problems of speech perception tests are discussed using a test for German as an example.

When misunderstandings occur in conversation, they may be due to different kinds of problems, not only hearing.

as "misunderstanding". Misunderstandings can be covert, too (Corder 1971), i.e., they may remain unnoticed at first, and the discrepancy in meaning may only become obvious after a certain time or by chance, if at all. Misunderstandings as such are by no means restricted to trouble because of hearing impairment, yet an increasing frequency in misunderstandings may indicate that a person's ability to hear is decreasing. Judging the ability to hear speech sounds properly on the basis of a person's understanding or misunderstanding of words or utterances is thus far from being a reliable indicator for a person's hearing.

> A misunderstanding can be overt, or it can pass unnoticed when it occurs.

The question therefore arises how we can infer from what a person understands what this person actually perceives acoustically and whether there is a difference in how people with normal hearing and people whose hearing is deteriorating mishear or misunderstand. To address this issue, concepts from research in second language acquisition might be helpful to classify misunderstandings, namely the distinction between global and local errors (Burt/Kiparsky 1972) on the one hand or systematic errors and more accidental mistakes on the other hand (James 1998: 83). Is it the mere amount of speech perceived (e.g., the percentage of units recognized out of the total amount of presented material)? For a hearing impaired person, distinct speech at a moderate tempo might still offer sufficient cues for how to decode the aural input. In rapid speech with elisions, assimilations or weak forms, the physical substance in an utterance might be too little so that major parts of an utterance become unclear or ambiguous and lead to loss of information as a consequence. Or is it the nature of the phonetic substance of the aural input (i.e., type of phone such as voiceless fricatives, combination of phones such as consonant clusters), that is difficult to perceive? In that case it is crucial to have detailed knowledge of the auditive properties of the individual sounds of a given language that are likely to cause problems and consider their distribution and their functional load in the respective language.

> Assessing the ability to hear speech sounds properly on the basis of a person's understanding or misunderstanding of words or utterances is not a reliable indicator.
>
> - How can we infer from what a person understands what this person actually perceives acoustically?
>
> - Is there a difference between how a person with normal hearing and a person with hearing loss mishear or misunderstand?

What do we know about problems in understanding utterances consisting of more than one word, i.e., connected speech? Listeners have to cope with many factors, such as the speaker's voice, choice of vocabulary and rate of delivery. From second language acquisition we have some knowledge about the difficulties learners encounter acquiring listening skills in a new language. Yet there is neither systematic research on the basic types of problems in decoding aural input in individual languages, their varieties and registers, nor are there comparative studies across languages that might show how these difficulties depend on the phonetic structures of individual languages or varieties to speak of. For example, the difficulties with understanding spoken Danish have been discussed by Grønnum (2003). What we have so far is mainly anecdotal evidence for misunderstanding, often children's lapses (*We three kings of Orientar/'We three kings of Orient are' (example from field notes), *Olaf the other reindeer/All of the other reindeer, *Der weiße Neger Wumbaba/Der weiße Nebel wunderbar 'The white negro Wumbaba'/'The white fog wonderful' (Hacke/Sowa 2004)[1] or the literary description of a hearing impaired person's difficulties in understanding conversation, as e.g., in David Lodge's novel Deaf Sentence, 2009.)

> How does perception differ when a word is provided as a single unit or as part of an utterance in authentic interaction?

In order to understand how hearing impairment leads to mishearing and misunderstandings in interpreting speech events, occurrences of mishearing in authentic conversation need to be investigated with respect to the phonetic substance that hinders decoding parts of utterances correctly.

> Studies on mishearing and misunderstanding in authentic conversation are needed to find out what phonetic substance hinders decoding parts of utterances.

---

[1] Cf. Celce-Murcia (1980: 207), who also pointed out that a "sizable corpus of detailed contextualized errors must be amassed, and it is very likely that the work of the ethnomethodologists such as Sacks, Schegloff, and Jefferson […] would be a useful source to consult in such an undertaking".

Since not only languages but also language varieties may differ greatly with respect to phonetic structure, unambiguous forms, and redundancy, the outcome of each investigation is only valid for the variety investigated and must not be generalized to other varieties or languages. In order to understand the nature of mishearing in a cross linguistic perspective (e.g., the influence of quantity vs. quality, levels of opening of vowels, intensity of aspiration or voicedness) and to make valid assumptions about potential problems, we need to compare the findings in studies of mishearing in different languages.

Bearing in mind the multi-facetted nature of understanding and the plethora of phonetic differences in the languages of the world, we might begin to see why speech perception tests are difficult to develop and why those presently in use have been criticized for not being satisfactory in diagnosing problems in hearing. But even with the more modest goal of taking stock of an individual's ability to identify stimuli via speech audiometry, there are potential problems that people not trained in phonetics and linguistics might not be sufficiently aware of. Although I will mainly discuss German examples in the following sections, the problems as such are not restricted to German but occur in their language specific shape in tests of speech perception in other languages.

> The importance of phonetic and linguistic knowledge will now be demonstrated by examining a German test as an example. Results also apply to other languages.

2. The understanding bias in testing speech perception

Speech perception tests have been developed as a tool to diagnose problems in hearing in a medical setting, yet they actually do test how many of a number of given stimuli a person understands. Ideally a speech perception test should disregard understanding altogether and solely test which sounds or combinations of sounds are heard correctly and which cause problems because of their similarity. (To my knowledge, the only attempt to systematically investigate the perception and perceptual similarity of German consonants is the study by Wüthrich 1974.)

> Ideally a speech perception test should disregard understanding altogether, yet this may be unrealistic.

Impracticable is the method of phoneticians using so-called 'nonsense words' when training to recognize the realm of speech sounds in the languages of the world. Even if we leave aside the question how such a training would have to be designed for a person with hearing loss, it will be far too time-consuming and therefore not a realistic approach to be used in medical contexts. Although the idea is not completely unknown for testing hearing, there is a test type called 'analytic speech test' or 'logatome test'. It uses so-called 'logatomes', i.e. non-existing words or syllables that might be words of a given language because they are constructed following the rules for the phonetic structure of a language. For a more detailed description cf. the NATASHA homepage (Verschuure 2000).

The considerable amount of variation in language is another factor that is difficult to match in a test situation. Speech sounds and their relevant phonemic distribution vary considerably between languages. Tests developed for a particular language are intrinsically based on the sound system of that language; they reflect the relationship between speech sounds and other parts of the linguistic system (morphology, syntax) and, depending on the test format, orthography as well.

> Designing an audiological speech test needs to address the considerable variation within a language.

Another challenge for developing adequate hearing tests is variation within a given language. Even for languages that have a recognized standard written language, we can by no means assume that this leads to a standardized norm of pronunciation. A brief look at the definitions of standard pronunciation for German, Danish, and Norwegian makes this obvious: In Germany there is the notion that professional speakers model the norm of pronunciation, in Denmark the national pronunciation standard is defined as that without prominent regional traits; in Norway the general rule is to follow codified norms when writing but to keep to the dialect/regional vari-

> Countries vary in the criteria they choose to decide politically what the standard language is.

ety when speaking. In Germany where there is a codified norm of pronunciation, the so-called *Standardaussprache* (Duden-Aussprachewörterbuch, 2006, p.29ff), this norm represents a model of a pronunciation on the basis of written Standard German, used, e.g., in the training of new speakers, it is not a description of an existing variety of German. Depending on where in Germany a person lives, very little aural input might actually be delivered in the standard variety in everyday conversation. (Cf. Meinhold 1973: 53, who has given examples how the underlying variety leads to different assimilations and elisions and to different forms in connected speech in the greeting *Guten Abend* ('good evening').) What conclusions can we draw as to a person's ability to understand connected speech in the local or regional variety he or she is normally exposed to if the test items in a speech perception test are presented in the standard variety?

The last linguistic bias to be mentioned here concerns the selection and presentation of the stimuli as well as the test person's recorded responses to the test items. I will briefly sketch some of the underlying problems connected with the "Freiburger Worttest" (DIN 45621, in the following "FWT"), which is widely used in Germany.

The above mentioned problems are now illustrated with a widely used language recognition test, the "Freiburger Worttest" ('Freiburg word test') ("FWT").

3. Selection and presentation of stimuli: The bias of the test material

I will restrict myself to discussing word level testing. Tests at sentence level are even more complicated to develop. They have to take into account not only the phonetic and phonematic structure of a given language but also syntactic probability of certain structures, semantic plausibility, redundancy, etc. Thus in the so-called "Oldenburger Satztest" the test item *Peter schenkt fünf grüne Bücher* ('Peter gives as present five green books') is syntactically awkward, since the verb *schenken* ('to give as a present') normally requires the recipient in the dative case. For the principles of this test, see Hagermann (1986), for the German version Kliem (1993).

In selecting test items for the word list, the FWT does not sufficiently reflect
- frequency
- functional load
- the entire inventory of phonemes
- register
- regional differences in vocabulary

The test most widely used in Germany for testing speech perception is a test at word level, constructed to represent the German sound system in a balanced way. It consists of sets of ten 2-digit numbers; a number of rows of twenty monosyllabic nouns each. Every row of words is supposed to be equally difficult. The recorded test items are played to the test person, leaving a pause for repeating after every item. The test person's answers are rated either 'right' or 'wrong' by the testadministrator.

There is no doubt that the value of testing isolated words for diagnosing hearing loss as such is limited. The value of a testing tool, nevertheless, depends on an appropriate selection of test items. In the FWT, the selection of test items is phonemic, it is based on so-called 'minimal pairs', e.g., pairs of words like *cat* vs. *hat* in English. Although phonemes are based on the sounds of a language, they do not necessarily represent the actual phonetic substance of a sound precisely but are the smallest units of a language that differentiate meaning. And, as Dogil (1993) has shown, even in very similar neighbouring dialects the same phoneme can have different acoustic realizations. Neither frequency, functional load, regional distribution of vocabulary, nor register have (as far as I can tell from an analysis of the word lists) been taken sufficiently into account when choosing test items. Some of the items are not likely to be part of every tested person's vocabulary, some seem dated, a drawback already mentioned in the audiological literature, e.g., Lehnhart (1996) or Kießling (2000), but has not led to a revision of the FWT[2]

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[2] A potential basis for a European standardization of tests has been created in the project NATASHA (Verschuure 2000). The project's homepage describes tests and test procedures used in Europe. Inventories of the sounds of 17 European languages were compiled by J.C. Wells, professor of phonetics at University College London.

yet. Furthermore, most people will be hesitant to repeat a word they are not familiar with, even if hearing proper is not a problem.

Looking at the structural level solely, we have to conclude that not all phonemes are included:

- There are no test items with a short or long high front rounded vowel as in *hübsch* 'pretty' or *süß* 'sweet'.
- There are no test items with a long lower mid front unrounded vowel as in *rät* 'gives advice'.
- There are no test items that contain the sequence of voiceless dental plosive and palato-alveolar sibilant as in *Matsch* 'mud'. (The question whether we should assume one phoneme (affricate) in the end of the word or two can be left aside in this context because it has no consequence for the actual pronunciation.)
- Sounds of the peripheral phoneme system of German, certainly not rare in educated speech, are omitted, e.g., the nasal vowels in a number of loanwords from French (as in *Restaurant* 'restaurant'), the voiced palato-alveolar sibilant as in *Journalist* 'journalist' or preceded by a plosive as in the English loan *Job* 'job'.

Since the test material only contains monosyllabic words, some features of the sound system are not tested at all. This concerns especially unstressed syllables containing schwa in word final position or before consonant where schwa 'reacts' with /r/, /l/, /m/, and /n/. In this position, /r/ disappears lowering the schwa (*Wasser* 'water')[3], with /l/, /m/, and /n/ the schwa is dropped and the consonants become syllabic after certain consonants (*Mantel* 'coat', *leisem* 'quiet', dative case, *Boden* 'floor'). The restriction not only to monosyllabic but also to non-inflected words leaves a number of consonant clusters as possible sources of hearing problems untested. Clusters of three or more consonants such as, e.g., /rkst/ (*merkst* 'notice', 2nd person singular) or /mpfs/ (*Strumpfs* 'stocking', genitive singular) might be more demanding to decode than less complex combinations. The same applies to compound words, where word final and word initial clusters at the juncture might add up to consonant clusters of considerable phonemic complexity, e.g. /pstkn/ (*Obstknödel* 'fruit dumpling'). The mere length of a compound word might help to eliminate ambiguity on the one hand. Yet, phonetic simplifications (assimilation, elision) in these clusters in connected speech might lead to difficulties in understanding nevertheless.

A last general remark on the drawback of the selection of single words as test items concerns prosody and weak forms. The pronunciation of words is not independent of their position in an utterance. Single word pronunciation does not only tend to be more distinct than the pronunciation of the same word in connected speech; in connected speech unstressed words become less distinct. Elision (*zeig! < zeige!* 'show', imperative singular; the voiceless plosive in the shorter form being more difficult to hear than the voiced counterpart in the longer form), assimilation (*ham < haben* 'to have'), or clitics (*haste < hast du* 'have-you') can change words significantly. Whether and how these features of connected speech contribute to mishearing needs to be shown in studies of authentic conversation.

Also sentence intonation and stress patterns have an influence on the pronunciation of words in connected speech, giving syllables or parts of utterances more prominence in terms of loudness, duration etc. It might be revealing to compare the effect of different intonation patterns across languages and to find out how (mis)hearing differs in languages with wide intonation contours such as British English and languages with rather moderate differences in pitch, e.g., Icelandic or Finnish.

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[3] This has led to establishing 15 additional diphthongs in the NATASHA-inventory of German vowels.

Some phonemes are not included:
- short and long high front rounded vowel
- long lower mid front unrounded vowel
- succession of voiceless dental plosive by a palato-alveolar sibilant
- sounds from high frequency loan words

Only words with one syllable are tested. This excludes some pronunciation features regular to the language.

Words are pronounced differently as single items and in connected speech.

A comparison of the individual rows of words in the FWT reveals that there is an uneven distribution of the phonetic structure of words in the different rows, particularly with respect to consonant cluster, where /pfl/ only occurs in two of the twenty rows of test items (row 8 *Pflug* 'plough'; row 17 *Pflock* 'peg'). A similar imbalance can be observed for the sequence of /a/ or /a:/ followed by /r/. Whereas some rows contain one item with each sequence (row 2 /a:r/ *Bart* 'beard', /ar/ *Mark* 'marrow'), others contain one item with either long (row 7 /a:r/ *Star* 'starling') or short (row 20 /ar/ *Park* 'park') vowel, some contain two items with short /a/ (row 9 *Markt* 'marked', *Sarg* 'coffin'), others contain none of them (e.g., row 10 and 14). The distribution of stimuli with voiced and voiceless plosives does not seem to be systematic. Some items with /p,t,k/ or /b,d,g/ followed by a consonant (row 11 *Kreis* 'circle') might be misinterpreted simply because there is a similar competing word (*Greis* 'old man'). In other cases, there is much less possibility of scoring wrongly because the test item cannot be part of a minimal pair (row 4 *Griff* 'handle' vs. *Kriff*). The selection of stimuli gives the impression that it was rather based on orthography than on phonology and phonetics.

> There is an uneven distribution of the phonetic structure of words in the different rows.

Test material should not only represent the sound system completely, it must also take into account the distribution of the actual allophones of a phoneme, when they differ substantially in their phonetic substance; this is the case of the phoneme /r/ in German. In Standard German pronunciation, /r/ has a consonantal allophone initially, which shows considerable variation (apical trill, uvular trill, velar or uvular fricative), and non-initially before vowels. The different variants are certainly different in perceptive prominence. The test material contains the stimuli *Schnur* 'string' and *Kork* 'cork'; in the first case, in standard pronunciation, /r/ is pronounced as a nonsyllabic vowel (after a long vowel, resulting in a diphthong), in the second case, after a short vowel, /r/ will be pronounced as a fricative in very formal or very distinct speech, or as a nonsyllabic vowel in less formal, yet still distinct speech (resulting in a diphthong with the preceding short vowel).

> The selection of test materials should
> - represent the entire sound inventory
> - account for allophonic distributions

Another problem concerns the pronunciation forms we are familiar with, a problem only occasionally mentioned in the literature on speech audiometry, as e.g. Richter (2004: 14), who used a sentence test in a slightly Bavarian colored version of standard pronunciation. In German standard pronunciation, the test item *Pflug* 'plow' is pronounced with an initial /pf/, whereas in a number of varieties of German and in connected speech the initial consonant cluster /pf/ is in some varieties reduced to a single consonant /f/ thus becoming homophone with *Flug*. In our day and age, the resulting *Flug* 'flight' might be what many people are more inclined to understand when they hear the test item. Topic and redundancy of messages in normal interaction will most likely take care of 'mishearing' of this kind. Rendering *Pflug* as *Flug* nevertheless counts towards a negative score in the test.

> Regional rules of pronunciation may lead to biased test results.

A difficulty mainly related to regional pronunciation of certain sounds is posed by the test item *Docht* 'wick'. In those parts of Germany where /r/ is commonly pronounced as a voiceless fricative this item might easily be understood as *dort* 'there'. To assume that people are aware that all test items are intended nouns, might be too optimistic for a general public's familiarity with grammar, especially since there are a number of homophones in the test rows, i.e. test items that can be decoded either as nouns or belonging to other word classes (e.g. in row 6 *Feld* 'field' or *fällt* 'to fall', 3rd person singular present tense).

The last comment in this section concerns the speaker's pronunciation in the recording of the test. The FWT presents a rather artificial pronunciation including some peculiarities. More than once I was puzzled by the pronunciation I encountered when listening to the complete test material.

> The test items are presented with artificial pronunciation and with some peculiarities.

While few items did not strike me as articulated particularly distinct, most came across as unnaturally distinct to such a degree that I found them hard to understand out of any context. This observation is in line with Kießling's caution (2000: 633) that the pronunciation appears outdated and unnatural ("Die Aussprache ist technisch veraltet und weist eine übertriebene Artikulation sowie eine unnatürliche Pegelregulation auf"). The most striking case of awkward pronunciation is perhaps the item *Spiel* 'game', not pronounced as monosyllabic with a monophthong but with a falling diphthongal glide towards schwa, thus resembling the bisyllabic manner in which speakers in the Cologne area might pronounce *Spiegel* 'mirror', the slight velarization of the final consonant adding to the impression of this distinctly regional pronunciation. This pronunciation of the stimulus might induce the test person to identify the item as *Spiegel* ('mirror'), which in real conversation may well be in the realm of possible interpretations of what has been heard. In terms of the intended stimulus, however, this is a wrong identification. It still needs to be investigated to what degree misleading pronunciation of stimuli affects the overall outcome of the test.

Kießling (2000: 633) cautions that in this test the pronunciation is outdated, overarticulated and the volume is altered in unnatural fashion.

It needs to be investigated to what degree misleading pronunciation of stimuli affects the overall outcome of the test.

4. Documenting the results: Some more potential pitfalls

When we turn from the person taking the test to the person administering it, we encounter potential problems in the way the results of the test are evaluated and documented. Common practice is that the tested person repeats the words he or she has heard. The person who administers the test evaluates whether the answer is right or wrong. At this point, regional variation or register in pronunciation might have an influence on the outcome. The tested person might have identified the above-mentioned stimulus *Pflug* ('plough') properly, yet repeats it with a regional or colloquial 'residue' in his or her pronunciation as *Flug* ('flight'), and in consequence will score poorly. One of the stimuli in the test is *Blatt* 'leaf'. In regional varieties of German where the distinction between /p/ and /b/ before consonant is neutralized (e.g., in a large part of the central German dialects), this might lead to confusion. Even people without a hearing impairment have difficulties differentiating between /p/ and /b/ in those areas both in perception and production; they will pronounce *Blatt* 'leaf' and *platt* 'flat' alike as [blat] or [plat], the latter being a frequent hypercorrect form for *Blatt* to compensate regional neutralization of the opposition in Standard German. And of course, the same potential bias rooted in regional variation applies to the administrator of the test when evaluating the answers of the tested person. For evidence with respect to the perception of plosives, compare Barry/Pützer (1995: 63), who describe that, based on their own articulation, speakers of two varieties in the Southwest of Germany interpret plosives differently ("daß die von den Sprechern des Moselfränkischen produzierten Lenisplosive weniger 'lenis' sind und daß die Sprecher des Moselfränkischen stärkere Lösungen noch als 'Lenis' einstufen, die von den Sprechern des Rheinfränkischen als 'Fortis' empfunden werden").

Problems in test administration:
• When the test person repeats a test item to the test administrator, regional variation or register may have an influence on the pronunciation and may lead to incorrect coding.

In order to avoid interference from the test administrator, it has been suggested that the test person ticks off the right answer in an answering sheet (cf. Tschopp 1992, who compared open and closed answering possibilities). Besides the fact that the options given in an answering sheet restrict the realm of mishearing ('it has to be one of these'), answering sheets have to be developed by people who have an expert knowledge both of the sound system of a language and of the correspondences between letters and sounds. Otherwise the results will be completely unreliable. In Tschopp's test people were asked to decide whether they had heard (among other possibilities) the stimulus *Rad* 'wheel' or *Rat* 'advice'. Tschopp was obviously igno-

Testing needs to consider phonemic and phonetic representation.

rant of the fact that both words due to devoicing of plosives in final position, the so-called *Auslautverhärtung*, are homophones in Standard German.

5. Instead of a summary: Linguistic issues to be taken into account

Tests supposed to diagnose trouble in speech perception need to be based on the sound system not only at the phonemic level but at the phonetic level as well. In this respect the discussion of speech perception in the audiological literature lacks a desirable amount of linguistic and phonetic expertise when it comes to discussing linguistic issues. This becomes obvious, e.g., when Stock/Knoblach/Heller talk about "/s/-Anlaut" and do not discuss the issue of voiced vs. voiceless s-sound. One may hope that the phonetic expertise included in the NATASHA-project will become the model for good practice.

In sum:
For selecting test items the linguistic regularities need to be taken into accout, in particular:

- not only phonemic but also phonetic variation must be taken into account

Languages with a large overall number of sounds are potentially more difficult to understand than languages with a rather limited overall number of sounds. Danish with it's over twenty monophthongs and close to twenty possible diphthongs is more of a challenge than Greek with five or Italian with seven vowels only. The more 'crowded' the system is, the more difficult it will be to identify and keep apart the individual sounds not only in those areas where high frequency causes trouble in perception. Languages with many (clusters of) voiceless fricatives and sibilants (e.g., German, with /f, s, ʃ, ç, x, h/ or Polish with /ɕ/ in addition), especially if these are centered around the area where hearing depends on the ability to hear high frequencies, are more likely to be difficult to decode than languages with few voiceless fricatives and only one sibilant (e.g., Finnish with only /f, s, h/). This is relevant since according to the "speech banana" especially [s, f, h] are particularly difficult to hear, followed by other voiceless fricatives. The banana-shaped depiction of the formant regions within the range of an audiogram of speech sounds (reprinted in Fant 2005: 4), which is often used to illustrate problems of speech perception, goes back to the work of Gunnar Fant on Swedish in the forties and fifties. Cross linguistic studies of hearing impairment might help to clarify how the sound system relates to hearing problems. (For a cross linguistic study on differences in the perception of vowel length, cf. Lehnert-LeHouiller 2010).

- the quantitative and qualitative differences in the sound inventories of different languages

From foreign language acquisition we know that languages differ in the problems they pose for decoding aural input. The more sounds tend towards neutralization in words or phrases and result in similar or identical phonetic surface, the more difficult the decoding will become due to ambiguity. Languages with many homophones will thus be more difficult to decode than languages with fewer homophones. Syllable structure, word or sentence stress are other factors that affect hearing and understanding. A language in which syllables as a rule are pronounced with rather little difference between stressed and unstressed syllables in a word (e.g., Finnish) might pose other problems than languages where the syllables in a word differ significantly in prominence or where unstressed syllables show a wealth of weak forms or disappear completely (e.g., Danish).

- differences across languages in the resources for decoding language

Testing isolated words does not take into account what really happens when trouble in interaction occurs but is mainly based on trouble caused by mishearing a single word. If tests are supposed to help understand or diagnose trouble hearing impaired persons encounter when identifying and differentiating individual sounds, they need to be constructed in such a way that they do not rely on understanding. One way of doing this might be to embed the test item in utterances such as "Did you really say (test item)?" or "He really said (test item)?" In this kind of format, even non-existing words, which in a logatome test might be too puzzling, could be inserted as test item in an acceptable context.

- differences in pronunciation of the same item when produced in isolation or in connected speech

As a prerequisite for constructing tests in such a way that they are focused on the specific problems of hearing impaired persons, we need to investigate how much their misunderstanding of connected speech differs from the misunderstandings that persons with normal hearing might experience. Another prerequisite for tailoring the tests more specifically are investigations of perceptual similarity of sounds in general as done by Wüthrich (1974) for German or for Chinese in a more recent study by McLoughlin (2010).

Language does not come in isolated words or in a vacuum; sounds may vary considerably in connected speech (even in news broadcasts read by speakers trained in Standard German pronunciation as I have shown in Bonner 2011), and morphophonemic variation can change pronunciation significantly. As a consequence, the pronunciation of inflected forms and words in connected speech must not be neglected. Furthermore, the question arises how representative the understanding of isolated words in distinct standard pronunciation is for understanding connected speech containing weak forms and regional colloquial pronunciation. Admittedly, the actual degree of variation of forms in connected speech might be far too manifold to be included in tests, especially if regional variation is to be taken into account as well. Nevertheless, investigating its effect on identification of sounds might help to understand better where trouble occurs. From foreign-language acquisition we know that the varying forms of connected speech as well as weak forms are often harder to understand than distinct canonical forms. We may safely assume that this applies to people with a hearing impairment, too.

