LANGUAGE AND HEARING CENTER
AMSTERDAM

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Workshop Organization

Vrije Universiteit Amsterdam (VU)
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Eline van Knijff

Vu University Medical Center Amsterdam (VUmc)
Theo Goverts
Alieke Breure
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Amstelzaal
The Amstelzaal is located in the main hospital building. If you enter through the main entrance, walk straight ahead following the signs to “Amstelzaal”. At the end of the hall, the Amstelzaal is located on your right.
Program

13.00 - 13.15  Registration
13.15 - 13.30  Doors open
13.30 - 13.45  Opening remarks - Prof. M. ter Hark, Dean Faculty of Humanities (VU)

13.45 - 14.35  Lecture by Prof. J. B. Tomblin (University of Iowa)

Language outcomes of children with mild-to-severe hearing loss: results of longitudinal multidisciplinary project ‘Outcomes of Children With Hearing Loss’

14.35 - 15.05  Panel discussion with:
- Dr. G.A. van Zanten (UMCU)
- Prof. A. van Wieringen (KU Leuven)
- Prof. A.F.M. Snik (Radboud UMC)
- Prof. I. Dhooge (UZ Gent)
- Prof. R.J.B.J. Gemke (VUmc/AMC)

Moderator: Dr. S.T. Goverts (VUmc)

15.05 - 15.35  Poster pitches

Break

16.05 - 16.55  Lecture by Prof. G. Morgan (City University London)

The influence of deafness and language on executive function development

16.55 - 17.25  Panel discussion with:
- Prof. H. Knoors (RU Nijmegen/Kentalis)
- Prof. B. van den Bogaerde (UVA/HU)
- Dr. D. Hermans (Kentalis)
- Dr. L. Ketelaar (NSDSK)
- Prof. J. Leybaert (ULB)

Moderator: Prof. M.M.R. Coene (VU)

17.25 - 17.30  Closing remarks - Prof. M.M.R. Coene (VU)

17.30 - 18.30  Poster presentations on (Child) Language and Hearing and reception
Lecture abstracts

March 3, 13:45 - 14:35

Language outcomes of children with mild-to-severe hearing loss: results of longitudinal multidisciplinary project ‘Outcomes of Children With Hearing Loss’

Prof. J. Bruce Tomblin
University of Iowa, United States

Research concerning the effects of hearing on language development informs both clinical and theoretical objectives. Findings from children who are deaf show that oral language development is substantially limited. Provision of cochlear implants early in life has shown substantial improvement in oral language outcomes, despite the fact that the acoustic information provided by these devices is far from ideal. These findings lead us to hypothesize that the systems serving language development are robust. Although language development clearly requires some degree of linguistic feedstock, there may be a point where the input becomes saturated. Thus, with a sufficient amount of input individual differences in language development are more likely the result of differences in internal cognitive and neural learning systems. This robust view of language learning predicts that there will be limits to how much clinical intervention focused on optimal input can do and predicts that research aimed at understanding cognitive and neural mechanisms will be most successful where children have received sufficient input.

If this robust model of language development is correct, then children with mild to moderate hearing loss may not be at risk for reduced or poor language development. These children have not been the focus of research on language development. Often when they have been studied, they have been combined with children with severe to profound loss. A small set of studies concentrating on these children has reported mixed findings. Some studies have suggested that these mild losses do not effect language development, thus supporting the robust systems account. Other studies have found effects at least in some areas of development.

A critical limitation in the current research has been the absence of recognition that many children with mild and moderate hearing losses are now often identified in infancy and receive early interventions that include improved hearing technologies such as hearing aids. If these interventions are efficacious, then it may be that such hearing losses are not benign and the systems serving language development are sensitive to the input limitations provided by mild and moderate hearing loss. The requisite studies exploring language outcomes among children with mild and moderate hearing loss are just beginning to emerge. This presentation first examines the findings of a multi-site, longitudinal study of the outcomes of children with mild-to-severe hearing loss (Outcomes of Children with Hearing Loss, OCHL). This study was designed to address major gaps in the extant literature on children who use hearing aids rather than cochlear implants. Three major factors (audibility, consistency and duration of hearing aid use, and caregiver input characteristics) are discussed in relation to children’s longitudinal outcomes. We argue that the language learning system is vulnerable
when there are constraints in the availability of cues. To the extent that language learning is dependent on statistical properties of the input, children with hearing loss may experience unique areas of vulnerability. We consider whether or not language development is robust in the context of this new generation of children with mild to severe hearing loss. Throughout the discussion, we will consider ways in which research with this group of children can inform more general theories of child language acquisition.

