ICRA 2005 Schedule

Monday, March 14, 2005

8:00-8:30 Welcome and Introductions – Alice Holmes

8:30-8:45 Welcome by Robert Frank, Dean of College of Public Health and Health Professions

8:45-9:15 Robyn Cox: Comparison of public health and private practice hearing aid patients in the USA

In hearing aid research it is commonplace to combine data across subjects whose hearing aids were provided in different service delivery models. There is reason to question whether these types of patients are similar enough to justify this practice. To explore this matter, we evaluated similarities and differences in self-report data obtained from hearing aid patients derived from public health (VA) and private practice (PP) settings. 154 hearing aid patients from United States VA (all men) and 79 (men and women) from private practice (PP) clinic settings provided self-report data on questionnaires both before and after hearing aid fitting. Numerous statistically significant differences were observed between the VA and PP subject groups. Before the fitting, VA patients reported higher expectations from the hearing aids and more severe unaided problems, compared to PP patients with similar audiograms. After the fitting, VA patients reported more satisfaction with their hearing aids. On some measures VA patients reported more benefit, but different measures of subjective benefit did not give completely consistent results. Both groups used the hearing aids an average of about eight hours per day. VA patients reported age-normal physical and mental health, but PP patients tended to report better than typical health for their age group. These data indicate that hearing aid patients seen in the VA public health hearing services are systematically different in self-report domains from those seen in private practice services. It is therefore risky to casually combine data from these two types of subjects or to generalize research results from one group to the other. Further, compared to PP patients, VA patients consistently reported more favorable hearing aid fitting outcomes. Additional study is indicated to explore the determinants of this result and its generalizability to other public health service delivery systems such as those in other countries.

9:15-9:30 Presentation-Directed Discussion

9:30-10:00 Stig Arlinger: Hearing Aid Technology- Benefit and Costs: A Multi-Center Study

A multi-center study has been performed with the aim of comparing complex versus simpler hearing aid technology and first-time users' preference for binaural versus monaural fitting in general and after consideration of costs for the hearing aids. A total of 161 subjects participated at four contributing hearing centers. Each

subjects was fitted binaurally with BTE aids of either an advanced type with non-linear digital signal processing or a more conventional device with analog linear signal processing. Both types were from the same manufacturer and appeared with similar housing that did not show any type name, and both types were programmed by means of PC. Thus, the test was essentially single-blind. Subjects started with either type in random order, had fine tuning after one week, and then wore the aids for 6 weeks before testing and switch to the other type. The test battery concerned speech recognition in noise (S/N at +4 dB), questionnaire concerning problems caused by the disability and quality of life measures such as HUI Mark 3 and EQ-5D. Finally, the subjects preferences for one or the other of the two types and for binaural vs. monaural fitting were assessed.

Speech recognition in noise improved significantly by hearing aids, slightly but significantly more so by the advanced signal processing compared to the linear aids. Most of the subjective instruments showed significant effects of hearing aid fitting but usually no significant difference between type of aid. Without cost consideration 60% of the subjects preferred the advanced aid – the most common argument was because of its sound quality. Those who preferred the linear aid most often explained this by having access to a manual volume control. When costs were considered, the distribution changed to 51% for the advanced aid. Most changes due to costs were from advanced to simple type; only one subject changed from binaural to monaural fitting with the advance aid. In all, 88% were fitted binaurally.

10:15-10:30 Presentation-Directed Discussion

10:30-10:45 Break

10:45-11:15 Louise Hickson & Sophia Kramer: Assessing Longitudinal Change in Rehabilitation Needs of Older People with Hearing Impairment

At the 2003 ICRA meeting, the working group identified longitudinal change in rehabilitation needs of older people as a key area for further research. This area was also identified as a research need by participants at the Eriksholm workshop on "*Candidature for and delivery of audiological services: special needs of older people"* in 2001. Many of that workshop are also members of ICRA. Specifically in this first phase, we evaluated changes in goals subsequent to and 3-6 months post initial rehabilitation, such as hearing aid fitting and/or attending an aural rehabilitation program. Data on approximately 60 participants was collected by Hickson (Australia), Kramer (Netherlands) and Stephens (Wales). While results in the participating countries differed to some extent, the findings suggest that the nature of the rehabilitation that the person was undertaking influenced the goals identified, that the majority of participants continued to identify one or two of their original goals as goals for rehabilitation post-intervention, and that many had at least one new goal at 6 months that they did not have at the initial assessment. These findings suggest the need for ongoing monitoring of older people with

hearing impairment, such that appropriate intervention can be provided as required.

