3:00

2aPPa17. Factor analyses of critical-band-filtered speech of British English and Japanese. Kazuo Ueda (Perceptual Psychology Unit, Kyushu University, 4-9-1 Shiobaru, Minami-ku, 815-8540 Fukuoka, Japan, ueda@design.kyushu-u.ac.jp), Yoshitaka Nakajima (Perceptual Psychology Unit, Kyushu University, 4-9-1 Shiobaru, Minami-ku, 815-8540 Fukuoka, Japan, nakajima@design.kyushu-u.ac.jp)

Two-hundred sentences of British English and Japanese, each uttered by 10 native speakers (5 females and 5 males) in each language, were analyzed through 20 bands of critical band filters. Smoothed power fluctuations derived from the filters were submitted to principal component analyses followed by varimax rotation. The first three factors explained 34-37% of variance. One of the factors exhibited two peaks along frequency axis in the standardized scores and two of the factors showed one peak for each. These three factors divided the whole frequency range of speech sound into four bands. The structure of the factors and frequency bands was essentially the same across the two languages. These frequency bands can be used for speech perception in general, because intelligible noise-vocoded speech sounds can be synthesized with the frequency bands.

Contributed Paper

3:20

2aPPa18. A Structuralistic Approach to Acoustic-Auditory Functions of Meaning. Ute Jekosch (Chair of Communication Acoustics, TU Dresden, Helmholtzstr. 10, 01069 Dresden, Germany, ute.jekosch@tu-dresden.de), Ercan Altinsoy (Chair of Communication Acoustics, TU Dresden, Helmholtzstr. 10, 01069 Dresden, Germany, ercan.altinsoy@ias.et.tu-dresden.de), Sebastian Merchel (Chair of Communication Acoustics, TU Dresden, Helmholtzstr. 10, 01069 Dresden, Germany, sebastian.merchel@tu-dresden.de)

In this paper we introduce a methodology of semio-acoustics to get information on how human listeners associate meaning to acoustic-auditory events. We concentrate on identifying cues in the auditory stream listeners base the association of meaning on as well on modelling major characteristics of the reference system of meaning. The methodology we use is closely related to structuralism, an approach that has its origins in semiotics. In principle, structuralism differentiates between creating functions, carrying functions and changing functions of systems of meaning. We concentrate on carrying and changing functions here using the following procedure: a sign-carrier (in our case an acoustic-auditory event the association of meaning is based on) is decomposed into sub-units. By a minimal pair analysis we investigate carrying and changing functions of acoustic-auditory features with regard to the associated meaning. We will introduce the methodology used and discuss first results of a pilot study.

3:40-5:20 Posters

Lecture sessions will recess for presentation of poster papers on various topics in acoustics. See poster sessions for topics and abstracts.

Contributed Papers

5:20

2aPPa19. Optimization of a dual recognition tasks for speech quality assessment. Virginie Durin (France Télécom, 2 avenue Pierre Marzin, 22300 Lannion, France, virginie.durin@orange-ftgroup.com), Laetitia Gros (France Télécom, 2 avenue Pierre Marzin, 22300 Lannion, France, laetitia.gros@orange-ftgroup.com)

This paper deals with perceptive test methodologies to assess speech quality of telecommunication systems. Faced with drawbacks of typical methodologies recommended by ITU-T, a new way to assess speech quality is investigated. The new approach requires collecting reaction times and performances when subjects are achieving tasks involving degraded speech signals; it is shown that reactions times lengthen and performances decrease in a specific task when quality is impaired. The proposed task is a dual task with a digit recognition memory task and a letter recognition task. Three different quality levels are applied to audio signals describing digits and letters. Different experimental designs are examined to reinforce the effect of speech quality on performances and reaction times. The results show significant differences of performances and reaction times between the three quality levels, depending on the experimental design.

5:40

2aPPa20. Electronic pass-through hearing protection and directional hearing restoration integrated in a helmet. Wouter K. Vos (TNO, Kampweg 5, 3769ZG Soesterberg, Netherlands, wouter.vos@tno.nl), Adelbert W. Bronkhorst (TNO, Kampweg 5, 3769ZG Soesterberg, Netherlands, adelbert.bronkhorst@tno.nl), Jan A. Verhave (TNO, Kampweg 5, 3769ZG Soesterberg, Netherlands, jan.verhave@tno.nl)

Compared to standard earplugs, electronic pass-through earplugs provide better sound localisation. Provided that the bandwidth is sufficiently wide and the earplugs do not change the shape of the pinnae. However, when a helmet is worn that partially or completely covers the ears, the directional hearing capability is diminished. We attempt to restore directional hearing when wearing a helmet by attaching a microphone array to the helmet. The signals from the microphone array are filtered with Finite Impulse Response (FIR) filters to recreate an individual or generic open-ear Head Related Transfer Function (HRTF). The filters are designed by minimisation of an error measure in the frequency domain. The error measure incorporates both the log magnitude and the phase differences between the original and the recreated HRTF. The global minimum is found using modern optimisation techniques like Particle Swarm Optimisation (PSO) or Differential Evolution (DE). The total system is evaluated with subject experiments. Participants have to localise sounds and rate the quality of sounds. Independent variables are the number of microphones that should be used and their positions on the helmet.

6:00

2aPPa21. How many psycho-acoustic attributes are needed? Torben Holm Pedersen (Delta Acoustics & SenseLab, Venlighedsvej 4, 2970 Hørsholm, Denmark, thp@delta.dk), Nick Zacharov (Delta Acoustics & SenseLab, Venlighedsvej 4, 2970 Hørsholm, Denmark, nvz@delta.dk)

Sounds may be characterized by objective perceptive attributes (for which there may exist physical metrics) or by subjective (affective or connotative) attributes. This paper will deal with the perceptive attributes. Within product sound quality the metrics for classical the psycho-acoustic attributes (loudness, sharpness, roughness and fluctuation strength) -maybe supplemented with tone and impulse prominence- are often used as the only attributes to characterize the sounds. But are these 4-6 attributes or dimensions sufficient to characterize a sound? Within room acoustics and reproduced sound many other attributes are used and in the language around 100 direct sound describing words may be found. This paper will give an overview over attributes used within different acoustic areas. The latter part of the paper will discuss the role of sensory evaluation methods as a means to systematically developing attributes for the objective qualification and quantification of sound characteristics.