This work was supported by NIH-NIDCD R01DC006681 and NIH-NIDCD R01DC009560.
Discussion Panel

Dr. G.A. van Zanten
University Medical Center Utrecht, the Netherlands

Prof. A. van Wieringen
University of Leuven, Belgium

Prof. A.F.M. Snik
Radboud University Medical Center, the Netherlands

Prof. I. Dhooge
Ghent University Hospital, Belgium

Prof. R.J.B.J. Gemke
VU University Medical Center Amsterdam / Academic Medical Center Amsterdam, The Netherlands

The discussion will be moderated by:

Dr. S.T. Goverts
VU University Medical Center Amsterdam
The influence of deafness and language on executive function development

Prof. Gary Morgan
City University London, United Kingdom

Studies have suggested that language and Executive Function (EF) are strongly associated. Indeed, the two are difficult to separate, and it is particularly difficult to determine whether one skill is more dependent on the other. Deafness provides a unique opportunity to disentangle these skills because in this case, language difficulties have a sensory not cognitive basis. In this study, deaf children (n=108) and hearing peers (n=125) were assessed on language and a wide range of non-verbal EF tasks. Deaf children performed significantly less well on EF tasks, even controlling for nonverbal intelligence and speed of processing. Language mediated EF skill, but the reverse pattern was not evident. Findings suggest that language is key to EF performance rather than vice-versa. I will also describe results from an analysis of language and EF development in a subgroup of these children tested 18 months later.
**Discussion Panel**

**Prof. H. Knoors**  
*Radboud University Nijmegen / Royal Dutch Kentalis, the Netherlands*

**Prof. B. van den Bogaerde**  
*University of Amsterdam / HU University of Applied Sciences Utrecht, the Netherlands*

**Dr. D. Hermans**  
*Royal Dutch Kentalis, the Netherlands*

**Dr. L. Ketelaar**  
*NSDSK (Nederlandse Stichting voor het Dove en Slechthorende Kind), the Netherlands*

**Prof. J. Leybaert**  
*Université libre de Bruxelles, Belgium*

The discussion will be moderated by:

**Prof. M.M.R. Coene**  
*Vrije Universiteit Amsterdam*
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Previous research has shown that multimodal input seems to aid word learning for typically developing (TD) children and typical adults. Most research has, however, focused on a relatively rich context, in which the learner had to acquire a new label for a known concept. A recent study by the author, however, showed that when there is little context (i.e., a new label for a new concept) TD children do not benefit from augmentative signs, whereas Deaf/Hard-of-Hearing (DHH) children do. The present study focuses on answering the question why these groups differ by testing TD children in a condition with babble noise and DHH children who do not use Sign Language. Results showed no effect of signs for the TD children. When compared to the TD group from our previous study, the groups did not differ significantly from each other. In case of the DHH children who do not use Sign Language, data collection is still ongoing. For the four children who have been tested so far, the descriptive results suggest there may be a positive effect of signs on spoken word learning.

These results suggest that a focus on visual input is not automatic when listening conditions are not ideal. Individuals who are DHH rather seem to make use of visual input to aid their spoken word learning because they are accustomed to doing so due to their limited auditory abilities. Importantly, Sign Language knowledge does not seem to influence the ability to utilise augmentative signs for spoken language learning.
Digital text comprehension in deaf students

Helen Blom, Harry Knoors, Daan Hermans, Eliane Segers & Ludo Verhoeven
Radboud University Nijmegen, Behavioural Science Institute, the Netherlands

Purpose. We investigated how reading comprehension of hierarchical hypertexts differs from linear digital texts within deaf and hard-of-hearing (D/HH) students, compared to students without hearing problems. Hereby, the individual variation within these groups has been investigated as well. As D/HH students often are lagging behind typically developing children in regular text reading and many have poorer working memory, the characteristics of hypertexts may cause additional problems in reading comprehension of those students.