11:15-11:30 Presentation-Directed Discussion

11:30-12:00 Ronald Schow: Comparison of Outcome Measures in Hearing Aid Fitting

This presentation will feature a system of categorizing hearing loss as developed by Brockett and Schow (2001) and shown on the web site www.isu.edu/csed/profile. Data will be summarized based on outcome measures after hearing aid fitting as previously reported by Gatehouse and compared with new findings from our own clinic at Idaho State University and from HearX, a large company with multiple offices in several states within the USA. Similar prefit and outcome measures for communication, use, and satisfaction will be compared for the different data sets and implications will be considered.

12:00-12:15 Presentation-Directed Discussion

12:15-1:15 Lunch

1:15-1:45 Arthur Boothroyd: CASPERSENT: Software for Computer Assisted Speech PERception Testing and Training at the SENTence Level Changes of auditory capacity can occur because of changes in hearing, fitting of sensory assistance, or modifications of sensory assistance. Adaptation to these changes may require more effective use of limited hearing, more effective use of visual input, or both. The speed and efficiency of adaptation is almost certainly influenced by time on task. Some persons may spend enough time on task in everyday communicative interactions. For others, however, the challenges of communication inhibit interaction and reduce learning opportunities. Interactive multimedia software offers a low-cost option for enhancing time on task. CASPER is a battery of testing/training programs, originally developed at the City University of New York for studies of the rehabilitation of cochlear implant recipients. As part of an NIDRR-funded Rehabilitation Engineering Research Center at Gallaudet University, CASPER is being updated for use on personal computers.

CASPERSENT provides opportunities for self-administered or clinician-administered sentence-level testing and training, via hearing, lipreading, or both. It uses the CUNY topic-related sentence sets to simulate conversational interaction. The availability of 60 sentence sets (of 12 sentences each) reduces the need for repetition of materials. Data are logged for subsequent graphing and analysis. In research studies, knowledge of topic can be manipulated and sentence length can be examined as an independent variable.

1:45-2:00 Presentation-Directed Discussion

1:45-2:15 Jan Wouters: Horizontal localization with Bilateral Hearing Aids: Without Hearing Aids is Better Than With?

The effect of bilateral hearing aids on directional hearing in the frontal horizontal plane was studied. Localization tests evaluated bilateral hearing aid users using different stimuli and different noise scenarios. Normal hearing subjects were used as a reference. The main research questions raised in this paper are (i) how do bilateral hearing aid users perform on a localization task, relative to normal hearing subjects, (ii) do bilateral hearing aids preserve localization cues, (iii) is there an influence of state of the art noise reduction algorithms, more in particular an adaptive directional microphone configuration, on localization performance? The hearing aid users were tested without and with their hearing aids, using both a standard omnidirectional microphone and an adaptive directional microphone configuration.

The main conclusions are: (i) bilateral hearing aid users perform worse than normal hearing subjects in a localization task, although more than half of the subjects reach normal hearing performance when tested unaided. For both groups localization performance drops significantly when acoustical scenario's become more complex. (ii) bilateral, i.e. independently operating hearing aids do not preserve localization cues (iii) Overall, adaptive directional noise reduction has an additional and significant negative impact on localization performance.

2:15-2:30 Presentation-Directed Discussion

2:30-2:45 Break

2:45-3:15 William Noble: The Real Benefits of Bilateral Hearing Aid Fitting

The vast majority of audiological practitioners would support offering bilateral over unilateral hearing aid fittings, given a universal understanding that the advantages of bilateral fitting outweigh the disadvantages. While there are numerous laboratory demonstrations of the potential benefits of bilateral fittings, robust controlled trials to demonstrate the reductions in disability, handicap and health-related quality of life, with the power to convince clients or funding agencies, are largely absent. We have previously reported a new disability inventory, the Speech, Spatial, and Qualities of Hearing Scale (SSQ), (International Journal of Audiology, 2004, *43*(2), 85-99). In addition to items covering a wide range of speech hearing contexts, the SSQ addresses the ability to divide and switch attention, monitor the spatial and temporal dynamics of the auditory world, and aspects of sound segregation, prosody and listening effort. We hypothesise that existing experiments to investigate the benefits of bilateral hearing aid fittings, which have concentrated on traditional, largely stationary, speech-hearing contexts, may be inadequate given the importance of these additional dimensions as drivers of hearing handicap.