The same is true for the wealth of regional variety in pronunciation in many languages, leaving variation in other parts of the language system aside. We may certainly assume that most people in Germany are familiar with Standard German pronunciation from news broadcasts in the media, yet Standard German is not what they hear in most situations of their daily life. We must not deduce that a person who scores highly in a test based on a standard variety of a language will in fact be able to cope equally with other varieties of that language. If certain varieties of a language are more difficult to decode than others, this will surely affect hearing and understanding. The question therefore arises what the existing standardized tests really measure. Do they measure how much people hear and/or understand or are they a tool to estimate costs and benefits for the medical system; e.g., are the results of the tests used as the basis for deciding whether a person's health insurance will pay for a hearing aid or not?

Constructing valid speech perception tests takes a lot of expertise from various disciplines. The effort is worth while, because with appropriate testing we might learn which sounds or sound combinations are difficult to hear and how we might adapt our speech in the interaction with hearing impaired persons. Only with the joint expertise from linguists, audiologists and last but certainly not least those who have to cope with a hearing impairment might we be able to get a more differentiated knowledge of the whole complex of hearing and understanding.

- differences between weak and distinct canonical forms

A person who scores highly in a test based on a standard variety of a language may not necessarily be able to cope equally with other varieties of that language.

Desideratum: A collaboration of linguists, audiologists and persons with hearing impairment can yield a more differentiated knowledge of the complex of hearing and understanding, thus providing a basis for test development.

Hearing aid adjustment: Translating symptom descriptions into treatment and dealing with expectations

Trine Heinemann, Ben Matthews and Pirkko Raudaskoski

Conversation analytic research on clinical encounters shows that interactional conduct can be consequential for diagnosis, treatment and compliance. Problems reported for doctor-patient interaction can also be identified in Danish audiological encounters. There are, however, also specific aspects to the interaction during hearing aid fitting. This report of a Danish pilot study describes two such problems. The first problem arises from the requirement that the audiologist needs to 'translate' the patient's subjective hearing description for making technological decisions. The second problem is the way in which the hearing aid user's implicit and often unrealistic expectations are handled. This kind of research has potential application for developing a model of best practices.

1. Introduction

Within the field of Conversation Analysis ("CA"), the study of medical interactions has a long history and has been applied to a range of medical settings, including general practice consultations, pediatric consultations, HIV-clinics, psychotherapy, neurology, epilepsy and encounters between pharmacists and patients (cf. Deppermann, ch.10, this volume). CA studies have thus so far, and successfully, illustrated the importance of interaction in clinical encounters, not just because of the fact that it is through interaction that social solidarity is established, but also, and perhaps more critically, because the way in which interaction is organized and conducted in a clinical encounter can be of great consequence for the diagnosis and treatment of a patient's illness and can ultimately affect matters such as patient participation and patient compliance (Collins et al. 2007; Stivers 2007). Whilst audiological encounters are, as yet to our knowledge, unexplored, it is clear from the Danish pilot study reported here, that many of the issues that have been identified in other medical settings are also of relevance in audiology. Our first explorations into the data, however, also suggest that audiology is a distinctive site of clinical interaction, for instance, with respect to the way in which medical professional rights and responsibilities can be negotiated in these encounters and the range of experimentation with treatment that is possible in these encounters (Heinemann/ Matthews forth.). In the following, however, we focus on two other issues that have surfaced from our study, namely (a) the problem faced by audiologists when trying to translate a patient's symptom description into a treatment, and (b) how audiologists seek to address hearing aid users' implicit and often unrealistic expectations towards their hearing aid.

Patient participation and compliance is significantly affected by how doctors and patients communicate.

This additionally applies to audiological encounters, while there are also specific issues.

This paper reports on the need to translate the patient's symptom description and unrealistic expectations concerning hearing aids.

2. Data

The Danish data consist of nine video-recorded interactions between an audiologist and nine different patients. The consultations were recorded over a period of a week in an audiological clinic in the north of Denmark. The clinic

Data:
Nine audiological encouters

where we collected our data was privately owned by the audiologist doing the consultations. There are some differences between public and private clinics which may be relevant for our analysis. At the time at which the data were collected (2008), the Danish public health insurance covered a maximum amount of approximately 6000 DKK per hearing aid for patients who acquired a hearing aid in a private clinic. The costs of a hearing aid (including fitting, adjustment and general service) ranged from around that amount up to 18000 DKK per aid, meaning that it was certainly possible for a patient to acquire an aid without having to pay for it himself or herself, but that more sophisticated aids acquired in a private clinic could cost the patient a substantial amount of money. (Due to the rules of the Danish healthcare system, if the same aid were prescribed in a public clinic, the full costs would be covered by public health insurance).

The audiologist in this clinic, in addition to prescribing aids as part of the public health insurance, also offered other services, such as adjusting the fitting and settings of hearing aids acquired at other clinics, at a fixed price to be paid once the patient was satisfied. Consequently, patients came into the clinic with a broad range of issues for the audiologist to address and can in many respects be thought of as 'customers', whose needs and requirements are to be met in order for them to be satisfied with their treatment and ultimately in order to ensure that the audiologist is paid and that the customers return. For ease of reference and because our data were collected in a clinical setting, however, we refer in this paper to the hearing aid users as 'patients'. We are aware that in doing so, we are to some extent categorizing the participants in ways that are not always (interactionally) relevant to them.

The audiological clinic offers hearing aid fitting and adjustment at a fixed price until the client is satisfied, even when coming from a different clinic.

During our week of data collection, we also observed the general work-practice in the clinic and conducted informal interviews with the staff in the clinic (the audiologist and a receptionist) as well as with several patients. Informed consent was obtained from all patients as well as from the audiologists. We did not, however, collect any ethnographic or medical background information from the patients, both because this was outside the scope of the pilot study, and because this would be problematic for ethical reasons. Instead, as is usual in the tradition of Conversation Analysis, we chose to focus on the information that is made available to us by the participants in and through their interactions with each other. From this we have gathered, among other things, that hearing aid users comprise a number of different types of patients, ranging from those that visit the clinic simply to have their hearing checked, to new patients with age-related hearing loss who are about to be prescribed their first hearing aids, and patients with a long-term hearing loss who are either about to be prescribed a new hearing aid, who have technical problems with some of the hearing aid equipment, or who have sought out this particular clinic in order to get their current hearing aid adjusted.

Data collection includes
- *video tapes of naturally oc-curring audiological encoun-ters*
- *ethnographic observations*
- *informal interviews*

The data comprise encounters with a range of patients and reasons for the consultation.

The audiological consultations in our data are sequentially organized in a similar fashion to that of other clinical settings, beginning with a problem presentation from the patient, a description of symptoms interspersed with 'diagnostic' questions from the audiologist (cf. Deppermann, ch.10, this volume). Typically, this is followed by an 'examination' in the form of the audiologist testing the patient's hearing or the hearing aid itself, depending on the problem described. Subsequent to this, a diagnosis is made and the audiologist attempts to treat the problem, either through adjusting the settings of the hearing aids, changing some physical part of the aid (changing wires, remolding plugs, applying lacquer to the plug, drilling bigger holes in the plug), after which a new testing sequence is initiated. As patients often present more than one problem, this process is often iterative; a single consultation may exhibit this sequence two or three times before

The audiological encounter to be analyzed follows the same sequence as other clinical settings.

the consultation comes to an end. In the following analysis we investigate in more detail how problem presentation and its subsequent responses can appear.

3. Translating symptom descriptions

Studies of symptom description in other medical settings have illustrated that crucial information can be gathered from such descriptions, information that may even serve to identify a patient's illness in a more accurate and expedient manner than through traditional medical tests (Gülich/Schöndienst 1999; Schwabe et al. 2007; Reuber et al. 2009; Gülich, ch.15, this volume). But one of the problems that people who seek medical help often encounter is that they have to rely on their own ability to verbally describe their symptoms in order to get a diagnosis and a treatment (see also Deppermann, ch. 10, this volume). In audiology, patients' problems concern matters such as sounds they cannot hear, the sensations they experience and the strange quality of the sounds they do hear. These symptoms are neither visible, nor do they necessarily occur during the actual consultation, hence treatment is entirely dependent on the patient's description and the audiologists' understanding and interpretation of this description. While the same may be the case in other medical contexts where patients have to describe a particular kind of pain or other sensory matters, patients in audiology are further hindered by the fact that the lay vocabulary for sound is rather poor (compared, for instance, to our vocabulary for vision), which exacerbates the difficulty of patients' task to adequately describe symptoms in relation to hearing. In practical terms, this means that individual patients using terms such as 'sharp', 'loud' and 'high' may not mean the same thing with these terms and do not have the same underlying problems. In a situation where the audiologist needs to adjust a hearing aid to address the patient's symptoms, the impoverished vocabulary and its practical application by different patients may thus cause troubles in determining what adjustments to make.

The following two examples illustrate how crucial a patient's description of symptoms can be for the treatment outcome. Here, a patient has come into the clinic to get further adjustments to a newly acquired hearing aid. The patient has already introduced two complaints and the audiologist, in response to this is now about to initiate the examination phase and has moved to the patient to connect the hearing aids to the audiological testing equipment before inserting the aids into the patient's ears. This move is illustrated in Figure 10. Figure 11 illustrates how the patient then moves slightly away from the audiologist before initiating his third complaint (shown below), thus both verbally and physically displaying that he was after all not finished with the problem presentation and that the audiologist's move towards the examination phase is premature.

First problem:

Patients' symptom descriptions are crucial for treatment because auditory sensations are
- not directly accessible to the audiologist
- not visible
- do not necessarily occur during the consultation

The linguistic resources are poor for describing how sounds are perceived.

One patient describing a hearing problem as 'sharp' may not mean the same as another patient using the same word.

Patient resists moving from his problem presentation to the audiologist's examination.

Figure 10: Symptom description. Audiologist moves towards patient to insert the hearing aid into the ear.

Figure 11: Sympton description. Patient moves head away from audiologist before presenting another problem.

#1a

```
001 Pt:   >.hh< Å' så har der været e:h >.hh< (0.1) no'eteh
          (.)skurren,
          >.hh< And then there's been e:h >.hh< (0.1) some eh
          (.) grinding,

002       >sommetider< når man
          ((laver tyggebevægelser))
          >sometimes< when you
          ((makes chewing movements with jaw))

003       *ø:hh*
          *e:hh*

004       (0.5)

005 Au:   ↓:hm: >Ja når du bevæger munden,<
          ↓:hm: >Yes when you move the mouth,<

006 Pt:   Ja.
          Yes.

007 Au:   eller hva';
          or what;

008 Pt:   J[a.
          Y[es.
           [
009 Au:   [.hh Altså det ka' godt være lidt
           nu fordi det er så varm.
          [.hh Well that can very well be
           now because it's so hot.

010       (0.3)

011 Au:   .hh[p Så sveder man lidt mer'        i
          øre[ne så ka' man m[ærke
          .hh[p Then you sweat a little bit more in the
           ea[rs then you can [feel
             [                [                [
012 Pt:   [Jah.         [Ja.         [Ja.
          [Yes.         [Yes.        [Yes.

013 Au:   det lidt mere. h[hh
          it a bit more. h[hh
                          [
014 Pt:                   [Jerh.=
                          [Yeah.=

015 Au:   =Det' det samme me: me- lissom me' brillerne.
          =It's the same wi:th wi- like with the glasses.
```

lines 1-3:

Figure 12: Patient's physical description of symptoms

Gesture achieves
- nonverbal description of sound perception
- stops audiologist from inserting wire in patient's ear
- resists moving from symptom description to examination

lines 9-15:
Audiologist
- translates patient's description into medical terms
- compares hearing aids with eye glasses

In lines 001-003, the patient describes his symptoms when moving his jaw, as resulting in a 'grinding sound'. At the same time, he illustrates the symptoms further through gesturing with both hands in front of his ears (see Figure 12). By doing this, the patient also hinders the audiologist from putting the wires into his ears. The patient also glances at the audiologist (something he seldom does in this extract). In this multimodal context, the hand gestures are multifunctional in this pre-diagnostic phase with technological equipment: The patient can convey the nature of the sound (visually describe the nature of the sound) and stop the doctor from doing the next step in the institutional routine. Both functions accentuate that the patient finds the piece of information he is delivering important and that the doctor should stop and listen.

As can be seen from the audiologist's response, he appears to have no problem translating this description into a diagnosis (or at least a cause), which is that 'grinding' occurs as a result of the patient sweating more inside the ears because of the warm weather and the sweat, presumably causing some sort of friction with the hearing aid plug, which in turn results in the grinding noise. This medical, professional 'translation' of the patient's description is delivered in lines 009-013, whereafter the audiologist furthermore delivers an analogy, comparing the problem with the hearing aid to a similar problem one might have with glasses. The diagnosis given by the audiologist in this example is a no-treatment diagnosis, which defines the symptoms as a temporary and 'undoctorable' problem. All this is a result of the audiologist's interpretation and translation of the patient's symptom description, and in particular the patient's use of the term 'grinding' to describe the sound or sensation that is troubling him.

> Audiologist's 'translation' results in a no-treatment diagnosis, which defines the symptoms as a temporary and 'undoctorable' problem.

Without access to the medical data and with our lack of audiological training, we cannot make any medical claims as to whether the audiologist here interprets and translates the patient's symptom descriptions correctly or not. But then we do not need to, because at a later stage in the consultation, the patient himself makes the claim (implicitly) that his descriptions was not understood correctly by reintroducing his complaint (see example #1b below). As we will show, example #1b furthermore indicates that an incorrect (and not just unsatisfactory) diagnosis has been made and that this was caused by the patient's use of the descriptive term 'grinding' and the audiologist's interpretation of that term.

> In response to the audiologist's diagnosis, the patient claims that the diagnosis is unsatisfactory and incorrect (cf. #1b below).

Example #1b begins at the point at which the audiologist has been engaged in adjusting the aid to solve one of the other complaints of the patient. The audiologist has shown that he is finished with this phase by first turning away from the computer monitor on his left while saying 'okay, good', then adjusting the keyboard to a 'neat' position, and finally getting up from his chair saying 'yes' while moving the caps for the ear pieces to the right on the table for easy access. He is thus creating the best 'instrumental stance' (Goodwin 2007) for his next action, which is to remove the wires connecting the aids to his computer, thus displaying to the patient that the adjustment activity is about to be over. At the point at which the audiologist has removed both the aids from the patient's ears, the patient gestures with his left hand that he is going to say something. He reintroduces the original complaint that was previously estimated to be a non-treatable problem. The audiologist's practical task with putting the test equipment away gives the patient space to continue to discuss the problem.

#1b

```
001 Pt:   Men hva' så, (0.3) det der me::h (1.5)
          But what then, (0.3) that thing with:h (1.5)

002       ((Au sits back down, packing away the ear pieces))

003 Au:   Kr hm[mm

                [
004 Pt:       [me' de lyde så'n l-
              [with those sounds like l-

005 Pt:   ((moves his hand up and down next to his left ear))

006       (1.1)
```

> Patient reintroduces the original complaint that the audiologist previously diagnosed to be a non-treatable problem.
>
> Patient's description is characterized by
> • hesitations
> • pauses
> • self-repairs

```
007 Au:    >Me' hva'ffor n[o'et?<
           >With       w[hat?<
                       [
008 Pt:                [Når'm' bevæger [(0.2) ø:h
                       [When you move  [(0.2) e:h
                                       [
009 Pt:                                [((moves hand up and
                                         down))

010        [(0.8)
011 Pt:    [((makes up and down movements with mouth))

012 Au:    .hh[hh
              [
013 Pt:    [D- der kommer (n-[ å-)
           [Th- there's some ( [    )
                               [
014 Au:                        [a' det sk- (0.8) gnaver
                               [that it gr- (0.8) gnaws

015        eller:[ skawer eller:;
           or:   [ grinds or:;
                 [
016 Pt:          [Nej eh::: al's- Nej du ve'
                  eh >me' a' der somme tider kommer< (org)
                 [No eh::: we- No you know
                  eh >that there's sometimes< (org)

017        no'en ly'e når man  [(1.0)
           some sounds when you [(1.0)
018 Pt:                        [((moves his jaw))

019 Au:    h: et hyl?
           h: a squeak?

020 Pt:    Ja.
           Yes.

021        (0.5)

022 Au:    Hyler det?
           It squeaks?

023        (0.2)

024 Pt:    Ja sommetider >du ved< kommer der (0.5)
           så'n (.) en mærk'li' lyd
           Yes sometimes >you know< there's (0.5)
           like a (.) a strange sound

025        så'n når man-
           like when you-

026        (1.6)

027 Au:    Okay,
```

Audiologist signals trouble in understanding the patient's turn.

Patient uses the same practices as before.

Patient adds mouth movements to further describe the problem.

Audiologist produces a candidate understanding of the patient's description, using lexical items more in line with his earlier diagnosis.

Patient corrects audiologist's candidate understanding and uses lexical items in line with his own earlier description.

Audiologist produces another candidate understanding, again in line with his own earlier diagnosis.

The participants are now back into the previously completed diagnostic mode.

Though the patient this time describes his symptoms in other terms than 'grinding', we can see that he has problems finding the right words (hesitations, pauses and the like) and instead chooses the more generic term *de lyde* ('those sounds', line 004) and a non-verbal explication (moving his left hand up and down). In line 005, the patient further tries to convey the quality of the sound with one longer upward movement, followed by two shorter up-down movements. That the audiologist also has problems understanding what the patient means is evident by his repair initiation *me' hva'ffor no'et?* ('With what?'*)* in line 007, but when the patient responds to the repair in lines 008-013, he merely reutilizes the same practices as before, i.e., a non-

verbal expression with the hands in line 009 and a partial reference to *de lyde* ('those sounds').[1]

In addition, he further seeks to illustrate the context of the problem by opening and closing his mouth (line 011). At this point, the audiologist appears to realize that this is a return to the patient's previous complaint and shows this through producing a candidate understanding in lines 014-015. In this candidate understanding the audiologist uses slightly different terms than the patient initially did, namely the terms *gnaver* ('gnaws') and *skawer* ('grinds', line 014-015). These are partial synonyms to the term *skurren* ('grinding') used by the patient when first introducing the problem in example #1a, except for one important difference: The latter term is ambiguous as to whether it refers to a sound or a sensation, whereas the other two can only be understood to refer to sensations. The audiologist's choice of terms here is thus consistent with the interpretation/translation he has made when the patient first introduced the problem, namely that the problem is a sensation, a physical problem, rather than an auditory one. That this was indeed the wrong kind of interpretation and not what the patient meant when describing his symptoms as a 'grinding' is evident from the patient's correction of the understanding in lines 016-017, produced in overlap with the audiologist and, once again, with an explication that the problem is an auditory one in so far as it has to do with sound. In response to this, the audiologist produces another candidate understanding, *et hyl?* ('a squeak'), with which he tries to specify the nature of the sound. He then does an understanding check *hyler det?* ('does it squeak?') in line 022, which turns the attention from squeaking as being the patient's subjective perception (in line with the candidate understandings of various bodily sensations earlier) to the hearing aid's 'objective' feature (and, therefore, treatable). The participants are thus now back into the diagnostic mode at a point where the audiologist had initiated closure of the treatment sequence and when the patient has confirmed that the problematic sound is indeed a squeak, a new treatment sequence is initiated (not shown here).

Examples #1a and #1b illustrate how determining one factor, i.e., a hearing aid users' choice of vocabulary, can be for the resulting diagnosis and treatment. Or, in other words, the way in which patients with hearing problems describe their symptoms may be consequential not only for what kind of treatment they get, but for whether they get any treatment at all. In this case, the outcome appears to be a successful and satisfying treatment for the patient, but this is only because the patient insisted on having his problem taken seriously, by re-introducing it at a point where the closing of the consultation (or at least the treatment sequence) had been initiated by the audiologist, and because the audiologist took the time and effort to seek specification of the problem once it was introduced a second time. Our pilot study suggests that not all patients are as insistent or take such an active role in their own treatment, and it is thus easy to imagine that there are hearing aid users who would accept the audiologist's initial explanation of the problem as non-treatable, thus leaving the consultation without getting their problem addressed. In addition to that, we may imagine that there are patients who get the wrong type of treatment because their description of other symptoms is interpreted and translated in a particular way.

The way in which patients with hearing problems describe their symptoms may be consequential for
• whether they get treatment
• the kind of treatment they receive

---

[1] At this point there may be another thing going on than 'mere' understanding. The patient is reintroducing a problem that the audiologist earlier (cf. #1a) determined as non-treatable. The patient can thus be heard to infringe on the audiologist's professional province by failing to accept the audiologist's medical opinion. His trouble with finding the right kind of words may thus also be caused by his orientation to the activity he is doing as delicate and potentially problematic.

Another issue that the examples above illuminate is the relationship between the technological and social aspects of such consultations. Although hearing aids are designed artifacts that consist of hardware and software elements, in the consultation we can see how they are also participants in social action. The patient is concerned with reporting what kind of problems he has had with the hearing aid, whilst the audiologist is trying to determine how to deal with the reported problems and distinguishing between those problems that can be addressed by re-programming the hearing aid and its fit, and those that cannot in fact be solved through audiological treatment (see also example #2). In this respect, the setup could be described as that of diagnostics (Büscher et al. 2010), which, in our present context of audiology, results in the patient and the audiologist together testing and changing the programmable features of the hearing aid to best address the patient's problems. In addition to this, however, we could claim that the patient might also be doing a kind of diagnostic work in trying to adjust his way of describing his problems to formulations that the audiologist finds worthy of interest (that is, problems which he can professionally treat). Thus, the patient's shift from using the term 'grinding' (in example #1a), to using the phrase 'those sounds' (in example #1b) could be a result of the previous testing sequences (not transcribed) where another problem was addressed, during which both audiologist and patient used the latter term in relation to a problem that the audiologist clearly oriented to as 'treatable'. In other words, the previous phase of this institutional encounter might have helped the patient to formulate his problem in a way that implies that the sound was made *by* the hearing aid, not that it was *of* the hearing aid. Our point, then, is that the ways in which hearing problems are described are not simply a matter of getting the descriptions 'right', i.e., so that they 'accurately' communicate the 'true nature' of the problem (whatever that might mean or however that might be determined in this setting). Rather, the different descriptions of sounds/problems simultaneously implicate different 'versions' of the technology. In example #1a the hearing aid emerges as a passive element in a transient, unavoidable circumstance (the patient's sweaty ear canal); in excerpt #1b the hearing aid becomes an active element of the problem itself. And this is achieved largely through a stepwise evolution of descriptors.

As such, hearing aids as material objects have certain properties that are negotiated and co-constructed in various social situations. We might call these properties 'accomplished ontologies'. In this setting, the precise determination of these properties have far weightier consequences for the hearing aid user than for the audiologist, and it is perhaps understandable that patients might try to convey their past hearing experiences with words that come as close as possible to the 'nature' of the problem, as was done in example #1a. Interestingly, in this case, the patient's description of his experience of use by describing a particular sound heard was unsuccessful in getting the problem treated, while the use of a generic term such as 'sound', at a specific sequential slot in the on-going institutional, practical and material situation, led the audiologist recognize the problem as treatable.

In any case, it is clear that the patient's 'problem description' in these consultations is the locus of a set of issues that are partly determinative of what does or does not get treatment, how treatment is pursued, and ultimately the quality of both the resultant treatment and the patient's experience of audiological care. While this is a topic that necessitates much further study, early concepts for technologies that might help ameliorate some of the challenges of problem description within the audiological clinic are being explored (Kjeldsen/Matthews 2008; Kelly in preparation).

There is a relationship between the technological and social aspects of such consultations.

Describing hearing problems in different ways
- communicates the nature of the problem
- implicates different 'versions' of the technology

Hearing aids are
- material/technological objects to the audiologist
- social/technological objects to the patient.

The way audiologist and patient communicate
- co-determines what does or does not get treatment
- how treatment is pursued
- the quality of the treatment
- how the patient experiences audiological care.

Second problem:

Clients often expect that the prescription and adjustment of a hearing aid will solve all their hearing problems.

4. Addressing implicit (and unrealistic) expectations

Not all problems with hearing can be addressed through the prescription of a hearing aid or the adjustment of such an aid, either because the patient has permanent damage to the hairs in the ear, because patients have lost part of the ability to process the auditory information they receive through the ear (cf. Mourtou/Meis, ch.2, this volume), or simply because the hearing problem is in reality caused by a particular physical environment, for instance the acoustic properties of a building or a room, the presence of many people and so on. However, once people with hearing difficulties have decided to seek help, they often expect that the prescription and adjustment of a hearing aid will solve all their problems - an expectation that is probably not helped by the fact that both audiology clinics and hearing aid manufactures have at times advertised the miraculous effects of hearing aids (cf. Mourtou/Meis, ch.2, this volume). Unrealistic expectations of the hearing aid are understood as a significant problem for hearing rehabilitation in general, as there is a clear connection between hearing aid users' satisfaction with their hearing aid and their use of it (ProMatura 2007). Thus, many of the hearing aids that end up in a drawer do so because they did not match the expectations of the patients using them - even if these expectations are in fact unrealistic. Audiologists are of course generally aware of this problem and new hearing aid users are typically encouraged to lower their expectations of their hearing aids. For instance, they are often given information leaflets to take home about this matter. However, it is not obvious that this information is in fact accessed, understood, processed and interpreted in the intended manner by the patient.