Method. 77 hearing students from 5th grade and 30 undergraduate D/HH students read 2 hierarchical hypertexts and 2 linear texts. For each text, they answered 10 MC questions and drew a text-related concept map. Furthermore, decoding, vocabulary, working memory and nonverbal reasoning skills were measured for each student.

Results. Repeated Measures ANOVA revealed that in both groups, hypertext did not cause additional problems in reading comprehension compared to linear digital texts. D/HH students performed similar to the younger hearing students on text comprehension, but drew more complex concept maps. Preliminary regression analyses do not seem to show a clear picture regarding the effect of individual variables on reading comprehension.

Conclusions. It seems that D/HH students do not show more comprehension difficulties of hypertexts compared to linear texts than hearing students, and that hierarchical hypertexts do not cause additional reading comprehension problems for children/adolescents.
Linguistic profiles of children with CI as compared with children with hearing or specific language impairment

Brigitte de Hoog¹,², Margreet Langereis³, Marjolijn van Weerdenburg¹, Harry Knoors¹,² & Ludo Verhoeven¹

¹Behavioural Science Institute, Radboud University Nijmegen, the Netherlands; ²Royal Dutch Kentalis, the Netherlands; ³Department of Otorhinolaryngology, Head and Neck Surgery, Hearing and Implants, Radboud University Medical Center, Donders Institute for Brain, Cognition and Behaviour, the Netherlands

**Purpose.** The spoken language difficulties of children with moderate or severe to profound hearing loss are mainly related to limited auditory speech perception. However, degraded or filtered auditory input as evidenced in children with cochlear implants (CIs) may result in less efficient or slower language processing as well. To provide insight in the underlying nature (auditory perception versus language processing) of the spoken language difficulties in children with CIs, linguistic profiles of children with CIs are compared with those of hard-of-hearing (HoH) children with conventional hearing aids and children with specific language impairment (SLI).

**Method.** Differences in linguistic abilities and differential linguistic profiles of 47 children with CIs, 66 HoH children with moderate to severe hearing loss, and 127 children with SLI are compared, divided into two age cohorts. Standardized Dutch tests were administered. Results: The children with CIs were outperformed by their HoH peers and peers with SLI on most linguistic abilities. Concerning the linguistic profiles, the largest group of children with CIs and HoH children shared similar profiles. The profiles observed for most of the children with SLI were different from those of their peers with hearing loss in both age cohorts.

**Conclusions.** Results suggest that the underlying nature of spoken language problems in most children with CIs manifests in limited auditory perception instead of language processing difficulties. However, there appears to be a subgroup of children with CIs whose linguistic profiles resemble those of children with SLI.
Due to technological developments in the field of cochlear implantation (CI) and good (language) skills of CI users, it is possible for children with hearing problems to go to regular education. As a result of the good performances of these children in primary and secondary schools, they can go on to higher education.

The aim of this (PhD) project is to chart the acoustic environment of classrooms, labs and lecture halls with the Speech Transmission Index (STI, Houtgast & Steeneken 1973; Steeneken & Houtgast, 1980). Furthermore, the needs and academic and language skills of students with hearing loss (using hearing aid(s) and/or a cochlear implant(s)) will be measured and evaluated. In this way, we’ll know what is needed for these students in colleges and universities to give talent an opportunity to flourish.
The influence of congenital hearing impairment on language production and language reception abilities in adults

Elke Huysmans & S. Theo Goverts
Dept. of Otolaryngology-Head and Neck Surgery (section Ear & Hearing), EMGO+ Institute for Health and Care Research, and Language and Hearing Center Amsterdam; VU University Medical Center, Amsterdam, the Netherlands

People with congenital hearing impairment (CHI) acquire spoken language with limitations in auditory perception, even when using hearing aids or a cochlear implant. We tested the hypothesis that moderate to severe CHI affects language acquisition in a way that weaknesses in language production persist into adulthood. A second hypothesis was that CHI-induced linguistic weaknesses also impede the use of linguistic knowledge in language reception (top-down), additional to bottom-up impediment resulting from current hearing limitations. A top-down, linguistic impediment of CHI on language reception would explain part of language processing differences between hearing impaired people with similar audiograms.