The SSQ was applied to three independent clinical groups: 144 people prior to being fitted with amplification; 118 people with at least 6 months experience of unilateral amplification; and 42 people with at least 6 months experience of bilateral amplification. Matching and statistical control ensured similar audiometric, disability and handicap profiles prior to fitting. For most traditional speech hearing contexts (in quiet, in noise, in groups) there was a benefit in fitting one aid, and no further benefit with two. In contrast, speech hearing in demanding contexts (divided or rapidly switching attention) showed further benefit of amplification in both ears versus one. The directional, distance and movement components of spatial hearing showed virtually no benefit from one hearing aid, whereas all components, but especially distance and movement, showed clear advantage of two. Finally, clarity of sounds, and effort needed in conversation, showed bilateral advantage. The conclusion is that the benefit of fitting two hearing aids will not be readily demonstrated so long as traditional speech hearing contexts are relied on to make the case. Having demonstrated the domains within which benefits of bilateral fittings are likely to occur, the challenge is now to construct performance tests that will allow candidature for bilateral versus unilateral fitting to be accurately predicted.

3:15-3:30 Presentation-Directed Discussion

3:30-4:00 Stuart Gatehouse: Hearing Disability in the Population: Rehabilitation Targets for Speech Hearing, Spatial Hearing, and Qualities of Hearing

We have recently reported a new hearing disability inventory, the Speech-hearing, Special-hearing and Qualities of Hearing (SSQ), for the assessment of auditory disability. (Gatehouse, S & Noble, W. 2004. The Speech, Spatial and Qualities of Hearing Scale (SSQ), *International Journal of Audiology, 43:85-99,* Noble, W & Gatehouse, S. 2004. Interaural asymmetry of hearing loss, Speech, Spatial and Qualities of Hearing Scale (SSQ) disabilities, and handicap, *International Journal of Audiology, 43:100-114.).* In addition to traditional contexts of speech-hearing, the inventory includes monitoring multiple speech streams (divided attention), suppressing unwanted speech streams (informational masking), switching attention between speech streams, appreciation of distance and movement as well as static location, sound source segregation, sound identification, listening effort and concentration, and appreciation of prosody. These non-traditional elements form important drivers of the experience of auditory handicap over and above traditional speech contexts. The perceptually more complex and demanding environments and tasks are likely to be influenced by non-auditory attentional and cognitive capacities. Given that modern signal processing in hearing aids maybe hypothesised to degrade the cues upon which these more complex environments and tasks are predicated, it is important to be able to dissociate direct auditory consequences from those which will inevitably accompany the deficits as people age.

This presentation reports data from a representative population sample on the SSQ reports, measures of normal and binaural auditory function, and attentional and cognitive capacities. The sample is carefully stratified across the primary dimensions of auditory impairment, age and hearing disability to allow efficient dissociation between the auditory and non-auditory components. The population sample is staged, with an initial postal screen of some of 9,000 individuals, followed by a home interview on a carefully stratified sample of 600 listeners, followed by laboratory tests of auditory and non-auditory capacities.

For each of the dimensions on the SSQ we report the separate and interacting affects of auditory function and age (more correctly non-auditory capacities in cognition and attention which accompany age). The deficits linked to audition then act as rehabilitative targets for audiology services to aspire to when attempting to manage auditory disability. Preliminary data from listeners with acoustical management via hearing aids give an indication of the extent to which the current hearing aid fitting and processing features meet those rehabilitative targets, and which are degraded.

4:00-4:15 Presentation-Directed Discussion

4:15-5:00 Stuart Gatehouse: Proposal for new working group "Evidence-based policy for Unilateral versus Bilateral Hearing Aid and Cochlear Implant Fittings"

Tuesday, March 15, 2005

8:30-9:00 Jan Wouters: Benefit of a Two-microphone Adaptive Beamformer in the New Nucleus Cochlear Implant System

A two-microphone adaptive beamformer in the BTE of the new Nucleus cochlear implant (CI) system was studied. Double-blind physical and perceptual evaluation was carried out with 5 adult Nucleus users. The tests consisted of pre- and post-tests in the lab and a two-weeks field test at home. The speech reception threshold (SRT) with sentences and percentage correct phoneme scores for CVC words have been measured in quiet and background noise at different SNRs. Two different noise scenarios (a single and three noise source) and two different noise materials (steady speech weighted and multitalker babble) have been used in the evaluation.

