

deg reference point. Within the limitations of the current experimental conditions, listeners showed appreciable sensitivity to the facing angle of a unidirectionally facing sound source. Our results also show evidence for a maximum auditory facing angle (MAFA).

2pPP21. Effect of auditory cuing on azimuthal localization accuracy. Norbert Kopčo (Hearing Res. Ctr., Dept. of Cognit. and Neural Systems, Boston Univ., 677 Beacon St., Boston, MA 02215, kopco@cns.bu.edu), Albert Ler, and Barbara G. Shinn-Cunningham (Boston Univ., Boston, MA 02215)

Auditory localization in the horizontal plane was measured following the presentation of a cue in order to explore whether attentional focus could improve localization accuracy. Subjects pointed to the heard location of a broadband target source that was presented (at a delay of either 50 or 300 ms) after a cue source. In half of the blocks of trials, the cue source came from the same (left/right) hemifield as the target on most (75%) of the trials, and thus (on average) provided the listener with information about the target location. In the other half of the blocks of trials, the cue source location was equally likely to come from either the same or the opposite hemifield and provided no information to the subject regarding target position. The presence of a cue biased localization performance in both conditions rather than improving accuracy when the cue provided information about the target laterality, even for a delay of 300 ms between the cue and target. Results suggest that auditory cuing, which has been shown to decrease response times, degrades localization accuracy. [Work supported by a grant from the Air Force Office of Scientific Research.]

2pPP22. Localization and speech-identification ability of hearing-impaired listeners using phase-preserving amplification. Ward Drennan, Stuart Gatehouse, Patrick Howell (MRC Inst. of Hearing Res., Glasgow Royal Infirmary, Queen Elizabeth Bldg., Glasgow G31 2ER, UK), Dianne VanTasell, and Steven Lund (Starkey Labs., Eden Prairie, MN 55344)

Hearing-impaired listeners experience increased difficulties recognizing speech and localizing sounds in adverse environments. This study investigated the benefits of signal processing in binaural hearing aids designed to preserve cues that accompany spatial location. The ability of listeners to localize click-trains in noise was tested, along with their ability *both* to localize *and* to identify words in noise (a dual task). Listeners experienced two types of bilateral hearing aid fittings: (1) a custom fitting that provided appropriate gain while also matching the phase measured near the tympanic membranes without the hearing aids, and (2) a conventional fitting (using the same hearing aid device) that provided the same gain with noncustom, linear phase. Testing occurred for each fitting immediately and following 3-months listening experience using a within-listener, within-device, randomized, single blind, crossover design. A rating-scale questionnaire was administered to assess perceived speech-hearing and spatial abilities. In the dual task, the listeners exhibited superior localization ability for the phase-preserving fitting initially and after 3-months experience. This advantage did not occur for the click-train localization task. Listeners rated their spatial abilities higher with the phase-preserving fitting, although little improvement was observed or reported for speech hearing.

2pPP23. Localization of sound by binaural cochlear implant users. John P. Preece, Richard S. Tyler, Jay T. Rubinstein, Bruce J. Gantz (Dept. of Otolaryngol., Univ. of Iowa, Iowa City, IA 52242), and Richard J. M. van Hoesel (CRC for Cochlear Implant and Hearing Aid Innovation, E. Melbourne 3002, Australia)

We examined the localization ability in five adult patients who were implanted bilaterally with the CI24M implant from Cochlear Corporation. These patients demonstrated a difference in either length of time deaf before implantation, preimplant thresholds, or both. Patients were tested in

an anechoic room. Signals were four 200-ms bursts of broadband noise separated by 55 ms of silence. Stimuli were randomly presented from one of eight loudspeakers arrayed in an arc at ear level in front of the patient. The speakers were separated by 15 deg azimuth. The patient was seated 1.5 m from the speakers and responded orally with a speaker number. The level of individual stimuli was varied randomly over an 8-dB range with an average level of presentation of 65-dB SPL measured at the approximate location of the center of the patient's head. Patients were tested with each ear separately and with both ears together. The results show a very good ability in all five patients to localize sounds with two cochlear implants. The monaural abilities varied considerably across patients, and often between ears for each patient, but were always worse than the binaural abilities. [Work supported by NIDC and CRC.]

2pPP24. Auditory motion aftereffects with varying interaural phase difference. Takayuki Kawashima and Takao Sato (Dept. of Psych., Univ. of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan, ll97031@mail.ecc.u-tokyo.ac.jp)

It has been known that the auditory motion aftereffect (MAE) is spatially specific [see, for example, D. W. Grantham, *Acoustica* **84**, 337–347 (1998), exp. 3]. However, it still is not very clear which cues for sound localization are responsible for this spatial specificity of the MAE, since several possible cues, such as the spectral profile or interaural level difference, covaried in most past studies. In this study, MAE and its spatial specificity were investigated with sound motion created by using only interaural phase difference (IPD) as a first step to identify the responsible cues. We used the probe method with the method of constant stimuli. Either with or without adaptation to a moving tone, subjects were asked to judge the direction of probe tone motion (0.7 ms duration, either to the left or the right). The slope and the position of the psychometric functions were affected by the direction of the adapter's motion direction, but only when IPD ranges (spatial ranges of motion) of the adapter and probe tones overlapped each other. These results suggest that the change in IPD is at least one of the cues which produce the spatial specificity.

2pPP25. Minimum dynamic lateralization for multiple moving sources. Michael F. Neelon and Rick L. Jenison (Dept. of Psych., Univ. of Wisconsin, Madison, WI 53706)

It is still unresolved whether auditory motion is perceived via specialized motion detectors or inferred from static samples of changes in spatial position. This question has been investigated by comparing minimum audible movement angles for single sources moving discretely or continuously [Perrott and Marlborough, *J. Acoust. Soc. Am.* **85**, 1773–1775 (1989)]. But using one source does not force the listener to determine movement by only one of the aforementioned processes. To better measure sensitivity to pure auditory dynamics, the following study simulates multiple overlapping sources moving in the same direction across random sections of the auditory hemifield. Experimental stimuli are composed of different portions of the trajectories of circling resonant sources, which are individually created by dynamically varying interaural time and level differences. The multiple, variable endpoints in the composite stimulus should inhibit the listener from relying solely on such cues to determine movement direction. Pilot studies using from 1–5 concurrent sources show dynamic lateralization thresholds are lowest for one moving source. This implies movement is best perceived when stimulus endpoints can be sampled. However, thresholds across multiple sources do not significantly differ regardless of number, which may represent a measure of sensitivity to pure auditory dynamics.