In two successive studies, we examined the long-term effects of moderate to severe CHI on linguistic abilities. Language production and reception were assessed in the visual and auditory modality to identify modality independent and dependent consequences of CHI. Language production was studied by analyzing morphosyntactic correctness of spoken and written language samples. Language reception was assessed with tasks for sentence recognition, either while reading or listening. To examine the use of specific morphosyntactic knowledge in language processing, the sensitivity for morphosyntactic distortions in sentences was additionally assessed. For all tasks, we compared performance of normal hearing adults (NH), adults with congenital hearing impairment (CHI), and adults with acquired hearing impairment (AHI). This latter group was included to disentangle the consequences of current hearing limitations on auditory task performance from the consequences of hearing limitations during the era of language acquisition. The poster presents the research method and group findings of the study.
Adult aging is often accompanied by hearing loss, as well as by cognitive decline. Both factors play a role in listeners’ understanding of speech in everyday suboptimal listening conditions. This study investigates the long-term effects that hearing loss acquired in adulthood may have on memory performance. Some studies have suggested that acquired hearing loss degrades the quality or accessibility of phonological representations in long-term memory. This was investigated further by looking into non-word reading, thus bypassing immediate effects of hearing loss. A sample of 60 older adults, varying in degree of high-frequency hearing loss and visual digit span performance, saw 72 multisyllabic nonwords varying in phonotactic frequency (i.e., the phoneme-co-occurrence statistics of the language). They saw the nonwords for 5 seconds and were prompted to orally produce them from memory after another 3 seconds. As expected, response accuracy was influenced by phonotactic frequency of the nonword. Crucially, response accuracy was also higher if the participant had better hearing, supporting the claim that hearing loss is associated with poorer memory performance. These results emphasize the relationship between hearing loss and language processing beyond the immediate effect of hearing loss on speech audibility.
Assessing narrative skills in oral deaf children

Anna Jones¹, Rosalind Herman², Nicola Botting², Chloe Marshall¹, Elena Toscano¹ & Gary Morgan¹,²

¹The Deafness, Cognition and Language Research Centre, University College London, United Kingdom; ²Department of Language and Communication Science, City University London, United Kingdom

Narrative skill encompasses the ability to communicate past or future events in chronological order (Beal & Snow, 1994). Deaf children born to hearing parents have restricted access to verbal and/or signed information and demonstrate difficulties in developing narrative structures needed to produce a coherent story (Crossen & Geer, 2001). Yet the assessment of oral deaf children’s narrative skills has focused solely on story retell or the use of picture cues. Herman et al. (2004) and colleagues have developed a narrative assessment in British Sign Language (BSL) by asking children to watch a non-verbal story and then retell the narrative. This approach poses two advantages for oral deaf children: story telling is not dependent on receptive language skills; the processing demand of dividing visual attention between the story pictures and communicating with the experimenter is reduced.

In this study, we tested the reliability and validity of testing oral deaf children on the BSL narrative production test. Sixty children (aged 6 – 11) watched the pre-recorded story. Their spontaneous stories told in English were filmed, transcribed and analysed in terms of story structure and content. Sixty hearing controls matched for age and non-verbal ability were also tested.

Results revealed good intra- and inter-rater reliability, and internal consistency for using the test in English. Oral deaf and hearing children performed similarly on narrative content and structure. This finding highlights that the BSL narrative production test is a deaf friendly method for assessing spoken English in addition to sign language narrative skills.
To distinguish between children with Specific Language Impairment (SLI) and typically developing children, a widely-used task is a 'nonsense word repetition task' (NWRT). In this task, children listen to non-existing words and repeat them. Typically developing children consistently outperform children with SLI on this task. Recently, an equivalent of this task is made for deaf/signing children in British Sign Language; a 'nonsense sign repetition task' (NSRT) (Marshall, Denmark & Morgan, 2006). Although the designs of this NSRT and general NWRTs look alike, it is not clear whether they measure the same skills. For the current study, a Dutch NWRT and a Dutch Sign Language (NGT) NSRT were developed. Ten participants, bilingual in Dutch and NGT, performed both tests and their results were analyzed. It turned out that their scores were significantly positively correlated. This suggests that the tasks measure the same skills. Further, the non-signs in the NSRT were from various categories, of which prior research had suggested that they increased in phonological complexity. These suggestions were partly confirmed by the current study; signs with a movement cluster were repeated less accurately than signs with one movement. Regarding handshape, in the original set, no difference was found between signs with a marked and an unmarked handshape. However, when a few deviant items were eliminated, it was shown that signs with an unmarked handshape were repeated significantly more accurately than signs with a marked handshape.