Example #2 below provides an example of this. Here, a patient who has been a hearing aid user for several years has sought the audiologist to inquire whether his current hearing aid can be adjusted to address some of the hearing problems he still has. In particular, the patient has described how he has trouble hearing in larger gatherings of people, even when sitting right across from the person he is listening to. The patient has then expressed the wish to have his hearing aid adjusted so that this is no longer a problem. Hearing in larger gatherings is a classical problem in audiology and one that is difficult to remedy with a hearing aid - at least without creating other, alternative problems with hearing. As such, the possibility of adjusting a hearing aid so that this problem is solved may be unrealistic, and, as can be seen from the example, the audiologist attempts to relay that message. Of interest to us is the way in which he does so, as well as the way in which the patient responds.

#2

```
020 Au: >man ska' altid tænke på< at kr hmmm (0.4)
        >one should always think about< that kr hmmm (0.4)

021     kunden- >al'så< (0.7) De mennesker der bruger
        høreapparater
        the customer- >well< (0.7) The people who use
        hearing aids

022 Pt: Jerh
        Yeah

023     (0.2)

024 Au: de e- m:- mener tit ås' (.)
        at det er så'rn at (.) de ska'
        they e- t:- often think (.)
        that it is the case that (.) they ought to
```

Many of the hearing aids end up in a drawer because they did not match the patients' expectations.

Excerpt #2 shows how the audiologist treats a long-term hearing aid user's problem of hearing while being in larger gatherings.

The audiologist tries to signal that the patient's expectation is unrealistic by reformulating the problem as generic. This may allow the patient to ignore the information as being irrelevant to his particular situation.

Audiologist tries to 'normalize' the problem.

```
025      forstå det hele (.) fordi de nu bruger høre apparater.
         understand it all (.) because they now use hearing aids.
026 Pt:                    ((Slow head nod))

027 Au: Det passer bare ikk'.
        That just isn't true.

028     (0.2)

029 Au: .hhhhh [Te' dels ka' det slet ikk' la' sig gøre,
                 i så'n et
        .hhhhh [Partly it can not be done at all, in a
030 Pt:        [((Slight head shake))

031     støjforhold hvis man ha:r musik
        å:* folk der snakker
        noise relation like that if one ha:s music
        and* people who talk

032     op a' hinanden,=å' så ve' man forstå .hhh
        next to each other,=and then one wants
        to understand .hhh the

033     bedstefaren der *er* oppe ve' bordet, som
        grandfather who's *up* at the table, who

034     mum[ler. .hh   D[et ka' man ikk'.
        mum[bles. .hh  O[ne can't.
           [            [
035 Pt:    [Ja.         [.tc Nej.
           [Yes.        [.tc No.

036 Pt: Det kommer ikk' frem. Nej=nej
        It doesn't get through. No=no
```

Audiologist describes an extreme scenario where nobody would be able to hear well.

It should be obvious from the audiologist's response (lines 020-031) that he has heard the patient as having unrealistic expectations of his hearing aids and that he is doing his best to address this. Here, we want to point to two practices that the audiologist employs to address the patient's expectations to his hearing aids as potentially unrealistic. Firstly, the audiologist addresses the problem as one that is general to hearing aid users (lines 020-021). The intention with this is presumably to show the patient that though he may have unrealistic expectations, he shares them with a number of other people in similar situations and should thus not feel bad about having had these expectations. Similar strategies are used also by other medical practitioners in 'delicate situations', such as for instance when doctors have to tell a patient that their physical symptoms are caused by a psychological disorder that needs to be addressed by psychotherapy rather than neurological surgery (Monzoni/Reuber 2009). But a potential problem with this approach is that once the medical professional, here the audiologist, reaches the part of his turn where he is to address the matter of unrealistic expectations, the problem has been turned into a problem generic to hearing rehabilitation, which may allow the patient to ignore the information he is given as being irrelevant to his particular situation.

The fact that the audiologist does not directly state to the patient that his expectations are unrealistic makes it easier for the patient not to apply these explanations to himself.

The second practice the audiologist makes use of is almost in opposition to the first. Having treated the issue of unrealistic expectation as generic, the audiologist then turns to particularizing or specifying. First, in lines 024-025, the audiologist states that hearing aid users believe they have to understand it all. This is what in CA terminology is called an 'extreme case formulation' (Pomerantz 1986; Edwards 2000), which, among other things, has been shown to be used as a device for "normalizing and pathologizing people's actions and character" (Edwards 2000: 348). In one sense, the audiologist thus may succeed in assuring the patient once again that it is com-

pletely normal to have these unrealistic expectations, but at the same time he has now reformulated those expectations to be about understanding it all (line 025), rather than what the patient expressed, which was an expectation (or a hope) to be able to understand one particular person in one particular situation. In other words, the audiologist here formulates a different (and extreme) version of what expectations patients in general may have of their hearing aid. This tack is further explored in his continuation in lines 029-032, where the audiologist describes a very particular, and again extreme, situation, in which patients should not expect to be able to hear, namely when the patient is in a room with music and many people talking, and attempts to hear an old grandfather who mumbles. The case described by the audiologist is so extreme that it is difficult to imagine anyone, independently of hearing problems, being able to hear the mumbling grandfather and so as an instance of what would be unrealistic expectations, this case serves as a good example. However, because the case has been so particularized, it no longer bears much resemblance to the situation described by the patient, who may thus once again be led to ignore the implication that he has unrealistic expectations himself.

We cannot determine whether it is indeed the case that the patient here has failed to understand the implication that his expectations are unrealistic, but a closer look at the patient's responses to the audiologist's formulations could indicate that this implication has not been taken in, or at least they show that there is no evidence that it has been taken in. In response to the audiologist's first turns-at-talk, the patient produces only non-verbal responses in the form of a slow nod in line 026 and a slight head shake in line 030. With this, the patient manages to display that he is listening, following and presumably even taking in the message delivered by the audiologist. Participants who are cast in the role of recipients, for instance, in the context of story-telling, or as here in the context of information-giving, frequently employ non-verbal responses such as these to show that they are affiliating with the current speaker (Stivers 2008), i.e., to claim that they have access to the speaker's stance towards what he is talking about. Here, this could be taken as an indication that the patient understands that the audiologist finds some of his customers' expectations problematic. But at the same time the patient is (studiously?) avoiding affiliating with this stance. This is particularly noticeable around line 027, where the audiologist has in effect stated that people should not expect to be able to hear everything just because they have been prescribed hearing aids. There are a multitude of possible answers that could have been delivered by the patient here, ranging from a simple acknowledging 'no', a change-of-state token such as *nå* ('oh'), a claim or display of understanding and agreement, such as 'now I know', or even a protesting 'I don't believe that I don't need to hear everything'. By withholding any response at this point, however, the patient could be heard to be implicitly resisting being given the information provided by the audiologist, which in turn may indicate that he will choose to ignore it. That the audiologist is sensitive to this possibility is indicated not only by the fact that he then continues with a particularization of an unrealistic expectation, but that this continuation is delayed first by a 0.2 seconds silence, then by a long inbreath.

Once the audiologist has provided the particular case with the grandfather, the patient does respond. He does so, however, in a way that claims understanding of the particularized case, but does not in any way display the relevance of this understanding to his own situation. That is, he clearly claims, both through the response particles *ja* ('yes') and *nej* ('no') in line 035 and through the more extended response *Det kommer ikk' frem. Nej=nej* ('It doesn't get through. No=no', line 036) that he has understood that in this particular (extreme) case it is unrealistic to expect to be able to hear (with

> There are indications that the patient fails to understand the implications of what the audiologist tries to convey.

> There are indications that the patient resists the audiologist's information.

or without a hearing aid), but nothing in his response indicates that he has understood this to apply to him, in his particular situation as well. In fact, the last part of his response, the multiple production of the negative response particle *nej=nej* ('no=no') may here actually indicate that he is actively resisting the information (or the relevance to him), in that it treats the audiologist's prior action (the delivery of the particularizing case) as persisting beyond the necessary (Heinemann 2003; Stivers 2004; Golato/Fagyal 2008). In other words, the patient here may be heard to express some annoyance with the fact that the audiologist at this point has launched a (potentially patronizing) lecture on the kind of unrealistic expectations that people who use hearing aids present to him as a professional.

Example #2 illustrates that audiologists are very well aware of the potential (unrealistic) expectations that patients may have of their hearing aids and shows that audiologists are adept at recognizing the existence of such expectations, even when they are embedded and only appear implicitly in interaction. The way, in which the audiologist addresses these expectations and seeks to correct them in example #2, is typical in our data, though it may very well be the case that different audiologists have different practices for doing so. What example #2 thus illustrates is one possible way in which expectations can be (and are) addressed, first by normalizing the fact that the patient has unrealistic expectations, then by stressing the unrealistic nature by providing a particularized and extreme case. Whilst these strategies or practices may serve to lessen the delicateness of having to correct a patient's expectations and emphasize the fact that some expectations are simply too unrealistic, they may, at the same time prove problematic in terms of whether the patient actually recognizes that his individual expectations are unrealistic and understands that he cannot expect his hearing aid to solve each and every one of his individual and particular problems with hearing. Whilst there is no evidence in example #2 to conclusively prove that the patient in question has had his expectations corrected, there is clearly no evidence to suggest either that he has understood the information provided by the audiologist or accepted it as applying to his situation.

> There are indications that the audiologist is sensitive to the patient's resistance.

> There is no evidence that the patient has understood the information provided by the audiologist or accepted it as applying to his situation.

5. Discussion

In the previous sections, we have sought to illustrate two issues that may surface when paying close and detailed attention to the interaction between hearing aid users and audiologists, namely the problems faced by audiologists when trying to translate a patient's symptom description into treatment and the problems that may arise because of the way in which audiologists address hearing aid users' implicit, but unrealistic expectations towards their hearing aid. CA was in this case used primarily as a method for pointing towards potential foci of future research into the organization of audiological interactions, for the purpose of identifying possible application areas for innovation and best practices in this setting. Neither the amount, nor the type of data investigated here make it possible at this point to reach firm conclusions as to whether there even is a best practice, and clearly more research, ideally from an interdisciplinary perspective, is needed before anything more conclusive can be said about the impact audiological interactions may have on issues such as the quality of diagnosis and treatment received by patients and their overall satisfaction with their hearing aid.

> The conversation analytic examination of the data indicates that
> - barriers to hearing aid use can be identified in audiological encounters
> - results provide points of departure for innovation and best practices

WHO/ICF guidelines and compliance in a hearing aid consultation

Catherine Brouwer and Dennis Day

From an ethnomethodological and conversation analytic ("CA") perspective, we explore consultations between audiologists and hearing impaired persons in a small, private hearing clinic in Denmark. Specifically we research the methods hearing impaired persons and audiologists utilize in solving problems brought to the consultation by the hearing impaired person and make note of how these methods might relate to the notion of compliance. Assuming that part of the problem with non-compliance involves what goes on in the hearing clinic consultation, we explore how guidelines, more specifically the World Health Organization's ("WHO") International Classification of Functioning Disability and Health ("ICF"), may relate to our analysis as well as how compliance might be understood as a member's notion.

In Sweden, roughly 7% of the population suffer from hearing loss which could be helped with hearing aids, and the vast majority are over the age of 50. Among these approximately 500,000 individuals, 50% actually have a hearing aid, and amongst these individuals, 50% report they actually use them (The Swedish Council on Technology Assessment in Health Care 2003). Similar statistics can be found for countries with similar health care systems such as the UK and Denmark (see for example Davis 2003; Barton et al. 2003). We may conclude then that 50% of those with hearing aids are non-compliant, and if we include those who need hearing aids generally, the statistic increases to 75% (see also Mourtou/Meis, ch.2, this volume).

(Non-)compliance in using hearing aids

Non-compliance is a complex phenomenon; the type of illness or disability the treatment is for, the complexity and frequency of that treatment, and a range of sociological factors all seem to have some bearing. Some reasons for not using a hearing aid may have to do with the feeling of being stigmatized or not accepting that one actually has a hearing problem (Delta 2009). The consequences for patients not using prescribed hearing aids are numerous. Generally, however, not using hearing aids means a loss of quality of life, not only for the hearing impaired person him/herself (Smith/Kampfe 1997), but also for persons around them (Scarinci/Worrall et al. 2008).

Generally, not using hearing aids entails a loss of quality of life, not only for the hearing impaired person him/herself, but also for persons around them.

A major issue for audiologists in private as well as public practice is therefore to ensure that hearing impaired people actually use their hearing aids. However, since fitting a hearing aid is not a straightforward process, but requires a period of adjustment of at least a month in which a patient "should be urged to return for consultation several times" (Gelfand 2001: 469), a reason for using or not using a hearing aid may directly depend on how hearing (aid) problems are presented and dealt with in the consultation itself.

In this article, we focus on how communication in hearing aid clinic encounters may play a role for compliance. We consider a consultation of a long-term hearing aid user, i.e., a person who would be thought of as a patient in compliance. Despite this, the consultation does not go well and there is some explicit and implicit indication that compliance may be threatened.

Research question:
• How does an audiologist and a long-term hearing aid user deal with the client's problems?

Our understanding of non-compliance has undergone quite some development in recent years, not least due to the increasing costs of health care and the aging of our population. Therefore, a first step of particular interest to us has been the move away from 'patient-centered' theories of non-compliance, which focused exclusively on various cognitive or affective states of patients as measured psychometrically, toward recognition of the role of both the care-giver and care-taker. Hulka et al. stated already in 1976:

> Rarely have researchers and practitioners seriously studied the extent to which apparent non-compliance is merely the lack of congruity between what the patient thinks he is supposed to do and what the physician thinks the patient is doing. (Hulka et al. 1976: 851)

It was a rather easy next step to move from the attribution of cognitive states to care-giver and care-taker, to a focus on the communication between them. Much effort has been put into the design of health communications, and a current recommendation is to use messages displaying "social and physical consequences in an emotional format" (Keller/Lehman 2008: 126). However, such recommendations seem more geared toward mass communicative, one-to-many communication, i.e., for example written information materials for patients, and less towards a care-giver-care-taker interaction in a consultation. Moreover, they are defective with regard to their underlying premise of communication, i.e., communication is not the mere transfer of information between independent, individual minds.

The World Health Organization's International Classification of Functioning Disability and Health ("ICF") suggests a broader focus on the patient and his or her own surroundings (see figure 13 below). However, even with this focus, the underlying premise with regard to communication sees communication as transactional and the recommendation has been for care-givers to obtain a range of information from the care-taker and to factor this information into actual diagnoses.

From a patient-centered concept of non-compliance to an interactional concept.

WHO focuses on care-giver's actions rather than on interaction.
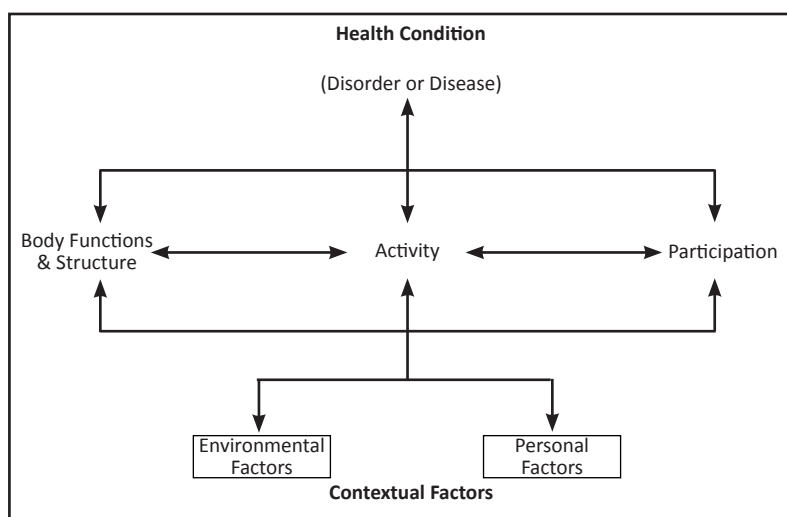

Figure 13: ICF Model of Disability (WHO 2002)

This model is intended as a framework for assessing health and disability amongst others at the individual level (WHO 2002) and is widely used in Denmark in medical practice. The clinical guidelines for audiologic diagnostic practice in Denmark are also built on this framework, and include all of the components from the ICF. Five out of eleven of the pages in the guidelines for audiologic assessment directly quote or refer to the components as de-

One major part of the Danish guidelines concerns describing the degree of disability and resources in terms of the ICF.

scribed in the ICF (Hoedt/Søltoft et al. 2006). One major part of the Danish guidelines thus concerns describing the degree of disability and resources in terms of the ICF, i.e., the bodily functions but also 'activities and participation', 'contextual factors', which again consist of 'personal and environmental factors'. As an internationally utilized tool, the ICF thus clearly entails a conception of disability as not just a bodily state, but recognizes the importance of personal and contextual factors in deciding how severe a disability is to be regarded.

With regard to compliance, the underlying assumption is that following these guidelines is an important step towards compliance. The client is involved not only as a complex and multifaceted person with a problem, but is also an active party in his or her own treatment in that he or she is being asked about the circumstances in which a disability is noticeable, thus contributing actively to a contextualized and personalized perspective of the disability.

The guidelines, however, are intentions in relation to diagnostic practice. In order to actually function in practice, they need to be "talked into being" (Heritage/Clayman 2010). It is not clear how the guidelines might relate to audiological consultations, partly because such consultations have scarcely been researched and partly because not all consultations are necessarily viewed as diagnostic. As we will demonstrate, even when factors such as personal experience and participation are mentioned during the consultation, it does not mean that they are taken into consideration in the treatment. Our analysis will point at three aspects of how patient and audiologist interact which limit the possibility of compliance. Subsequently we consider how guidelines in the medical practice may or may not be in line with what goes on in this consultation.

In this way, our analysis will complement the few studies of medical consultations with a focus on non-compliance. Lutfey (2004) demonstrates in her analysis the general point that compliance is not simply a matter of patients' substantive reports and evaluations of their own behavior, but also a constructed resource within the medical consultation itself. Barton et al. (2003) takes us one step further with her finding that asymmetry in consultations between general practitioners and patients often follows displays of non-compliance by patients.

Guidelines fixed on paper need to be 'talked into being'.

The analysis will show interactional achievements which may contribute to non-compliance.

1. Methodology

CA has since its incipience aimed to describe talk as a recognizable social practice exhibiting social order where turn-taking and repair secure intersubjective understanding. A particular focus on institutional talk, such as we are dealing with in this paper, has taken a central position (Day/Wagner 2008). Institutional talk is characterized by

- specific goal orientations,
- special constraints on allowable contributions,
- particular inferential frameworks and procedures (Heritage 2005).

Overviews of Conversation Analysis within health care can be found, for example, in Maynard (2003) and Heritage/Maynard (2006).

Within CA, recorded data are transcribed using procedures set out by Gail Jefferson (Jefferson 2004). The effort in CA is to arrive at how interactants order and structure their interaction and thus make sense to and for each other. The objective of this study is to track this sense-making and reveal whether and how there is a tension between the intentions for audiologic practice (the guidelines) and what may actually happen in a consultation. The contribution of this study is thus to discuss the relation between

We analyze one consultation in which, at first sight, a tension between guidelines and actual practice seems present.

guidelines such as the ICF in general, as well as the guidelines for audiologic diagnostic practice in Denmark in particular, and consultative practice. In order to do this, we analyze one particular consultation in detail, in which, at first sight, such a tension between guidelines and actual practice seems present. We present findings concerning how the hearing impaired person and the audiologist interactively manage accounts of why the client is seeking help. 'Accounts' refer to the methods through which the hearing impaired person offers reasons for his or her visit to the audiologist. It is important to note that both the account and the fitting of the hearing aid are interactively managed by both parties. In other words, the impetus for and results of a consultation are socially managed. In the case at hand, the way in which it is managed has consequences for how the consultation is structured. We relate therefore the structure of this consultation to the guidelines for audiology practice in Denmark.[1] We also compare it with what has been described as a typical structure for primary health care encounters. And we find some fundamental differences. These differences, as we will argue, may have consequences for the choice of treatment as well as client satisfaction and ultimately compliance.

Differences between guidelines and how they are implemented has consequences for choice of treatment.

2. Conversation Analysis of medical interaction

Of particular relevance to this study is the multitude of CA studies dealing with doctor-patient interaction. These studies show, amongst other things, that the medical encounter can be sub-divided into problem presentation, history taking, physical examination, diagnosis, and treatment recommendations (Byrne/Long 1976; Heritage/Maynard 2006; Heritage/Clayman 2010; see also Deppermann, ch.10, this volume). Notably, it has been found that there is often a place in the consultation before the examination, diagnosis and treatment for a patient to 'present concerns' (Robinson 2006).

Sequences in doctor-patient interaction

For example, patients are given the opportunity to describe how their problem is affecting them emotionally and socially. Moreover, a task patients often achieve in this early part of the consultation is presenting their visit as reasonable, i.e., that they present their problem as an actual health problem that they need a doctor for (Heritage/Robinson 2006).

Patients usually present their concern as reasonable.

Of course, the visit to the audiological clinic is not the same as a primary health care encounter. It may be even more important for clients to be able to describe their problems in terms of how they are affecting them socially, since not being able to hear is to a significant extent a social problem for the patient. In the following analysis, we describe the long trajectory in which the patient and the audiologist attempt to work out what the problem is, and how to deal with it.

In hearing disability and assistive technology the patients' problem is significantly social.

3. Analysis

With this in mind, let us now turn to the audiology consultation. The data below are from one of 11 video recordings of consultations at a private clinic in Denmark.[2] The client has come in on a return visit: He has been having trouble hearing with his hearing aid. As it turns out, the client has two channels on his hearing aid, and he has less noise reduction on one channel than on the other. This is a common way of providing the patient with the possibility of being able to adjust the hearing aid in noisy surroundings. As we will see, the client claims that noise reduction per se is a problem for his hearing. The recording starts with the patient explaining why he is revisiting the clinic in order to have his hearing aids readjusted. 'Cli' refers to the client and 'Aud' to the audiologist.

Data description

Client presents problems in a return visit as faulty technological adjustment.

[1] Hereafter referred to simply as 'the guidelines'.
[2] The recordings, as well as ethnographic observations and interviews, were carried out in 2009 by Trine Heinemann and Dennis Day.

#1 Problem presentation - Heinemann-Day 2009

```
001 Cli:   øh hh (0.3) deri fejlen den ligger mener jeg
           eh hh (0.3.) the fault lies therein I think

002 Aud:   mmh

003        (0.3)

004 Cli:   det er (0.5) at (1.1)
           that is (0.5) that (1.1)

005        øh når du sætter (rigtig) støjdæmpning på
           eh when you put (real) noise reduction on

006 Aud:   mhm

007        (0.4)

008 Cli:   så kan jeg ikke høre.
           then I cannot hear
```

Cli = client; Aud= audiologist

Client
- assigns fault to audiologist's earlier hearing aid fitting
- implies problem solution
- claims technical expertise usually assigned to audiologist

As in the primary care encounters, early in the consultation the patient presents his concerns, lines 001-008. Note that his presentation is done in a very specific way.

Firstly, the presentation is announced as a fault (line 001) rather than as a problem. Moreover the fault is assigned to the audiologist ('when you put on the (real) noise reduction, I cannot hear', lines 004-008). The issue of failure has thus been made relevant. The presentation of the 'reason for the visit' may be heard as a complaint about the earlier treatment by this audiologist.

Secondly, the consultation does not start with presenting a problem and leaving it up to the audiologist to find a solution, as one could expect in a lay-expert encounter. As Heritage/Clayman (2010) assert, in primary health care encounters, it is in the problem presentation phase that a patient has the possibility to pursue his or her own agendas. As soon as the problem presentation phase is over, the patient 'loses the interactional initiative'. The client in this case, being a knowledgeable hearing aid user, has not only found out what his problem in expert terms is, but he has also already figured out what a solution of the problem should be. This solution is implicitly mentioned in the problem presentation - the client wants the noise reduction to be removed (lines 004-008). We see the client in the problem presentation thus pursuing his own agenda by implying that his problem has an obvious solution.

Thirdly, the problem is presented as a type of problem that is of a technical kind. In other consultations, clients may present their issues in terms of actually hearing sounds, for example 'I keep hearing this click sound'. Alternatively, a client may present a problem by describing situations in which hearing has been troublesome (see also Brouwer forthcoming). In dealing with both these types of problem presentations, the audiologist's job is to use information presented by a lay person and make sense of it in a specialist way. The third way of presenting a problem that we have observed in our data, of which this excerpt is an example, is typically done by a hearing aid user that has gathered some 'expert' knowledge and addresses issues that focus on the hearing aid as equipment. This type of problem presentation reveals a possibly problematic shift in positions of epistemic authority (Raymond/Heritage 2006), i.e., the patient claims a kind of expertise that is typically assigned to the audiologist.

We see thus a client making a strong case for his visit being reasonable in three ways:

- Presenting it as a failure on the account of the audiologist,
- Claiming expertise on what the problem is (thus implying a solution),
- Focusing on the technical aspect.

In making this case, the client has thus outlined a number of issues about the case that the audiologist can choose to treat in his reaction. In the next lines, we see the audiologist taking up these three issues (expertise, failure, and technical nature of the problem).