Significant improvements of both the SRT in noise (average improvement of 8-16 dB) and the percentage correct phoneme scores (average improvement of 21-40%) have bene obtained by the beamformer w.r.t. the directional microphone. In addition, SSQ and APHAB questionnaires showed a preference for the beamformer in noisy environments, evaluated in take-home experiments, in the lab sound scenarios as well as in real-world environments (café, bus, …).

9:00-9:15 Presentation-Directed Discussion

9:15-9:45 Gail Donaldson: Place-pitch discrimination of single- versus dual-electrode stimuli by cochlear implant users with the Clarion C-II device

Cochlear implant (CI) listeners have a limited number of pitches associated with place of stimulation in the cochlea. For single-electrode stimulation, this limitation is imposed by the finite number of electrode contacts along the implanted array as well as underlying constraints of neural survival and irregularities in the current field. Limitations in place pitch are thought to underlie difficulties that CI listeners experience with complex listening tasks such as speech recognition in noise.

One way to increase the number of place pitches available to CI users is to make use of simultaneous or near-simultaneous stimulation of two electrodes (Townsend et al., 1987; McDermott and McKay, 1994). Previous studies have demonstrated the feasibility of this approach for creating intermediate pitches between the pitches associated with stimulation of single electrodes. However, there is very limited data to indicate the range of place-pitch steps that may be achievable with dual-electrode stimulation in users of contemporary CIs.

The purpose of the present study was to estimate how many place-pitch steps could be achieved using dual-electrode stimulation in users of the Clarion CII device. To this end, the discrimination of single- versus dual-electrode stimuli was assessed in six subjects at each of three locations along the implanted array. Stimuli were 1000-Hz pulse trains (monopolar, cathodic-first biphasic pulses, 32 us/ph). Dual-electrode stimuli were produced by simultaneously stimulating adjacent electrodes along the implanted array while varying the proportion of current (□) directed to the more basal electrode of the pair. The effects of stimulus level (medium soft vs. medium loud) were also assessed at the middle electrode location in each subject.

Five of six subjects could discriminate dual-electrode stimuli from single-electrode stimuli at all three cochlear locations. For these subjects, discrimination thresholds (□ranged from 0.11 to 0.64, suggesting that dual-electrode stimulation could provide a 2- to 9-fold increase in the number of place-pitch steps available relative to single-electrode stimulation. A level effect was observed in three of six subjects who demonstrated better discrimination thresholds at higher stimulus levels.

Findings suggest that dual-electrode stimulation could be used to improve spectral resolution in the majority of CI users with contemporary devices. Additional research is needed (1) to directly measure the number of place-pitch steps that subjects can discriminate between adjacent single electrodes, (2) to compare discrimination thresholds and perceptual attributes for simultaneous and near-

simultaneous dual-electrode stimuli, and (3) to evaluate the potential benefits of using dual electrode stimuli in speech processing implementations.

9:45-10:00 Presentation-Directed Discussion

10:00-10:15 Break

10:15-10:45 Hans Verschuur: Patient Screen by Hearing Aid Dispenser
10:45-11:00 Presentation-Directed Discussion

11:00-11:30 Jurgen Kiessling: NAL-NL1 Versus Loudness Based Fitting

The fitting formula NAL-NL1 has been implemented in the fitting software of all major hearing aid manufacturers and it has proven to be an appropriate fitting tool for non-linear hearing instruments. Still, it can be discussed whether or not a personalized loudness based fitting procedure, e.g. loudness restoration plus frequency specific corrections, would probably need less fine-tuning than threshold-based approaches. In this context binaural amplification was given to 12 listeners with mild to moderate sensorineural hearing loss

(1) according to NAl-NL1 (Experimenter Edition 1.39) and
(2) resulting in complete loudness normalization at 0.5, 1.5, 4 and 6 kHz ($LoudFit_{total}$) as a first order approach to a final frequency corrected version ($LoudFit_{plus}$).

Both amplification schemes were implemented on a stationary master hearing aid (MHA) developed by HoerTech (Oldenburg/Germany). The MHA offers 11 compression bands and is presently equipped with head phones (Sennheiser HDA 200).

