

structure and a wave-number domain filter to quantify far-field radiation. Results from these tests will be used to help determine how quieter materials can be designed. [Work supported by NSF.]

11:25

4aSA9. Structural vibration noise from open grid bridge decks. J. M. Cuschieri (Ctr. for Acoust. and Vib., Dept. of Ocean Eng., Florida Atlantic Univ., Boca Raton, FL 33431) and M. Tournour (Sherbrooke Univ., Sherbrooke, Canada)

The contribution to the overall tonal component of the noise from the vibration of the grid section of an open grid bridge deck due to excitation by the interaction with the vehicle tires is investigated. Using vibration field measurements of the grid and laboratory measurements of the acoustic radiation efficiency, it is shown that the contribution to the overall noise level measured at the curb from the vibrations of the grid is insignificant. The main reason for this result is the poor acoustic radiation efficiency of the grid. Because of the large percentage of open area, the plate-like modes of the grid deck have very poor radiation efficiency. Similarly, the individual grid elements, based on their size and the frequency range where the predominant excitation from the tire takes place, are also very inefficient acoustic radiators. The significance of this result is that mitigation procedures that only reduce the vibration of the grid will not significantly reduce the overall radiated noise. [Work sponsored by FDOT.]

11:40

4aSA10. Tire noise from open grid bridge decks. J. M. Cuschieri (Ctr. for Acoust. and Vib., Dept. of Ocean Eng., Florida Atlantic Univ., Boca Raton, FL 33431) and S. Gregory (General Dynamics, Groton, CT)

Having identified that the contribution to the overall noise from the grid vibrations is insignificant, the attention is focused on the noise radiated from the vibrations of the tire. Field measurements of tire vibrations are rather difficult, therefore laboratory measurements and analytic mod-

eling were used to understand the contribution from the tire vibrations. The laboratory measurements of both vibration and radiated noise compare well with the estimates from the analytic modeling. Using an estimate of the interaction force between the tire and the grid, from the field vibration data, it is shown that the estimated radiated noise level is comparable to the field measured noise level at the curb. This leads to the conclusion that the noise from the tire vibrations is the dominant source, and mitigation procedures must consider ways of reducing the excitation of the tire. This conclusion is verified by sound level measurements performed with the contribution from the grid vibrations removed. [Work sponsored by FDOT.]

11:55

4aSA11. Combined large area sensor—actuator tile for the NRL-ABC platform. Robert D. Corsaro and Brian Houston (Naval Res. Lab., Code 7130, Washington, DC 20375-5350)

A new research platform has been constructed for underwater studies of sensor/actuator coupling mechanisms. It consists of a 15-tile array of "ABC" tiles, where each tile contains a large area actuator, pressure sensor, and velocity sensor, where the latter is constructed by summing and integrating the outputs of four accelerometers. This paper presents details of the tile design and the predictive models used. Issues addressed include spatial sampling, near-field sensing, internal resonances, and both direct and extraneous coupling mechanisms, all of which can contribute to complicate the system transfer functions. Acoustic characteristics of the ABC tile were evaluated in the NRL Large Pool Facility, both in the free field and when mounted on a backing structure, and these results are compared with predictions. Implications for local control of the actuator's surface are also discussed.

FRIDAY MORNING, 2 JUNE 1995

CONGRESSIONAL HALL A, 8:30 A.M. TO 12:00 NOON

Session 4aSC

Speech Communication: Potpourri (Poster Session)

Sandra Gordon-Salant, Chair

Department of Hearing and Speech Sciences, University of Maryland, College Park, Maryland 20742

Contributed Papers

All posters will be on display from 8:30 a.m. to 12:00 noon. To allow contributors an opportunity to see other posters, contributors of odd-numbered papers will be at their posters from 8:30 to 10:15 a.m. and contributors of even-numbered papers will be at their posters from 10:15 a.m. to 12:00 noon. To allow for extended viewing time, posters will remain on display until 8:00 p.m.