#2 Taking up issues - Heinemann-Day 2009

```
009 Aud:  ja (0.2)
          yes

010       det er fordi den tager noget af det væk
          that is because it takes some of it away

011 Cli:  ja
          yes

012       (0.2)

013 Aud:  og øhmmm (0.2) det har jeg [og]s tænkt over
          yes ehmmm       that I also have been thinking about
                                     [
014 Cli:                             [nu]
                                      now
```

Audiologist takes up the issues of
- expertise
- failure
- technical nature of the prob-
  lem

He
- explains technical feature and
- ascertains independent assessment of the technical functioning.

The audiologist, following the agenda of the patient, also treats the prob-lem as a technical one by providing an explanation for what the hearing aid does (line 010). The explanation, however, does not necessarily follow the patient's assertion that this is a problem. Instead, the explanation hints at the hearing aid performing in the way it is supposed to do. Thereby the audi-ologist possibly challenges the problem presentation of the client.

In line 013, 'yes ehmmm that I also have been thinking about', he addresses the failure issue: By asserting he has been thinking the matter through, he indicates that he, being the expert, has been pondering about the problem, and has actually thought of a solution for it. This hints at this case not being a routine case, and it also addresses the expertise issue.

Note however, how the patient continues his problem presentation in line 016:

#3 Continued problem presentation - Heinemann-Day 2009

```
016 Cli:  og nu  ef↓ter
          and now after

017       (0.3)

018 Aud:  jha?=
          yhes?

019 Cli:  =at du har (0.5) ha hh (0.7)
          that you have ha

020       har taget øh støjdæmpningnen væk (0.2)
          have taken eh the noise reduction away
```

Audiologist and client differ in what course of action they are pursuing.

```
021 Aud:  [jha?]
          yhes?
          [
022 Cli:  [eller] (.) en del af et væk
          or          a part of it away
0
23        (0.2)

024 Aud:  ja
          yes

025       (0.7)

026 Cli:  så ku jeg bedre høre
          then I could hear better

027 Aud:  ja
          yes
```

The audiologist and the client, thus, seem to differ with regard to what they are actually doing (presenting the problem vs. dealing with a problem). The audiologist, now, restates what he started to say in line 013 (what he has been thinking about), thereby disregarding the extended problem presentation of the client.

#4 Making a noise-reduction program - Heinemann-Day 2009

```
028       (2.2)

029 Aud:  det vi så kan gøre og det jeg=har (.) tænkt på i går      Audiologist maintains his exper-
          what we then could do and this I have thought about        tise in problem solution.
          yesterday

030       det er at vi=øh laver program et?
          that is that we eh make program one?

031       (1.0)

032 Aud:  hvor (a) jeg tager den helt væk
          where I take it away completely

033       (1.0)

034 Aud:  på program to (.)
          der fjerner jeg noget af de svage lyde
          on program two
          there I remove some of the weak sounds

035       (0.3)

036 Cli:  [ja?]
          yes
          [
037 Aud:  [så] jeg laver et ø:h et støjprogram (.) til dig
          so I will make a noiseprogram for you

038       (0.3)

039 Cli:  ja                                                       Audiologist and client agree on
          yes                                                       problem.

040       (0.2)

041 Aud:  ja:
          yes
```

The audiologist, to sum up, has addressed the accounts for the visit in the same ways as the patient had presented them.

Firstly he treats the problem as a technical problem with a technical solution (line 030-037). Secondly, he addresses the failure issue by asserting that this is a puzzle, rather than a routine issue (line 029). Thirdly, and importantly for the further trajectory of the consultation, the audiologist addresses expertise by not immediately responding positively to the implied solution from the client, thus indicating that his expert opinion may differ from what the client wants.

If we consider the implications for actual treatment, several issues should be mentioned. When a problem is presented as a technical problem, the focus from the start is on the hearing aid and how it should be fitted, rather than on the client and how he or she can obtain acceptable hearing functions. Consequently, such consultations differ from other health care encounters. In particular, a typical element one can find in primary health care consultations is a sequence in which the physician solicits the patient's concerns and complaints. Such a sequence, typically being the very first in the consultation, serves, for the physician, as a way of providing all the details that may be important for diagnosis and treatment, and, for the patient, as a way of feeling he or she is being heard. Such a phase in the consultation has been called 'data gathering' and may consist of both history taking and physical exam (Heritage/Clayman 2010). In the consultation at hand, that sequence is, so to speak, skipped, and as we will show, there is no natural 'space' in the consultation where that type of exchange could occur.

> Difference to other medical encounters: focus on technology preempts focus on client.

Also, a number of elements that are presented in the clinical guidelines for audiologists in Denmark, based on the ICF-framework are, as a consequence of this type of problem presentation, not included in the consultation. Although this is a return visit and thus not a consultation where a full report on all aspects of hearing should be done, some elements that could be of importance are not addressed. For example, there is no talk about the precise conditions in which the client cannot hear, whether the noise reduction distorts his hearing in all situations, or whether he has tried to switch channels. Similarly there is no talk of how much the hearing impairment has been bothering the patient or his relatives, how it has affected his social life, or whether he has tried to solve the problem with non-technical hearing strategies. As we will see later on, the patient forwards such issues, and their treatment in the interaction is problematic.

#5 Reaction to the patients' solution - Heinemann-Day 2009

```
042        (0.5)

043 Aud:   men::
           but

044        (0.5)

045 Aud:   støjreduktionen den: ↓øh
           the noise reduction that eh

046        (1.1)

047 Aud:   den kan jeg også godt fjerne hvis du vil have det
           that I could also take away if you want it

048        (0.2)

049 Cli:   mmm tror du ikke bare den skulle fjernes
           mmm don't you think it just should be removed
```

> Client does not take up audiologist's solution, audiologist ascertains his technological expertise.

```
050 Aud:  hhh *jo* altså nu lad mig lige se
          hvordan det ser ud men
          yeah well let me just see at
          how it looks but

051       altså je sjhhh
          well I shhh
```

In line 045 et seq., the audiologist addresses the implied solution by the client. Previous to this in lines 037-042, his own solution is proffered but receives little uptake from the patient. The solution that is then put forward is a secondary, and not, for the audiologist, a preferable solution: It is preceded by a prolonged 'but', line 043, and there are pauses, prolongations and an *øh* in this turn; additionally the phrase 'if you want that' is added to it. Again, the audiologist is claiming his expertise as an expert on the technology of the hearing aid.

In this way, the client has proposed to deal with the consultation in terms of failure, expertise and technicalities, and the audiologist has gone along with treating the client's trouble in those terms.

In the next turn, it becomes apparent that the client on the one hand sticks to his, in the light of what he has found is the problem, obvious solution; on the other hand, he is sensitive towards the expertise issue (line 049). In other words, his turn is an appeal towards the audiologist not just to do what he wants, but to agree with him.

Again at line 050, the audiologist shows reluctance to the now explicitly stated client solution: his turn starts with a hearable inbreath, a *jo* (roughly translatable as 'well') with a creaky voice, and an assertion that a definite answer is being postponed. This assertion ('let me see how it looks first') indicates for the client what has to be done next - a test of how the hearing aid works for the client.

This line is crucial. The testing situation can be compared with an examination in primary health care encounters. The audiologist has more or less announced that the phase of presenting concerns on the part of the client is about to be over, and that they are moving into the examination phase. Facing the unavoidable test, the client makes an ultimate attempt to get the expert to agree: He restates that it is the noise reduction that is the problem, but this time, he focuses on how that problem affects him (lines 067-069). The audiologist in the meantime is busy getting things ready for the test and only reacts minimally.

#6 Insisting on the problem - Heinemann-Day 2009

```
053 Cli:  altså det kan jeg godt sige dig det
          that is I can really tell you that

054       det der har gået mig (0.4)
          this has got to me

055       på he↓r
          here

056 Aud:  ja?
          Yea?

057       (0.4)

058 Cli:  det er det her støjprogram de↓r
          it's this noise reduction program it is

059       (0.2)

060 Aud:  mh↑m
```

```
061         (0.4)

062 Cli:    °og det° det derfor at jeg .hh altså:
            and that's why I well

063         (0.5)

064 Cli:    og det har jeg jo sagt til dig ↓at
            and this I have told you that

065         (0.6)

066 Cli:    ↓at ↓↓øh (.) wa- sidder man °i° selskab med nogen
            that uhh if you're sitting at a party with someone

067         ↓m- man ikke ku høre
            you could not hear

068         (0.8)

069 Cli:    faktisk >>dem man sidder<< ved siden af dem overfor
            really when you're sitting right beside them

070         (0.2)

071 Aud:    jha
```

Upon this reaction, the client tells about two instances which not only ex-
emplify what the problem is, but also how it has an impact on some of his
personal and everyday activities. The first one is put in general terms, but
can be heard to refer to a specific experience:

#7 Reporting experience I - Heinemann-Day 2009

```
090 Cli:    [men du kan] godt se (.)
            sure but you understand

091         hvis du [så] skruer det andet ned også så=
            if you turn down one thing so that
                    [
092 Aud:            [ja]

093 Cli:    =jeg ikke kan høre det er at-
            I can't hear things

094         (0.5)

095 Cli:    altså ikke sjovt ↓at (.)↓at sidde: (.)
            you know it's not much fun sitting

096         i selskabet og o:g ska sige ja og amen
            at a party and and just have to agree

097         til noget m:an ikke har hørt
            with something one has not heard

098         (0.2)

099 Cli:    [(for ikke at spille)] helt idiot ↓du
            in order to not look like an idiot, man
            [
100 Aud:    [nej det er det ikke]
            No of course not
```

Client pursues his line of action
by reporting two social situations
in which the problem occurred.

First situation: At a party, the cli-
ent reports feeling like an 'idiot'
because he cannot hear properly.

And a little later, the client mentions another one of his experiences:

#8 Reporting experience II - Heinemann-Day 2009

```
108 Cli:  ah for eksempel ↓hvis (.)
          ah for example if

109       nytårsaften >jeg var ude at < dan↓se
          new year's eve I was out dancing

110       og så videre ikke: (.)
          and so forth not

111       ikke= ↓øh kan snakke med den man er ude at
          not able to talk with the one you are out

112       danse med eller noget
          out dancing with or anything

113       (0.8)

114       det var altså ikke spændende der der tog
          jeg dem af (↓og)
          that was not a thrill, so I took them off

115       (0.2)

116       så gik det faktisk bedre uden ↓jo
          and I could actually hear better without them see

117       (0.8)

118 Aud:  mh ↑m
```

These tellings of distress, however, get very little reaction from the audiologist - most of his reactions are minimal (e.g., line 118), while he prepares the equipment for the upcoming test.	Second situation: At a dance client took out the hearing aids and could hear better.

4. Discussion

As we have seen in the analysis, the client and the audiologist deal with issues of expertise, failure and technology in the phase where the client presents his concerns. Comparing this consultation with the typical structure of primary health care encounters, we see that both client and audiologist focus on issues of diagnosis and treatment already from the beginning. This may account for the lack of uptake on the part of the audiologist of the patient's tellings of distress. This, coupled with the audiologist's reluctant reaction to the implied solution, may cumulatively be heard by the patient as a case of the audiologist not seeing the gravity of his troubles, or at least he may feel that the audiologist, focusing almost exclusively on technical aspects in relation to solving the problem, is not very empathetic.

We may then expect an unhappy client leaving the clinic, and one who may potentially be non-compliant. Additional grounds for this inference can be found in the patient's telling of his taking his hearing aids off in lines 114-116. This is a particularly interesting bit of accounting by the patient. Not only does it help setting up the inference that he may become non-compliant, it is an actual report of non-compliance. Thus non-compliance is explicitly topicalized within this interaction. In the work cited by Lutfey (2004),

Margin notes:

The audiologist orients more to the technology than to the client's tellings of distress.

Audiologist's exclusive focus on technology does not take up the client's social and psychological concerns.

Divergent displays of expertise.

Client topicalizes non-compliance.

compliance is not so explicitly topicalized as in this data, rather it is seen in displays of patients' expert-like understanding of their affliction as well as reports of it following the recommendations of a particular treatment. Similar to the segment in focus here, however, is how compliance is interactively managed.

In this view, it is important to note the sequential placement of this topicalization of non-compliance, roughly within the patient's attempt to negotiate his preferred technical solution, since it can be heard as a method to attain his solution. Thus, it may be postulated that non-compliance can be seen not only as an analytically motivated inference, but also as an explicit concern for interactants themselves. We can, from this case, furthermore suggest that topicalized non-compliance may be used strategically by interactants. This is particularly noteworthy in view of Barton's (2000) results where displays of non-compliance preceded displays of epistemic asymmetry. Here, a display of non-compliance is used to pursue epistemic symmetry, i.e., the topicalization of non-compliance can be heard as a patient's method to pursue his own suggested technical solution rather than the audiologist's. Finally, from this case, we can suggest that the patient topicalizing non-compliance may be orienting to a concern on the part of the audiologist with regard to non-compliance. A fundamental finding in Conversation Analysis is that of 'recipient design', whereby turns of talk are crafted for specific recipients. Thus, by reporting a case of his own non-compliance for the audiologist, the patient is orienting to a possible concern of non-compliance for the audiologist.

This raises a question: Of what concern is compliance for the medical professional? The patient's possible concern for compliance is perhaps intuitively clear: His life will improve if he complies. It is not intuitively clear to us what the audiologist's concern might be from the patient's perspective in general, but here it would seem that, for the patient, there is some value in compliance for the audiologist such that that value can be threatened by him telling of his non-compliance. Accepting the patient's technical solution would restore that value.

> Accepting the patient's technical solution would increase willingness to comply.

5. Conclusion

We believe that the sort of analysis we have provided may shed light both on the clinical guidelines for audiological consultation, as well as the issue of non-compliance. With regard to the guidelines, we find that, although information concerning the client's psychological state and social life is in fact transacted in the consultation, they do not provide the inclusiveness nor the holistic patient perspective which the recommendation seeks to achieve. And the two main reasons why this is not the case are actually quite simple to see. Firstly, the tellings by the client in which such issues are addressed are sequentially 'out of place' with regard to the institutionally mandated 'order' of such consultations. Secondly, not only are the 'present concerns' out of place, as it were, they are also not received by the audiologist in a way which would be commensurate with the ICF recommendation. Thus any benefit of following the recommendation for compliance may be at risk in this consultation.

> Audiologist does not integrate client's psychological state and social life, while focussing exclusively on technology. This is not in line with WHO guidelines and may contribute to non-compliance.

The relationships between guidelines and medical practice, generally, are often issues of debate and enquiry (see for example Richey/Roffman 1999; Sandén et al. 2001; Rhodes et. al. 2006); recently, guidelines have come under critique for their role in attempts to 'govern by standards', a common method within what is known as 'new public management' (Thevenot 2009). In this view, guidelines are attempts to standardize, in this case, medical treatment, often as a means to test the viability of various treatments. Because of this discussion it is important for us to distinguish between a

> It is important to distinguish between
> - guidelines, and
> - how they are institutionally mandated.
>
> We propose change in institutional practices, not in WHO guidelines.

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guideline, and the institutionally mandated order mentioned above in order to avoid confusing the two, and to highlight that our intention is not to evaluate the guidelines per se.

The 'order' we refer to above is an empirically and logically generated account of the sequential and collaborative practices found in consultations. Its veracity hinges not only on observations of such encounters, but also on a vast number of studies of 'ordinary' spoken interaction because of the basic similarities between all kinds of spoken interaction, i.e., people take turns, they repair problems of understanding, they design their utterances for each other and so forth. Note that all of these features of talk are interactively managed, as this is one crucial difference between a guideline and an institutional order. The guidelines, which we take as a prescriptive list of instructions, specify a list of topics that should be transacted in a consultation, that is to say, information should be passed from one interactant to the other. The problem with this is, as noted above, that in spite of a desired transaction, i.e., the patient describing his difficulties in social life, the exchange of information does not preserve the spirit of the guideline. In our research example, it came in the wrong place, and was not interactively managed as an acceptable contribution at that time.

The question immediately arises, whether the guidelines should be made more interactive. However, there is no straight answer to such a question, for it portends further investigation into just within what sorts of practices guidelines are used as resources. Do guidelines guide anything? Are they used to guide consultations in the Ethnomethodological sense that they are indexically and reflexively made relevant by interlocutors in displaying the accountable nature of their actions? Or are they resources for quite different institutional practices, such as in evaluating medical personnel or in pursuits of 'evidence-based' treatments? Because of such questions, and our inability to answer them, we are in no position to offer a general evaluation of the guidelines as such, merely to highlight that as a guideline found in a report for how to conduct a consultation (Hoedt/Søltoft et al. 2006), they do not seem to account for what happened in the case at hand.

With regard to compliance, we maintain, along with Lutfey (2004) and Barton (2000), that insight into compliance can be found in the consultation. Although compliance is dealt with more frequently nowadays as an outcome of not only the singular patient, but also those with whom he or she interacts, there is still little insight into the actual, naturally occurring practices of 'being a patient' within which compliance might be seen as an appropriate action or not. This should be seen in contrast to other methods by which compliance might be probed, for example, interviews, questionnaires and the like.

Since compliance is not, or at least infrequently, something which takes place within consultations, the insights we gain concerning compliance are not prima facie evidence of compliance actually taking place or not. We can thus only track 'reports' of compliance as such. We would argue however that participating in consultations is an ordinary practice of 'being a patient'. Furthermore, we would argue that medical interactions are significant sites for compliance, given that compliance can be seen as following a particular set of medical institutional recommendations often delivered and evaluated in consultations. Because of this, we conclude that our findings have some ecologically validity for compliance more generally.

> Do guidelines guide anything?

> The provision of guidelines does not seem to account for whether they are implemented in institutional practices.

> More conversation analytic research is needed to understand how compliance is an outcome of institutional interaction.

> Medical interactions are significant sites for compliance.

Aphasia as an example of how a communication disorder affects interaction

Minna Laakso

Social interaction with hearing loss is located in the larger field of communication with disorders. Within this field, Conversation Analysis ("CA") has studied the socio-interactional aspects of aphasia for over 20 years. This overview shows what kinds of results can be expected from analyzing interaction where participants have unequal communicative competencies. Parallels to communication with hearing loss are drawn in the areas of mutual understanding, collaborative adaptations, sequence organization, turn-construction, and identity work. The results have been applied to planning interventions.

1. Introduction

Within the last two decades, a growing number of CA studies have focused on conversations where one or several participants have communication disorders. Perhaps the most studied in this field are the conversations of people with aphasia, a cognitive-linguistic disorder caused by brain damage (see e.g. Silvast 1991; Milroy/Perkins 1992; Klippi 1996; Laakso 1997; Aphasiology special issue edited by Hesketh/Sage 1999; Goodwin 2003; Wilkinson et al. 2010). Later on there have been CA studies on conversations of people with dysarthria (e.g. Bloch 2005), developmental language disorders (e.g. Gardner 2005; Tykkyläinen 2009) and voice disorders (Sellman 2008) as well. Since conversations of people with hearing loss are less studied, we can gain some potential insights to hearing loss communication from looking at prior research on aphasia, which has already been studied more extensively.

Since conversations of people with hearing loss are less studied, we can gain some potential insights to hearing loss communication from looking at prior studies on aphasia.

Aphasia as a linguistic and medical condition has been studied since the nineteenth century. However, the social-interactive aspects of aphasia have only become more recognized from the 1980s onwards (e.g., Holland 1982; Goodwin 1995). Until then, the study of aphasia focused on the brain damage and language symptoms of the individual with aphasia. However, as a deficit of speech and comprehension, aphasia forms a threat to the emergence of a shared understanding between the participants in interaction. CA has provided a way to analyze this interaction and has added to our knowledge on aphasia by revealing how individuals with aphasia and their conversational partners manage aphasia and construct a shared understanding in collaboration with each other. The research has uncovered the problems they encounter and the practices they use within their interactions. Generally, investigators of aphasic conversation have found some adaptations to the structures of conversation, such as turn-construction, sequential organization, and repair of problems in speaking, hearing or understanding (Kolk/Heeschen 1992; Heeschen/Schegloff 1999; Beeke et al. 2007). Furthermore, adaptation is found to be a collaborative process that occurs between speakers in the quest for mutual understanding, not something that takes place within an individual.

Adaptation to a communicative disability like aphasia does not take place within an individual but rather in the social interaction.

Similarly to hearing impairment, aphasia is a very heterogeneous phenomenon. It is heterogeneous both in its symptoms and in how people react to these symptoms in their interactions in different contexts. The symptoms of aphasia vary from non-fluent speech in Broca's aphasia, to normally flowing but erroneous speech in fluent, Wernicke's aphasia. Furthermore, besides these speech features, auditory comprehension, word finding and repetition skills can be disordered to various extents so that aphasia is clinically divided into six (Luria 1970) or eight (Goodglass/Kaplan 1972) symptom categories. Within one type of aphasia, there is also variation with regard to the severity of the symptoms. For example, anomic aphasia can be mildly affecting only some less frequent word classes or it can be severely touching almost all common words. Consequently, conversational difficulties may also be varied. In the following, I will describe some recent findings on different kinds of aphasia. The main division will be made between studies on non-fluent aphasia, where speech is sparse, and studies on fluent aphasia, where speech is full of lexical-semantic errors. I will first consider prior studies on turn-construction and participation, then sequential repair patterns, and finally collaborative meaning making and discursive roles. In all these features, there may be similarities with hearing impairment communication.

> Similarly to hearing impairment, aphasia is a very heterogeneous phenomenon both in its symptoms and in how people react to these symptoms in their interactions in different contexts.

> Aphasic difficulties include mainly speech and sometimes also auditory comprehension.

2. Adaptive turn-construction and active participation in interaction

Conversations that involve people with and without aphasia are generally considered to be asymmetric in participation as the interactants do not have equal linguistic competencies. However, CA studies have shown that aphasics may be actively involved in interaction by using other resources, such as gesture, to construct their turns (e.g., Goodwin 2006). In doing so, they compensate for their disability to talk. For example, a person with severe non-fluent aphasia was shown to be an active participant in interaction using only three words, vocalizing and pointing gestures to construct his turns-at-talk (Goodwin 1995). Besides pointing and illustrative gesturing, also drawing and writing are commonly used as turn-constructional resources in non-fluent aphasia (Klippi 1996: 49-110). In severe aphasia, vivid prosody can be used to display stance and convey some meaning even in situations where there is no intelligible speech (Goodwin et al. 2002). Thus, in severe non-fluent aphasia the construction of turns may differ from ordinary talk-in-interaction. In fluent types of aphasia, where speech is more preserved, turn-construction is often less disturbed but gestures may be used in some syntactic slots in the utterance to compensate for the inability to find certain words (Helasvuo et al. 2004; see transcript #1 below).

#1 Aphasia therapy interaction; Aphasic client (AC) is explaining her home chores to the speech and language therapist (SLT).

```
001 Slt:  no  mitäs sä oot    nyt kotona  puuhaillu.
          PRT what you be-2SG now at.home do-PPC
          well what have you been doing at home now.

002 Ac:   no<  (1.4) nää (2.0) .tch kuha (.) ii noita:
          PRT       these      just         those
          well<(1.4) these (2.0) .tch just (.) ee those:

003       *(4.3) umm pessy*   (0.2)
               wash-PPC
          * (4.3) uhm washed* (0.2)
          *AC GRABS HER SLEEVE*
```

> Linguistic adaptations in utterance construction

Figure 14: Communication disorder in interaction. Screenshot shows how the client (on the left) grabs her sleeve (line 003 above)

In aphasic interaction, prosody and multimodal resources such as gestures are used extensively. In hearing loss conversation, gaze plays an important role.

In transcript #1, the aphasic client produces pronominal modifiers in plural form (*nää, noita*, line 002) that project a noun phrase. She compensates for her difficulty in producing the noun phrase with a gesture (line 003). By grabbing her sleeve she indicates the kind of word she is after (e.g., 'clothes') and then produces the transitive verb ('washed', line 003), making her utterance more understandable to the recipient. The gesture thus replaces the missing object noun phrase. In sum, prior studies show that aphasic interaction relies heavily on multimodal resources of communication such as gestures, gaze and prosody.

Aphasics use linguistic and discursive strategies to compensate for difficulties in speech production.

In addition to the use of multimodal resources, linguistic adaptations in utterance construction have also been observed. For example, in less severe cases of non-fluent aphasia, speakers may resort to systematically simplified utterances, telegraphic style, in order to construct their turns effectively despite their slow linguistic processing (Heeschen/Schegloff 1999). Simplified utterances allow swifter participation in conversational turn-taking, in which non-fluent aphasics often have difficulty. Furthermore, people with fluent aphasia may use less canonical word order as a method of turn-construction in conversation (Wilkinson et al. 2003). By topicalizing the most important noun phrases (left-dislocation) they highlight a referent, and then produce a full utterance related to that referent using only a pronoun to refer to the already produced noun phrase. This practice allows them to produce more complicated utterances even with somewhat slow and restricted lexical access. However, most importantly, this practice allows the speakers to construct their turns quickly enough to hold a speaking turn in the on-going interaction. With hearing loss, one may also expect to find reliance on the multimodal aspects of interaction, as well as changes in participation and turn-construction.

With hearing loss, one may also expect to find reliance on the multimodal aspects of interaction, as well as changes in participation and turn-construction.

