

to simultaneous and sequential N -tone patterns. Estimates of decision weights showed a predominant reliance of listeners on no more than 2–3 tones in each pattern independent of N . Measures of weighting efficiency systematically decreased with N while noise efficiency remained constant across N . The results are discussed in terms of their implications for the interpretation of early experiments on the effects of the bandwidth-duration product on signal detection. [Research supported by NIDCD Grant 5R01DC1262-14.]

1pPP22. Individual differences in source identification for synthesized impact sounds. Robert A. Lutfi (Dept. of Communicative Disord., Univ. of Wisconsin, Madison, WI, 53706) and Raman Arora (Univ. of Wisconsin, Madison, WI, 53706)

Impact sounds were synthesized according to standard textbook equations given for the motion of freely vibrating bars, membranes, and plates. In the two-interval, forced-choice procedure highly practiced listeners identified from these sounds various physical attributes of these sources and the manner in which they were driven to vibrate. A COSS analysis of the trial-by-trial data [Berg, "Observer efficiency and weights in a multiple observation task," *J. Acoust. Soc. Am.* **88**, 149–158 (1990)] revealed large differences across listeners in the acoustic cues used within each identification task, but similarity in the cues used within listeners across tasks. Only in conditions in which the acoustic information for identification was highly constrained did listeners use identical cues. Despite the large individual differences in listening strategy, identification accuracy was similar across listeners. Where there were differences in identification accuracy the differences appeared large, related to differences in internal noise and not listening strategy. [Research supported by NIDCD Grant 5R01DC006875-01.]

1pPP23. Using multidimensional scaling to determine distances in the perceptual space of rolling sounds. Christophe Stoelinga, Dik Hermes (Technische Universiteit Eindhoven, Den Dolech 2, P.O. Box 513, 5600MB Eindhoven, The Netherlands), and Armin Kohlrausch (Philips Res. Labs. Eindhoven, 5656AA Eindhoven, The Netherlands)

We recorded sounds generated by a ball rolling over a wooden plate. Ball diameter, rolling speed, and plate thickness were varied. In a difference-scaling experiment, the important dimensions of the space spanned by these sounds were determined. All sounds were combined in pairs and subjects were asked to quantify the difference they heard in each pair. In this way all possible perceptual differences could play a role in the difference scalings without a need to interpret these differences in terms of underlying object properties such as size or speed. Using multidimensional scaling, a good fit for the scaled differences was obtained with a minimum of three dimensions. None of the dimensions corresponded directly with one of the three mechanical parameters varied in the rolling sounds. Differences in speed lead to a smaller distance in the thus-obtained perceptual space than differences in size, for the ranges we used. This corresponds to results from experiments where the subjects were directly asked to judge size and speed differences using the same sounds. Remarkably, the plate thickness resulted in large distances in perceptual space, while this mechanical property is poorly recognized when participants are directly asked for it.

1pPP24. Optimizing information-transfer rates for human communication. Charlotte M. Reed, Nathaniel I. Durlach (Res. Lab. of Electron., MIT, Cambridge, MA 02139, cmreed@mit.edu), and Hong Z. Tan (Purdue Univ., West Lafayette, IN 47907)

This research is concerned with investigating the factors that contribute to optimizing information-transfer (IT) rate in humans. This issue has important ramifications for the design of human-machine interfaces in a wide variety of applications, including virtual environment and teleoperator systems as well as sensory aids for persons with impaired vision and/or

hearing. Based on the results of several early studies from the 1950s, a general rule of thumb has arisen in the literature which suggests that IT rate is dependent primarily on the stimulus delivery rate and is optimized for presentation rates of 2–3 items/second. Thus, the key to maximizing IT rate is to maximize the information in the stimulus set. Recent data obtained with multidimensional actual signals, however, appear to be at odds with these conclusions. In particular, these current results suggest that optimal delivery rate varies with stimulus information to yield a constant peak IT rate that depends on the degree of familiarity and training with a particular stimulus set. We discuss factors that may be responsible for the discrepancies in results across studies including procedural differences, training issues, and stimulus-response compatibility. [Research supported by Grant No. R01-DC00126 from NIDCD, NIH.]

1pPP25. A miniature, low-cost, user-friendly personal sound-level dosimeter. Harold A. Cheyne, II and Thomas E. von Wiegand (Sensimetrics Corp., 48 Grove St., Ste. 305, Somerville, MA 02144-2500, harold@sens.com)

The objective of this research is to develop a miniature, low-cost, user-friendly personal sound-level dosimeter that can meet the ANSI S1.25-1991 standard. This dosimeter is intended for people whose work-related or recreation-related activities expose them to noises that cause hearing loss. In contrast to typical dosimeters that are controlled by a manager or clinician, the wearer of the miniature dosimeter will also control it and receive its data output to better appreciate his or her sound exposure dose. To significantly miniaturize the dosimeter and lower its cost as compared to typical dosimeters, it will have a reduced feature set, simplified signal processing, an inexpensive microphone capsule, and a microcontroller rather than a digital signal processor. Preliminary tests, using a Texas Instruments embedded controller and an LCD display, suggest that approximations to the standard dosimeter function blocks can be made while maintaining the ANSI tolerances. Tests with inexpensive microphone capsules show acceptable drift due to temperature and humidity for a dosimeter. Following further testing for compliance with the ANSI standard, a limited set of field tests is planned, with wearers using both the miniature dosimeter and a commercial dosimeter, to compare their dosimetry performance.

1pPP26. Intimacy in performance venues: Towards a socioecological methodology. Bobby Gibbs, II (Rensselaer Polytechnic Inst., 110 8th St., Troy, NY 12180), Jonas Braasch, and T. Krueger (McGill Univ., Montreal, QC, Canada)

Intimacy can be subjectively defined as the feeling of closeness to performance. Intimacy has been widely correlated with the initial time delay gap, the delay between the direct sound and early reflections in a venue [Beranek, *Concert and Opera Halls: How They Sound* (Acoustical Society of America, New York, 1996)]. Contemporary research suggests that visual stimuli have considerable bearing upon intimacy perception [e.g., Cabrera and Nguyen, *J. Acoust. Soc. Am.* **116**, 2475 (2004)]. Building upon paradigms of ecological psychology, the author hypothesizes that social affordances, perceived offerings of social propinquity in a venue, will significantly enhance the auditory impression of intimacy. A socioecological approach to weigh the hypothesis is proposed wherein auditory perception is evaluated in the context of both the physical and the social environment. The methodology will employ interviews, ethnographic analyses, field studies, and laboratory tests. The research results will likely have immediate ramifications for the tools of visualization and auralization, its acoustical analogue. The study has broader ramifications for the design process, engendering the possibility of more humane design of artistic listening spaces through understanding reciprocal relationships between physical, acoustical, and social domains. [Work supported by ASA Minority Fellowship and RPI Humanities, Arts, Architecture, and Social Sciences Fellowship.]