4aSC1. Lexical distinctiveness in lipreading: Effects of phonemic equivalence classes on the structure of the lexicon. Edward T. Auer, Jr. and Lynne E. Bernstein (Ctr. for Auditory and Speech Sci., Gallaudet Univ., 800 Florida Ave. N.E., Washington, DC 20002)

Speech perceived on the basis of viewing a talker's face affords less phonetic distinctiveness than acoustic speech. Effects of this reduced distinctiveness can be estimated in relation to the structure of the mental lexicon. Based on empirical measures of phonetic confusability, recoding rules can be defined for mapping fully specified phonological forms into

lexical equivalence classes. For example, under the recoding rule that /b/ and /p/ are in the same phonemic equivalence class the words "bat" and "pat" map into the same lexical equivalence class. After applying a set of recoding rules to a large online lexical database, the resulting structure of the lexicon can then be studied quantitatively. One such measure of the recoding effects on the lexicon is percent information extracted (PIE) [D. M. Carter, *Comput. Speech Lang.* **2**, 1–11 (1987)]. Lexical statistics describing the results of applying sets of recoding rules derived from analyses of visual-phonetic confusability to a 30 000-entry lexicon will be pre-

sented. Implications for the use of top-down lexical constraints in resolving bottom-up visual-phonetic ambiguity during lipreading will be discussed. [Work supported by NIH.]

4aSC2. The effects of featural priming on word recognition. E. Morrish (Nottingham Trent Univ., Nottingham NG11 8NS, UK)

The aim of this paper is to test the hypothesis that broad phonetic categories [V. Zue, Proc. IEEE 73, 1602–1615 (1985)] can act as a contact representation for lexical access. The results of this work will be considered in terms of implications for the neighborhood activation model. The technique used in this experiment was “phonetic priming” [A. Jongman and J. Sereno, Working Papers Cornell Phon. Lab. 7, 151–176 (1992)]. Subjects were asked to make a lexical decision about a target word which was preceded by a subphonemic prime (either an ambiguous fricative or an ambiguous stop). The prime either matched or mismatched the manner of articulation of the initial phoneme of the target. Reaction time results showed an interaction between initial and prime, so that when these matched, the subjects’ reaction time was inhibited. Furthermore the neighborhood effect [Goldinger *et al.*, J. Memory Lang. 28, 501–518 (1989)], that words from a low-density similarity neighborhood are recognized faster than words from a high-density neighborhood, was enhanced by the presence of the phonetically related prime. These results suggest that broad phonetic features may activate lexical candidates.

4aSC3. Multinomial models of speech perception. Court S. Crowther (UCLA Phon. Lab., Dept. of Linguistics, Los Angeles, CA 90024-1543) and William H. Batchelder (Univ. of California, Irvine)

It is often the case that two different acoustic cues can influence perception of *both* of two adjacent phonemes within a syllable. In such cases, it is of interest to determine whether the cues are evaluated independently; that is, does a listener’s evaluation of one cue influence evaluation of the other cue? Another, related question is whether, as some researchers claim, phoneme decisions are dependent in the sense that, when cued by the same information, the decisions compete for the information. This study modeled data from a two factor, four category experiment in which *F1* offset frequency and vowel duration cue *both* voicing and vowel identity in CVC syllables. A family of multinomial processing tree models [e.g., D. M. Riefer and W. H. Batchelder, Psychol. Rev. 95, 318–339 (1988)], of which the fuzzy logic model of perception for the two factor, four category design is a special case, was developed and tested to explore the independence issues. This modeling approach is highly flexible and allows one to test a wide range of hypotheses regarding speech cue processing.

4aSC4. Talker variability and token variability in spoken word recognition: Effects on repetition priming in lexical decision and an explicit recognition memory task. Emily A. Lyons (Language Perception Lab., Dept. of Psych., Park Hall, SUNY, Buffalo, NY 14260)

Recent research (e.g., Goldinger, 1993) has suggested that representations of spoken words in memory may be veridical exemplars that encode instance-specific information, such as characteristics of the talker’s voice. This account of spoken word recognition was examined in work presented at a recent meeting of the Acoustical Society (Luce and Lyons, 1994). Evidence was presented in support of the claim that exemplar-type representations are used in explicit recognition memory tasks, but that more abstract representations play a role in tasks such as lexical decision. However, the previous work did not make clear the explicitness of the information encoded in exemplar-type representations; specifically whether only gross factors such as talker variation are encoded, or whether within speaker variation is also encoded. The present research expands on these previous results by comparing the effects of talker variation and same-speaker token variation on a repetition priming and an explicit recognition memory task. [Work supported by NIDCD.]