MA thesis, September 2015
Bilingual children acquiring a null- and a non-null argument languages simultaneously tend to oversupply inappropriate from the target language point of view arguments in their null argument language. This is a robust finding not only in language pairs involving a non-null argument language (English-Italian) but also if both languages allow argument drop (Spanish-Italian). The account of this fact appeals to the executive function mechanisms involved in language inhibition (cf. Sorace 2011). While language inhibition may be less of an issue in bimodal bilingualism (Emmorey et al. 2008), phenomenon is still observed (albeit only in a few works) in bimodal studies with language-pairs consisting of two null argument languages (LSC-Catalan, Bel et al. 2009) and a null- and a non-null argument languages (ASL-English, Fredriksen & Mayberry 2015). To complete the paradigm, what is required is a study involving two Sign Languages.

We examined ~1,200 uttr narratives produced by 12 male (age\textsubscript{mean} 15;03) ASL-asL2 learners whose L1 is EmiratiSL. Subjects are in their 2nd year of an ASL immersion program and had no previous exposure to ASL. Like ASL, EmiratiSL allows argument omission. Tests of ASL proficiency (ASD-DT, Bochner et al. 2011, and ASL-CT, Hauser et al. 2015) were also administered.

Results show low rate of subject omission: 35%\textsubscript{mean} (range: 30-43%), sharply contrasting with the (near-) native ASL data (55-65%, Wulf et al. 2002). Unlike in Fredriksen & Mayberry, ‘pronominal’ IX constitute 40% of overt referents. Proficiency scores correlated with rates of omission (r=0.74.4, p=.02). The data support language inhibition/executive control explanation of over-suppliance effects.
The assessment of subtle listening challenges in children with cochlear implants in mainstream education

S. Krijger¹, P. Govaerts¹,² & I. Dhooge¹,³

¹Department of Otorhinolaryngology, Ghent University, Belgium; ²The Eargroup, Deurne-Antwerp, Belgium; ³Ghent University Hospital, Ghent, Belgium

Introduction and aim. Eighteen years after implementation of a Universal Newborn Hearing Screening Program in Flanders (UNHSP) and the introduction of an early intervention plan, opportunities have changed drastically for deaf born children. Evidence exist that pediatric implanted children can match the language development of normal hearing peers, resulting in a growing amount of children with CIs in mainstream schools. Teachers of mainstream education are not educated to notice subtle listening problems of CI users, which can result in misunderstandings and educational risks for the child.

In this study, different assessment tools were evaluated on their efficacy to screen for subtle listening challenges.

Materials and method. A Dutch translation of The Listen Inventory for Education (LIFE-R; Anderson, 2008) was administered in a group of CI users in secondary mainstream education. Results of the LIFE-R were compared to the outcome of the LIFE-R for teachers and speech recognition scores of each individual CI user.

Results. Results show that assessment tools used in clinical practice, are obsolete if not supplemented with tools that do meet the needs of the current group of CI users. Basic speech audiometry cannot disclose subtle listening challenges of CI users. The LIFE-R is able to assess veiled listening challenges, and provides information about listening strategies and self-advocacy skills of the CI user.

The LIFE-R can be used as an assessment and follow-up tool for CI users in mainstream education and will provide important information for child, parents, teachers and other caregivers involved in the rehabilitation of children with CIs.
Abstract for the project Playing it by ear: serious gaming for better hearing

David Lopez Mejia¹, Elise Prins¹,², Mylène van der Koogh¹, Tibor Bosse¹,² & Monique Lamers¹,³

¹Network Institute Vrije Universiteit Amsterdam, the Netherlands; ²Vrije Universiteit, Faculty of Science, Department of Computer Science, the Netherlands; ³Vrije Universiteit, Faculty of Humanities, Department of Applied Linguistics, the Netherlands

Despite the most sophisticated hearing aids, hearing impaired people experience difficulties in speech understanding, particularly in difficult hearing situations like noisy environments. Especially in the trajectory of rehabilitation, training is important. However, after years of being tested, (young) patients are quickly bored by traditional training programs. To make training applications more appealing and, therefore more effective, gamification can be an adequate method (Hamari et al. 2014). Gamification refers to "the use of game thinking and game mechanics in non-game contexts to engage users in solving problems" (Deterding et al. 2011). Mechanisms used for this purpose include rewarding, adaptivity, role-playing and challenge (Garris et al. 2002). With hearing impaired children showing less engagement than their normal hearing peers (Rieffe et al. in press), it is an open question if and how the above mentioned mechanisms can be of added value within the context of speech perception training for hearing impaired language users.