In the mid-frequency range (0.5 – 2 kHz) average gain deviations between both approaches are less than 5 dB. However, above 2 kHz $LoudFit_{total}$ provides increasingly more gain than NAL-NL1 with increasing frequency and decreasing input level, e.g. 20 dB more gain at 6 kHz for 40 dB input. With some minor exceptions these findings are also represented on the perceptional level in terms of aided level loudness functions. Aided speech in noise testing (Göttingen Sentences) shows consistently better speech recognition thresholds for $LoudFit_{total}$ and subjective sound quality judgment results in slightly better ratings of $LoudFit_{total}$.

The findings may be explained by the extra amplification in the high frequency range provided by $LoudFit_{total}$ particularly due to the fact that NAL-NL 1 makes no gain prescription beyond 6 kHz. In a next step, headset measurements with insert hearing aid receivers are planned to study the transition to real hearing instruments and to derive frequency specific corrections on top of $LoudFit_{total}$.

11:30-11:45 Presentation-Directed Discussion

11:45-12:15 Lunch

12:45-1:15 James Hall: Audiologic Assessment and Management of Tinnitus

Tinnitus or hyperacusis affects millions of persons in the United States. Within recent years, we have witnessed unprecedented research and clinical interest in tinnitus & hyperacusis. This lecture emphasizes principles, protocols, and current practices important in the audiologic assessment and management of tinnitus. A clinically feasible approach to caring effectively for this challenging and underserved patient population is reviewed. The presentation will include information on basic mechanisms of tinnitus/hyperacusis, and a review of effective tinnitus treatment options

1:15-1:45 Presentation-Directed Discussion

1:45-2:15 Purvis Bedenbaugh & Eugene Martin: How Ongoing Noise Interferes with the Responses of Neurons in the Auditory Thalamus to Transient Sounds

We are investigating how ongoing noise interferes with the responses of neurons in the auditory thalamus to transient sounds. Ongoing noise stabilizes dynamical patterns of neuronal activity related to its spectro-temporal modulations. First order models suggest that such ongoing activity additively combines with activity evoked by transient sounds, or simply raises the threshold for responding to transient sounds. We find that noise not only attenuates the response to probe sounds (masking), but also changes the temporal response pattern (scrambling).

Two brief probe sounds, a Gaussian noise burst and a brief sinusoidal tone, were presented in silence and in three ongoing noises. The three noises were targeted at activating the auditory system in qualitatively distinct ways. Dynamic ripple noise (DRN), containing many random tone-like elements, is targeted at those parts of the auditory system which respond well to tones. ICRA (International Collegium of Rehabilitative Audiology) noise, comprised of the sum of several simultaneous streams of Schroeder-phase speech, is targeted at those parts of the auditory system which respond well to modulated sounds, but lack a well defined response to tones. Gaussian noise is targeted at those parts of the auditory system which respond to acoustic energy regardless of modulation. In anesthetized rats, we contrasted responses recorded extracellularly in the dorsal (nonlemniscal) and ventral (lemniscal, main ascending pathway) divisions of the auditory thalamus. Activity is quantified as the mean spike rate and as the temporal reliability, which measures the repeatability of temporally precise firing. Decreases in probe evoked mean firing rate and in temporal reliability define masking and scrambling, respectively.

The mean firing rate evoked by the background noises varies across thalamic divisions: ICRA and DRN evoke a high firing rate in the ventral division, while only ICRA noise evokes a high firing rate in the dorsal division. A first order

model would therefore predict that ICRA and DRN would be the strongest maskers in the ventral division, while ICRA and Gaussian noise would be the strongest maskers in the dorsal division. In contrast, these data show that ICRA and DRN are the strongest maskers and scramblers of probe evoked activity in both divisions. Interestingly, ICRA and DRN evoke the highest temporal reliability in both divisions, suggesting that the timing of noise induced reliable firing, not the response magnitude, predicts both masking and scrambling. In awake rats, extracellular recordings were obtained from what we believe to be the ventral division of the auditory thalamus. All noises both attenuated and decreased the precise temporal repeatability of the onset response to probe sounds. In addition, the modulated noises induced context-specific changes in the temporal pattern of the response to probe sounds. Scrambling of the temporal response pattern may be a direct neural correlate of the unfortunate experience of being able to hear, but not understand, speech sounds in noisy environments.