3. Sequential construction of extended repair sequences

As compared to ordinary conversation, the studies on aphasic interaction have pointed out a higher frequency and greater length of repair sequences (e.g., Milroy/Perkins 1992; Laakso 1997; Laakso/Klippi 1999; Perkins 2003; Wilkinson 2007). Normally a repair sequence takes maximally three or four speaking turns, but in aphasic interaction they often extend far beyond that. In ordinary conversation speakers quickly self-repair when they err. Speakers with aphasia make more errors but cannot self-repair their own speech errors effectively because they only have erroneous or too general words available (Laakso 1997: 158). Thus, at the same time linguistic impairments require more repair work and limit the aphasic individuals' abilities to do the corrective repair. As a consequence, the resolution of repair is not usually fast. Due to their comprehension difficulty, persons with fluent aphasia may also misunderstand others and produce sequentially unfitting turns as a response. These problems activate also the interlocutor to make, e.g.,

clarification requests, to which the aphasic individuals may have difficulty to respond. A long and complex repair sequence may often extend into ten or more turns.

In the following excerpt #2, a distorted production of a place name leads to a long repair sequence, in which the aphasic client tries to clarify what she means. The clarification attempts of the healthy interlocutor are marked with arrows in the left margin.

#2 Aphasia therapy interaction; Aphasic client (Ac) and speech and language therapist (Slt) are talking about the place (a hospital) where Ac used to work .

			Ac = client with aphasia

Ac = client with aphasia
Slt = speech and language
        therapist

```
001 Slt:  Millä osastolla oliko se ihan  tää  Meilahden
          which ward.in    was-Q it right this PLACENAME-GEN
          In which ward (did you work) was it right here

002       päärakennus,
          main.building
          in Meilahti main building,

003 Ac:   Eiku mä oon  ollu: (.) Tölveeh-lissä.
          PRT  I  have be-PPC   (DISTORTED WORD).in
          No I have been in (.) Tölveeh-li.

004       (0.5)

→   Slt:  Hetkinen,
          PRT
          Wait a moment,

006 Ac:   Se on niiko:n ööm (0.5) mielisairaalan  työssä.
          it is like    uhm        mental.hospital work.in
          It is like uhm (0.5) mental hospital work.

→   Slt:  Hetkinen eli se on missä täällä on sellanen.
          PRT       PRT it is where here   is one.like.that
          Wait a moment so it is, where in here is one.

008 Ac:   Se on tässä: yym (1.0) Tsyleedin   ja  ton:
          it is here    uhm       (DISTORTED WORD)and this
          It is here: in the corner of uhm (1.0) Tsyleedi

009       Tyynerin-kadun       kulmassa.
          (DISTORTED WORD).street corner.in
          and Tyyneri streets. ((continues with jargon))

010       (1.0)

→   Slt:  On[ks se-
          is-Q  it
          Is[ it-
            [
012 Ac:    [Ni se on nyt ainoostaan jääny.
            so it is now only       left
            [So that is now only left there.

→   Slt:  Nyt mä en ihan ymmärtäny.
          Now i didn't quite understand.

014 Ac:   Mitä: mitäköhän mää-
          what  what-Q-CLI I
          Wha:t what on earth did I-

→   Slt:  Eiku mä yritin  vaan saada selvää et   missä
          PRT  I  try-IMP just get   clear  that where
          No I just tried to find out where here
```

A distorted place reference by the aphasic interactant is the source of repair.

Therapist initiates repair several times (cf. arrows in left margin) when the trouble is not resolved.

```
→          täällä on sellanen,
           here   is one.like.that
           is one,

→          oletko sä psykiatrian    klinikalla ollu?
           be-Q  you psychiatry-GEN clinic.in  be-PPC
           have you been at the clinic of psychiatry?

           ((interaction continues with further repair attempts))
```

As was seen above, not only the person with aphasia, but the healthy interlocutor(s) as well take part in the repair process to resolve the problems aphasia causes (cf. Pajo, ch.8, this volume, for a parallel analysis on communication with hearing loss). Thus the successful repair outcome can be described as collaboratively achieved (Laakso/Klippi 1999; Lindsay/Wilkinson 1999; Perkins 2003). Furthermore, as repair sequences extend into long and complex sequential activities, they do not always end well, but the participants may experience a real halt in interaction (Aaltonen/Laakso 2010).

> Repair sequences are longer and more complex due to aphasia.
>
> Both interactants are involved.

      Some researchers have even suggested that in aphasic interactions there is no such preference for self-repair as in ordinary conversation (e.g., Milroy/Perkins 1992). In this view, direct other-correction by the non-aphasic speaker is both a common and a preferred practice. However, as was seen above, the healthy interlocutors try to resolve the trouble on their behalf to restore mutual understanding. It may be that aphasic interactions in general tent to expect other-correction by the healthy participants. However, it also seems possible that the interlocutors negotiate case by case what kind of treatment the problem is to receive. Furthermore, interesting differences in other-correction have been observed between therapy and home interactions of aphasic speakers (Lindsay/Wilkinson 1999). Friends and family members are also observed to engage in differing ways in the other-correction of aphasic problems. For example, Heeschen and Schegloff (1999) observed that a female friend of an aphasic woman made 'unobtrusive' other-initiations of repair, whereas the husband made direct corrective actions that underscored the incompetence of his wife. Thus, there seems to be variation to which extent different co-participants orient to the preference of self-repair or make 'exposed' corrections (Jefferson 1987) when interacting with the aphasic speakers.

> Other-correction by the healthy partner often seems to be preferred.
>
> Repair activities in home settings differ from therapy interaction.

4. Collaboration in meaning making: participatory roles and identities

A general finding in prior studies is that the non-aphasic interlocutors do a lot of interpretive work and collaborate actively in constructing the utterances of their aphasic co-participants (see e.g. Milroy/Perkins 1992; Goodwin 1995; Helasvuo et al. 2004; Aaltonen 2010). Collaborative constructions show how the participants adapt to the restrictions aphasia as a linguistic difficulty sets both for the aphasic individuals and their conversational partners. In particular, non-aphasic co-participants provide collaborative completions regularly in connection with word searching. The collaborative involvement of the healthy partners is mainly invited by non-verbal means such as gazing or pointing at the non-aphasic recipient (Laakso 1997:161-181 and 2003; Laakso/Klippi 1999; Helasvuo et al. 2004). In these cases, aphasic speakers are orienting to their identities as speakers with limited communicative competence and to their partners as more competent or 'knowing' participants, who are invited to co-construct the emerging speaking turns. In particular, this is the case in triadic conversation involving family members where frequently the spouse of the person with aphasia is used as a resource to provide the missing words (Laakso 2003; see transcript #3).

> Conversation partners may use a variety of actions to orient to the disability. These range from compensating for the disability to exposing it.
>
> Aphasics and their partners co-construct turns at talk.

       Please note that in the transcript below some special notations are used: Arrows mark the search and its completion. The line above the speech line indicates speaker's gaze; initials mark at whom the speaker is looking. Change in gaze direction is noted as follows:

      SP____   speaker is looking at his spouse
      R_____,,,   gaze shift away from the recipient R
      ...SP_____   gaze shift to recipient SP

#3 Aphasic home interaction; A man with non-fluent aphasia (A), his spouse (SP) and the researcher (R; behind the camera) are talking about the snow conditions for sowing early potatoes.

```
001 R:    Nyt oli uutisissa että ne   lumilingolla    on
          now was news.in    that they snowblower.with have
          It was in the news that they have used snow
          plowers

002       [tääl eh heh £pe- pelloilla£
          [here            field-PL-ADE
          [here eh heh £on the fi- fields£
          [
          [R__ ,,,            … SP_____
→   A:    [Joo  toi (.) toi *(.) mikä  toi  Heikkiä*
          [yes  that    that     what  that placename
          [Yes  that(.) that (.) what that Heikkiä
                        *A points at her spouse     *
```


Figure 15: Communication disorder in interaction. Screenshot from aphasic home interaction

```
004 SP:   Heikkilän   [siellä mailla.
          placename-GEN  there  lands.in
          There on the lands of Heikkilä.
                       [
005 A:                 [Nii joo toi  (.) joo.
                       [Yes yes that (.) yes.
```

As can be seen in the transcript, the man with aphasia is first looking at the researcher (beginning of line 003) but when he enters into difficulties in speaking, he turns to his spouse (end of line 003). At the same time, he produces a search question word approximating a place name and also points at his spouse. In this way the man with aphasia orients to his spouse as a knowing participant who may help him in finding the proper name for the place. The spouse provides the name and suits her utterance to fit the original remark of the researcher (line 004). In this way, the trouble is solved quickly and the conversation can continue. This kind of collaborative and interpretive practices may also appear in the three-party interactions in which people with hearing loss take part with their significant others.

In family conversations with three persons the spouse of the person with aphasia often compensates in specific ways for the disability.

This has also been reported for triadic hearing loss communication.

Despite the fact that collaboration is usually the case, some contradictory findings have also been reported. Some studies show that the interlocutors do not always support the smooth flow of conversation by trying to resolve the problems aphasia causes. Instead, the non-aphasic interlocutors may adopt a role of a 'teacher' asking the aphasic persons to correct their mispronunciations (Lindsay/Wilkinson 1999; Bauer/Kulke 2004), or, as being in the professional role of speech and language therapists, they avoid taking the next speaking turn, thus forcing the aphasic speakers to continue speaking despite of their difficulties (Laakso 2003). In some rare cases, the spouses of aphasic individuals may even totally halt the interaction in order to make their aphasic co-participants to construct their utterances by themselves (Aaltonen/Laakso 2010). In these cases, the non-aphasic spouses treat the aphasic individuals as competent in completing their own speaking turns. Furthermore, neither do all aphasic individuals invite their interlocutors to co-construct their speaking turns. Instead, these aphasic speakers keep their speaking turn and make it evident, often nonverbally, that they are rejecting any interruptions or completions by others (Laakso 1997: 161-174). These findings may be related to the fact that incompetence presents a threat to one's face and social identity (see, e.g., Goffman 1963; 1967). Thus the interlocutors do not want to take a participatory role that would acknowledge an incompetent identity of the aphasic participant.

When a non-aphasic interlocutor does not compensate for the disability, the conversation is less fluent, yet the identity of the aphasic interactant as a competent participant is not threatened.

The discursive identities and participatory roles people take reflect the fact that aphasic difficulties are often treated as delicate issues within interaction. For example, speakers with aphasia may produce embarrassed laughter when they encounter difficulties (Laakso 1997: 92-94; Wilkinson 2007). Furthermore, healthy co-participants do not always correct aphasic speech errors in occasions when they do not comprehend the talk of the person with aphasia (Laakso 1992). As was seen in transcript #2, the speech and language therapist did not directly address the oddly formed place and street names but instead showed more delicately that she had difficulty in understanding by saying, for example, 'wait a moment' and 'no I didn't quite understand'. Neither do aphasic speakers always actively request clarification, even though they have problems in understanding the speech of others.

Conversation partners often treat communication problems due to aphasia as delicate matters. Hearing loss is also a delicate issue for many people.

Although not yet extensively studied, some interactive adaptations may appear in the interactions of people with auditory hearing impairment as well. If the person does not hear, he or she may not explicitly address that but tries to cope with the situation with limited access to what the others have said. Thus, hearing difficulty may be treated as a delicate matter in interaction as well (cf. Skelt, ch.7 and Pajo, ch.8, this volume).

5. Conclusion and future directions

To conclude, in comparison to conversations between unimpaired participants, there seem to be several characteristic features of aphasic interaction. Firstly, the turn-construction may be different linguistically and combine multimodal elements with speech of aphasic participants. In many ways, persons with aphasia adapt their turn-construction practices to be able to effectively take the speaking turn in on-going conversation. Secondly, as aphasia causes problems in speaking and understanding, it is dealt with repair practices, often in lengthy repair sequences. Thirdly, the collaborative participation of the non-aphasic partners may be enhanced in aphasic interaction. For example, non-aphasic co-participants do a lot of interpretive work and complete the utterances of their aphasic interlocutors; thus the identities and discursive roles of the participants become altered. However, not all aphasic individuals or their partners adopt these identities but resist them by avoiding open acknowledgement of difficulty or try to make their partners show their

The identities and discursive roles of the participants become altered in a range of ways due to the disability.

competence in speaking. However, in these features there is considerable variation depending on the severity and type of aphasia, and the discursive identities and roles the participants adopt.

Recently, there have been interesting developments in the study of aphasic interactions. For example, longitudinal comparisons have been made to find out how conversational practices adapt to aphasia in the long run (Laakso/Renvall 2007; Wilkinson et al. 2007; Klippi/Helasvuo 2011). For example, it has been found that in the acute phase speakers with aphasia first try to communicate by speech as they did before their illness. When this results in effortful and fragmentary utterances, they start to use more gestures and talk more slowly in order to adapt to their language difficulties. Furthermore, the interlocutors also learn how they can take part in interpreting aphasic utterances, and thus also adapt in the long run. Longitudinal comparisons of interactions of hearing impaired people are relevant for the study of hearing impairment communication as well. In particular, it would be illuminating to study interaction before and after the implementation of a hearing aid, and later when the person has learned to use the hearing aid properly.

> Cross-sectional comparisons reveal that interactional behavior differs according to variation in the participation framework.

In sum, CA has proved to be a useful tool in the study of interactions of persons with aphasia and other communication disabilities. Furthermore, it can also reveal changes in interactive behaviors cross-sectionally, with different interlocutors, or longitudinally, at different points of time. This has lead to many practical applications of CA in terms of planning intervention to improve or change interactions of people with aphasia (e.g., Whitworth et al. 1997; Booth/Perkins 1999; Wilkinson et al. 1998; Lock et al. 2001). Undoubtedly the same can be done in connection with hearing loss as well.

> CA studies on aphasia in communication have been successfully applied to intervention.

Conversation Analysis as a new approach to the differential diagnosis of epileptic and non-epileptic seizure disorders

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An applied project with conversation analysts and medical experts in epileptology demonstrates an interdisciplinary collaboration from inception to successful implementation. The starting point was the clinical problem of diagnosing what kind of seizure a patient is suffering from in order to select the appropriate treatment, a process which may take several years. The conversation analytical ("CA") examination of patients' seizure descriptions yielded distinct CA/linguistic categories indicative of the seizure type. On this basis, a scoring table for differential diagnosis was developed for clinicians. This innovative collaboration serves to illustrate a possible methodological trajectory for other projects at the interface of medicine and interaction, such as hearing loss.

1. Introduction

In this paper, I will be reporting on an interdisciplinary research project carried out with a team of conversation analysts/linguists and a medical expert, Dr Martin Schöndienst, who is head of the psychosomatic clinic at the Bethel Epilepsy Centre in Bielefeld. I will summarize the origin, the development and the main aspects of this project and give an idea of the methodological and empirical problems we have been, and still are, faced with. This article reviews our research from a linguist's perspective, but of course it could not have been written at all without the interdisciplinary collaboration, especially with Dr Martin Schöndienst, from the medical side.

The focus will be on general aspects of our approach, but in order to illustrate how we proceeded and since we are working in the context of CA, I will also consider a few practical examples from the specific context of interaction with epilepsy patients. I hope that some of our observations and results will also be useful in the context of the treatment of hearing problems.

How does a linguist come to collaborate with a medical expert in epileptology? I should emphasize that what started the project was not linguistic interest in medical communication in general or some particular theoretical problem, but an observation made by the medical expert, Martin Schöndienst, in his everyday contact with patients in the Bethel epilepsy centre. In "listening to people with seizures"[1], he found that there seemed to be significant differences in the manner in which patients talk about their seizures, and that these different ways of talking might be related to the kinds of seizures the patients suffer from.

In order to appreciate the significance of this observation, it is important to realise that there are different types of seizures. The main difference is between epileptic and non-epileptic, i.e., psychogenic seizures; a seizure may include falling down, convulsions, trembling, losing consciousness, etc., and yet not be an epileptic one. Diagnosis is often very difficult. Despite the

Conversation analysts and medical experts collaborated in analyzing a data base of patients' seizures descriptions.

This project summary includes:
- origin
- phases and main aspects
- methodological issues
- empirical problems
- outcome
- successful application to the medical field
- reflection of the importance of the patients' perspective

Starting point:
- The medical expert listened to patients' tellings and had the impression that the seizure descriptions differ.

[1] This is the title of an article which gives a more detailed presentation in English of the Bielefeld project than is possible here (cf. Schwabe et al. 2008).

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elaborate and complex techniques of diagnosis available today it takes on average more than 7 years for a patient with non-epileptic seizures to receive the right diagnosis (cf. Plug et al. 2009a). The two types of seizure require completely different forms of treatment. There is a wide range of medications for treating epilepsy, most of which have serious side-effects, but which are not effective in the case of non-epileptic seizures. So developing a new diagnostic instrument is potentially of great value.

The clinical problem:
- It takes more than 7 years to diagnose a seizure. Treatments differ depending on the type of seizure.

Doctors normally tend to listen only to what the patient says, i.e., what symptoms he or she describes. Schöndienst, however, became convinced that carefully listening to how patients communicate the subjective aspects of their seizures would not only offer new and important insights into seizure disorders and lead to a better understanding of how patients experience them, but might also have practical implications for the diagnosis of epileptic and other seizure disorders (cf. Schöndienst 2002).

Doctors normally tend to listen to *what* patients say. Dr Schöndienst also listened to *how* patients talk.

In order to develop a more precise idea of the characteristics of patients' descriptions, a linguistic/conversation analytic approach was needed. This is where our interdisciplinary cooperation started.

Reason for interdisciplinary collaboration:
- A linguistic/conversation analytic approach was needed.

So our main concern was to work out the inter-relationships between the communicative and the medical dimensions of illness and to make a contribution to the improvement of diagnostic techniques.

2. Methodological considerations

The central question for our interdisciplinary research was: is it possible to show that there are systematic differences in seizure description between patients suffering from epileptic seizures and patients suffering from psychogenic, non-epileptic seizures? Can we define different types of description which may be related to different types of seizures?

Research question:
- Is there a connection between the way patients describe their seizure and the kind of seizure they have?

Our research was guided by general principles of CA (cf. Egbert/Deppermann, ch.5, this volume). This choice was motivated by the openness of this approach, which allows for discovery of unexpected phenomena by close study of the data. At the beginning we did not know what exactly we were looking for and what (kinds of) phenomena might prove to be relevant. This is precisely the starting-point of Conversation Analysis, where "unmotivated examination" (Sacks 1984: 27) plays a central role, and the objects to be investigated are expected to emerge from the conversational data. However, "using observation as a basis for theorizing" (Sacks 1984: 25) is hardly what medical researchers are familiar with; they tend to formulate theoretical hypotheses and then test them empirically.

One of the major consequences of this approach, which is also fully in line with the main purpose of our research, is that "analytic interests should not be constrained by external considerations" (Atkinson/Heritage 1984: 17). In our case this means that data analysis does not start with medical, i.e., epileptological categories; instead we consider the patients' categories and the aspects of the illness which *they* present as relevant. This "analytic mentality" (Schenkein 1978) enables us to reconstruct the illness-specific subjective experiences of the patients themselves and to discover the features they distinguish in describing their seizures. The most important aim is to highlight the patients' rather than the doctors' relevancies.[2] From the beginning of our research we have been convinced that this is a good way of approaching the data. Conversation Analysis was thus our main methodological orientation. We did, however, adapt the approach for the purposes of differential diagnosis.

Analytical approach:
- to look for patients' categories rather than the doctor's relevancies

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[2] For general aspects of the application of CA to medical communication cf. Heritage/Maynard (2006).

3. Procedure

The empirical basis for analysis is "materials collected from *naturally occurring* occasions of everyday interaction" (Atkinson/Heritage 1984: 2), in our case: talk between doctors and patients suffering from seizures. So in order to be able to analyse patients' ways of describing their seizures, our first task was to collect conversational data. According to the principles of Conversation Analysis we started to record doctor-patient interactions in ordinary settings, i.e., in-depth open interviews conducted by a doctor or a psychotherapist with in-patients of the psychotherapy-oriented clinic headed by Martin Schöndienst. These interviews were not arranged for research purposes; they were part of normal clinical treatment and would have taken place anyway. It was only the recording on audio or video tape that was research-motivated.

Detailed analysis of these data showed that patients did indeed talk about their seizures, or the illness in general, and that they mentioned a considerable variety of different aspects. We started to suspect that some of these might be of a systematic nature. Firstly, the descriptions of the seizures themselves, or of aspects of them, varied substantially in length, detailedness and elaborateness. They also varied in the degree of difficulty the patients were 'displaying' in describing them and in the methods they used to do so. Secondly, there were specific topics which appeared to be relevant to our purpose, such as particular episodes like the very first seizure or the most severe one, a phase of unconsciousness during the seizure, and what patients did, or did not do, in order to overcome the seizure. Finally, there were clear differences with respect to initiative: sometimes it was the patients themselves who brought up the subject of their seizures, and immediately proceeded to describe them; on other occasions it was left to the doctor or the therapist to elicit a description.

Having spent a few months on the analysis of this kind of 'naturally occurring' doctor-patient talk, we started to develop guidelines for doctors in order to improve the comparability of the data. The aim of these guidelines was to give all patients, as far as possible, equal interactive conditions with respect to choice of subject and choice of descriptive technique, etc., as well as opportunities for a detailed description of what they experience during their seizures, and finally make sure that all relevant points were raised in the course of the conversation.[3] Following these guidelines, each interview begins with an open question, which refers, for example, to the patient's current situation or his or her expectations of the treatment offered. This question gives the patient the opportunity to introduce subjects of his or her own choosing and set up his or her own priorities. As it is not the doctor, who brings up the topic of seizures, it is interesting to see what is the first topic introduced by the patient (it is not necessarily the seizures).

During this opening sequence, and to a minor extent also during the whole interview, the doctor refrains from directive questioning in order to encourage the patient to build up the conversation from his own perspective and to stress the aspects he himself regards as relevant. In this initial phase the doctor must be prepared for hesitations, frequent pauses and even long periods of silence.

Later on, in the second part of the interview, the doctor asks questions about the seizures, their general development, auras which may precede them, unconsciousness during the seizure, and so on. He will also focus on particular seizure episodes: the first seizure, the last one and the most severe or the most memorable one. This of course applies only if the patient has not volunteered this information during the initial phase already. In the

Data:
- Naturally occurring doctor-patient interaction (video and audio)

First results:
Patients' seizure descriptions vary in
- what aspects are mentioned
- length
- detailedness
- elaborateness
- orientation to difficultness of describing seizure
- methods of description

Ensuing step:
Interview guidelines for doctors. Goals:
- better comparability
- to give patients the same conditions across interviews

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[3] Cf. Plug et al. (2009a) for a more systematic version of these guidelines.

third part of the interview, the doctor has the opportunity to ask precise concerning the medication, the frequency of seizures or other aspects of the illness and its ongoing treatment.

4. Data analysis

The data, recordings and transcripts, were analysed by an interdisciplinary team consisting of linguists and medical researchers. The linguists/conversation analysts were not informed about the patients' diagnoses and had in general no or very little knowledge about epilepsy or other types of seizures. Thus their observation of the patients' ways of talking about their seizures was not influenced by epileptological categories or hypotheses. We started with single-case analyses and then proceeded to compare the various solutions patients found for the task of describing their seizures.

In the following, I will illustrate our work as well as some of our results by analysing a few examples. I will focus on formulation activities, because these turned out to be of particular relevance for diagnostic purposes.

One of the most striking characteristics is that patients, when they come to describe their seizures or auras, very often begin by saying that they are very difficult to describe or that it is hardly possible at all to communicate their feelings and sensations to another person. So from a linguistic point of view it is noticeable that they frequently resort to metadiscursive comments such as "that is so hard to describe", "I can't really describe it", "there are no words" or: "there is no language for that", "it is impossible to explain", etc. The following sequence from a conversation between a patient, Mrs Reifen, and a psychotherapist provides a good example of this. When the therapist asks the patient what she knows about the course of her seizures, she first mentions "an awful taste in the mouth" (not quoted in the example below) and then "a strange feeling in the head", which she then tries to explain:

#1 Patient describes the course of her seizures (Mrs Reifen/epileptic seizure)

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018 Pat:  da is son seltsames gefühl dann im kopf,
          there is a strange feeling then in my head

019       als ob ich (---) ja (--) ich seh schon noch alles aber
          as if I        well    I can still see everything but

020       ich bin doch nich mehr da hab ich das gefühl ja, (--)
          I'm not there any more     that's what I feel

021 The:  hm, (.) was sehn sie dann noch, (--)
          hm      what do you still see then

022 Pat:  ja ich seh schon die umgebung noch, aber
          well I still see my surroundings     but

023       aber irgendwie (.) hab ich das gefühl, (-)
          but somehow        I have the feeling

024 The:  hm hm, (--)

025 Pat:  ja ich bin woanders: (.) trotzdem. ((lacht kurz))
          well I am somewhere else anyway ((laughs briefly))

026       (.) ja (.)
              yes

027 The:  hm können sie sagen (.) m: wo anders oder
          hm can you say          where else or

028       wie (.) woanders,
          how somewhere else
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Analysis
- The interviews are analyzed by the conversation analysts and the doctors.
- The conversation analysts have no prior knowledge of the medical diagnoses of patients.

Patients' seizure descriptions can be categorized into different types.

Two types are presented here:
- epileptic seizures (cases 1 and 2)
- non-epileptic seizures (case 3)

Epileptic (case 1):
Patient's description shows a high degree of formulation efforts.

Lines 018-030:
Patient reformulates several times the strange sensation in her head.