The project Playing it by ear sets out to answer this question. In this poster we will present the setup of the games that are currently being developed within this project. The games use existing methods from audiology testing, as they focus on discrimination and identification of minimal pairs of phonemes in non-words and words, and the understanding of words both in isolation and in sentences. Using an adaptive mechanism, stimuli are presented in different noise levels depending on the performance of the gamer, using different types of noise. This all takes place in the scenery of an appealing setting for children: space. In addition to the game, guidelines will be given for gamification in training programs to improve the hearing in difficult listening situations.
The teacher's role in language development of students with language impairment and the effect of a professional development program.

Anouk Middelkoop- van Erp¹, Ludo Verhoeven², Eliane Segers² & Linda Keuvelaar-van den Bergh¹

¹Fontys University of Applied Sciences, the Netherlands; ²Radboud University Nijmegen, the Netherlands

Research shows that five to seven percent of the students in primary school, are students with a specific language impairment (SLI) (Gerrits, 2012). This means that in every group of 30 students there is an average of two students with SLI. It is widely acknowledged that reading is a language based skill. Language impairments have been found in poor readers (Bishop & Snowling, 2004). Research shows that teachers have poor sensitivity and specificity in identifying students whose oral language skills require further investigation (Antoniazzi, Snow & Dickson-Swift, 2010). Causes are the increased complexity of the teachers profession and a lack of (adequate) training. Little research regarding SLI students in primary school has been conducted.

This also applies for the teacher’s role in language development of students with SLI. In the Netherlands “Passend Onderwijs” imposes a challenging task. Since August 1st, 2014 primary schools are responsible to all students who need extra support to provide good education. The policy “Passend Onderwijs” is the result of the Salamanca Statement (UNESCO, 1994). The statement prescribes values of inclusive education. Inclusive education reinforces the need for teachers to professionalize.

Almost all teachers professionalize, but there is a large degree of variation in content, duration, frequency and impact. Professionalization doesn't always correspond to the teachers' needs. Several researchers have argued that this problem can be attributed to a lack of recognition of how teacher learning is embedded in their professional practices and working conditions (Borko, 2004; Timperley & Alton-Lee, 2008). This research will contribute to the optimal alignment between professional development of teachers and language development of students with language impairment.
Development and validation of 'Dutch Feather Squadron' app for auditory processing assessment

Karin Neijenhuis¹ & Matthew Barker²

¹Rotterdam University of Applied Sciences, Research Centre Innovations in Care, the Netherlands; ²University of Auckland, New Zealand

This poster describes the development of a new iPad app for assessing auditory processing disorders: 'Dutch Feather Squadron'. The original Feather Squadron app (Barker & Purdy, 2015) was translated and adapted to Dutch and consequently standardized in 8- to 12yr-old Dutch, typically developing children. With the help of 14 students from the minor 'Language & Hearing', 131 children from regular primary schools were tested with Dutch Feather Squadron. They also determined test-retest reliability, validity and effects from multilingual development. The results described adequate sensitivity and reliability, and no influence of multilingual development on test scores. Furthermore, professionals mentioned in qualitative interviews that this app could have an additional value in clinical practice. A follow-up is on the way: currently data from 5- to 8-yr-old children are being analyzed. In 2016, this app will be published in the app store.
**Language use and cognitive control in bimodal bilinguals**

Ellen Ormel¹, Marcel Giezen²,³, Esther van Diggelen⁴, Ulrika Klomp⁵, Katya Buts⁶, Zheng Yen Ng⁷, Francie Manhardt¹ & Merel van Zuilen¹

¹Centre for Language Studies, Radboud University Nijmegen, the Netherlands; ²Laboratory for Language and Cognitive Neuroscience, San Diego State University, United States; ³Basque Center on Cognition, Brain and Language, San Sebastian, Spain; ⁴Universiteit Utrecht, the Netherlands; ⁵Vrije Universiteit Amsterdam, the Netherlands; ⁶Universiteit van Amsterdam, the Netherlands; ⁷The Ear Foundation, Nottingham, United Kingdom

For bilinguals of two spoken languages, experience with the use of multiple languages has been shown to result in specific cognitive advantages (Bialystok et al., 2012). For bilinguals of a signed language and a spoken and/or written language, i.e. deaf and hearing bimodal bilinguals, research into possible cognitive advantages has only just started. Emmorey et al. (2008) found that hearing bimodal bilingual adults did not show the same advantage as unimodal speech bilinguals on an inhibitory control task. This raises the question whether the unique nature of bimodal bilingual language processing might affect different aspects of cognitive control than for spoken language bilinguals.

Although bimodal bilinguals have not shown advantages in inhibition thus far, they may do in aspects of cognitive control that more directly relate to the way they coordinate their different languages. The aim of the present study was therefore to investigate the ability to monitor and coordinate information within and/or across modalities in both deaf and hearing bimodal bilingual children as well as adults.

For the purpose of this study, we have developed six non-linguistic tasks that require monitoring and coordination of auditory, motoric, and/or visual information. Data collection has been completed for 42 hearing bimodal bilingual adults (25 L2 learners of NGT and 18 CODAS) and 30 bimodal bilingual children (15 hearing and 15 deaf) between 6 and 11 years old.

Our first results suggest possible advantages in cross-modal integration. We tentatively conclude that (hearing) bimodal bilingual adults’ unique experience with processing linguistic information in different modalities may selectively enhance their domain-general abilities to integrate information across modalities.
Unilateral hearing loss affects language and auditory development

A. Sangen\textsuperscript{1}, L. Royackers\textsuperscript{2}, C. Desloovere\textsuperscript{2}, J. Wouters\textsuperscript{1} & A. van Wieringen\textsuperscript{1}

\textsuperscript{1}ExpORL, Dept. Neurosciences, University of Leuven, Belgium ; \textsuperscript{2}ENT University Hospital Leuven, Belgium

An increasing body of research suggests that children with unilateral hearing impairment lag behind with respect to their normal hearing peers. In view of possible interventions it is necessary to document their developmental outcomes. The aim of the present research is to examine auditory, linguistic and cognitive outcomes of children with unilateral hearing loss compared to those of age-matched normal hearing children of similar age.

A case–control study was carried out with 22 children with unilateral sensorineural hearing loss between 5 and 15 years of age and age-matched normal hearing controls. Language, working memory, and speech in noise (presented to the good ear through headphones) were assessed by means of behavioral measures and aspects of hearing disability and academic performance by means of questionnaires.

Our results show that children with unilateral hearing loss score comparably to children with normal hearing with regard to speech in noise presented to the good ear, working memory and morphological language abilities, but lag behind in expressive vocabulary and syntactic language skills. Furthermore, the speech, spatial and qualities of hearing questionnaire (SSQ) indicates that in daily life, the unilaterally hearing impaired children experience problems in spatial hearing and in understanding speech in noisy situations, and that the effort they have to put into listening and in understanding speech is considerably greater than in normal hearing children. Our data suggest early intervention for children with unilateral hearing loss to prevent speech language delays.
This study investigates the processing of grammatical cues (case and verb-agreement) of children with a cochlear implant (CI). Do CI children perceive the cues, and do they make use of them in processing?

We examined children’s comprehension of subject and object questions. In order to correctly interpret object questions (in which the object precedes the subject) in German, case (e.g. Welchen Esel fängt der Tiger ‘Which donkey is the tiger catching?’) and/or verb-agreement cues need to be used. The acquisition of object questions is a long ride for normal hearing children (NH) as they heavily rely on word order and interpret object questions incorrectly as subject questions. For CI children, the subtle cues may even be harder to detect and mastered, since their linguistic input is different in terms of length (less years) and reliability.

Participants were 36 NH children (age 7;05-10;09, Mean: 9;01) and 33 CI children (7;01-12;04, Mean:9;07, bilateral < 3ys). A picture selection task with eye-tracking was carried out to test children’s comprehension of subject and object questions. Two additional tasks tested children’s comprehension of verb-agreement in standard word order and children’s auditory discrimination of case (e.g. ‘der’ vs ‘den’).

