

variability. Monosyllabic words were presented in quiet at one of three speaking rates (fast, medium, or slow). In one condition, all stimulus items were presented at the same speaking rate while in a second condition speaking rate was varied from trial to trial. In control conditions, items were presented at either fixed or varying overall amplitudes. For young listeners, spoken word identification did not differ as a function of speaking rate. Older subjects, in contrast, demonstrated similar identification scores for slow- and medium-rate items but had significantly reduced identification performance for words presented at fast speaking rates. Identification accuracy was also reduced for older listeners in the mixed—as opposed to single—rate condition but only for those items presented at the fast speaking rate. Young listeners were not affected by variability due to speaking rate and neither group showed reduced identification as a result of variability in overall amplitude. Implications for speech perception in older listeners are discussed in terms of current views about perceptual normalization for different sources of variability. [Work supported by NIH.]

8:30

4aSP3. Talker differences and perceptual normalization. James S. Magnuson and Howard C. Nusbaum (Dept. of Psychol., Univ. of Chicago, 5848 S. University Ave., Chicago, IL 60637)

Recognition performance for speech is generally worse for utterances produced by a mix of several talkers compared to utterances produced by a single talker. This performance impairment can be attributed to those aspects of talker normalization used to determine the vocal characteristics of the talker each time the talker changes. The present study investigated the size and nature of talker differences that may affect normalization. Spoken words were generated by a text-to-speech system for matched pairs of synthetically defined talkers. All but two of these pairs differed only in average fundamental frequency. One remaining pair of talkers differed in perceived gender but both talkers had the same average pitch; the other pair differed in both gender and pitch. Response times in a speeded word recognition task were compared for blocks of stimuli produced by a single talker and blocks of stimuli produced by a mix of one of the pairs of talkers. The results are important for understanding how listeners use pitch differences between talkers during talker normalization.

8:45

4aSP4. Attentional effects on phonetic encoding of acoustic cues. Peter C. Gordon (Dept. of Psychol., Harvard Univ., 33 Kirkland St., Cambridge, MA 02138) and Elizabeth J. Pyatt (Harvard Univ., Cambridge, MA 02138)

The role of attention in the phonetic encoding of acoustic cues was studied by examining the effect of a nonspeech distractor task on listeners' classification of the speech sounds /ra/ and /la/. Consistent with previous results [Gordon *et al.*, *Cog. Psychol.* 25 (1993)] it was found that the impact of a relatively strong cue (F3 transition) on phonetic classification was reduced when listeners could not devote full attention to the speech sound. In contrast with previous results, the impact of a relatively weak cue (an aperiodic burst during the formant transition) was also reduced when full attention was not possible. This result conflicts with models in which the importance of attention in phonetic encoding is greater for acoustic cues whose phonetic importance is very great. It suggests that the role of attention in phonetic encoding depends on specific characteristics of acoustic cues.

9:00

4aSP5. Changing the deployment of attention to phonetic structure. Alison K. Baldwin and Howard C. Nusbaum (Dept. of Psychol., Univ. of Chicago, 5848 S. University Ave., Chicago, IL 60637)

Previous research on perceptual learning of synthetic speech and non-native phonetic contrasts suggests that listeners shift the focus of their attention from one set of acoustic cues to another, although this hypothesis has never been tested directly. The present study was carried

out to determine whether training could alter perception of stop-consonant place of articulation of shifting attention from a transition cue to the spectral shape of the release burst. CV syllables were synthesized with transitions specifying one place of articulation and release burst shape specifying another. One group of subjects was given feedback consistent with the category specified by the transitions; the other group was given feedback consistent with the bursts. Although subjects initially tended to respond based on transition cues, feedback was effective for both groups. Furthermore, for subjects who showed learning, attentional changes also generalized to the same phonetic categories in new vowel contexts. The implications of these results for theories of speech perception and perceptual learning will be discussed.

9:15

4aSP6. The abstractness of lexical representations. James T. Myers (Lang. Percept. Lab., Dept. of Psychol., SUNY at Buffalo, Buffalo, NY 14260)

This study attempted to address a fundamental question concerning lexical representations, namely, whether they are encoded in an abstract phonemic form, where only information that is lexically distinctive is recorded, or more concretely. To this end a same-difference task was given to native speakers of American English. Subjects found that the allophone of /t/ that occurs before /r/, as in "truck," more similar to the distinct phoneme found in "chuck" than to the allophone of /t/ found in "tuck." By contrast, subjects found the allophone of /t/ that occurs after /s/, as in "stuck," more similar to the allophone of /t/ that occurs in "tuck" than the acoustically similar but distinct phoneme found in "duck." It is hypothesized that while the second segment of words like "stuck" is truly an allophone of /t/, the first segment of words like "truck" is in fact the same phoneme as in "chuck." The forms being compared are thus represented phonemically in both cases. [Work supported by NIDCD.]

9:30

4aSP7. On the perceptual integrality of duration and amplitude cues to stress. Alice Turk and James R. Sawusch (Dept. of Psychol., Park Hall, SUNY at Buffalo, Buffalo, NY 14260)

Traditionally, amplitude, duration and F0 have been proposed as independent cues to stress [D. Fry, *J. Acoust. Soc. Am.* 27, 765-768 (1955)]. However, there is psychoacoustic evidence that the perception of loudness depends on duration [B. Scharf, "Loudness," in *Handbook of Perception*, edited by E. C. Carterette and M. P. Friedman (Academic, New York, 1978), Vol. 4, pp. 187-242]. Beckman proposed the intensity integral as a more appropriate cue to stress than either amplitude or duration alone [M. Beckman, *Stress and Non-stress Accent* (Foris, 1986)]. The present study tested the perceptual integrality of duration and amplitude using Garner's paradigm [W. R. Garner, *The Processing of Information and Structure* (Erlbaum, Hillsdale, NJ, 1974)]. Preliminary results suggest that duration and amplitude are integral. Further, the integrality is asymmetric: Variation in duration interfered with responding to amplitude to a greater extent than amplitude variation interfered with responding to duration. These findings suggest that both duration and energy (the integral of amplitude over duration) may serve as auditory cues to stress. [Work supported by NIDCD Grant Nos. R01-DC00291 and T32-DC00036 to SUNY at Buffalo.]

9:45

4aSP8. The distinctiveness of word onsets. David W. Gow, Jr., and Peter C. Gordon (Dept. of Psychol., Harvard Univ., Cambridge, MA 02138)

Acoustic measurements examined the distinctiveness and salience of word onsets and matched syllables that occurred in non-word-initial position. Three naive speakers rehearsed and read phonemically identical one- and two-word sequences such as "cartel" and "car tell" under three conditions: citation form, read slowly in sentential context, or read quickly in sentential context. Analyses examining the timing of segments