

contours were resampled to produce a fixed duration of 400 ms (two standard deviations above the mean). The great majority of the signals were accurately identified under all four conditions, suggesting that the overall effect of duration on vowel identity is modest. Significant duration effects were observed, however, especially in the short-duration condition in which the majority of /æ/ tokens were heard as /ɛ/ and many tokens of /a/ and /ɔ/ were heard as /ʌ/. [Work supported by NIH.]

8:45

5aSC3. Thresholds for second formant transitions in front vowels. Shawn Goodman and Diane Kewley-Port (Dept. of Speech and Hearing Sci., Indiana Univ., Bloomington, IN 47405, shgoodma@indiana.edu)

Formant dynamics in vowel nuclei contribute to accurate vowel classification in English. This study examined listeners' ability to discriminate dynamic second formant transitions in female vowels /i, ɪ, e, ε, æ/. Acoustic measurements were made from the nuclei (20% to 80% of vowel duration) of vowels in /bVd/ context in short sentences. Based on measurements along with informal listening, natural sounding vowel nuclei were synthesized. Synthesis parameters were selected to yield 12 discrimination conditions: initial frequency value for F_2 (2525, 2272, or 2068 Hz), slope direction (positive or negative), and duration (110 or 165 ms). F_0 and F_1 were both steady-state. Stimuli with steady-state F_2 s were compared to those in which final frequency varied. Five listeners were tested under adaptive tracking using a modified 2AFC task with feedback to determine ΔF , the threshold for frequency extent (the difference in frequency between the initial and final F_2 values). Analysis showed that initial frequency, slope direction, and duration all contributed to significant differences in ΔF . Results indicated that listeners attended to differences in frequency extent (Hz), not formant slope (Hz/s). Formant extent thresholds were 3 to 18 times smaller than extents measured in the natural speech tokens. [Work supported by NIHDCD-02229.]

9:00

5aSC4. Production and perception of English vowels. Byunggon Yang (English Dept., Dongeui Univ., 24 Kayadong, Pusan 614-714, South Korea, bgyang@hyomin.dongueui.ac.kr)

This study examined the relation between production of nine English vowels and perception of the synthesized vowels by 14 American male and female speakers. Fant's bandwidth equations were employed to dynamically tune to the varied formant frequency values. A remarkable r^2 value was obtained from the regression analysis between the center formant frequency values at which the subjects perceived the same vowel quality from the discriminatory test and the formant values of the synthesis models. Males and females perceived the synthesized vowels in the same way with converging center formant values and similar ranges of the same vowel quality. There was a strong link between production and perception of male and female speakers. The average r^2 value was very high, which suggests a very lawful relation between production and perception. From the individual analyses we found that listeners adjusted the criteria for vowel discrimination in relation to their own vocal tracts. This result suggests that speaker normalization can be pursued by finding an individual regression equation between the reference and observed formant patterns. Also, the present data proved that human listeners possess a very accurate perceptual mechanism to extract invariant features from complex acoustic stimuli.

9:15

5aSC5. The obligatory use of vowel duration in speaking rate normalization. Kathleen M. Measer and James R. Sawusch (Dept. of Psych., SUNY at Buffalo, Buffalo, NY 14260, kmmeaser@acsu.buffalo.edu)

Speech segment duration varies with speaking rate and phonetic identity. This study explored how listeners normalize for speaking rate when variation in segmental duration was a result of phonetic identity. Listeners identified the initial consonant in series that ranged from "beat" to "wheat" and "bead" to "weed." Even though the endpoints of the series

were spoken at the same speaking rate, the vowel duration in "bead"–"weed" was longer than "beat"–"wheat." Luce and Charles-Luce [J. Acoust. Soc. Am. 78, 1949–1957 (1985)] showed that vowel duration is an acoustic correlate of final stop voicing. Even though the vowel duration difference was an acoustic correlate of the final consonant voicing, listeners responded to the series as if vowel duration variation were also a cue to speaking rate. Listeners gave more /b/ responses to the "bead"–"weed" series. These data are inconsistent with models of perception in which acoustic correlates are uniquely assigned to sources in speech production. Instead, speaking rate normalization appears to be an early, autonomous process and the perceptual utilization of duration information for multiple aspects of speech perception may be obligatory. [Work supported by NIDCD Grant No. R01DC00219 to SUNY at Buffalo.]

9:30–9:45 Break

9:45

5aSC6. On idiolectal differences in speaking rate: A comparison of spontaneous and read speech. Robert E. Remez, Janelle Barnes (Dept. of Psych., Barnard College, 3009 Broadway, New York, NY 10027, remez@columbia.edu), Dalia Shoretz (Harvard Univ. Med. School, Boston, MA 02115), Maya Chatav, and Rebecca Piorowski (Barnard College, New York, NY 10027)

Individuals who share a dialect nonetheless differ consistently in phonetic expression. The origin of such idiolectal differences has been sought in sociolinguistically and in physiologically motivated accounts. Our study focused on characteristic differences in the habitual rate of speech production within a dialect, aiming to calibrate the contribution of neuromuscular constraint in idiolect differences. We sampled and analyzed the temporal characteristics of spontaneous and read speech produced by a set of adolescent female talkers from Brooklyn, New York. Spontaneous speech was elicited by open-ended questions, while the Farm Script was used as the text for production of read speech at comfortable and at rapid rates. Overall, the rate of rapid read speech was correlated with the rate of comfortable spontaneous speech and comfortable reading, indicating a clear contribution of neuromuscular constraints to characteristic differences in speech rate. However, some talkers exhibiting the ability to produce rapid speech at the fastest rates adopted comfortable speaking rates at the slower end of the distribution. In light of these findings, we doubt that idiolectal differences in speaking rate can be accountable solely by appeal to differences between individuals in agility of oral articulators. [Work supported by NIH DC00308.]

10:00

5aSC7. Effects of talker voice on lexical neighborhood and speech perception. Liza K. Zimack and James R. Sawusch (Dept. of Psych., SUNY at Buffalo, Buffalo, NY 14260, lkz2@acsu.buffalo.edu)

Previous research has shown that the number of words that a syllable is similar to (lexical neighborhood) influences the perception of the syllable and its phonemes. For example, in "bowth" "powth" and "bows" "pows" series, "bowth" is similar to more words than "powth," while "pows" is similar to more words than "bows." Listeners report more syllables beginning with /b/ in "bowth" "powth" and more that begin with /p/ in "bows" "pows." However, with one particular talker, no effects of lexical neighborhood were found. This research focused on two explanations for the lack of neighborhood effects for this talker. One possibility is that the previous method of determining lexical neighborhood is inaccurate for this talker. Alternatively, the time course for phonetic and lexical information processing may be different for this talker. In this research, listeners identified the final consonant in two nonword CVC series: "faesh" "faech" and "taesh" "taech." With a syllable final target phoneme, lexical neighborhood influences should build up prior to the processing of the target phoneme. Implications of the data for models of word recognition and perception with different talkers will be discussed. [Work supported by NIDCD Grant No. R01DC00219 to SUNY at Buffalo.]