4aSC5. Lexical influence on the perception and segmentation of speech: Evidence from the migration paradigm. Sven L. Mattys and Arthur G. Samuel (Dept. of Psych., SUNY at Stony Brook, Stony Brook, NY 11794-2500)

The present study addresses the issue of lexical influence on perception through a new paradigm based on the migration of linguistic units from one ear to the other when two stimuli are presented dichotically. For ex-

ample, “dentast” and “kolbisk” could be presented dichotically, with subjects judging if “dentist” was presented. The migration of the vowel, leading to erroneous perception of a pre-specified target, occurred less often with word targets than with nonsense word targets. This result indicate that the lexical representation of a signal imposes some restriction on the acoustic-phonetic stage of processing of the signal. Furthermore, when the two items of the pairs were played binaurally rather than dichotically, the migration rate increased substantially, but the size of the lexical effect remained unchanged. However, the lexical effect disappeared when the migrating vowel was located in the stressed syllable of the stimuli. In this condition, the lexical resistance collapses and words become as susceptible to migrations as nonsense words. This second result may suggest that lexical access is initiated on strong syllables of words: when the stressed syllable is mispronounced, lexical access is impaired, eliminating the lexical effect. [Work supported by AFOSR, NIMH, and BAEF.]

4aSC6. Phonological and phonotactic influences on perception of two non-native vowel contrasts. Robert A. Avery and Catherine T. Best (Dept. of Psych., Wesleyan Univ., Middletown, CT 06459 and Haskins Labs., 270 Crown St., New Haven, CT 06511)

Listeners’ native phonology constrains their perception of non-native phonetic distinctions. Although most non-native contrasts are discriminated poorly, recent findings that certain contrasts are discriminated well led to development of a “perceptual assimilation model” (PAM), which proposes that the perceptual assimilation of non-native phones to native categories predicts discrimination performance [e.g., Best *et al.*, JEP:HPP 14, 345–360 (1988)]. The current study investigated native phonotactic influences on three assimilation patterns. Non-native contrasts that: (1) assimilate to two categories (TC) and show excellent discrimination; (2) assimilate equally to a single category (SC) and show poor discrimination; (3) assimilate as a category goodness difference (CG) and show good discrimination. American adults labeled and discriminated lip-rounding contrasts among Norwegian high front vowels [i/–y/; /ɛ/–/y/] in CV’s and CVC’s. In both contexts, Norwegian /i/ of course was assimilated to English /i/; /ɛ/ was assimilated to /u/. Although /y/ was assimilated equally to /i/ or /i/ in CVCs, it was virtually always called /i/ in CVs, compatible with the English phonotactic constraint against final lax vowels. Thus, /ɛ/–/y/ showed TC assimilation and good discrimination in both syllabic contexts. In CVs, /i/–/y/ showed SC assimilation and poor discrimination; in CVCs, it showed TC or CG assimilation and good discrimination.

4aSC7. Phonotactic and metrical influences on subjective ratings of spoken nonsense words. Michael S. Vitevitch, Paul A. Luce (Language Perception Lab., Dept. of Psych., SUNY, Buffalo, NY 14260), Jan Charles-Luce, and David Kemmerer (SUNY at Buffalo)

This research examined English speakers’ intuitions about the phonological “goodness” of nonsense words. Subjects rated bisyllabic, CVC-CVC nonsense words that varied in phonotactic probability and stress placement. Using a ten-point scale, subjects judged how English-like the nonsense words sounded. Although all nonsense words were phonotactically legal in English, subjects showed strong preferences for stimuli composed of highly probable phonotactic contributions. