



SWEDISH INSTITUTE FOR DISABILITY RESEARCH  
LINNAEUS CENTRE HEAD GRADUATE SCHOOL

# HEAD Graduate School Third Summer Workshop

*Hearing and deafness from memory to society  
- ongoing thesis projects*

June 14–15, 2010

Vildmarkshotellet, Kolmården Zoo, Sweden



Linköpings universitet



ÖREBRO UNIVERSITY



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## **Welcome to the wilderness of Kolmården**

It gives us immense pleasure to welcome you to HEAD Graduate School Third Summer Workshop.

The program features nearly 30 presentations of scientific work within the broad field of hearing and deafness. Some presenters are invited keynote speakers, but most are Ph.D. students and postdocs from, or associated with, the HEAD environment. In addition to oral and poster presentations, there will be parallel discussion groups. Of course, these two days will also include social activities of various kinds.

The role of senior researchers is to provide a model of active participation, constructive criticism and support.

The variety of interests and perspectives within the research area of hearing and deafness is broad. This workshop is organised around three main themes: Memory and language, Society, and Intervention.

The workshop is supported by the Swedish Research Council.

Just as in previous years, the workshop was organised by a group of HEAD doctoral students, postdocs and administrators.

### **Organising Committee**

The workshop was organised by Isabelle Boisvert, Elisabet Classon, Magnus Emilsson, Maria Hugo-Lindén, Helén Johansson, Lisa Kilman, Björn Lidestam, Marie-Louise Lund Mattsson, Ulrika Löfkvist, Cecilia von Mentzer, Sushmit Mishra, Shahram Moradi, Elaine Ng, Parivash Ranjbar, Mary Rudner, Niklas Rönnerberg, and Adriana Zekveld.





## Practical information

**Check-in procedure:** When registering, you will receive your room key. You may access your room as from 15.00.

**Food:** Breakfast, lunch, and dinner will be served in the restaurant near the hotel lobby.

**Spa:** The hotel features a spa with swimming pools, sauna and jacuzzi. The spa is open between 08.00 and 22.00 and access is free of charge for workshop participants.

**Discussion groups:** During the workshop there will be parallel discussion groups. In connection with registration, you will be asked to select which sessions you want to participate in.

**Evaluation sheet:** Please, fill in the evaluation sheet at the end of the workshop. You will find the evaluation sheet in the folder given to you upon arrival. Once filled in, evaluation sheets are to be put into a designated box in the conference lobby.

**Questions:** If you have any questions regarding practical matters during the workshop, please contact any of the members of the organising committee (identifiable by their coloured name badges).

## **Swedish Institute for Disability Research**

The Swedish Institute for Disability Research (SIDR) was founded in 2000 in cooperation between the universities of Linköping and Örebro. Since 2007, Jönköping University is also a part of SIDR. Disability Research is an interdisciplinary subject and includes medical, technical, behavioural and cultural perspectives. In research and research training SIDR aims to pursue excellence, adopt the perspective of the individual, promote collaboration with user organisations and industry and promote development of the International Classification of Functioning (ICF). The SIDR graduate program is a leading European research program in Disability.

For further information about SIDR, please visit [www.ihv.se](http://www.ihv.se)

## **Linnaeus Centre HEAD**

In 2008, Linköping University received a major 10-year grant from the Swedish Research Council to create Linnaeus Centre HEAD. HEAD stands for HEaring And Deafness and thus indicates the field of research.

Linnaeus Centre HEAD forms part of the Swedish Institute for Disability Research. The backbone of the centre is a multidisciplinary research team, comprising a core group of senior scientists, postdoctoral research fellows and close collaborators. The grant is supplemented by funding for the HEAD Graduate School.

For further information about Linnaeus Centre HEAD, please visit [www.headcentre.se](http://www.headcentre.se)

## **HEAD Graduate School**

HEAD Graduate School is run in collaboration between the universities of Linköping and Örebro within the framework of the Swedish Institute for Disability Research. It is also affiliated with Linnaeus Centre HEAD, and is funded by the Swedish Research Council. The graduate school promotes excellent research training and is open to doctoral students whose projects fall within the broad field of hearing and deafness research. The activities of the graduate school include courses, seminars, workshops and mobility incentives and it provides an excellent forum for developing links between research, clinicians, user organisations and industry.

At present, 28 doctoral students are enrolled at the graduate school.

For further information about HEAD Graduate School and its activities, please visit [www.ihv.se/head](http://www.ihv.se/head)

### ***What's been going on within HEAD since last summer?***

Since the previous HEAD workshop, the graduate school has been active towards enhancing research. The HEAD seminar series has continued during the year with a variety of speakers including international guests as well as speakers from the HEAD environment. The seminar series was started in 2008, and is open for all. Such seminars have also provided HEAD students the opportunity to meet and discuss their research with researchers and students from other research environments. On a more intimate level, Ph.D. students in Linköping have initiated a journal club that meets approximately once a month. For each meeting, one of the students selects an article to be discussed over lunch. In September the HEAD Graduate School members were invited by Linnaeus Centre for Cognition, Communication and Learning to a one day seminar in Lund, and also in November, HEAD and The Graduate School for Hearing Disabilities in Working Life at Karolinska Institute in Stockholm, co-organised a workshop held at Graninge Stiftsgård, Stockholm. In addition to the oral sessions, there was a poster session where the Ph.D. students from the two graduate schools contributed with some 20 posters. Currently, the next workshop to be held this fall is being planned.

Further, a number of graduate courses have been organised by the graduate school including a course introducing the field of hearing and deafness and courses on methods. For example, Ingrid Johnsrude has held a course on fMRI as a research method during this spring.

