

labeling of nonspeech percepts, the labeling of speech percepts was more susceptible to manipulation of the synchrony of base and transition, but less disrupted by decreases in transition amplitude and by the backward masking of transitions. These findings lend further support to a modular view of phonetic perception. [Work supported by NICHD.]

9:20

**Z6. The b/w contrast and considerations of syllable duration.** Edith M. Maxwell (36-511, MIT, Cambridge, MA 02139) and Karen L. Landahl (Department of Linguistics, University of Chicago, Chicago, IL 60637)

Recent research suggests that a set of acoustic properties are ambiguous with regard to their categorization as /b/ or /w/ depending on the duration of the following vowel [J. Miller and A. Liberman, *Percept. Psychophys.* 25, 457-465 (1979)]. Such evidence causes difficulty for a theory of acoustic invariance [S. Blumstein and K. N. Stevens, *J. Acoust. Soc. Am.* 66, 1001-1017 (1981)], since identification of properties at the onset appears to be dependent on the context of later-occurring acoustic material. We repeated earlier experiments [J. Miller and A. Liberman, *Percept. Psychophys.* 25, 457-465 (1979)] with some variation. While maintaining continua of stimuli between /b/ and /w/, our stimuli were made more natural by manipulating the spectrum of voicing prior to consonant release. The consequence was weak prevoicing and an abrupt onset at the /b/ end, and stronger prevoicing and a gradual onset at the /w/ end. Results showed that the tendency for identification of mid-valued stimuli to be affected by the following vowel duration was reduced. These findings suggest that earlier results may be explained by the structure of the synthetic stimuli and by properties of auditory processing. [Work supported in part by NSF and by NINCDS.]

9:35

**Z7. Perceptual equivalence of two acoustic cues for /r/-/l/.** Linda Polka (Psychology Department, Old Dominion University, Norfolk, VA 23508) and Winifred Strange (Communicology Department, University of South Florida, Tampa, FL 33620)

The perceptual effects of orthogonal variations in two acoustic parameters which differentiate American-English prevocalic /r/ and /l/ were examined. A spectral cue (frequency onset and transition of  $F_3$ ) and a temporal cue (relative duration of initial steady-state and transitions of  $F_1$ ) were varied in synthetic versions of "rock" and "lock." Four temporal variations (A, B, C, D) in each of ten stimuli of a spectral-cue continuum were generated. In phonetic identification and oddity discrimination tasks with the four series, systematic displacement of perceptual boundaries and discrimination peaks reflected a trading relation between the two cues. Utilizing the A and C series, the perceptual equivalence of spectral and temporal cues was investigated by comparing the relative discrimination of three types of stimulus comparisons: facilitating cues (values of both acoustic parameters were selected to facilitate phonetic differentiation), one-cue (only spectral cue values varied), and conflicting cues (values of both acoustic parameters were selected to conflict as to phonetic differentiation). As predicted, discrimination accuracy was ordered: facilitating cues > one-cue > conflicting cues comparisons, indicating that perceivers responded on the basis of an integrated phonetic percept. [Supported by NIMH.]

9:50

**Z8. Asymmetries in the influence of vocalic context on fricative perception.** Virginia A. Mann (Department of Psychology, Bryn Mawr College, Bryn Mawr, PA 19010 and Haskins Laboratories, 270 Crown Street, New Haven, CT 06510) and Sigfrid D. Soli (Department of Psychology, University of Maryland, College Park, MD 20742 and Haskins Laboratories, 270 Crown Street, New Haven, CT 06510)

The perception of a synthetic fricative noise as /f/ or /s/ is influenced by an adjacent vocalic segment. The influence is greater when the synthetic noise replaces the natural friction in FV syllables than in VF syllables [S. D. Soli and V. A. Mann, *J. Acoust. Soc. Am. Suppl.* 1 71, S75 (1982)]. These differences could be due to differing articulatory interactions in the

production of FV and VF syllables, or, alternatively, to a strategy favoring later-occurring acoustic cues. These hypotheses were tested in a perceptual study using vocalic segments from natural FV and VF syllables, where F = /f/ and /s/, and V = /a/ and /u/. The vocalic segments were combined with synthetic friction noises to yield VFV stimuli, allowing a direct assessment of the relative strength of vocalic cues on either side of the friction noise. The results showed that the influence of fricative place of articulation cues was restricted to following vocalic segments. However, lip-rounding cues in both the preceding and following segments influenced fricative perception. These findings are consistent with the view that the observed perceptual asymmetries are based on coarticulatory asymmetries. [Supported by NICHD.]

10:05

**Z9. Acoustic and articulatory asymmetries in fricative-vowel and vowel-fricative productions.** Sigfrid D. Soli (Department of Psychology, University of Maryland, College Park, MD 20742 and Haskins Laboratories, 270 Crown Street, New Haven, CT 06510) and Virginia A. Mann (Department of Psychology, Bryn Mawr College, Bryn Mawr, PA 19010 and Haskins Laboratories, 270 Crown Street, New Haven, CT 06510)

When synthetic noise replaces the natural friction in FV syllables and VF syllables, the influence of the vocalic segment on the perception of the noise as /s/ or /f/ is greater for the FV syllables [S. D. Soli and V. A. Mann, *J. Acoust. Soc. Am. Suppl.* 1 71, S75 (1982)]. The acoustic and articulatory bases of this perceptual asymmetry were examined. Mean formant tracks displaying confidence intervals and amplitudes were computed for natural FV and VF syllables, where F = /f/ and /s/, and V = /a/ and /u/. FV and VF transitions were equally stable, although FV transitions exhibited larger coarticulatory differences due to fricative context. FV transitions also occurred during the highest amplitude portion of the vocalic segment, while VF transitions occurred as voicing amplitude was decreasing rapidly before the upcoming voiceless fricative. These acoustic differences would lead to larger vowel context effects for FV syllables. Thus the perceptual asymmetries appear to be a consequence of differences in the organization and timing of the supralaryngeal and laryngeal events which produce initial and final voiceless fricatives. [Supported by NICHD.]

10:20

**Z10. Intelligibility of consonants in VCV fragments excised from connected speech.** A. Schmidt-Nielsen (Naval Research Laboratory, Code 7526, Washington, DC 20375)

Confusions between pairs of intervocalic consonants excised from connected speech were investigated under several conditions of speech degradation: digital voice processing, noise, bandpass limiting. The stimuli were created by digitally extracting only the VCV portion from read sentences such as the following: "...wants to study seals and their breeding patterns." / "...wants to study seals and their breathing patterns." When these were presented to listeners, the distribution of the types of errors that were made, e.g., voicing, nasality, place of articulation, differed from those made on citation form syllable-initial consonants. Intervocalic consonants that were taken from word initial position scored higher initially than those taken from word medial or word final position, but the medial and final segments dropped less under mild degradations than did the initial ones. [Work supported by ONR.]

10:35

**Z11. Psychoacoustic properties of imagined speech stimuli.** Christopher D. Farrar (Department of Linguistics, Ohio State University, Columbus, OH 43210)

Synthetic consonant-vowel syllables were generated by factorially crossing four values each on two acoustic continua (VOT and  $F_2$ - $F_3$  transition onset frequency) to produce 16 stimuli identifiable as /ba/, /pa/, /ta/, and /da/. In addition, four silent stimuli were generated. The complete set of 20 stimuli was presented to subjects in a paired comparison test for scalar judgments of similarity. Silent stimuli were presented