Session 2aPPb

Psychological and Physiological Acoustics: Spatial Factors in Binaural Hearing (Poster Session)

D. Wesley Grantham, Chair
Bill Wilkerson Center for Otolaryngology and Communication Science, Department of Speech and Hearing Science, Vanderbilt University Medical Center, Nashville, Tennessee 37212, USA

Contributed Papers

Posters will be on display in the Poster Gallery from Monday to Wednesday, 15–17 March. Authors will be at their posters from 10:00 a.m. to 12:00 noon on Tuesday, 16 March.

2aPPb1. Near-field localization in echoic rooms. Scott Santarelli, Norbert Kopco, Barbara G. Shinn-Cunningham (Dept. of Cognit. and Neural Systems, Boston Univ., 677 Beacon St., Boston, MA 02215, shinn@cns.bu.edu), and Douglas Brungart (Armstrong Lab., Wright–Patterson AFB, OH 45433-7901)

The current study examines the ability of subjects to indicate the distance and direction of sources within 1 m of the head in a medium-sized, echoic classroom. Two conditions were tested in the same group of subjects. In the first, subjects were seated in the center of the room, relatively far from any hard reflective surfaces. In the second condition, subjects were located at the same position in the room, but a 12×4 enamel-covered wallboard was positioned next to the listener to create an additional artificial wall approximately 6 in. from the left ear of the listeners. The initial hypothesis was that previous localization results from tests in anechoic space would be nearly indistinguishable from the results in the first condition, since for sources near the head, the direct-to-reverberant energy ratio in this first condition would be very large. However, it was believed that the addition of a single, short-latency echo might bias some localization judgments, particularly judgments of distance and elevation. Instead the results indicate that localization accuracy and variability are comparable for the two echoic conditions, but that both measures of localization ability are worse in echoic conditions than in anechoic conditions.

2aPPb2. The effect of sentence onset asynchrony on call sign detection and message intelligibility in a simulated ''cocktail party.'' Brian D. Simpson (Dept. of Psych., Wright State Univ., 3640 Colonel Glenn Hwy., Dayton, OH 45435, bsimpson@sdl.psych.wright.edu), Robert S. Bolia (Veridian, Dayton, OH 45431), Mark A. Ericson, and Richard L. McKinley (Air Force Res. Lab., Wright–Patterson Air Force Base, OH 45433-7901)

Previous research has demonstrated that the spatial separation of multiple simultaneous talkers improves detection and intelligibility of a critical speech signal among non-signal speech events [Nelson *et al.*, J. Acoust. Soc. Am. **103**, 2341–2342(A) (1998); M. L. Hawley *et al.*, J. Acoust. Soc. Am. **99**, 2596(A) (1996)]. However, few findings on the effects of varying phrase onsets have been reported [J. C. Webster and P. O. Thompson, J. Acoust. Soc. Am. **26**, 396–402 (1954)]. The purpose of the present study was to investigate the effect of varying the interval between sentence onsets on call sign detection and message intelligibility. The relative onset times of two to eight temporally overlapping phrases were varied systematically in both spatially separated and nonspatially separated conditions on the horizontal plane. The phrases were presented virtually to five normal-hearing listeners. All possible temporal positions of the target phrase were examined. Results will be discussed in the context of listening to speech in real-world situations. [Work supported by AFOSR.]

2aPPb3. Speech intelligibility in real and virtual adverse auditory environments. Nancy L. Vause (U.S. Army Res. Lab., Human Res. and Eng. Directorate, Aberdeen Proving Ground, MD 21005) and D. Wesley Grantham (Vanderbilt Univ. Med. Ctr., Nashville, TN 37212)

The purpose of this investigation was to examine the effects of real and virtual adverse conditions on speech intelligibility. The experiment was designed to examine the effect of presentation method on speech intelligibility in conditions of noise and reverberation as signal-to-noise ratio was systematically varied. Additionally, this investigation evaluated the influence of talker gender on speech intelligibility in anechoic and reverberant environments as a function of signal-to-noise ratio and presentation method. Speech intelligibility scores were obtained from 21 normal hearing subjects using a nonsense syllable test. The syllables were recorded in three environments (diotic anechoic, virtual anechoic, and virtual reverberant) with three signal-to-noise ratios (0, 5, 9 dB) using two simultaneous masking sources. The findings indicate that (a) traditional diotic presentation of these stimuli degrades speech intelligibility compared to virtual presentation and may not accurately represent real-world performance; (b) the signal-to-noise ratios did not influence performance trends between presentation modes, as intelligibility improved with increasing SNR; (c) reverberation decreased intelligibility although the effects were not as dramatic as expected; and (d) using these stimuli, the female talker tokens were more easily identified than male talkers in a virtual presentation, but not generally for diotic presentation. [Work supported by NICDC and U.S. Army.]

2aPPb4. Monaural and binaural minimum audible angles for virtual sound sources. Robert S. Bolia (Veridian, 5200 Springfield St., Dayton, OH 45431, rbolia@falcon.al.wpafb.af.mil), Alan D. Musicant, and Daniel A. Gajewski (Middle Tennessee State Univ., Murfreesboro, TN 37132)

A number of researchers have employed the minimum audible angle (MAA) paradigm to investigate the precision with which listeners can discriminate differences of sound-source location in the free field [A. W. Mills, J. Acoust. Soc. Am. **30**, 237–246 (1958); W. M. Hartmann and B. Rakerd, *ibid.* **85**, 2031–2041 (1989)]. Surprisingly, this has been done only for binaural listening conditions, although Man's capacity for monaural localization is well documented [J. R. Angell and W. Fite, Psych. Rev. **8**, 225–246 (1901); R. A. Butler, R. A. Humanski, and A. D. Musicant, Perception **19**, 241–256 (1990)]. In the present study, monaural and binaural MAAs were determined using a broadband stimulus for seven virtual sound-source positions in the horizontal plane. Listeners indicated via a three-alternative, forced-choice paradigm whether the stimulus presented in the second interval appeared to move clockwise, counterclockwise, or not at all, with respect to that presented in the first interval.