Lines 019-020 and 022-031:
Numerous self-repairs display patient's difficulty in describing her sensations during seizure.

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029 Pat:  weil in meinem kopf is son gefühl als ob ich (.)
          because in my head there is a feeling as if I

030       ((Zungenschnalzen)) (-) woanders (.) auweh; (---) .h
          ((clicks her tongue))   somewhere else oh dear

031       o::h das geht so schlecht beschreiben
          ((lacht kurz))(-)
          oh   that's so hard to describe
          ((laughs briefly))

032 The:  ich glaub dass das schwer is aber versuchense mal.(--)
          I believe that it is difficult but try

033 Pat:  als ob ich n=stück weggerückt wär ja. (-)
          as if I was moved away a bit     yes

034       sagen=mer mal so
          let's say

035 The:  hmhm,

036 The:  innerlich oder (.) wie meinen sie das. (--)
          inwardly or       what do you mean

037 Pat:  als ob ich mich dann (.) ich erleb mich
          as if I then            I experience myself

038       einfach ganz anders (--)
          quite differently

039 The:  fühlen sie sich fremd (.) in sich selbst fremd
          do you feel strange       strange inside yourself

040 Pat:  ja. (-) ich ja auch.
          Yes    me too
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Telling is punctuated by metadiscursive comments on the 'indescribability'.

In order to arrive at a closer description, Mrs Reifen reformulates several times the strange sensation in her head (lines 018-030). These reformulations are partly self-initiated, partly initiated by the therapist's questions. The reformulation sequence is punctuated by metadiscursive comments on the 'indescribability' of these sensations (cf. Gülich/Furchner 2002; Gülich 2005).

It is not just these types of comments which indicate the degree of formulation effort involved; there are other phenomena. Thus, Mrs Reifen's speech production is characterised by numerous repairs, such as hesitations, self-corrections, repetitions, false starts, restarts and reformulations (see lines 019-020 and 022-031). All of this suggests a considerable amount of effort. The metadiscursive comment is only one of the typical traces of this effort, though it is an important one because it can be considered as a sort of 'accounting' for the formulation difficulties. In other cases there are no such comments but the patient conveys indescribability by all sorts of verbal and communicative devices.[4] It is particularly interesting that this phenomenon had already been noticed in an epileptological context: It was described by Janz as early as 1969 in his book about "epilepsies".

Another form of intensive formulation work which we find in Mrs Reifen's self-report is the recurrent use of long chains of reformulations, where she uses the same pattern several times in succession. She solves the problem of describing her strange sensations, which mainly consist of <u>double perceptions</u> by means of a series of adversative phrase structures ('I

[4] See Gülich/Lindemann (2010) for a multimodal description of epileptic fear and Gülich/Couper-Kuhlen (2007) for the use of verbal, prosodic and visual devices to distinguish between everyday fear and epileptic fear.

can still see everything, but I'm not there anymore', lines 019-020, or 'I see my surroundings still, but I am somewhere else', lines 022-025). This pattern indicates simultaneous but contradictory perceptions. We interpret the numerous variations on this theme during a large part of the interview as a typical linguistic reflection of a particular type of aura, technically known as 'experiential aura' (Wolf et al. 2000).

Thus we consider conversational techniques such as metadiscursive comments or reformulations as 'methods' patients employ to solve the difficult task of describing subjective, and often rather unusual and strange perceptions, sensations and feelings.

Another technique we found in our data is the use of metaphors. This has been investigated by Volker Surmann, a member of our research group, in his PhD thesis (Surmann 2005). Surmann studied not only the metaphors themselves but also the contexts in which they occur and formal aspects of their use. Following Lakoff and Johnson's approach (Lakoff/Johnson 1980; 1999), he tried to work out the concepts that underlie the metaphors used in the description of seizures. He found that one of the most frequent concepts is the idea of the seizure as an entity approaching from outside. The patient in the next example, Mr Schott, conceptualises the seizure as an enemy he has to fight. Right from the beginning, even before describing the seizure feeling in detail, he makes comments such as *ich hab dagegn: (-) angekämpft* ('I fought against it', line 131), and *ich hab mich halt dagegen geWEHRT>, (0.7) ich WOLLte=s nicht (*'I defended myself, I didn't want it', lines 208-209). Later on he develops the metaphor, speaking about stronger or longer fights, which are more difficult to win than others, and of his fear of losing the fight.

#2 A patient uses intensive formulation work (Mr Schott/epileptic seizure)

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626 Pat:   (--) wenn die HEFTIGER sind,
                 when they are stronger

627         wenn das so=n (-)stärkerer (.) n größerer k(r)ampf is,
                 when it's a stronger and bigger fight

628         innerlicher kampf is, oder so=
                 an inner fight  or something

629 Int:   mhmh

630 Pat:   (--) dann (1.1) tritt da auch wieder ne angst auf.
                 then the fear comes back again

631 Int:   mhmh

632 Pat:   (--) dann kommt die auch wieder;
                 then it comes back again

633         (1.5)

634 Pat:   wenn er schnell vorbei is, oder so,
                 when it's over quickly or something

635         dann (1.3) is das egal;
                 then it doesn't matter

636         (0.6) wenn=ich länger kämpfen muss dagegen,
                 but when I have to fight longer

637         (1.5) dann: (-) spüre ich auch wieder (0.8)
                 then I feel again

638         empfind=ich auch wieder angst;
                 then I feel afraid again
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Epileptic (case 2):
further techniques for intensive formulation work

Patient resorts to a metaphor
- to describe the 'indescribability' of his seizures
- the seizure is portrayed as an enemy he has to fight

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639        (--) dass (--) n gro:ßer anfall kommen kann;
           that a big fit may come

640        (1.7)

           ((34 lines not displayed))

674 Pat:   .h (-) und äh: wenn das: der kampf wie gesagt (1.5)
           and when it the fight like I said

675        wenn das n HARTER kampf is, (1.4)
           when it is a hard fright

676        je LÄNGER DER DAUERT,
           the longer it lasts

677        (1.2) desto mehr angst kommt in mir hoch;
           the more afraid I get

678 Int:   (-) [dass sie das nich schaffen,]
               [that you won't

679 Pat:       [°dass da so was passiert;° ]
               [that something like that happens

680        (-) dass ich das dass ich den kampf verliere,
               that I that I lose the fight
```

The sequence quoted shows how the metaphor of fighting the seizure is expanded and becomes the main pattern of description. The use of this metaphorical concept is also framed by explicit references to 'indescribability': Just like Mrs Reifen, Mr Schott starts his seizure report with repeated metadiscursive comments such as 'it's hard to describe', 'I can't describe it any better, I have often tried' (not quoted in the excerpt). Thus the metaphorical description is his method of solving the problem of description.[5] It is the method of one group of patients, and it is characterised by two main features: the seizure is experienced as a threatening entity coming from outside, and the patients actively try to overcome it (Surmann 2005: 230). These patients use 'coherent' metaphors (i.e., the chosen metaphor is sustained throughout); there is another group of patients who typically use 'incoherent' metaphors, i.e., the initial metaphor is repeatedly dropped and replaced by a different one.

When we compare these patients' intensive formulation work with what the next patient does in speaking about her seizures, we immediately see a completely different method: Mrs Erle does not volunteer much detailed information, she rather sticks to brief, straightforward descriptions of the circumstances of the seizure.

#3a Patient uses straightforward formulations (Mrs Erle/non-epileptic seizure)

```
012 Pat:   mh, (--) ich mein ich fall immer um, und: (--)
           mh      i mean i always fall down and

013        merk=s ni un:d (3.1)
           I don't realise it and (3.1)

014        es dauert dann auch ne ganze weile
           it takes quite a while then
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Non-epileptic seizure (case 3): Contrasts to cases 1 and 2:
- little formulation work
- patient briefly lists what happens when she goes into a seizure
- no signs that the description is an effort

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[5] Cf. the example analysed in Schwabe et al. (2008:59-60). For a detailed analysis of patients' conceptualisations of seizures cf. Surmann (2005).

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015        bis ich wieder da bin.
           until i am back again

016 Doc:   (4.5) mh,
           (4.5) mh

017 Pat:   (2.1) die könn auch praktisch ma- mit mir mach=n
           (2.1) they can actually d- do with me

018        was se wolln; ne,
           whatever they want right

019        letztens ham=se im krankenhaus mir (---) .h
           the other day in the hospital they

020        wiede n zäpfchen eingeführt,
           inserted a suppository again,

021        hab ich ni gemerkt;
           i did not realise that

022        (--) also (---)
               well

023        die kriegen mich auch ganz schwer munter;
           they also have a lot of trouble waking me up again

024 Doc:   runter,
           down

025 Pat:   munter;
           awake

026 Doc:   munter;
           awake

027 Pat:   munter ((kurzes Lachen))
           awake ((short laugh))

028 Doc:   im krankenhaus,
           in the hospital

029 Pat:   im krankenhaus; =überhaupt so;
           in the hospital  generally

030        wenn=ich jetz so auf der straße liege,
           when I'm lying on the street now

031        meistens passiert=s ja auf der straße
           mostly it happens on the street

032        (--) wenn=ich umfalle,
               when I fall down

033        zu hause is=es ja noch gar nit passiert
           at home it never happened so far

034 Doc:   ah ja,
           oh right
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Mrs Erle just briefly lists what happens when she goes into a seizure ('I fall down and I don't realise it and it takes quite a while then until I am back again', lines 012-013); there are no signs that the description is an effort. Instead of describing her feelings, she reports on a short episode from her stay in hospital (lines 017-021); this does not concern the seizure itself but its treatment by the staff, who are vaguely referred to as they (line 019). After these rather general remarks she volunteers some further details (left out here) concerning the situation at home. Then she remains silent. After a long

pause, or more precisely, two pauses, separated by the doctor's "hm", the doctor initiates an additional description by asking a question:

#3b Second seizure description elicited by doctor (Mrs Erle/non-epileptic seizure)

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046 Doc:  (3.2) °mh,° (13.4) das is schon alles was sie:
          (3.2) mh (13.4) that is all you can

047       sozusagen dazu (--) zu sa:gen hättn; (-) oder:
          I really say about this                 or

048 Pat:  (2.1) ja ich kann mir auch nit viel drunter
          (2.1) yes I can't really picture this

049       vorstelln; ne, (--)
          at all right

050       weil=ich ebnd auch nie merke jetz:
          because now I never notice

051       dass mir jetz vorher schwindlich wird,
          that I feel dizzy before

052       .hh (---) oder schlecht wird, oder was gar nichts;
          or that I feel sick or something      nothing at all

053       >°urplötzlich: (--) lieg=ich dann irgendwo;°< (8.2)
            all of a sudden      I am lying somewhere

054       das kündicht sich emnd nie an; ne, (--)
          there is never a sign before right

055       dass ich jetz sagen kann ich setz mich irgendwo
          so that I could say I'll sit down somewhere

056       oder halt mich fest, oder was (---)
          or hold on to something or something like that

057       das geht alles nit (5.3)
          I can't do that (5.3)