Finally, it should be mentioned that three members of the graduate school have successfully defended their Ph.D. theses. In October 2009, Parivash Ranjbar defended her thesis which concerned monitoring aids for persons with profound deafness or deafblindness. Some weeks later, Malin Wass defended her thesis on cognitive ability in children who have received cochlear implants, and in May 2010, Emelie Rydberg had the same opportunity. Emelie's work focuses on deaf people and their position on the labour market. The theses can be found at [www.ibl.liu.se/cdd/ihv/head/disputation?l=en](http://www.ibl.liu.se/cdd/ihv/head/disputation?l=en)



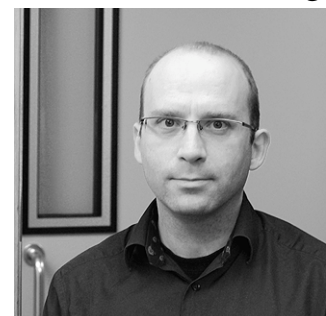
## **Keynote speakers**

**Lars Nyberg** was born 1966 in Bollstabruk, Ångermanland, in the northeast of Sweden. He defended his thesis 1993 and 1994–96 he had a post-doc position in Canada. He was approved as docent at Umeå universitet 1996, where he 1999–2005 was professor in psychology. Since January 2006 he is a professor in neuroscience. Nyberg has been working as a special adviser at the National Agency for Higher Education, been a member of a fact-finding board at the Swedish Research Council, been a member of the board at the Centre of research on Physical Education as NevroNor in Norway. He has had a “bistilling” as professor at the university in Bergen. 2001 he received Göran Gustafsson-award in medicine for his research about functions of the brain and 2008 Mångbergs award for excellent studies in higher order cognitive functioning in man. He is a member of the Swedish Royal Academy of Science. 2009 he was nominated as a Wallenberg Scholar.



Lars Nybergs main research area is in the field of cognitive neuroscience. It deals with the connection between functions in the brain and different cognitive operations as memory and consciousness. Modern technique, e.g. functional brain imaging, primarily MRI-camera, is used in this research. One research route is conducted within the Betula-project which is a study about aging, memory and health. Betula has been chosen as a strong research area by the Swedish Research Council and is a part of the Linnaeus Environment, Aging and living-conditions at Umeå University. The focus of study is for example how brain structures and functioning change in individuals with extensive or small memory deterioration. Another research route deals with cognitive control, as the ability to regulate attention, memory access and emotional reactions. These studies are conducted within the frame of a Nordic Centre of Excellence run by Lars Nyberg.

**Michael Akeroyd** is the Section Director at the MRC Institute of Hearing Research in Glasgow, Scotland. His research focuses on what a hearing-impairment means for someone: how it affects their quality of life, how they listen, and what a hearing aid can (or cannot) do for them. He uses the techniques of experimental and computational psychoacoustics to study motion tracking, distance perception, the dynamics of sound and "binaural sluggishness", localization or lateralization of sounds, and speech perception and speech segmentation.



**Ingrid Johnsrude** trained as a clinical psychologist (neuropsychology) at McGill University in Montreal, and obtained her Ph.D. in 1998. She was a Wellcome Trust postdoctoral fellow at the Wellcome Department of Imaging Neuroscience in London (1997–1999), and then Investigator/Scientist at the Medical Research Council's Cognition and Brain Sciences Unit in Cambridge UK (2000-2004). She is currently Associate Professor and Canada Research Chair in Cognitive Neuroscience at Queen's University, and a Professor at the University of Linköping. Her primary research interest is to identify sources of information that young and older people can exploit to facilitate their understanding of degraded, noisy speech. Being able to communicate with other people in noisy environments is essential to maintaining social and family relationships, participating in society, and engaging in leisure/recreational activities with others. People with even mild hearing impairments report increased difficulty hearing speech in background noise and appear to be at increased risk of negative psychosocial health outcomes. As people age, and the fidelity of the auditory input deteriorates, top-down cues to speech comprehension become increasingly important. She uses both behavioural and functional imaging (fMRI) methods extensively in her work.



**Emelie Rydberg** has a Bachelor's degree in Hearing Science and has also studied Sociology, Special Education and the Swedish sign language. Emelie's main research interest is deafness and society. "Deaf people and the labour market in Sweden. Education – Employment – Economy" is the title of her thesis and in May this year she got her Ph.D. in Disability Research at the University of Örebro. The thesis focuses on deaf people's education, employment and income. These issues are interrelated, as higher levels of educational attainment are associated with lower unemployment rate and higher levels of income. The national context is Sweden and the Swedish welfare state in 2005. Emelie Rydberg's thesis was carried out within the Swedish Institute for Disability Research.





Monday, 10.00–10.15

Oral presentation

## **Lexical and Semantic development in Children with Cochlear Implants**

Ulrika Löfkvist<sup>1,2</sup>, Ing-Mari Tallberg<sup>2</sup>, Björn Lyxell<sup>3</sup>, Anette Lohmander<sup>2</sup>

<sup>1</sup>HEAD Graduate School

<sup>2</sup>CLINTEC, Karolinska Institute

<sup>3</sup>Department of Behavioural Sciences and Learning, Linköping University

**Background:** More than 350 deaf children have been operated on at the Karolinska University Hospital in Stockholm, Sweden since 1991 (February, 2010) and since 2000 mostly bilaterally. The variety of outcome is huge within this heterogeneous group. Clinical experience indicates that many children with CI have poor vocabulary. The aim and the purpose of this project is to study lexical and semantic development in children with cochlear implants compared to age-matched normal hearing children.

**Method:** The study incorporate school children with CI in the ages of 6-9 years (n=35) and a control group of age-matched normally hearing children (n=35). The lexico-semantic ability is assessed with a battery of tests including receptive and expressive vocabulary as well as tests of semantic knowledge. Analysis of responses on vocabulary tests with regard to strategies and substitutions is also conducted.

**Results:** Preliminary results from this study show that children with CI at the ages of 6–9 have a poorer and insufficient lexico-semantic network compared with age-matched, typically developed normal hearing children, especially regarding expressive vocabulary and word fluency. There is, however, a large individual difference within the group of children with CI compared within the control group.



Monday, 10.20–10.35

Oral presentation

**Phonological similarity and sensory memory traces modulate span size in deaf signers and hearing non-signers**

Josefine Andin, Jerker Rönnerberg, Mary Rudner

Linnaeus Centre HEAD  
Swedish Institute of Disability Research  
Department of Behavioural Sciences and Learning, Linköping University

Short term memory (STM), but not working memory (WM), has been shown to be reduced in deaf signers compared to hearing non-signers. By using visually presented characters (digits and letters) and typed recall we investigate memory span in deaf native signers (DS) and hearing non-signers (HN). In accordance with previous studies we found no difference between the groups on the WM dependent operation span. However, digit spans were significantly larger than letter spans for both groups. We also found an interaction effect between group and character, pointing towards a smaller disadvantage for DS than HN when letters instead of digits, were used. We propose two main explanations for these results: The greater phonological similarity of digits in sign language compared to letters in both sign and speech-based language reduces span size for DS. With visual stimuli the use of auditory sensory memory traces is reduced in the HN, leading to no difference between the groups in the letter condition. The present study strengthens earlier results where group differences have been found for STM, but not for WM, emphasizing that routine use of digit spans as a measure of cognitive capacity is problematic in sign language users.



Monday, 10.40–10.55

Oral presentation

## **Dynamic Compression, Spatial Hearing, and Cognitive Performance**

Rufus Söderberg<sup>1</sup>, Björn Lyxell<sup>2</sup>, Birgitta Larsby<sup>2</sup>

<sup>1</sup>Örebro University

<sup>2</sup>Linköping University

**INTRODUCTION.** Spatial hearing outcome of hearing aid fitting might benefit from further knowledge of sound lateralization. Effects from signal processing and cognitive speed on sound lateralization performance have been examined in this study.

**METHOD.** Sound lateralization performance and cognitive performance were measured in adult participants. They assessed direction of noise pulses presented through earphones. Direction was simulated with interaural level differences with and without interaural time differences.

Dynamic compression was set to bypass, independent channels, or linked left and right channels.

Cognitive performance was assessed by means of letter matching, lexical or phonological tasks. The mean response time and the number of correct responses were recorded for each test condition.

**RESULTS.** For sound lateralization accuracy, presence of interaural time differences improved performance. Independent channels dynamic compression reduced lateralization accuracy. For sound lateralization speed, presence of interaural time differences improved performance by 145 ms. The response time for the lateralization tasks correlated more to the letter matching task than the other cognitive tasks.

**ADDITIONAL DATA.** A preview of data from a follow-up experiment will be presented.

Monday, 11.10–11.55

Keynote address

**Aging and memory: Patterns of change, variability, and directed training**

Lars Nyberg

Radiation Sciences & Integrative Medical Biology, Umeå University

Based on data from a 20-year longitudinal study, we have previously shown that conclusions on how aging affects cognition across the adult life span vary greatly depending on whether they are based on cross-sectional or longitudinal studies. Here we extend this work to analyses of functional brain activity patterns. Previous age-comparative functional neuroimaging studies have revealed evidence for under- as well as over-recruitment in regional brain activity as a function of increasing age. However, past conclusions rest on cross-sectional designs. Preliminary longitudinal analyses indicate that such analyses are more sensitive than cross-sectional comparisons and that they mainly show under-recruitment in older age, notably in frontal cortex.

Analyses of inter-individual differences in cognitive performance reveal substantial heterogeneity within the aging population, and brain imaging data suggest that stable rather than declining cognitive functioning is correlated with a “youth-like” brain response. Transitions in the positive direction (i.e. higher performance with increasing age) are rare, but investigations of the effects of directed training show evidence for plasticity in older age. Recent evidence, including preliminary results from our group, indicates that one basis for improved cognitive performance after cognitive training could be enhanced dopaminergic neurotransmission. These molecular imaging cognitive-training findings will be related to recent observations of age-related reductions in the responsiveness of the striatal dopamine system to cognitive challenges.

Collectively, these findings support the notion of a key role of the fronto-striatal system in cognitive aging, and suggest that targeting the dopamine system is central in attempts at neurorehabilitation in older age.

Monday, 13.00–13.35

Discussion group

**Phonological intervention in children with cochlear implants  
and/or hearing aids**

Cecilia von Mentzer<sup>1</sup>, Elisabeth Engström<sup>2</sup>, Björn Lyxell<sup>1</sup>, Marianne Ors<sup>3</sup>, Inger Uhlén<sup>2</sup>, Birgitta Sahlén<sup>3</sup>, Malin Wass<sup>1</sup>

<sup>1</sup>Linnaeus Centre HEAD, Swedish Institute for Disability Research, Linköping University

<sup>2</sup>Karolinska Institutet, Stockholm

<sup>3</sup>Linnaeus Centre, Lund University

Few studies have examined the impact of phonological intervention at neurophysiological and cognitive levels of explanations in longitudinal perspective in children. In the present study we will follow children between 5 and 7 years of age with cochlear implants and/or hearing aids and normal hearing children over a period of 3 years. The purpose is to study how phonological intervention may affect their neurophysiological and cognitive development and how this possible development is related to development of various aspects of reading. Computer based phonological intervention will be accomplished by means of the Swedish version “Graphogame-SpelEtt” developed at Jyväskylä Institute of reading, Finland. The children will be trained with guidance by their parents 10 minutes daily for a period of 4 weeks. The intervention program will be administered by means of the Internet with support of a speech and language pathologist. We will include normal hearing children matched for age and sex as well as a language matched group as control groups that follow the same A-A-B-A design. Event Related Potentials; Mismatch Negativity and N400, will be measured pre and post-intervention. Auditory stimulation includes both sound and spoken words.

Monday, 13.00–13.35

Discussion group

**As clear as crystal or all Greek...? The combined effect of hearing impairment and L2 on speech perception in noise**

Lisa Kilman<sup>1,2,3</sup>, Adriana Zekveld<sup>2,3,4</sup>, Mathias Hällgren<sup>5</sup>, Jerker Rönnerberg<sup>2,3</sup>

<sup>1</sup>HEAD Graduate School

<sup>2</sup>Swedish Institute for Disability Research

<sup>3</sup>Department of Behavioural Sciences, Linköping University

<sup>4</sup>Department of ENT/Audiology and EMGO+ Institute, VU University  
medical center, Amsterdam

<sup>5</sup>Department of Clinical and Experimental Medicine, Linköping University

An increasingly common situation is cross-language communication in which one or more of the speakers depend on a second language (L2). However the efficiency of such conversation is lower than native-language (L1) communication and if the conversation is proceeding in a noisy condition, the intelligibility is even poorer.

Background noise has an adverse effect on L1 comprehension and this effect is larger for hearing impaired persons compared to normal hearing persons. Various factors are related to differences between individuals in the ability to comprehend speech in noise. Some factors are associated with the hearing impairment and the hearing aids whereas others are related to cognitive abilities and efficiency in language processes and memory.

In this study we will examine L2 speech perception in noise for both normal hearing and hearing impaired persons. We will use different types of noise to examine the relation between noise-type and L1/L2 comprehension and the effect of hearing impairment on this relation. We will additionally examine the association between type of noise and working memory capacity on L1 and L2 comprehension in noise.