Overall the children performed well on the additional task on verb-agreement (CI: 86%; NH: 96% correct responses) and case (CI: 90%; NH: 99%). Considering only those CI children how scored like NH children on the additional tasks, their comprehension of object questions was still worse (CI: 66%; NH: 86%) and more time was needed to detect the correct interpretation.

Even though CI children perceive case and verb-agreement, their development of syntactic capacities to use these cues for comprehension still lags behind.
Spelling in deaf children with a cochlear implant

Simon, M.¹ & Leybaert, J.²

¹Centre de Recherche en Neuropsychologie et Cognition (CERNEC), Université de Montréal, Montréal, Canada; ²Center for Research in Cognition & Neurosciences (CRCN), Université Libre de Bruxelles, Belgium

We examined the spelling level and strategies of deaf children with cochlear implant (CI). We hypothesized that the spelling accuracy of CI children is strongly correlated with their reading skills. Therefore, we compared the spelling skills of deaf children with CI with those of normally hearing (NH) children matched for reading level. A picture written naming task was designed to assess spelling. In addition to reading level, vocabulary and speech intelligibility were measured in CI children.

Twenty one CI users (aged from 7 to 12 years) were compared to 45 normal-hearing children.

In the sub-groups with higher reading skills, the CI children did not differ from the NH children. However, in the sub-groups with poor reading skills, the deaf children made more spelling errors, more precisely more non-phonological spelling errors than the NH children (p < .001). These findings suggest that deaf children with cochlear implants and poor reading level use phonological spelling strategies to a lesser degree than hearing peers.
Executive functioning (EF) starts to develop in the first five years of life and is related to later learning and social skills. The caregiving environment of a young child is an important factor in the development of EF. Research indicated that parental sensitivity is positively related to EF in children. Different studies showed that school-aged children with hearing loss (HL) have EF deficits or delays, especially concerning working memory. Only a few studies investigated EF in preschool children with HL. The results of these studies indicated that EF deficits begin to emerge as early as in the preschool years.

In this pilot study we investigated EF in 19 toddlers with HL. Furthermore, the relation between EF, child’s language ability and parental sensitivity was examined. The Brief-P, a parent questionnaire, was used to examine EF. A video clip of parent-child interaction during a free play session was used to code parental sensitivity.

The preliminary results indicate that young children with HL are more at risk for deficits or delays in EF. We found a higher problem rate for EF in the toddlers with HL compared to their hearing peers. A higher problem rate for working memory was related to lower language ability and less parental sensitivity.

The ability to detect these EF deficits and/or delays at this young age has important implications for early intervention programs. Early interventionists should be aware of the risks of EF deficits in children with HL. Appropriate guidelines to stimulate these functions should be developed.
About LHCA

The Language and Hearing Center Amsterdam (LHCA) is an interdisciplinary collaboration between researchers from different departments at the Vrije Universiteit Amsterdam (VU) and the VU University Medical Center Amsterdam (VUmc).

Goals

The LHCA has three main goals:

- Conducting innovative research on the language and hearing interface;
- Developing and organizing programs and courses on language and hearing at the Vrije Universiteit Amsterdam (VU) and the VU University Medical Center Amsterdam (VUmc);
- Creating a platform for contact and collaboration between experts and interested parties to enable the development and discussion of research proposals, research opportunities and research results.

In this way, the LHCA hopes to function as a local, national and international center for research, education and expertise.

History

The LHCA was founded in 2014 by Dr. Theo Goverts (VUmc, Otolaryngology – Head and Neck Surgery Ear&Hearing) and Prof. Martine Coene (VU, Humanities). Since 2010 the departments of Ear&Hearing (VUmc) and Language Literature and Communication (VU) have collaborated on both research and education.

In 2013 the two departments started organizing annual lecture series about Child, Language and Hearing. The center will continue the organization of these lectures to allow professionals and students at both Bachelor and Master level access to the latest research in their field.
Funding

Research projects at the LHCA have received funding through the following projects and institutions:

- NWO Kiem
- NWO Alfa Meerwaarde
- FP7 (European Union’s Seventh Framework Programme) - Hearing Minds Project
- SHiEC AAL-2013-6-065
- Network Institute, Digital Humanities
- Hogeschool Rotterdam, Kenniscentrum Zorginnovatie, 'Promotievoucher'