2:15-2:30 Presentation-Directed Discussion

2:30-2:45 Break

2:45 -3: 15 John Harris: How Automatic Speech Processing can Impact Audiology
3:15-3:30 Presentation-Directed Discussion

3:30-3:50 Alice Holmes, Sharon E. Powell, John G. Harris, & Meena Ramani: Cellular Phone & Digital Hearing Aid Compatibility: A Qualitative Analysis of User Preferences

The purpose of this research is to identify qualitatively different ways in which digital hearing aid users experience cellular phone usage. This is accomplished by using a qualitative method of analysis, Phenomenology, in which meaning is ascribed to participants' views and comments on their related life experiences. Phenomenology assumes that as a group, people generate finite numbers of qualitatively different understandings of various experiences.

Two focus groups were held at the University of Florida Speech and Hearing Center. Information obtained during the focus groups indicates that in general, persons who wear hearing aids have a great deal of difficulty in trying to understand speech over cellular phones. The majority of hearing aid users prefers to wear their hearing aids while using cellular phones and do not find cellular phones to be hearing aid or telecoil compatible. It is for this reason that increased telecoil strength and increased volume output for specific frequencies are needed. Hearing aid users expressed a desire that cellular phones have the capability to be set for each user's individual hearing loss on a frequency-by-frequency basis, as well as some amount of self-control in the ability to adjust the phone settings for themselves. Hearing aid users desire the ability to have their cellular phone store multiple programs for multiple listening situations (e.g., listening in quiet,

listening in noise) and cellular phone ring tones that are geared toward various types of hearing loss.

Many cellular phones do not sufficiently accommodate hearing aid microphones. The amount of feedback and interference when using a cellular phone with hearing aids is one of the main problems indicated by users of these products.

3:50-4:00 Presentation-Directed Discussion

4:00-5:00 Working Groups

Wednesday, March 16, 2005

8:30-8:50 Purvis Bedenbaugh: How the Auditory System Responds to the Cues to Emotional Prosody From Both Laboratory and Clinical Perspectives

Speech communication transmits semantic messages along with contextual information, such as the emotional state of the listener. Emotional prosody is estimated from vocal gestures and spectro-temporal contrasts which can extend across multiple phonetic segments. We are interested in how the auditory system responds to the cues to emotional prosody from both laboratory and clinical perspectives. From a laboratory perspective, emotional prosody perception provides a window into how the auditory system processes non-segmental and supra-segmental features of speech sounds, and it provides a second order assessment of speech processing quality. For example, although the semantics in speech can be recognized in severely degraded signals, emotional prosody recognition requires much higher audio fidelity.
We recently investigated (1) the acoustic spectral resolution required to identify emotional prosody, (2) the regions of the acoustic spectrum which are most essential for emotional prosody identification, and (3) whether temporal fine-structure is essential for emotional prosody identification. Young adults identified the emotional prosody in sentences from a standard neuropsychological assessment as either happy, sad, angry, fearful, or neutral. To control acoustic spectral resolution and eliminate temporal fine structure, the sentences were processed with a noise-excited vocoder. These data suggest that emotional rosody recognition requires much higher acoustic spectral resolution than sentence recognition, but that fine-structure is not essential. Emotional prosody identification is most limited by acoustic spectral resolution at low frequencies. Temporal cues, beyond those necessary to estimate the $f0$ contour, are also essential for emotional prosody identification.

From a clinical perspective, emotional communication is important for overall social adjustment, especially maintaining relationships. Listeners who misjudge emotional signals may be perceived as lacking in empathy, for example.
Decreased audibility, frequency selectivity, and temporal processing may lead to impairments in emotional prosody recognition. Likewise, the spectro-temporal dynamics of hearing aid and cochlear implant speech processors may obscure cues to emotional prosody. Emotional prosody recognition performance decreases with age; some of this decrease may be related to hearing impairment.

We recently evaluated emotional prosody recognition in a group of hearing aid users and in a group of cochlear implant users using the same emotional prosody test we used with young adults. Hearing aid users willing to perform the test without their hearing aid performed similarly to control listeners, but their performance decreased by approximately one standard Z-score when using their hearing aid. Most errors involved misclassification of fearful and angry prosody, suggesting that the hearing aid distorted temporal cues. Emotional prosody

recognition was very poor in most cochlear implant users, across a wide range of speech-recognition scores. One cochlear implant user had only modestly impaired emotional prosody recognition.

8:50-9:00 Presentation-Directed Discussion

9:00-9:20 Rahul Shrivastav: Speech Based Optimization of Cochlear Implant Speech Processor Parameters

9:20-9:30 Presentation-Directed Discussion

9:30-10:30 Working Groups

10:30-10:45 Break

10:45-12:15 Business Meeting

12:15- Lunch