Monday, 13.00–13.35

Discussion group

**Development of Theory-of-mind and Working memory in children and adolescents with deafblind syndromes**

Hans Erik Frölander

Swedish Institute for Disability Research, Örebro University

The overall purpose is to study theory-of-mind (ToM) and working memory (WM) in individuals with deafblind syndromes. ToM refers to an ability to understand self and others. Clinical observations suggest a higher frequency of deviance in ToM. It could hypothetically be caused by specific syndromes but also results of dual sensory impairment. Studies have reported delay in ToM to a higher degree in individuals with deafness and individuals with blindness. Communicative hindrance has been suggested to be a plausible explanation. Cognitive development has also been proposed to account for acquisition of ToM. WM referring to the ability to simultaneously store and process information over a short period of time, will in this study be related to ToM. In a first study the performance of 15 adolescents with Alström syndrome will be examined. A reading span test measuring WM capacity and “Strange stories”, a test of the ability to understand story characters’ thoughts and feelings will be used and compared with age matched non-syndromal individuals and individuals from other specific populations. Results will be related to degree of functional disabilities, general health and experienced participation in daily life events.

**Keywords:** ToM, WM, Deafblind syndromes, Alström, children and adolescents, Reading span test, the Strange stories test, dual sensory impairment, general health, participation

Monday, 13.00–13.35

Discussion group

**Internet-based cognitive behavioural self-help treatment for chronic tinnitus**

Cornelia Weise<sup>1,2</sup>, Maria Kleinstäuber<sup>3</sup>, Kristine Tausch<sup>3</sup>, Wolfgang Hiller<sup>3</sup>,  
Gerhard Andersson<sup>1,2,4</sup>

<sup>1</sup>Department of Behavioural Sciences and Learning, Linköping University

<sup>2</sup>Linnaeus Centre HEAD, Swedish Institute for Disability Research, Linköping  
and Örebro University

<sup>3</sup>Department of Clinical Psychology and Psychotherapy, Johannes Gutenberg  
University Mainz, Germany

<sup>4</sup>Department of Clinical Neuroscience, Psychiatry Section, Karolinska Institutet,  
Stockholm

Tinnitus is defined as a subjective acoustic perception, such as ringing in the ear. For approximately 2–4% of the adult population tinnitus is a considerable problem which leads to several associated problems, e.g. depressive symptoms or difficulties in communication. Cognitive behavioural treatment (CBT) has been shown effective, however, it is not available for most tinnitus patients. Therefore internet-based approaches were developed and showed promising results. To further investigate the efficacy of internet-based CBT treatments, a randomized controlled trial was initiated.

90 patients were randomly assigned, either to a treatment or a waitlist group. The treatment consists of a guided CBT-self-help program, including different tools to improve coping with tinnitus. Patients work on the program for 10 weeks and receive a weekly feedback from a psychotherapist. Patients who are assigned to the waitlist are given access to an online discussion forum. Each week the forum moderator posts a new discussion topic, which is related to tinnitus, however, not to aspects of tinnitus coping.

Within the discussion group at the HEAD summer workshop, the design of the study, the development of the treatment protocol, the recruiting process, data analysis procedures, as well as problems in conducting an internet-based study will be discussed.

Monday, 13.40–14.05

Keynote address

**Deaf people's position on the labour market**

Emelie Rydberg

HEAD Graduate School  
Swedish Institute for Disability Research  
Örebro University

In four studies a deaf population consisting of 2,144 persons born 1941–1980 who attended a school for the deaf in Sweden has been compared to a reference population consisting of 100,000 randomly selected persons from the total Swedish population born 1941–1980.

Registered information about these persons in 2005 have showed that there are differences in level of educational attainment, position on the labour market and sources of revenue and disposable income between the deaf and the reference populations with the deaf population having a poorer position than the reference population in all areas.

These differences between the deaf and the reference populations cannot be associated with differences in independent factors, such as sex, age and immigration background, for which the results have been adjusted. In this thesis it seems as being part of the deaf population is of importance.

Individual and contextual factors in conjunction with deafness that can increase the understanding of the differences between the deaf and the reference populations in an educational context, labour market context and economic context will be discussed.

Monday, 14.10–14.25

Oral presentation

**Characteristics of Interaction within the Video Relay Service  
(VRS)**

Camilla Warnicke

HEAD Graduate School  
Swedish Institute for Disability Research  
School of Health and Medical Sciences, Örebro University

To talk on the phone is a natural part of the everyday life of hearing people, and a practice that is taken for granted. However, for Deaf people, using a phone has not been possible until recently, when an Internet-based system for video phoning was introduced. In 2006, the Swedish Post and Telecom Agency established the VRS, procuring the service from Örebro County Council. The service offers Deaf and hearing people the opportunity to speak to each other, established by means of a sign language interpreter, who provides simultaneous interpretation.

The video phone practise entails new challenges for interaction that all communicating parties must adapt and relate to in different ways. The sign language interpreter is the only person in the interaction who is directly linked to both of the primary parties, and is also often the only person who is bilingual and bicultural in the encounter. This may influence the fluency of the interaction in various ways.

The overall aims of the current project are thus to systematically describe, analyze, explain and understand the characteristics of this type of interaction. The first part of the project focuses on the specifics of the turn-taking and turn-allocation of participants, as preliminary observations indicate that turn-taking may be a dilemma in the VRS-setting.



Monday, 14.30–14.45

Oral presentation

**Hearing impaired in working life: Effects of noise on work-related task performance**

Magnus Emilsson<sup>1</sup>, Björn Lyxell<sup>1</sup>, Björn Lidestam<sup>1</sup>, Kim Kähäri<sup>2</sup>, Claes Möller<sup>3</sup>

<sup>1</sup>Department of Behavioural Sciences and Learning, Linköping University

<sup>2</sup>Institute of Neuroscience and Physiology, University of Gothenburg

<sup>3</sup>School of Health and Medical Sciences, Örebro University

An ongoing study on the acute effects of noise on performance in work-related non-auditory tasks will be presented. In the study, performance of normally hearing and hearing impaired individuals in five tasks in four sound conditions will be compared. In addition, the extent to which working memory, executive functions and phonological abilities can explain individual differences in susceptibility to noise disruption will be examined. Preliminary results will be presented.

## Program

### MONDAY

When	What	Where
09.30-09.50	Coffee and sandwich	Conference lobby
09.50-10.00	Welcome	Chimpanzen
Theme 1: Memory and Language Chaired by <i>Lisa Kilman &amp; Elaine Ng</i>		
10.00-10.55	<b>1st oral session</b>	Chimpanzen
10.00-10.15	Ulrika Löfkvist	
10.20-10.35	Josefine Andin	
10.40-10.55	Rufus Söderberg	
11.00-11.10	<b>Break</b>	
11.10-11.55	<b>Keynote address</b> Lars Nyberg: <i>Aging and memory: Patterns of change, variability, and directed training</i> Introduced by <i>Cecilia von Mentzer</i>	Chimpanzen
12.00-13.00	<b>Lunch</b>	Hotel restaurant
13.00-13.35	<b>Discussion groups</b> Cecilia von Mentzer Lisa Kilman Hans Erik Frölander Cornelia Weise	Chimpanzen Delfinen Babianen Apan
Theme 2: Society Chaired by <i>Sushmit Mishra &amp; Ulrika Löfkvist</i>		
13.40-14.05	<b>Keynote address</b> Emelie Rydberg: <i>Deaf people's position on the labour market</i> Introduced by <i>Sarah Granberg</i>	Chimpanzen
14.10-14.45	<b>2nd oral session</b>	Chimpanzen
14.10-14.25	Camilla Warnicke	
14.30-14.45	Magnus Emilsson	
14.50-15.25	<b>Discussion groups</b> Inger Jonasson Cecilia Henricson Adriana Zekveld Berit Rönnåsen	Chimpanzen Delfinen Babianen Apan
15.30-16.00	<b>Coffee</b>	Hotel restaurant
16.00-19.00	<b>Social activities</b>	Delfincenter
19.00-	<b>Dinner</b>	Hotel restaurant

**TUESDAY**

<b>When</b>	<b>What</b>	<b>Where</b>
Theme 3: Intervention Chaired by <i>Shahram Moradi &amp; Magnus Emilsson</i>		
<b>08.30-09.15</b>	<b>Keynote address</b> Michael Akeroyd: <i>Spatial hearing and hearing-impairment</i> Introduced by <i>Adriana Zekveld</i>	<b>Chimpanzen</b>
<b>09.20-10.25</b>	<b>3rd oral session</b>	<b>Chimpanzen</b>
09.20-09.35	Niklas Rönnerberg	
09.40-10.05	Amin Saremi	
10.10-10.25	Traci Flynn	
<b>10.30-11.00</b>	<b>Coffee</b>	<b>Hotel restaurant</b>
<b>11.00-11.35</b>	<b>Discussion groups</b> Isabelle Boisvert Elaine Ng Sushmit Mishra Moa Wahlqvist	<b>Chimpanzen</b> <b>Delfinen</b> <b>Babianen</b> <b>Apan</b>
<b>11.40-12.30</b>	<b>Poster presentations</b> Åsa Skagerstrand Sarah Granberg Elisabet Classon Shahram Moradi Jana Besser	<b>Chimpanzen</b>
<b>12.30-13.30</b>	<b>Lunch</b>	<b>Hotel restaurant</b>
<b>13.30-14.15</b>	<b>Keynote address</b> Ingrid Johnsrude: <i>Some ways that knowledge and context can assist speech comprehension</i> Introduced by <i>Björn Lidestam</i>	<b>Chimpanzen</b>
<b>14.15-14.30</b>	<b>Final remarks and sandwiches to go</b>	<b>Chimpanzen</b>

Monday, 14.50–15.25

Discussion group

**Adult persons with acquired severe hearing and vision loss  
– experiences of participation**

Inger Canemark Jonasson<sup>1,2</sup>, Ann-Britt Johansson<sup>3,4</sup>

<sup>1</sup>Habilitering och Hälsa, Västra Götalandsregionen, Borås Lasarett

<sup>2</sup>School of Health Sciences, Jönköping University

<sup>3</sup>Eikholt Dövblindcenter, Norway

<sup>4</sup>The Sahlgrenska Academy, University of Gothenburg

Research area of interest in this study is about *lived experiences of participation in daily life* from a *life-world* approach for adult people with acquired severe hearing and vision loss, *deaf-blindness*. Interviews have been carried out with five men and three women at two or three occasions with each participant during a period of two years. Analyses were made from a hermeneutic approach. The analysis shows that working life, community contribution, social coherence and aids were important spheres that impact experiences of participation. Age, time and space, in a life-span perspective, are other factors of importance. The study shows that social recognition impact experiences of how you are recognized as a human being and that impact experiences of participation. In addition to the interviews participant observations and notations were made.

*Key words: interviews, deaf-blindness, experience, participation, daily life, life-world*

Monday, 14.50–15.25

Discussion group

**Children with CI and Usher syndrome type I or Connexin 26:  
Working Memory and Phonological Abilities**

Cecilia Henricson<sup>1,2,3</sup>, Björn Lyxell<sup>2,3</sup>, Claes Möller<sup>2,4</sup>, Björn Lidestam<sup>2,3</sup>

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The purpose of the project is to explore phonological ability and working memory capacity (WMC) in children (6–14 years) with cochlear implants (CI) and the diagnose Usher syndrome type I or Connexin 26. Persons with Usher syndrome type I have vestibular areflexia (lack of balance function) and a progressive visual condition due to retinitis pigmentosa (RP). Connexin 26 is a common cause of non-syndromal, congenital deafness. WMC and phonological ability are correlated with language development in children with typical development, in children with hearing impairment and CI (e.g. Adams & Gathercole, 1995; Gathercole & Baddeley, 2000; Sahlén et al., 2006; Wass et al., 2007). The results by Wass (2009) show that children with CI have a different phonological development than hearing children, and many of them display problems with tasks that explicitly require phonological processing. In the present project, the purpose is to examine how auditory stimulation provided by the CI affects cognitive development in children with congenital deafness and a vision problem.

Monday, 14.50–15.25

Discussion group

**The contribution of speech intelligibility, age, hearing loss and cognition to listening effort**

Adriana A. Zekveld<sup>1, 2, 3, 4</sup>, Sophia E. Kramer<sup>1</sup>, Joost M. Festen<sup>1</sup>

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Hearing loss reduces the capacity to understand speech. A major complaint of hearing impaired people is increased mental distress and fatigue caused by effortful speech comprehension. It is unknown to what extent auditory factors like the intelligibility level of the speech, and intrinsic factors like age and hearing loss influence listening effort. Additionally, the influence of cognitive abilities on processing load during listening is unclear. This study examined the effect of these factors using an objective measure of allocated effort (pupil dilation). Three groups of participants were included: young (N = 38) and middle-aged participants (N = 38) with normal hearing and middle-aged participants with hearing impairment (N = 36). Participants performed speech reception in noise tests at three intelligibility levels (50%, 71%, and 84%, respectively). The pupil diameter during speech perception was compared to the pupil diameter during listening to noise-alone. Participants additionally performed tests of processing speed, word vocabulary, and linguistic ability.

The results of this study indicate that the objectively and subjectively measured processing load varies between intelligibility levels, and additionally, we observed an association of age, hearing impairment, and cognitive abilities with the objectively measured processing load.

Monday, 14.50–15.25

Discussion group

**Deafblindness and Alström Syndrome - Early diagnosis and early intervention - A case study with focus on medical, functional, psychological, pedagogical, developmental and social aspects**

Berit Rönnåsen, Claes Möller

Swedish Institute for Disability Research, Örebro University

Hugo is a 4-year-old child with Alström Syndrome (AS). AS is a genetic syndrome with many organs involved. Among others are severe congenital visual loss with early blindness (14–18 yrs), progressive hearing loss with acquired profound deafness (30–40 yrs), cardiomyopathy (heart disorder), obesity, developmental problems and early metabolic syndrome (diabetes, high blood lipids, and hypertension). The workshop will be using a bio-psycho-social framework with focus on deafblindness in conjunction with AS. In a 4-year-old boy, the impact of visual and hearing loss on speech, language and communication is vital to analyze. We will further address the strength and weaknesses in social interaction with a special emphasis on play. We will discuss the play with objects, peers and adults and the importance of good environment. In AS other features such as eating habits, diet and obesity is important to take into consideration. How does the diagnosis and prognosis of a serious disorder and possibly early death affect family and personnel? The workshop will be an interaction between the medical profession (Claes Möller) and an expert of children with deafblindness (Berit Rönnåsen).

We will invite the participants to discuss the effects of early diagnose and early intervention strategies.

Tuesday, 08.30–09.15

Keynote address

**Spatial hearing and hearing impairment**

Michael A Akeroyd

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Kingdom

Spatial hearing is a central part of everyday listening. The ability to determine the direction of a sound source is such a natural and effortless skill that it is only remarked on in rare or challenging circumstances, such as when someone cannot determine the direction of the siren of a passing ambulance. But there is more to spatial hearing than just direction: the auditory processing that gives someone the ability to determine direction also allows them to improve the detection of sounds. Given the key role location plays in our auditory perception of the world, it is not surprising that self-reported difficulties in locating sounds are an influential contribution to the difficulties faced by hearing-impaired listeners. This talk will describe the primary phenomena of spatial hearing and how they are affected by hearing impairment.



Tuesday, 09.20–09.35

Oral presentation

**Testing effort for speech comprehension using the individuals' cognitive spare capacity – The Auditory Inference Span Test**

Niklas Rönnberg<sup>1,3</sup>, Stefan Stenfelt<sup>1,3</sup>, Mary Rudner<sup>2,3</sup>

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Modern hearing aids use a multitude of parameters to give the user an optimal speech signal. Fitting of the hearing aid becomes a handiwork due to the limited data of the patients hearing status (primarily an audiogram). A hearing in noise test (SNR threshold) is often used to evaluate the fitting. However, testing the SNR threshold as done in clinical use today is not ecological valid. Another way to think about hearing aid fitting is to ease the listening effort.

Therefore, we propose the Auditory Inference Span Test (AIST) as a clinical tool during hearing aid fitting to assess the patient's effort to understand speech. AIST is a combined auditory, memory, and processing test. It relies on the idea that the more cognitive resources that are required to process and understand speech, less cognitive resources are available for storage of the speech information. In AIST, sentences are presented in noise and afterwards the patient is required to recall and process the information from the sentences. Correctness and answering speed is measured and scores correlate to the effort required to understand the speech.

Data from piloting tests indicate that the AIST is well suited as a clinical test for listening effort.

Tuesday, 09.40–10.05

Oral presentation

## **Specific diagnosis of inner-ear hearing impairments**

Amin Saremi<sup>1, 2, 3</sup>, Stefan Stenfelt<sup>2, 3</sup>

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Most of the complicated functions of human auditory system are attributed to the inner-ear performance. Most of the patients with hearing loss suffer from impairments that originate from inner ear (sensorineural hearing loss), mainly within the cochlea. Despite this fact, today's hearing aid fitting perceptions focus mostly on checking hearing thresholds measured by pure tones. However, this popular method does not distinguish different types of impairments that might originate from the inner ear.

The aim of this project is to investigate the characteristics of the inner ear by introducing a signal transmission model. This model incorporates different functions of the cochlea, passive basilar membrane vibrations, and hair cell performance, including non-linear functions, frequency selectivity and active amplification.

Several audio and psycho-acoustical tests are carried out on three groups of subjects. First group includes normal hearing subjects, second group consists of elderly subjects with presbycusis, and finally the third group consists of subjects with well-documented noise induced hearing loss. The results of the tests will be compared with each other through an optimization process in order to enable us explore the parameters of our peripheral model.

The model will give out a powerful tool for specific diagnosis of the disorders within the inner ear and will hopefully improve the current hearing aid fitting techniques.

Tuesday, 10.10–10.25

Oral presentation

**The high prevalence of otitis media with effusion in children with cleft lip and palate as compared to children without clefts**

Traci Flynn<sup>1</sup>, Claes Möller<sup>2</sup>, Radoslava Jönsson<sup>3</sup>, Anette Lohmander<sup>4</sup>

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**Objective:** Children with cleft lip and palate universally present with otitis media with effusion (OME). The purpose of the present study was to examine and compare the prevalence of OME, hearing sensitivity, and audiometry methods utilised for assessment in children with and without clefts. **Methods:** Two groups of children (with unilateral cleft lip and palate (UCLP), and without clefts) were followed prospectively and longitudinally from 1 to 5 years of age with data collection at four points. Assessments at each point included: (1) otomicroscopy, (2) tympanometry, and (3) hearing assessment. **Results:** Children with UCLP demonstrated a significantly higher prevalence of OME than children without clefts at all ages. Of those ears with OME, 83.1 percent of all ears exhibited a hearing loss. The hearing loss was significantly more pronounced in the cleft group. Children with UCLP utilised a lower age-appropriate audiometry testing method than age-matched children without clefts at younger ages. **Conclusions:** This presentation highlights the findings of children with UCLP demonstrating a significantly higher prevalence of OME than children without clefts and the hearing loss associated with OME. Finally, the method of audiometry utilised with both groups of children will be discussed.

Tuesday, 11.00–11.35

Discussion group

## **The limits of speech recognition tests when evaluating cochlear implant candidacies**

Isabelle Boisvert<sup>1,2,3</sup>, Catherine McMahon<sup>1,2</sup>, Björn Lyxell<sup>3,4</sup>

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Speech recognition tests are often viewed as one of the critical tests needed to establish cochlear implant candidacy. These tests are used to evaluate the individual's auditory abilities in everyday life situation with the best fitted hearing aids. Based on the results of the speech recognition tests and on previous finding, clinicians will estimate whether a cochlear implant could improve the auditory abilities beyond that of hearing aids. However, speech recognition tests are limited in evaluating the auditory abilities alone as many factors contribute to the variability of the results. The outcomes of a speech test can be influenced by the testing setting (stimuli's characteristics, equipment's quality and calibration, characteristics/ adjustment of hearing aids, test-retest reliability, etc.), the cognitive state of the client (attention and motivation), and the cognitive language processing abilities of the client (quality of the phonological representation, lexical knowledge, ability to guess, etc). Despite having much variability, the speech recognition results that are measured are used to make decisions regarding an individual's candidacy to receive a cochlear implant. This presentation will facilitate a discussion about the factors contributing to the variability of the speech recognition results and their significance in the decision-making process.

Tuesday, 11.00–11.35

Discussion group

**Effects of hearing aid signal processing on cognitive outcome measurements**

Elaine Hoi-Ning Ng<sup>1,2</sup>, Mary Rudner<sup>1,2</sup>, Thomas Lunner<sup>2,3,4</sup>, Jerker Rönnerberg<sup>1,2</sup>

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The study examines how a signal processing in hearing aids affects cognitive demands and cognitive spare capacity of speech recognition. A dual task, which consists of a primary perceptual speech recognition task and a secondary free recall memory task, was used to investigate the cognitive outcomes allocation with the use of binary time-frequency masking noise reduction technique. A subset of the Swedish Hearing In Noise Test (HINT) sentences was employed, and experienced hearing aid users with symmetrical moderate to moderately-severe sensorineural hearing impairment were tested. Both perceptual and memory performance in different conditions (i.e. in quiet, in speech spectrum noise and in 4-talker babble, with and without binary masking) were compared. Preliminary results will be discussed.

Tuesday, 11.00–11.35

Discussion group

## **Cognitive Spare Capacity Test**

Sushmit Mishra<sup>1,2</sup>, Mary Rudner<sup>1,2</sup>, Thomas Lunner<sup>1,2,3,4</sup>, Stefan Stenfelt<sup>1,3</sup>,  
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The purpose of the study is to devise a test of cognitive spare capacity (CSCT) that takes into account potential interaction between working memory capacity, executive function, noise and modality of presentation. Cognitive spare capacity is a measure of residual processing capacity, i.e. the cognitive capacity available for solving other tasks such as problem-solving and decision-making once the meaning of the spoken message has been understood. The CSCT taps executive functions (updating, inhibition) at different memory loads (low, high) in two modalities of presentation (audio, audiovisual) using a 2x2x2 within subjects design. The validation of the test will be carried out on a group of young adults and later the test will be administered to elderly adults with hearing impairment. The CSCT will be administered alongside a battery of established cognitive tests to assess its validity in terms of assessing different aspects of cognitive function relevant to speech understanding, including inference-making ability. The results of the study will allow us to develop the working memory model for Ease of Language Understanding (ELU, Rönnerberg et al., 2008) and take step towards developing a clinical test of cognitive spare capacity.

Tuesday, 11.00–11.35

Discussion group

## **Usher syndrome and psychosocial health**

Moa Wahlqvist<sup>1,2,3</sup>, Berth Danermark<sup>2,3</sup>, Claes Möller<sup>2,4</sup>, Camilla Johansson<sup>4</sup>

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The aim is to study psychosocial factors that promote health among persons with Usher syndrome type II.

Usher syndrome is an inherited condition that impacts both hearing and vision, it can be separated into three different clinical groups that are named I, II and III. Usher type II means that the individual have a congenital mild to moderate hearing loss that is quite stable and a normal balance, the vision problems are constituted by Retinitis Pigmentosa (RP) with an onset in the teens and a progressing course during life.

Two questionnaires have been used, the National public health survey that covers physical and mental health and the Hospital Anxiety and Depression Scale (HADS) which is a self-assessment scale, validated and used for detecting depression and anxiety.

The results and consequences of psychosocial factors such as depression, anxiety, sleeping disorders, self esteem, and thoughts of suicide, within Usher type II will be discussed at the work shop. Results are preliminary at this stage, but as far as we have analyzed there are differences when it comes to depression, anxiety and thought of suicide and suicide attempts between persons diagnosed with Usher syndrome type II and normal Swedish population.

Tuesday, 11.40–12.30

Poster

## **Soundscape Perception**

Åsa Skagerstrand<sup>1, 2, 3, 4</sup>, Stefan Stenfelt<sup>2, 5, 6</sup>

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Aim of this study is to compare the perception of annoying sounds when hearing function differs. Compared sounds exists in the daily soundscape, and has been seen, in a previous study by Skagerstrand et al., as annoying for persons using hearing aids. The result of the comparison is between three groups of persons, 1) persons with normal hearing, 2) persons with sensorineural high-frequency hearing loss, and 3) persons with sensorineural high-frequency hearing loss using hearing aids. This quantitative study compare results from hearing tests as well as cognitive tests with loudness and annoyance scaling tests for eight sound examples. The scaling tests are performed in an anechoic chamber. The scaling tests show interesting similarities and disparities between the three groups that will be presented in a poster.