058       komische sache, ne, ((lacht kurz))
          funny thing this isn't it ((short laugh))
```

Mrs Erle's reaction is rather similar to her first description in extract #3a. She does not give any further details, but repeats more or less what she has said before, i.e., that she does not feel anything. Whereas patients like Mrs Reifen and Mr Schott make an effort to depict what they are feeling and experiencing before or during a seizure, Mrs Erle describes rather what she does not feel: 'I never feel dizzy beforehand, nothing at all, there is never a signal before it' (lines 050-051) – she uses quite a number of negations.

The narrative reconstruction of seizure episodes is of interest because patients suffering from seizures typically have to deal with a rather difficult communicative task, the description of a phase in which they lose control. The few examples we have seen already show that there are considerable differences between the patients' 'methods' in solving this problem: some patients tend towards a rather 'holistic' description of the phase of restricted control. All they do is name it and emphasize the fact that they do not know or perceive anything during this phase. Others, however, though they too lose consciousness, rather try to describe in detail what they do or what happens to them in such phases, by deducing from situational cues or sorting to a witness's statements (Furchner 2002; Gülich/Furchner 2002).

Case 3 (continued):
Doctor elicits a second seizure description.

Patient provides no further details.

In general, seizure descriptions differ in whether they are
• short and 'holistic' (non-epileptic) or
• detailed with efforts to communicate the 'indescribable' (epileptic).

In sum, we found a number of clearly distinguishable types of description. They have here been illustrated from the areas of formulation work, metaphorical conceptualization and reconstruction of the phase of reduced control, but there are many others.

5. Results

The main outcome of the analysis of the data has been the emergence of a number of distinct types of seizure description, but the aim of our research was not limited to this: the central idea we pursued was to make a contribution to differential diagnosis. In the following, I will summarise our analytic procedure by listing the main steps leading from single-case analyses to the development of a diagnostic instrument:

From single-case analyses to diagnostic categories:

Step one: Through single-case studies we discover the individual participant's recurrent communicative patterns in describing auras and seizures. The excerpts from the interviews with Mrs Reifen, Mr Schott and Mrs Erle were examples taken from such case studies.

1. Discovering communicative patters

Step two: We systematize these observations in order to discover the individual patient's conversational 'methods'; we create what we call a 'conversational profile', where thematic, interactive and verbal aspects are brought together.

2. Creating individual conversational profiles

Step three: We compare the 'methods' of different individuals and we group individuals according to their methods. We find similarities between the methods used by Mrs Reifen and Mr Schott and differences between both of them and Mrs Erle.

3. Grouping of cases

Step four: We relate patients' 'methods' to different syndromes, i.e., epileptic vs. non-epileptic seizures. Mrs Reifen and Mr Schott suffer from epileptic seizures, while Mrs Erle suffers from non-epileptic seizures.

4. Relating linguistic and clinical observations

Step three is as far as Conversation Analysis can go; we do not need medical knowledge for this kind of analytic work. In fact, we even deliberately avoided referring to medical categories. But step four demands epileptological expertise. Thus, our central aim can only be reached through interdisciplinary work.

To reach the central aim, an interdisciplinary approach was required.

The following table shows the linguistic criteria developed so far which have turned out to be relevant to differential diagnosis.

FEATURE	FOCAL EPILEPTIC SEIZURE WITH AURAS	NON-EPILEPTIC SEIZURE
Subjective seizure symptom	typically volunteered, discussed in detail	avoided; discussed sparingly
Formulation work (e.g., reformulations, metadiscursive comments)	extensive, large amount of detail	practically absent, very little detailing effort
Seizures as a topic	self-initiated	initiated by interviewer
Focusing on seizure description	easily volunteered	difficult or impossible ('resistance against focusing')
Spontaneous reference to attempted seizure suppression	usually made	rarely made
Seizure description by negation	rare	common (e.g., 'no warning', I' feel nothing', 'I do not know anything has happened')
Description of periods of reduced consciousness or control	- intensive formulation work - aiming at a precise, detailed description - precise placement of period of lost consciousness in the seizure process - display of willingness to know what precisely happened during periods of unconsciousness - degree of unconsciousness can be challenged in interaction with interviewer	'holistic' description of unconsciousness (I know nothing) - unconsciousness stated without differentiation or description - pointing out inability to remember or take in anything - no self-initiated detailed description - presentation of gaps in consciousness as the most dominant element of the disorder - completeness of unconsciousness cannot be questioned in interaction
Metaphors, conceptualisation of seizures	- seizures presented as an external, independent, threatening entity - active struggle against seizure-threat, e.g. metaphors of fighting	

Table 11: Linguistic criteria used for differential diagnosis (adapted from Schwabe et al. 2008)[6]

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[6] This summary is based on an English presentation of the German project: Schwabe et al. (2008); Surmann (2005) contains a shorter version of this table. In Schwabe et al. (2008) the principal distinctive features found in the German project are described in detail and illustrated by examples, e.g. formulation effort, phase of reduced control, metaphorical conceptualisations.

The table shows that faced with the same task (i.e., the description of their seizure experiences) the two groups of patients, those with focal epileptic and those with non-epileptic seizures, resort to different conversational procedures. The consequence of this result is that if doctors listen not just to *what* patients say but to *how* they say it, particularly in terms of the features we have identified, this may lead to the correct diagnosis or at least to a first diagnostic hypothesis.[7]

The results are based on the approach of listening not only to *what* patients say but to *how* they say it.

6. Innovation and application in medicine

The results of the German project formed the basis for the research carried out by Markus Reuber, a neurologist working with conversation analysts/ linguists at the Department of Neurology at Sheffield University Hospital. Taking up our research design, he started in 2005 with the intention of examining whether the interview techniques we have developed would produce the same results with English speaking patients suffering from epileptic or non-epileptic seizures. This project represents a significant development of our work: the Sheffield-team not only confirmed and completed our findings but continued in a more systematic way.[8] All patients participating in the study were in-patients admitted to a video-electroencephalography ("EEG") unit because the nature of their seizure disorder was uncertain. The conversations with the patients were not part of the standard treatment but interviews, all of them conducted by the same doctor according to the guidelines already at hand, which were completed and strictly applied. The interviews were video-recorded, transcribed and analysed by a linguist who was fully 'blinded' to diagnostic information (Reuber et al. 2009). The analysis was 'hypothesis-driven', i.e., guided by the features which had been discovered in the German project. For the English research group, the relevant features were already defined (cf. e.g., Plug et al. 2009b), but in the course of their research new ones were added.[9] The relevant features were summarised in a 'differential diagnosis scoring table' which served to systematise and evaluate the observations.[10] The linguist was then asked to develop a diagnostic hypothesis (epileptic vs. non-epileptic seizures), which was finally compared with the medical diagnosis, i.e., the result of the video-EEG.

The results of the pioneering German project are replicated for English.

Two linguists/conversation analysts blinded to the medical diagnosis analysed 20 descriptions of seizures.
Independently they arrived at the same result as the medical diagnosis in 18 and 17 (respectively) cases.

Listening to patients and taking their descriptions seriously is also in line with changes in the general focus of the linguistic study of medical interaction, whereby closer attention is paid to the role of the patient, his perceptions, and his expertise regarding his own illness (cf. Gülich 2003). In the past, the focus tended to be on the doctor and on comprehension problems, misunderstandings, the difficulty of technical terms, lack of time and attention given to the patient and similar issues. Interactive aspects and the patient's perspective were taken into account only in the context of Conversation Analysis, which throws a "spotlight on the patient".[11] The approach of

This 'patient'-centered approach is in line with current changes in medical practice.

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[7] Surmann (2005) shows that a third group, patients with an idiopathic generalised epilepsy, can be identified through their use of the same conversational procedures, although there are differences in distribution. We are convinced that linguistic analysis can go even further and help to distinguish subtypes of seizures; Wolf (2002), for example, argues that the linguistic analysis of reformulation techniques can be used to subdivide the group of focal epileptic seizures into frontal-lobe seizures and temporal-lobe seizures.

[8] For a detailed description see Schwabe et al. (2007).

[9] Cf. for example the use of diagnostic labels such as 'seizure', 'fit', 'attack' described in Plug et al. (2009c).

[10] The Scoring table is accessible via URL: http://listeningseizures.wikidot.com/start [Last retrieval August 18, 2011].

[11] This is the title of Drew's contribution to a special issue of "Text" on "Lay Diagnosis" (Beach 2001).

the Bielefeld and the Sheffield project also enhances the status of patients' activities or competences, but it goes one step further, since it tries "to establish the predictive and discriminatory power of a linguistic analysis based on the described features" (Schwabe et al. 2007:723). This may well change doctors' attitude towards patients and the way they interact with them. "One reason why it is of great importance to communicate the findings of this study successfully to clinicians is that they demonstrate the practical usefulness of allowing patients time to develop their agenda and to detail their subjective symptomatology in clinical encounters" (Schwabe et al. 2007:12). Thus this kind of research not only illustrates a new application of Conversation Analysis in medical settings, it also "demonstrates the potential of CA as a diagnostic tool in a multidimensional clinical decision process" (Schwabe et al. 2007:12). This potential is certainly not restricted to seizure disorders.

This approach tries "to establish the predictive and discriminatory power of a linguistic analysis based on the described features" (Schwabe).

Conclusions and future perspectives for application and innovation

Arnulf Deppermann and Maria Egbert

In developing an interdisciplinary approach integrating Conversation Analysis ("CA"), audiology and User Centered Design, the applied goal of this international collaboration is to analyze real-world social interaction from the perspective of the participants in order to build an empirical basis for innovation in the field of communication with hearing impairment and hearing aid use. In reviewing theory, methodology and analysis of eight cases analyzed in this volume, the editors assess the potential of application for the various stakeholders in communication with hearing loss and hearing aids, including the estimated impact factor. The chapter closes with a consideration of desiderata for future research.

The last decades have seen continuous technological development of hearing aids in terms of size, acoustic properties and flexible handling, resulting in increasingly smaller and almost invisible instruments with a wide range of features. Still, the rate of hearing aid supply and use is rather poor, as described in ch. 1 - 3. Neither innovation in technology nor opportunities for medical support have changed this unsatisfying picture. The reasons seem to go back to interactional, emotional, societal and technological problems. Of these reasons, social interaction is researched the least.

> Of the interactional, emotional, societal and technological problems, social interaction is researched the least.

This volume sets out to explore prospects for change by focusing on the interaction between persons with hearing impairment and their partners, both in everyday, medical, and audiological contexts. The papers in this volume provide new insights into how these interactions are structured, how problems arise and how participants deal with them. In this chapter, we turn to the perspective of application and ask: Which prospects for improvement and innovation do the studies collected in this volume open up? We are addressing this question by attending to the different social groups of stakeholders to whom hearing loss becomes relevant in one way or another.

1. Hearing loss communication in everyday life and at the workplace

The first stakeholder group, of course, consists of the persons with hearing loss in their everyday life at home, at work and in public. Interactional studies on hearing loss show what problems can be expected to occur in interaction (like mishearings and ensuing problems such as wrong inferences), and what sites are most difficult to deal with for a hearing impaired person (like multi-party interaction, interaction in cars, noisy environments). Examples from video tapes of naturally occurring encounters can be used as a basis for enhacing people's awareness to situations which are likely to cause problems. They can be used to develop strategies to deal with expectable problems preemptively, i.e., by arranging spatial and auditory environments, bodily pos-

> Stakeholder groups:
>
> • persons with hearing loss

tures, seating arrangements, etc. in a way which fosters hearing conditions as much as feasible. The same applies to skills of adapting the hearing aid to personal and situational contingencies.

The second stakeholder group consists of almost everybody because due to the prevalence of hearing loss, each normal hearing person is likely to communicate with a person with hearing loss in public encounters, at the workplace, and in private situations with family and friends. Interactional studies show the 'normal' consequences of hearing loss in interaction. However, the personal experience and the expectable consequences of hearing loss are little known so that people with and without hearing loss will benefit from better knowledge. Such knowledge can be gained from video-taped interaction. For example, descriptions of hearing impaired persons' experiences convey what an altered auditory relationship to the world and, most importantly, to others feels like. If knowledge about the interactional and experiential realities of hearing loss is made publicly available, both to hearing impaired persons and to their communication partners, this will result in an enhanced understanding and acceptance of the normalcy of problems and experiences associated with hearing loss. This will help to reduce embarrassment and uncertainty for hearing impaired persons.

Interactional studies, however, do not only lay bare the nature and the causes of communication problems associated with hearing loss. They also highlight successful strategies of dealing with problems in everyday settings, namely, interactional practices of checking and securing understanding. In various ways, interactional studies provide the basis for designing materials containing information like brochures, DVD's or supportive websites (like they are already available for other kinds of illnesses and impairments, see, e.g., www.healthtalkonline.org) to deal with hearing loss in the way it is experienced in its social context. The goal is to empower patients, supporting them in their struggle to cope with the consequences of hearing loss, to equip them with strategies which help them to master hearing problems and make them a part of an integrated agentive identity. Relevant information includes knowledge about symptoms and consequences of hearing loss in social situations, its impact on social relationships, the personal experience of hearing loss and its relevance to well-being, strategies to deal with problematic interactional situations and strategies for the use of hearing aid technologies and their adaption to everyday settings.

Information of this kind will not only be valuable for the persons (already) affected by hearing loss, but also to the wider (still unaffected) public. This is particularly important because first symptoms of hearing loss tend to get neglected and downplayed in their relevance. Better knowledge and less stigmatization will increase awareness and readiness to actively deal with the problem already in the initial stages.

Given the high incidence of hearing loss, almost every citizen is likely to take part in interactions with people who have a hearing loss. It is a basic interactional task for all those who regularly interact with hearing impaired persons, e.g., in the family, at the workplace or at school, to arrive at communicative solutions which work as to minimize communicative impairment, which, after all, affects all participants. Enhanced knowledge will sensitize people for problems which are likely to be encountered. From an interactional view, it must be underscored that dealing with hearing impairment in interaction is a collaborative task for all participants, meaning that the unimpaired partner has to contribute his/her share to the collective endeavor of accomplishing intersubjective meanings in the same way the impaired person needs to (see Skelt, ch.7, Pajo, ch.8, and Laakso, ch.14, this volume). The person with hearing loss is not so much simply impaired as an isolated individual. Degree and reality of impairment unfold in the social context. They

- persons with normal hearing in interaction with partners with hearing loss

The personal experience and the expectable consequences of hearing loss on communication are little known so that people with and without hearing loss will benefit from better knowledge.

Interactional studies provide the basis for designing materials containing information like brochures, DVD's or supportive websites.

The goal is to empower patients.

Better knowledge and less stigmatization will increase awareness and readiness to actively deal with the problem already in the initial stages.

Dealing with hearing loss is a collaborative task of the normal hearing partner and the partner with hearing loss.

depend on how interactional partners cooperate in overcoming problems associated with hearing loss. In the first place, this implies that problems due to stigmatization and unrealistic expectations are less likely to emerge. This requirement is not as easy to fulfill as it might seem at first sight, because communicative support destined to warrant common understandings, e.g., via repair and overarticulation, might also work in the opposite direction as it draws attention to the disability (see Skelt, ch.7, Pajo, ch.8, and Laakso, ch.14, this volume). Instead, the social network of the hearing impaired person can learn to anticipate problems, to see how they are co-responsible for interactional outcomes and to use strategies to foster communicative success.

Opportunities for social support are particularly important with respect to hearing problems at the workplace. Economical loss, motivational problems and social disintegration are associated with hearing loss (Christensen 2006a/b); cf. also Egbert/Deppermann, ch.1, this volume). Since these problems seriously affect both the hearing impaired person, colleagues and employers, it is most vital to prevent these negative consequences. Studies on the everyday reality of hearing loss are needed to identify socio-ecological factors of well-being at the workplace in terms of stress reduction, health and safety in the workplace, and interactional management of hearing problems. Information is needed in order to enhance awareness about which factors impair and which factors contribute to a sustainable integration of hearing impaired persons at the workplace. One related arena is the integration of hearing impaired students in school. Groeber/Pekarek-Doehler (ch.9, this volume) show how the fine-grained analysis of classroom interaction uncovers problems and dilemmata of interactional participation of hearing impaired children which are hidden from a more global socio-psychological or political point of view. They show that workable solutions to communication problems, which aim at social integration in accordance with the "Convention on the Rights of Persons with Disabilities" propagated by the United Nations, need to take the local contingencies of situated interaction into account. Improvement will involve (job) health policies on the levels of legislation and organizational implementation, but it will include interactional strategies on a more local, interpersonal level as well. In particular, more attention needs to be paid to possibilities and necessities of prevention of detrimental effects which can be avoided by suitable arrangements and support for persons with hearing impairment.

> Solutions to communication problems aiming at social integration in accordance with the United Nations' "Convention on the Rights of Persons with Disabilities" need to take the local contingencies of situated interaction into account.

2. Hearing loss communication in health care

A second group of studies assembled in this volume deals with interaction of hearing impaired persons with health care professionals. General practitioners (see Deppermann, ch.10, this volume), ear, nose and throat doctors, and audiologists (see Heinemann et al., ch.12, this volume and Brouwer/Day, ch.13, this volume) until now are not trained to attend to the interactional dimension of hearing loss, although it becomes eminently relevant in their professional encounters with patients. Still, taking linguistic and interactional aspects into account is a key to the improvement of diagnosis, treatment and patients' compliance. With respect to history taking, doctors need to become sensitive to the precise ways in which patients describe their troubles in order to use the patient's descriptions for refined diagnosis (see Deppermann, ch.10, and Gülich, ch.15, this volume). This is also vital to successful fitting of hearing aids adapted to the patient's individual experiences and contexts of use (see Heinemann et al., ch.12, this volume). Patients' descriptions point to obstacles against hearing aid use, which may result from fear of stigmatization, anticipated damage to personal identity and unrealistic

expectations regarding the benefits of the hearing aid (see Mourtou/Meis, ch.2, and Brouwer/Day, ch.13, this volume).

Therefore, doctors and audiologists will profit from training in how to listen closely to the patient. They need to learn to attend to the details of the patient's talk in order to identify problems well beyond physiological aspects of hearing loss which are crucial for successful and sustainable treatment and which thus inevitably need to be dealt with in the clinical encounter. In addition to information materials which avert to the interactional aspects of hearing aid treatment, programs of communication training based on conversation-analytic insights need to be developed. Trainings will have to provide skills concerning the delivery of information to the patient, diagnostic listening to key formulations, successful conduct of medical and audiological interaction in terms of warranting the patient's participation and the systematic exploration of the patient's problems, attention to psycho-social aspects, identity concerns and expectations.

Another field of linguistically based improvement concerns testing procedures. Bonner (ch.11, this volume) highlights inadequacies of speech perception tests, which result from the neglect of language-specific properties of the phonetic system and from not taking regional variation and properties of colloquial speech into account. Linguists are called to take part in the development of tests which are better adapted to linguistic reality, which are more sensitive to abilities of speech perception in conversational contexts and which avoid artifacts due to linguistically flawed premises of test-construction.

3. Conclusion

In the introduction to the volume, we have argued that hearing impairment needs to be analyzed directly where it occurs, with an analytical focus on the participants' perspective. In addition to taking medical and technical aspects into account, it is necessary to study interactional, societal, and political orders ranging from micro to macro contexts (see the Introduction to this volume, ch.1). The studies collected in this volume suggest that the interactional level is particularly decisive for a better understanding of hearing problems and for innovation in its treatment. This is because it is in social interaction that both the physiological, medical and technical aspects of hearing impairment and hearing aids and the more abstract orders of social, economic and political organization become a lived reality in terms of subjective and interpersonal experience. Therefore, it is a most obvious thing to do to look for innovation and potentials for change in sites of social interaction where hearing impairment and hearing aid use become relevant. This task becomes relevant a fortiori as the importance of interaction to hearing impairment has been grossly underrated and as hearing impairment interaction has not yet become an object of systematic scientific and applied endeavors. To be sure, this does not mean that all problems will find their solution at the level of social interaction. However, social interaction is the touchstone by which the relevance and implementation of more abstract conditions and policies is to be measured and which sets up criteria for successful coping with hearing impairment.

Keeping this crucial role of social interaction in mind, we can see that research on interaction with hearing impairment and on the use of hearing aids in interaction impacts also on broader, less local orders of stakeholders. Health care policies (institutional, national, European Union, WHO-standards) can only be successful if professionals are trained to implement abstract policies successfully in the minute details of caregiver-caretaker interaction (see Brouwer/Day, ch.13, this volume). Therefore, it is of immediate political interest to introduce the knowledge and skills concerning the

Doctors and audiologists will profit from training in how to listen closely to the patient.

Social interaction is the touchstone
- by which the relevance and implementation of conditions and policies is to be measured
- which sets up criteria for successful coping with hearing impairment

Health care policies are only successful if professionals are trained to implement abstract policies in actual interaction.

interactional aspects of hearing impairment into the education and training of medical and audiological professionals.

Hearing aid companies deplore that the saturation of the market ranges between only 20 to 40% currently (depending on the country, see Egbert et al., ch.3, this volume). The studies in this volume suggest that acceptance and use of hearing aid technology does not only depend on technical affordances, but also importantly on social factors. It is not technology as such which accounts for patterns of its use, but its social contextualization which is mediated by politics of knowledge and identities and by various kinds of social inequalities (see Keating/Raudaskoski, ch.4, this volume). More adequate advertizing in terms of creating realistic expectations in prospective users (thus preventing non-use because of disappointment of unrealistic hopes), improved management of the interaction with clients in terms of exploring their problems, contexts of use, and expectations more systematically, explaining and checking skills to handle the hearing aid, etc. and more personalized support for the user is necessary to enhance acceptance of hearing aids as a helpful technology.

The hearing aid industry will benefit from achieving a better understanding of communication with hearing loss and hearing technologies by a higher market saturation.

It is not technology as such which accounts for patterns of its use, but its social contextualization.

This volume is only a beginning. Much more basic research is still needed in order to explore how hearing loss and hearing aid use is dealt with in different contexts of social interaction, how audiological and medical interactions with hearing impaired persons are structured and may be optimized, how User Centered Design can take up insights form Conversation Analysis for the design of hearing aids (see Matthews/Egbert, ch.6, this volume). We need interdisciplinary collaboration in order to get to know better the various interactional contexts, tasks, and problems which are relevant to hearing loss and use of hearing aids. This turn to the actual sites of hearing loss and hearing aid use in everyday life promises to gain better insights into patients' concerns and their (non-)use of hearing instruments, both by asking them in interviews and questionnaires, and also by observing their everyday practices, thus finding practices and structures in the reality where they are lived, beyond people's retrospective beliefs and evaluations (see Egbert/Deppermann, ch.5, this volume).

The interdisciplinary collaboration, international comparison and pioneering research reported in this volume is a starting point.

The interdisciplinary approach needs to be complemented by an international approach. Since there are national differences, (see Egbert et al., ch.3, this volume), comparative studies are needed in order to detect problems which remain hidden from a perspective which focuses on just one country. In order to arrive at guidelines and tools of a best practice, the diversity of different health care systems, languages, and cultures has to be taken into account.

In order to arrive at guidelines and tools of a best practice, the diversity of different health care systems, languages, and cultures has to be taken into account.

While we conducted the research presented in this edited volume, we have formed an international network "Hearing aids communication". On our internet site hearing-aids-communication.org, we are reporting on new projects and other network activities.

Applying Conversation Analysis to the multiple problems of hearing loss

Charles Antaki

Charles Antaki is Professor of Language and Social Psychology at Loughborough University. As a conversation analyst and social psychologist, he has published widely on institutional discourse. Among his recent publications is "Conversation Analysis and Psychotherapy" (edited with Anssi Peräkylä, Sanna Vehviläinen and Ivan Leudar). As editor of the volume "Applied Conversation Analysis" he spearheads the practical application of Conversation Analysis to the settings in which the research is conducted.

This collection of articles is testament to how a number of social sciences - sociology, linguistics, psychology, speech sciences - can come together to illuminate what looks like a physical system, where scientists and technologists must rule. What happens to your hearing seems to belong to the non-social world, and if it goes wrong then the people to sort it out are those who know about sound-waves, nerves, and the electronic circuitry that can bridge any gap that opens up between one and the other. But as the contributors to the book show, we know the physical world only through the social. Practitioners and clients must establish what the client's experience actually is, whether it is treatable, and what device would best deliver the desired result. That is where the contributors to this book come in: how, exactly, do practitioner and client do all that? Might they do it better?

I shall comment on how the contributors have answered those questions by inspecting the turn-by-turn, moment-by-moment development of the scene in front of them. In commissioning the bulk of their contributors, Egbert and Deppermann have gone down the road of Conversation Analysis (CA), and specifically the kind of applied CA that means to identify how institutions go about their business. Indeed, the editors' motivation is to identify best practice, and to feed that back into the institutions they work with - it is a sort of interventionist applied CA (for more discussion of interventionist CA, see Antaki 2012).

After the Editors' very clear and useful introduction to CA, with specific bearing on audiology, there are eight chapters which report CA-based empirical work which relate more or less directly to hearing loss, and what might be done to remedy it. I will group them into three sorts: those which describe the social experience of hearing loss in terms of conversational interaction; those that comment on practitioners' dealings with clients with hearing loss; and finally, those that directly target the clinical interaction between audiologist and client.

The interactional consequences of hearing loss.

In Chapters 7, 8 and 14 Louise Skelt, Kati Pajo and Minna Laakso respectively go right to the heart of the social experience of deficits in communication - their interactional consequences in the everyday world. Pajo's case study of an episode of talk between two sisters, one with a severe hearing loss, shows very clearly how their intimate knowledge of each other's communicative habits (including frowning and other indications of trouble) can be a resource that professionals might need to consider in their own work with clients. Communication of course is a two-way process, and in Chapter 14 Laakso gives a masterly overview of what CA has discovered about the production problems of aphasia, since Charles Goodwin's pioneering work in the mid-1990s. She uses her account to excellent effect to introduce the reader to crucial elements of conversation's construction: turn-taking, the construction of short and long sequences, and, inevitably in disordered communication, the mechanisms of repair. Everyone has to deal with mishearing and misspeaking (or what can be claimed as mishearing and misspeaking), so in Ch. 7 Skelt quite properly draws on a very large and articulated literature on conversational repair. She shows how it is that a conversational partner of someone with hearing loss can design their talk so as not to reveal that the partner hasn't heard - because, as Skelt says, "to do so [at certain points] would be potentially sensitive, calling into question his interactional competence" (p.59). On the other hand, Skelt shows that an audiologist has a reason not to let the opportunity to repair pass, when it can be done (and she shows how) in a less demeaning way; the audiologist is doing it in the client's best interests, and has the time and resources to manage the sometimes complicated tangles that can result in trying to repair a deficit when it is profound. The positive and encouraging point she makes is that CA can spot ways of initiating repair which are more sensitive and successful than others - and this can be fed back to practitioners themselves, as part of their training.

Practitioners' dealings with clients with hearing loss

The issue of training is taken up smartly by Simone Groeber and Simona Pekarek Doehler in Chapter 9 when they inspect, in great detail, the complex world of the classroom. A teaching assistant can help a deaf child overcome his or her sensory impairment to engage with, and so profit from, the teacher's instruction. But as the authors say, training is vital: "the intervention of assistant teachers who have a good mastery of sign language may be an important step towards optimising the hearing impaired student's participation" (p.89, emphasis removed). This is tangential to the issue of hearing aids as such, but a worthwhile example of policy implications of close qualitative study.

Deppermann's chapter 10 is again not specifically about hearing aids, but about the more fundamental problem of how any person's sensory experience can be communicated to another. In this case, we have patients describing their hearing to a doctor (not an audiologist). Deppermann helpfully sets out what social science has already discovered about doctor-patient interaction (probably the most heavily researched area of applied CA), and into this framework sets the particular case of a consultation in which the patient complains of hearing problems. His analysis is not strictly confined to the technical details of how the sequence plays out, but nevertheless, it is a persuasive account of how the patient's initially unspecific (though alarming) description of her experiences get refined and shaped co-operatively with the doctor's inexpert guidance. However, as Deppermann sagely points out, there is always a risk that the doctor unconsciously leads the description in certain ways, and fails to fully explore all the possible avenues that it might lead down - a point later expanded upon in Chapter 12.

The sharp end: audiologist and client

In Chapter 13, Rineke Brouwer and Dennis Day consider the way the interaction runs off in a given encounter between an audiologist and his client, who is returning to report a problem with his hearing aid. The authors' close attention to the details of the talk allows them to identify that the client's nomination of the problem, his proposed solution, and his expressions of dissatisfaction, are all given rather short shrift by the audiologist. Brouwer and Day compare the audiologist's practices with those idealised in the relevant institutional guidelines, and find them lacking; that is an important finding. They then speculate that this might mean that the patient, when he leaves the consultation, might not be as ready as he might be to comply with the audiologist's recommendations. It was beyond the scope of their study to

track the man to find out whether he did or did not comply. Nevertheless their chapter does at least throw light on how the practitioner can come across as unsympathetic in the interaction, and, even though the authors are conscious of the ethnomethodological principle of disinterestedness, their analysis does provide hints as to how that might be avoided.

Heinemann, Matthews and Raudaskoski's chapter, like that of Brouwer and Day, takes us through a consultation between client and audiologist. Heinemann et al's analysis focuses on two central elements of the social-scientific themes in the book as a whole: how the client's experiences are rendered into diagnosable and treatable categories, and how the audiologist manages the client's expectations and requirements of how their experience will change. In closer detail than Depperman, and with the extra benefit of showing us the visual scene, they catalogue the precise ways in which the client uses words and gestures to get across what he's hearing. In a particularly impressive piece of analysis, they chart how it is that the audiologist entirely fails to register what the client means by hearing a "grinding" noise, and misdiagnoses it, to no-one's benefit. Heinemann et al's central analytic section on pp 115-124 is I think the most sustained evidence of how CA can illuminate what audiologists and clients do together, as it concentrates on the key moment of adjusting the instrument so as to improve the client's hearing. That must be at the very centre of any understanding of the treatment of hearing loss. The authors' subsequent analysis of how the audiologist copes with the client's expectations of how effective the hearing aid will be is more abbreviated, but addresses a participants' concern that is on a par with the central issue of the establishment of the hearing experience itself.

Concluding comments

If I reflect on the promise that the Editors held out at the beginning of the book, then what we perhaps miss are two further developments which are yet to receive sustained research attention. One is a study of the very end of the process of hearing aid usage: the experience of actually possessing and using the device in daily life. The other is a concrete implementation of changes in practitioners' practices, perhaps as a result of an intervention designed by a collaboration between academic researchers and practitioners themslves. But Egbert and Deppermann remind us that the chapters in this book are - in spite of their accomplishments and technical expertise - still only pilot studies, showing the way forwards. To my mind they have certainly done that. They have shown that the minute inspection of how ordinary sensory experience is described and communicated (or

not), and of key practices in the audiologist's consultation, can bring remarkable benefits. With the kind of projects showcased in this book, the scene is set for a deeper understanding of the diagnosis and treatment of an under-researched problem in everyday social life.

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User Centred Design: Usability, experience, enskilment

Jacob Buur

Professor Jacob Buur is a pioneer and internationally renowned expert in user centred design. He is currently director of an interdisciplinary center for Participatory Innovation at the University of Southern Denmark, funded by the Danish Research Council. His research on design methods and processes is applied both in academia and in industry.

From a User Centred Design standpoint this volume presents a goldmine of qualitative insight into hearing impairment. Insight that can potentially fuel not just the design of better hearing aids, but also the innovation of the systems, clinical practices, and even policies that govern the hearing impairment relief. Whereas quantitative results from measurements, experiments and surveys are necessary when companies and public agencies make decisions on new developments (i.e. when they balance the size of new investments with the risk of failure), only *qualitative knowledge* can drive the creative process of innovating something new.

User Centred Design is an approach that puts knowledge about people at the centre of a product development effort, before knowledge about technologies or markets. This focus on people warrants a genuine concern with why and how technology is used, and thus ensures higher acceptability of new products and technologies once they hit the market. To acquire such knowledge about people, their practices and preferences, User Centred Design relies on the human sciences, for instance, psychology, anthropology and sociology. Conversation Analysis is a rather new addition, and a very exciting one.

In recent years User Centred Design has made two significant moves. One is from an expert, cognitive psychology position on how people think towards a participatory position that people should better be involved in development processes to explain their own practices. This is often referred to as the Scandinavian school of participatory design. The other move is from a focus on usability to user experience to user enskilment. *Design for usability* made the assumption that technology even for the first-time user needs to be 'user friendly' to warrant the highest level of efficiency and satisfaction, a strictly functional perspective. Over the last decade designers have shifted towards *design for user experience*, not just focusing on the result of human interaction with technology, but also on how people perceive it. A yet newer focus is on how people develop their skills with technology, not just the skills of operating a product.

Design for enskilment combines a deep respect for people's expertise with a longitudinal view of how people develop their practices.

For hearing impairment this means that User Centred Design is concerned both with the user friendliness of hearing aids, with people's experience of using them, as well as with how people are able to develop their (social) hearing skills with the technology. This volume makes a fine contribution to the latter of the three. It helps understand and respect the 'expertise' of the hearing impaired – the skills that people need to develop to cope with hearing impairment, to explain their hearing experiences to audiologists and other experts, and indeed to 'use' a hearing aid and handle the social challenge relating to its use. With the three User Centred Design perspectives in mind, it is all too clear, that the crucial 'compliance' issue (of a very low percentage of hearing impaired ever accepting to use a hearing aid) cannot be resolved as a functional usability problem, nor as an individual experience problem, it lies in the social enskilment realm.

What the human sciences bring to User Centred Design is the insistence that there is much more to technology acceptance than a simplified fulfilment of 'user needs'. Knowledge beyond how people interact with products is required – knowledge of how practices and new technologies constantly shape each other; and that this process is inherently social.

The industrial reality of User Centred Design is such that very short time is allocated to user studies and to the analysis of data. We talk of a few days in the 'field' studying hearing impaired persons and audiologists. Here it is highly inspirational to see results from researchers who have had the time to bring analysis of video-recorded conversations to a higher level. With its strict focus on the details of social interactions, Conversation Analysis is a research method that forms theories of what actually unfolds, and in doing so is able to 'see the big in the small'; to provide a larger picture based on the micro interactions that people actually engage in.

Hearing aids communication: An otologist's point of view

Antti Aarnisalo

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Advances in medicine and technology

Technology behind hearing aids is under constant development, and innovations are applied to the everyday life of hearing impaired patients. Otologists consulting these patients have to be aware of different hearing aid technologies to meet the needs and expectations of patients. Amplification with different kinds of assistive technologies has revolutionized the rehabilitation of sensorineural hearing loss. We are able to offer possibilities from mild to profound hearing losses to effectively improve patients' communication.

Due to the huge technological and medical progress, choices have increased while decision making has become more difficult. When consulting the patient, modalities and options of rehabilitation should be taken into account, such as whether an implantable or non-implantable technology is appropriate. The decision making process also includes whether several novel medical possibilities to reconstruct the middle ear can achieve better hearing. In patients with severe hearing loss, the consideration of electric and acoustic amplification is relevant as well.

The analytical chapters in this edited volume shed light on several ways in which communication is related to the process and outcome of treatment.

The role of communication

Communication with patients plays a crucial role in the choice of treatment. For example, when discussing surgery, the patient is normally well informed by the otologist. It is important that the patient understands what can be realistically gained with the operation and what the possible risks and complications of the procedure are. In cases where non-surgical options are considered, the otologist should make an effort to explain to the patient different possibilities and to encourage the patient for an audiological consultation.

Otologists have to be aware of the low compliance rate in using assistive technologies; the dimension of this problem has to be acknowledged. From a clinician's point of view, a low compliance rate often relates to patient-professional interaction. Communication in all stages of the rehabilitation process is highly important to successful hearing aid use. The way the information is provided is crucial. The patient is seeking answers to many questions and the situation is new to the patient.

Therefore, difficulties in communication and problems related to this, in particular with elderly patients, should be recognized by the clinician. These issues should be raised in conversation with the patient and dealt with properly. Competing theories of doctor and patient concerning the nature of the hearing loss affect the interaction and lead to miscommunication. Trust should be built. The expectations of the patient are sometimes unrealistic and this should be recognized. The patient will neglect medical treatment and rehabilitation of hearing will be unsuccessful if the expectations of the patient are unfulfilled. The patient should receive adequate information.

International classification of functioning disability and health and their national adaptation can be implemented in the interaction between hearing impaired patient and otologist. However, it is not just difficulties with hearing that are to be evaluated. All the problems that can have impact on the functioning disability should be recognized and evaluated. Often problems with vision or motor skills due to different medical conditions, again especially with elderly people, can cause compliance problems. They can also have an effect on treatment and rehabilitation options of the patient.

The potential of applying communication research in audiology

Our goal is successful communication with hearing aids. Compliance rate for hearing aid usage is a major clinical issue. This book gives us valuable tools to evaluate and to deal with this problem.

A few comments by an audiologist

Erik Brodersen

Erik Brodersen is an independent consultant, speech- and hearing therapist, audiologist, project advisor, project manager, teacher and trainer. He is the fouding member and secretary of the "WHO/EURO Advisory Group in Support of People with Hearing Disability" (1989 – 1991), member of the "WHO Working Group on Development of Appropriate Hearing Aids and Hearing Aids Services for Developing Countries", (1998-2004), Member of the Advisory Board "IMPACT UK", and Founder and President of "IMPACT Denmark". He has working experience from Bangladesh, China, Denmark, Egypt, Ghana, Hong Kong, India, Kenya, Kyrgyzstan, Lithuania, Mongolia, Nepal, Nicaragua, Norway, Philippines, Thailand, Uganda, UK, and Vietnam. His comments refer to Chapter 12 (Heinemann et al.)

Interesting reading – which should induce a broader discussion of best practices when the patient, who in this setting is actually a customer, meets the audiologist and expects to get information and counselling. For the first time user this is the beginning of an exiting new life with improved hearing; for the already user this is the situation, where his experiences should be listened to when the selection of hearing aids is considered with the audiologist.

However, from my years of practice as hearing pedagogue in hospital clinics I can recall very many disappointing situations when the audiologist ended up treating the patient in a patronising way – because they simply both ran out of words relevant for a qualified conversation – and both got frustrated!

I hope that you can continue your research and also study and analyse the interaction patterns in situations between the audiologists and parents with children, when in dissimilar age groups (40-50-60-65-70-75-80-85+), with different levels and types of hearing loss – and with individuals of different educational, academic or work-related background.

As one important outcome of your research, teaching and training materials for audiologists and other hearing aid fitters should be developed and used as part of the academic training, supporting the efforts to develop and maintain sustainable quality in the whole fitting-, counselling- and quality-control process.

Understanding social interaction for rehabilitation and therapy of hearing loss

Thomas Kaul

Professor Thomas Kaul is a specialist in hearing rehabilitation at the University of Cologne, Department of Special Education and Rehabilition. His research on communication with hearing loss over the whole life span has focused on understanding the barriers due to hearing disability and the innovations necessary to foster integration.

Our everyday lives are determined to a large extent by communication. A hearing impairment can have comprehensive effects on interaction and communication and therefore negatively affects the quality of life of the hearing impaired.

The present volume "Hearing Aids Communication" casts an interactional perspective on the connection between hearing impairment, communication and hearing aid technology. In discussing this topic the authors access new territory. The authors working in various fields take on the subject matter of the book in a joint interdisciplinary fashion. The approaches taken span disciplines such as audiology, User Centered Design, as well as Ethnomethodology and Conversation Analysis. This way a deeper understanding of the various aspects and contexts of communication among hearing impaired persons is possible.

The articles discuss the doctor-patient interaction, communication throughout the process of hearing aid adjustment, and an analysis of the everyday types of communication in private and institutional environments. The study of real conversations among hearing impaired persons makes an important contribution to the understanding of the communication problems hearing impaired persons and their conversation partners tend to face. The analysis of conversations enables a deeper insight into the communication process, the structure of the communication problems and their potential solutions, as well as the social interaction between the conversation partners.

Understanding these processes is of central significance for the rehabilitation of the hearing impaired. Conversations among hearing impaired persons are continually accompanied by communication and understanding problems and may become a big obstacle for all those participating in the conversation. Understanding may then become a problem, which often entails frustrations as well as physical and psychological stress, and in some cases social retreat. Medical, audiological as well as pedagogical-psychological rehabilitation would support people that are hard of hearing and enable them to deal with their hearing impairment in a better and more adequate fashion. This includes the provision and customization of hearing aids, as well as the promotion of communication capabilities.

From this perspective it is especially important to understand the structure and development of the communicative framework of understanding the problems and origins of misunderstandings, as well as how to deal with the disruptions. Only a comprehensive understanding of these links creates options for rehabilitation and therapy. Through rehabilitation hearing impaired persons may become analysts of their own communication and may then have a constructive influence on it.

It involves for instance understanding the process of speaker changes and the development of misunderstandings, the classification and categorization of communication problems (Which part did I actually not understand?), and the assessment of the social and communicative expectations on the part of the participants in different contexts of communication. The present volume picks up these issues and allows a deeper insight and understanding of the structure of the conversations as well as of the communication and social dynamics prevailing in the various private and institutional environments.

The articles in this volume are focused not only on the communication of the hearing impaired. The analyses presented are more comprehensive and broader. Thus doctor-patient communication is taken into account, as well as the processes of communication and negotiation in hearing aid fitting and verification. The interpretation of linguistic attributions of subjective experiences, as well as mutual and diagnostic "negotiations" are part of professional settings. The various perspectives of those affected and of the professionals come into view, which is of great importance for a successful diagnosis and rehabilitation.

The volume "Hearing Aids Communication" makes an important contribution towards an interdisciplinary cooperation in a very significant social area. The results are relevant for the hearing impaired themselves but also for all the experts involved in their rehabilitation.

Beyond the first step: The perspective of those using hearing technology

Alexander Görsdorf

Alexander Görsdorf, hard of hearing since early childhood, has been a user of hearing aids for 30 years, and of a cochlear implant for 2 years. He holds an M.A. degree in European Ethnology and Philosophy from Humboldt University, Berlin, and received his Ph.D. in Sociology from Bielefeld University. His field of expertise comprises the sociology of face-to-face interaction, science and technology studies, and communication analysis. He is also the author of "Not quite like Beethoven", a blog about hearing loss, that was shortlisted for the Grimme Online Award in 2010 (→ notquitelikebeethoven.com).

I have accepted the request to comment on the present volume from the perspective of someone with hearing loss and years of experience in using hearing technology—in everyday settings, in school and at work as well as in medical and audiological settings. In what follows, I offer three remarks which, I hope, will strike a good balance between inevitable subjectivity and a more generalized "users' view".

It takes two…

Taking up the issue of hearing impairment as a phenomenon of communication resonates very much with my and others' practical experience. Probably the single largest misconception about hearing loss is the belief that it affects only the ones who have it. Even those afflicted may often be inclined to think so, which is the source of much personal misery. However, what is impaired is, to a very large degree, not an individual but talk itself. The papers in this volume nicely illustrate this fact. Dealing with hearing loss—i.e. repair and face management with the means of turn taking, eye gazes, gestures and avoidance—is a collaborative endeavour (see especially chapters 7 and 8). So from this perspective, the volume's methodological approach, to have a closer look at what the salient interactional issues actually are and how they are being addressed and managed in interaction seems highly expedient.

The merits of such an analytical perspective are twofold. On the one hand, they can afford individuals with hearing loss with a sense of relief, even empowerment: Many times, recurrent misunderstandings should not be attributed to the deaf person's individual deficiencies in dealing with their affliction but rather, and more accurately, to all participants struggling with the pitfalls of hearing impairment. Moreover, in this light many quirks of the deaf can be explained. Saying "yes" when in fact they have not understood a word, e.g., turns out to be a highly effective means of keeping the conversation going, saving face, and sometimes even furthering understanding in that it prompts more speech, bits and pieces from which may help to make sense of what previously has not been understood. On the other hand, such a perspective highlights the important contributions and efforts of the normally hearing interlocutors—which are often neither properly recognized nor acknowledged by those with hearing loss.

A matter of compliance?

The papers in this volume are diverse. At various points, however, my impression was that the analysis is limited by a (sometimes implicit) focus on the issue of compliance, i.e. the observation that—while there have been great technological advances in hearing aid technology—the rate of hearing aid supply and use is still rather poor. This entails a specific direction of the analytic gaze, one that forecloses other fruitful analytic questions which seem relevant in the context of the volume's aspirations towards promoting User Centered Design. If the problems that we are interested in are in fact interactional ones, then hearing technology is only one of the means that the people we study use to address them. Moreover, because of their structure (or rather: the structural value they have for the interaction as it unfolds), assistive devices and the concepts and guidelines that come with them may well bring about interactional/communicative problems of their own. This is a rich area of inquiry for any academic endeavour that situates itself within the field of Science, Technology, and Society ("STS"). In contrast, where compliance is the analysis's focal point technology, medical and audiological procedures as well as guidelines and regulations tend to be black-boxed, excluded from the analysis.

From the perspective of a person with hearing loss, there are several instances where the analysis appears slanted. E.g. in the sequence on p.59f we learn that enumeration (line 005) is a "repair technique which is both taught and employed by rehabilitation audiologists". In this particular sequence, however, it seems to me that this 'standardized' repair technique may have moonlighted as a source of misunderstanding. At the

given sequence position and accompanied by finger points, "one, two" may not only be interpreted as an indication of a total amount of two (implant centers) but also of a sequence of action (act one: this implant center, act two: that implant center). Another example can be found in chapter 13 (p. 135) where removing a hearing aid, because one seems to understand better without it, is solely analyzed as an instant of non-compliance (and not as a functional alternative to the use of hearing technology when it comes to achieving the best possible acoustical understanding). Departures from this direction of the analytical gaze are the very interesting chapter on the deficiencies of common speech understanding tests from a linguistic standpoint (chapter 11) and the result of chapter 12, the importance of insisting and talking back during hearing aid fitting. A useful way of balancing analytical lopsidedness could be a hermeneutic approach that carefully reconstructs what Kati Pajo calls the "basis of trouble" (p. 67) in any given sequence (or even at any given point in that sequence).

From analysis to innovation

Obviously, the volume's aim of improving practices and technologies is one with which people with hearing loss can easily identify. How exactly, though, can we get from Conversation Analysis to innovation? Which way should we be looking when searching for improvement on the basis of a given analysis, what would constitute an innovation in the first place? It seems to me that these questions might deserve more attention and reflection. Let me give two examples.

Chapter 9 shows that being a pupil with hearing loss and a personal assistant means having to coordinate engagement in two different frameworks of participation at the same time and without disrupting the classroom order. It arrives at the recommendation that assistants should "have a good mastery of sign language" (p. 89). The assumptions that make such a recommendation sensible, however, remain implicit. Depending on the stance one takes on the problem of how inclusive schooling is supposed to take place and to what degree the classroom order should adapt to hearing impairment, one might as well imagine the recommendation to be that the hard of hearing pupil should be encouraged to address the regular teacher (orally) and ask for clarification, thus participating in the main communicational frame in the classroom (and, in so doing, centering it around himself). Personally, I would argue that if one strives for practical innovation here, one should at least briefly reflect such politico-pedagogical problems and competing approaches as well as the spin they give to the analysis. In any case, what is to be noted here is that improvement and innovation can only be conceived

with reference to any particular set of assumptions or the problems of a particular practice (often a professional one). Chapter 15 provides a case in point as the success story told there seems to have been made possible by explicitly making a particular clinical problem of diagnosis and some initial medical observations the starting point (or at least main point of reference) of the analytic endeavour.

As a whole

I think the great merit of the present volume consists in having demonstrated the value of thorough analyses of naturally occurring interactions. The papers provide unique opportunities of insight into the fact that communication with hearing loss and hearing aids to a very large extent means grappling with emerging interactional problems. Any attempt at enhancing interaction, technology, training and policy making in this area will benefit from such fine-grained knowledge about its subject. I hope the above points serve as fruitful starting points for discussion about how to follow up on this first step.

Change Management

Claus Have

Claus Have is a senior consultant with Dacapo Theatre Odense, a business consultancy working with companies and organizations to support change management. Claus holds a master's degree in "Complexity and Change Management" from University of Hertfordshire. He has specialized in facilitating organizational change processes. He is hearing impaired and uses hearing aids. About the connection between his work and his hearing loss he reports, "From participation in Reflexive training I have come to terms with my hearing loss in a very embodied sense and it has even become a strength in my relational work."

First of all I would like to thank the contributors of this very important volume, which adds new insights to an area of fundamental significance for society and individuals. The cross-disciplinary approach is a promising cocktail with great potential for future research.

This commentary centers around a set of reflections that have come to the author's mind from the perspective of the embodied experience of being hearing impaired himself and from the perspective of being a business consultant with a complexity approach to change (Have, 2007).

There is no substantial reason to doubt the figures presented in the introduction of this volume, although you may feel inclined to do so in order to wipe away a creeping sense of discomfort by realizing how many fellow human beings and thereby also healthy and productive human relations may suffer from lack of knowledge, insight and motivation. At the end of the day, these figures about hearing loss amount to a major strike to the innovative potential of society – especially, if you consider innovation to be a result of participatory and collaborative endeavor.

The authors in this book point again and again to social interaction as a key to understand barriers and drives for hearing impaired human beings' inclinations – both in private life and in work life. This is a very important move away from a unilateral focus on technology and medical diagnosis in hearing aid business and health care. At the same time, it sets a new agenda as concerns work place and educational environment. The volume presents solid evidence both in the introductory chapters and in the analytical part that, through research on social interaction between stakeholders and potentially hearing impaired persons, there is a wealth of new knowledge to be gained. Linked to this perspective of people interacting with each other, several authors touch on an underlying, fundamental aspect of understanding relational exchange, the formation of individual and collective identities.

The implications for change management in the work place are enormous. As long as you get the work done, there might be no reason to intervene, neither from a manager's perspective nor from a colleague's perspective, if we more or less consciously experience the hearing impairment of a colleague. However, there can be many reasons for reluctance to take action. A sense of confidence in sustaining stable and well-known patterns in power relations may be one and at the same time, most of us do not fancy that our closest associates change identity, because this inevitably would challenge the image of ourselves as well. Another reason may be that no one is able to or is having a history in identifying signals linked to hearing impairment. A third reason may be that managers and colleagues are shying away from crossing the threshold between professional and private/personal spheres. A fourth reason may be that they have an embodied anticipation of denial by the hearing impaired person.

From the perspective of a hearing impaired person, this works perfectly well, as long as you seem to get along socially and professionally. But very often, you are not consciously aware that you nurture a self-image that may not be in sync with the image your surroundings have of you. At the end of the day, this may result in both professional and social marginalization, and the process towards this catastrophic result may be paved with heavy strains on the person's sense of identity followed by symptoms of stress.

Coming to terms with the problem seems to demand a high degree of reflexivity and audacity from all stakeholders at the work place in order to overcome the barriers described above. The wake-up call has to be initiated from somewhere and by someone. Of course, there are various degrees of hearing impairment, and due to this fact, there are multiple ways of compensating for it and repairing gaps in natural conversation. Compensation and repair are aspects of conversation that are co-created among interlocutors, even if the problem

given sequence position is not just due to hearing impairment, but rather due to pure lack of ability to understand each other. Collusion is a term from the business world suggesting futile action. But the analogy to what goes on here seems striking, although the stakeholders bring different aspirations to the act of collusion – and do so more or less consciously. If changes are called for, someone has to break repetitive patterns of social interaction.

So, how can the insights of this volume be of help for, e.g., management of an organization?

The authors of the volume draw attention to the richness of the detail of conversations between people. Of course, talk is important, but body language seems to be an equally rich source of knowledge that should be taken into account. The chapters in the volume invite the reader to extract checklists of important signs to be aware of in social interaction and to begin reflecting on past experience. Reading the volume from a business consultant's perspective, I begin to see an opening into everyday organizational life and I sense a profound wish for continuation of the research with specific focus on moments that matter in work-life environments.

Finally, I will suggest for the next volume in this series an integration of incomplete narratives from various stakeholders with inspiration from checklists of signs, which could be a broadening and cross-fertilization of the research scope. The strength of an incomplete narrative is its ability to evoke response from a perspective of mutual recognition as it invites readers to bring their own narratives of any kind to the fore.

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Editors

MARIA EGBERT is the coordinator of the international, interdisciplinary network "Hearing Aids Communication". She is associate professor at the University of Southern Denmark. As a conversation analyst she has published on communication problems in German everyday settings, as well as on intercultural and business communication.

"I am interested in communication with hearing loss because I find that intersubjectivity lies at the heart of human interaction. I love that I can learn so much from interdisciplinary collaboration, including the combination of theoretical with applied research and the interface of interaction and technology. I am intrigued by the phenomenology of hearing."

ARNULF DEPPERMANN is full professor of German Linguistics and Head of the Department of Pragmatics at the Institute for German Language in Mannheim. His areas of specialization are Conversation Analysis, interactional linguistics, grammar and semantics in interaction, understanding in interaction, positioning, identity and narration, as well as multimodal interaction.

"Hearing loss in interaction is a very timely object of study, both in terms of applied and basic research. As I am a linguist and a psychologist by training, it combines my interest in understanding in interaction with my interest in rehabilitation psychology. Moreover, interaction with hearing loss makes processes and requirements of understanding in interaction visible which may pass unnoticed when dealing with understanding under 'normal conditions'."

Authors

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MARIA BONNER is associate professor of German at the University of Southern Denmark. She has worked on the structures of especially German and the Nordic languages. Her research areas include foreign language acquisition, phonetics, and articulatory training. In particular she is interested in the perception and misperception of sounds in connected speech.

"Language learners and people with hearing impairment have a similar problem. Both groups have to cope with the wealth of phonetic variation in spoken language as a potential source for misunderstanding or not understanding. Looking into the relationship between sound systems and understanding difficulties for both groups links the research on hearing loss to my research on foreign language phonetics."
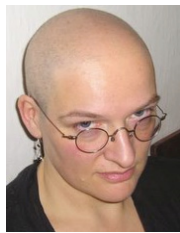
CATHRINE BROUWER is associate professor at the University of Southern Denmark. Using ethnomethodological Conversation Analysis she studies interactions between hearing impaired persons and their conversation partners as well as interactions between second language users and their conversation partners. She specifically focuses on the intersection of social practices and cognition.

"I became interested in hearing loss when I started to teach students of audiology in linguistic subjects in 2006. Over the past five years I have become more intrigued by audiology, since it is an interdisciplinary field, with input from medical science, technology and the human sciences. I'd like to not only contribute with findings on hearing loss communication, but to work toward an integration of this knowledge in both the training of audiologists, in audiology practice and in research on hearing loss communication."

JETTE DAMSØ JOHANSEN is a hearing therapist at the public Center for Assistive Technologies and Communication ("Center for Hjælpemidler og Kommunikation") in Padborg, southern Denmark. Her work includes hearing aid consulting, as well as socio-psychological help with coping. She has also participated in a research project on tinnitus with GN Resound and is currently starting a new project on tinnitus with Widex.

"Hearing loss in interaction is a very timely object of study, both in terms of applied and basic research. As I am a hearing therapist, it combines my interest in understanding in interaction with my interest in rehabilitation psychology. Moreover, interaction with hearing loss makes processes and requirements of understanding in interaction visible which may pass unnoticed when dealing with understanding under 'normal conditions'."

Authors

DENNIS DAY is associate professor at the University of Southern Denmark. His background is in Ethnomethodology and Conversation Analysis. He is keen to work on particular settings (e.g. workplaces and public spaces), and particular people (e.g. those with communicative disability) because these sorts of settings may address the 'lived' conditions of disabilities which have hitherto not been the focus of disability research.

"I am involved in several projects related to the design of hearing aids, either as a researcher myself or as a PhD supervisor. I am particularly interested in the design process itself, it being new to me, as well as the general area of technology support for persons with communicative disability and their envrionments.

SIMONE GROEBER is a PhD student at the University of Neuchâtel/Center for Applied Linguistics, working on interactions of hearing impaired bilingual adolescents with hearing students in classroom situations. She has also contributed to a multimedia online lexicon project (funded through the Swiss National Science Foundation) which is designed to assist seconday school students, interpreters and other professional using sign language.

"The aim of my disseration is an empirically based description of the difficulties hearing impaired participants encounter in school interactions despite their use of hearing aids and cochlear implants. The analysis focuses on the negotiation of understanding through the creative use of different semiotic resources (spoken language, sign language, gaze, artifacts)."

ELISABETH GÜLICH is professor emerita at the University of Bielefeld. As a linguist and conversation analyst she has published widely on German and French with a focus on medical interaction, formulaic speech and narratives. She has directed several research collaborations on representation of seizures and anxiety in doctor-patient interaction.

"I am fascinated by interdisciplinary cooperation in various research contexts. In the study of doctor-patient interaction I am particularly interested in the inter-relation between illness descriptions or illness narratives and medical aspects of the illness. My conversation analytic work aims at contributing to medical diagnosis by detailed analyses of the interactional achievement of illness descriptions."

Authors

TRINE HEINEMANN is associate professor at the University of Southern Denmark with Conversation Analysis as her area of specialization. She is interested in institutional interactions. Her previous work has focused primarily on the communication between elderly and their home helpers. Recently she has conducted research on interactions in an audiological clinic.

"Within both home help interactions and audiological consultations I am primarily interested in how these institutions are talked into being and how patients'/clients'/care-recipients' personal needs, wishes and knowledge are met or alternatively countered by the institutional representative."

ELIZABETH KEATING is full professor of linguistic anthropology at the University of Texas at Austin. Her research focuses on impacts of communication technologies (including hearing aids), computer-mediated communication, virtual collaborative work and gaming spaces, language and social inequality, American Sign Language, and multimodal interaction.

"I have an interest in sign language communication and in communication among those with hearing loss, particularly how interactions are organized and how different semiotic modalities are recruited for communication and understanding."

MINNA LAAKSO is associate professor at the University of Helsinki, Institute of Behavioural Sciences. As a conversation analyst she has researched multimodal interaction with aphasia and language development. She is principal investigator of the interdisciplinary project "Communication with Hearing Aid" funded by the Finnish Academy (2011-2014).

"I'm interested in communicative breakdowns and how people restore and maintain their intersubjective understanding. Thus far, I've studied mainly linguistic breakdowns, but I'm very interested in finding out how people manage with breakdowns due to hearing impairment, a perceptual problem. As a speech and language therapist I'm also interested in how people learn to use hearing aid technologies in their communication."

Authors

EILA LONKA is associate professor of logopedics at the University of Helsinki, Institute of Behavioural Sciences, with a specialization in speech perception, speech reading and communication with cochlear implants. She has published on hearing rehabilitation and technological application, both for a scientific audience and for practitioners, including the development of multimedia materials.

"Before working at the university I worked as a speech therapist in a hearing clinic for several years. Now I am responsible for teaching courses in logopedics handling hearing impairment. I am also supervising master theses in this area."

BEN MATTHEWS is associate professor of design studies at the University of Southern Denmark/SPIRE. His interests are at the intersection of social research methodology and design research. Much of his research concerns studies of designers in areas of practice, e.g. participatory design and interaction design. He is currently a supervisor on an industrial PhD project to support transition from non-users to users of hearing aids.

"I first became involved in research related to hearing loss, communication and the design of related technologies associated with the condition during a project collaboration with the Danish hearing aid manufacturing outfit Oticon A/S in 2008. My interests with respect to hearing technologies relate to how such devices can be better designed to support users' and professionals' existing skilled practices."

MARKUS MEIS, PhD in medical psychology, is Director of the "Department of Effects Research" of the Hörzentrum Oldenburg, an institution combining university, clinical and practical expertise regarding hearing impairments and their apparatus-based compensation. He is actively involved in company liason and applied research, with publications in medical psychology and psychological acoustics, e.g on barriers to hearing aid use and the effects of noise on learning and memory.

"I am fascinated by the interface of social psychology, acoustics and assistive technologies for hearing loss. The goal of my work is to combine industry involvement, research and teaching in order to contribute to improve the lives of people with hearing loss."

Authors

Eleni MOURTOU is a PhD student at the University of Southern Denmark. Her PhD project deals with securing understanding in interactions of hearing impaired adults and children with hearing individuals in institutional settings. She has participated in a project on the speech and hearing development of children with cochlear implants.

"I'd like to help making the public aware of the communication problems of people with hearing loss, promote the rights of people with disabilities and improve the methods of hearing rehabilitation."

KATI PAJO is a speech therapist and PhD student at the University of Helsinki, Institute of Behavioral sciences, with a conversation analytic project on communication adults with acquired haring impairment in their home environment. She has also studied interaction in speech therapy. She is consultant of the project "Communication with Hearing Aid".

"I am interested in how disability and handicap effect communication at home and other social areas of life and how communication therapy can be developed."

SIMONA PEKAREK DOEHLER is full professor of applied linguistics at the University of Neuchâtel, Centre for Applied Linguistics. As a researcher in Conversation Analysis her areas of specialization are second language interaction and learning, grammar in interaction, and plurilingual interaction. She is particularly interested in how people organize their social encounters by using language and other semiotic resources.

"Studying hearing loss communication allows me to zoom into issues of social organization that are a pervasive feature of social encounters, but may be weighted or shaped differently in different communicative situations, and with different communicative partners. Due to the work of my doctoral student Simone Groeber, my attention was drawn in particular to the bilingual nature of communication that involves both spoken and sign language."

Authors

PIRKKO RAUDASKOSKI is associate professor at the University of Aalborg/Department of Communication and Psychology. Through her interest in communication as an embodied undertaking in material environments she has studied how technologies shape any interactional situation. Her research also includes the interactional organisation of sign language talk.

"Hearing loss is one of those 'deficiencies' that help analyze in mundane interactions how body/technology/identity/intelligibility etc. emerge as interactional phenomena. My interest in hearing loss communication is twofold: 1) the analysis of it helps understand any communication situation; 2) detailed analyses might help people deal with hearing loss in their everyday life."

JOHANNA RUUSUVUORI is senior researcher at the Finnish Institute of Occupational Health in Helsinki and adjunct professor for social psychology at the University of Tampere. Her research focuses on interaction in social/health care services and in work life. She directs the current project "Work life involvement of hearing impaired people" (Finnish Work Environment Fund).

"Hearing loss represents a problem of communication providing a window to examine the achievement and loss of intersubjectivity in social interaction, as well as the possible social causes of non-compliance. I am also interested in finding solutions to enhance work life involvement of hearing impaired people."

LOUISE SKELT worked as an audiologist and rehabilitationist with Australia's National Acoustic Laboratories (1982 to 2002) and became aware of the need for further research on naturally-occuring hearing impaired interaction to inform audiologists' rehabilitation practices. She made this the focus of her conversation analytic PhD at the Australian National University.

"My particular interest is in the collaborative repair and prevention of problems of hearing and understanding arising in hearing impaired communication, since advice on the management of such problems is provided in the course of audiological rehabilitation programs. I continue to be involved in the development of rehabilitation programs for cochlear implant recipients."

Transcription Notations

Transcription follows the system developed by Gail Jefferson (1984). Only conventions actually used in the transcripts are explained here.

The transcript lines start with the line number to the left, followed by the speaker code and the transcribed talk. Talk is transcribed according to an approximation of how it is uttered, not according to standrad orthography, e.g..

