3:45

2pPPb2. Distance judgments of nearby sources in a reverberant room: Effects of stimulus envelope. Scott G. Santarelli, Norbert Kopčo, and Barbara G. Shinn-Cunningham (Hearing Res. Ctr., Dept. of Cognit. and Neural Systems, Boston Univ., Boston, MA 02215)

Localization was measured for nearby sources with abrupt or slow rise/fall times in a reverberant space. A recent model of distance perception [A. W. Bronkhorst and T. Houtgast, Nature **397**, 517–520 (1999)] suggests that perceived distance is computed from the room impulse response. The model assumes that energy in the onset of the impulse response (primarily from the direct sound, varying with distance) is compared to late energy (primarily from the reverberation, roughly independent of distance). However, other results suggest that subjects are poor at deconvolving transfer function and sound source characteristics [Rakerd *et al.*, J. Acoust. Soc. Am. **106**, 2812–2820 (1999)]. Taken together, these results suggest that subjects cannot use the transfer function, but estimate source distance from some statistic closely related to that proposed in the model (e.g., the ratio of initial to late energy in the total waveform at the ear). For impulsive sounds, such a simpler statistic yields results similar to those of the model; however, distance judgments would be significantly degraded for sources with slow onsets. However, subjects were equally good at judging distance, independent of characteristics of the stimulus envelope. [Work supported in part by AFOSR Grant No. F49620-98-1-0108.]

4:00

2pPPb3. Human capabilities of dereverberation. Brad W. Libbey and Peter H. Rogers (Georgia Inst. of Technol., Atlanta, GA 30332-0405, gt1556a@prism.gatech.edu)

Humans listening to speech in a small room are frequently unaware of reverberation. It is unknown if neurological processes remove these echoes or if they are simply disregarded when speech is phonetically processed. In other words, is there a neurological mechanism that is capable of removing echoes to create a clean speech neurological signal before phonetic processing? Or is the brain capable of processing reverberant phonemes? Word intelligibility experiments examine these questions. Preliminary experiments investigate how characteristics of simulated reverberation such as room size, absorption of walls, source location, and listener position affect intelligibility. The results of these experiments are used in the design of primary experiments that address human capabilities. In the capability tests the effects of binaural listening, reverberation level, and deconvolution processing are investigated. These experiments approach the fundamental questions through the use of a three-factor experiment (the factors being binaural versus diotic, high versus low levels of reverberation, and simulated reverberation versus convolutional noise). Through the primary and interaction effects of these factors the data illustrates the extent of neurological dereverberation.

4:15

2pPPb4. Discrimination of brief interaural temporal disparities embedded within diotic bursts of broadband noise. Michael A. Akeroyd, Leslie R. Bernstein, and Constantine Trahiotis (Dept. of Surgery (Otolaryngol.), Ctr. for Neurological Sci., Univ. of Connecticut Health Ctr., Farmington, CT 06032)

Zurek (1980) measured listeners' sensitivity to interaural disparities conveyed by a 5-ms segment of a 50-ms burst of otherwise diotic broadband noise [P. M. Zurek, J. Acoust. Soc. Am. **67**, 952–964 (1980)]. He found that thresholds for interaural time delay (ITD) were markedly elevated when their onset was between 1 to 5 ms following the onset of the noise. Zurek postulated that the leading portion of the diotic burst of noise briefly inhibited sensitivity to subsequent binaural information and, in that manner, linked his findings to the ''precedence effect.'' In our view, one implication of that reasoning is that the trailing portion of the diotic burst should have little, if any, effect on threshold ITDs. In order to test this hypothesis, we employed Zurek's general paradigm and included conditions in which we omitted either leading or trailing portions of the diotic burst of noise. We found that omitting *either* the leading *or* the trailing portion of the diotic noise greatly reduced the elevation in threshold ITDs observed in the original paradigm. Consequently, it appears that Zurek's original data, although interesting and important, may reflect effects and mechanisms apart from those responsible for the ''precedence effect.'' [Work supported by NIH DC 04073.]

4:30

2pPPb5. Influence of source and echo separation on echo threshold of natural complex sounds. Miriam N. Valenzuela and Ervin R. Hafter (Dept. of Psychol., Univ. of California, Berkeley, CA 94720, miriam@ear.berkeley.edu)

Most studies of the precedence effect are based on stimuli that differ dramatically from ''realistic'' stimuli. Important differences include the following. (a) Stimulus types used in studies are often clicks, noise bursts or sinusoids; realistic sounds are mostly harmonic or inharmonic complex tones. (b) Durations of stimuli used in studies often avoid a temporal overlap between lead and lag; durations of realistic sounds are normally such that first and subsequent wave fronts overlap most of the time. (c) Lead and lag stimuli used in studies to simulate a primary sound and its reflection from a nearby surface are often signals of equal amplitude and identical wave form; reflections of realistic sounds differ normally from the primary sound in amplitude and wave form. As a first step toward understanding the precedence effect and its significance in ''real world'' situations, experiments with synthetic piano tones of durations longer than 100 ms (longer than echo delays in typical rooms) were conducted in a simulated reverberant environment. The dependence of echo threshold on the direction of sound incidence was studied using measurements of fusion and localization dominance. The results show a decrease of echo threshold with an increase of spatial separation between primary source and reflection.