Tuesday, 11.40–12.30

Poster

## **The development of ICF Core Sets for Hearing Loss**

Sarah Granberg

Audiological Research Centre, University Hospital of Örebro and SIDR, School of Health and Medical Sciences, Örebro University

The International Classification of Functioning, Disability and Health (ICF), adopted by the World Health Organization (WHO) in 2001, offers a framework for a comprehensive understanding of health. One of the main goals of the ICF is to provide a conceptual framework of health that can be applied both for research purposes, and in clinical settings. In order to promote the use of the ICF in clinical settings, the WHO initiated the Core Sets project. Core Sets, targeting a specific health condition, consist of a set of ICF categories which can serve as minimal standards (Brief ICF Core Set) or as standards for comprehensive assessment (Comprehensive ICF Core Set). In 2009, a process of developing ICF Core Sets for Hearing Loss was initiated. This process involves three phases of development. In the first phase four scientific studies are conducted in order to collect evidence for relevant ICF categories to be used in the Core Sets. In phase two, a consensus conference is held in order to establish relevant ICF categories, and in the third phase, the Core Sets retained are tested and validated. This poster presentation describes the process of developing ICF Core Sets for Hearing Loss.

Tuesday, 11.40–12.30

Poster

**Hearing impairment, linguistic processing and access to verbal long-term memory: An ERP-study**

Elisabet Classon<sup>1,2,3</sup>, Jerker Rönnerberg<sup>2,3</sup>, Mary Rudner<sup>2,3</sup>, Mikael Johansson<sup>4</sup>

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This poster presents an ongoing study focusing on linguistic processing and access to verbal long-term memory representations in participants with and without acquired severe hearing impairment. ERPs are registered during an explicit decision task where stimuli are visually presented word pairs with different levels of phonologic, semantic and visual relatedness. The inter stimulus interval is manipulated to engage either strategic or automatic facilitation of memory access. In addition a number of cognitive and hearing measures are collected. Hypotheses include group differences in the N400 effect, particularly in the more challenging phonologic tasks. Analyses will further investigate relationships between ERP-responses and performance on the cognitive and hearing tests. Data collection is ongoing but we hope to be able to present some preliminary results.

Tuesday, 11.40–12.30

Poster

**Audiovisual integration in noise and silent conditions:  
Using a gating paradigm procedure**

Shahram Moradi<sup>1, 2, 3</sup>, Jerker Rönnerberg<sup>2, 3</sup>, Björn Lidestam<sup>2, 3</sup>

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**Aim:** The aims of study is to compare time windows of unimodal (auditory or visual) and multimodal stimuli (audiovisual) stimuli in silent and noise conditions and also investigating the contribution of bottom-up and top-down processing in each modality (auditory, visual, and audiovisual). Moreover, we would like to know the lexical and contextual effects on time window.

**Method:** 30 Swedish college students (15 males) participate in a within-subject design. Stimuli are vowels, consonants, words, non-words, and sentences. We use a gating-paradigm approach to measure time course of stimuli. Selected stimuli (based on a pilot study) are recorded at 120 frames per second. Then, each modality of stimuli (auditory, visual, and audiovisual) is gated (a new gate for every 8.33 ms). In noise condition, we will use a white noise (SNR in noise condition: 0, -2, -4, -8, -10), noise in which presented simultaneously to the stimuli. In vowels, consonants, words, and non-words, we will gate the entire stimuli, whereas in sentences, we just will gate the last word of a sentence.

Tuesday, 11.40–12.30

Poster

**The Text Reception Threshold test revisited – strengthening associations with SRT and working memory**

Jana Besser<sup>1</sup>, Adriana A. Zekveld<sup>1, 2, 3</sup>, Sophia E. Kramer<sup>1</sup>, Jerker Rönnerberg<sup>2, 3</sup>,  
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This poster presents results of a study aimed at increasing the association between the Speech Reception Threshold (SRT) test and its visual analogue, the Text Reception Threshold (TRT) test. The latter measures a person's ability to read partially masked text and is intended to measure individual cognitive abilities involved in speech understanding in noise. Earlier research suggested that the original TRT test does not fully meet this requirement. Adaptation of the test is required before clinical implementation can be considered.

We therefore developed and evaluated several modified TRT test versions that specifically aim to increase the load on processing speed and verbal working memory (WM) capacity. In order to evaluate the TRT test versions' reliance on WM capacity, we created a Dutch version of the Reading Span test.

56 normal hearing adults (18–78 years) with varying educational levels participated in the study. Using a counterbalanced design, each participant performed 5 TRT tests, SRT tests in stationary and modulated noise, a Reading Span test and a Letter-Digit-Substitution Test (LDST). Correlation analyses revealed significant associations between all TRT test versions and speech understanding in modulated noise, reading span, and LDST performance. Interesting variations in the strength of the relationships were observed. Some of the TRT versions also correlated significantly with age.

Tuesday, 13.30–14.15

Keynote address

**Some ways that knowledge and context can assist speech  
comprehension**

Ingrid Johnsrude

Linnaeus Centre for Hearing and Deafness (HEAD)  
Department of Behavioural Sciences and Learning, Linköping University  
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As people age and the fidelity of the input deteriorates, top-down cues to speech comprehension become increasingly important. I will report a series of experiments in which colleagues and I explore the ways in which meaningful context and prior knowledge can assist speech comprehension – such benefit is particularly evident when speech is degraded, noisy, or interfering talkers are present. Behavioural studies are used to identify context and knowledge-based factors that can influence comprehension of sentences, and functional magnetic resonance imaging (fMRI) studies are used to explore the neural substrates of these influences. So far, the factors that we have investigated and manipulated include perceptual learning of degraded speech, coherent sentence-level meaning and predictability, the presence of homophones, and voice familiarity.



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## HEAD Graduate School Summer Workshop

Since 2008, HEAD Graduate School organises a summer workshop held each year. The workshop gives Ph.D. students experience of what it is like to organise a scientific conference and it provides them with an opportunity to present and discuss their research with other researchers within the field of hearing and deafness. Of course, the workshop is also about having a good time together. Thus, the program also includes social activities where participants can interact in a more laidback fashion. In 2009, when the workshop was held at Båsenberga Hotel & Konferens, one of the activities was to prepare lunch together outdoors. This year, however, participants will not be asked to cook. Instead, rumour has it that social activities might have something to do with dolphins.



Workshop participants enjoying the lunch prepared by themselves at Båsenberga Hotel & Konferens in June 2009.