```
004 Kay: a:a-and a couple of other families.
```

For transcripts with talk in languages other than English, the first line contains the original talk, the second line a gloss, if necessary with linguistic abbreviations in CAPS of what cannot be translated, and the third line printed in blue provides a more idiomatic translation. When irrelevant to the analysis, the gloss is left out.

```
011 Pir:  Sa-i-t(s)-ko selvä-n,
          Get-PST-2SG-Q clear-GEN
          You got that
```

The following notations are used:

`This is a [word ]` `        [Oh ye]ah`	Left-hand brackets mark the onset of simultaneous talk by the second speaker. Right-hand brackets mark where simultaneous talk stops.
`(0.5)` `(.)`	Length of a silence in tenths of seconds A silence less then 0.2 seconds
`(xxx)`	Inaudible (number of syllables)
`↑` `↓`	The syllable following the upward arrow is relatively high-pitched (several arrows mark very high pitch); the syllable following the downward arrow is relatively low-pitched
`wo̲rds`	The underlined syllable or sound is stressed.
`wo::rd`	Colons indicate stretching of sounds (sonorants).
`wo-`	A hyphen marks that the speaker 'cuts off' his/her speech.
`.hhh`	A period followed by 'h' indicates a hearable inbreath (the more 'h's the longer the inbreath).
`hhh.`	The letter 'h' followed by a period indicates a hearable outbreath (the more 'h's the longer the outbreath).
`wo(hh)rd (hh)uh`	The letter 'h' in parentheses marks the plosive sound in laughter (sometimes in words).
`=`	The equals sign marks latching: the next unit follows without time lag.
`((voiceless))`	Double parentheses contains comment on speech production.
`°word°`	The degree symbol marks soft voice.
`WORD`	Capital letters mark loud voice.

Additional notations are explained where they are used in the respective chapter.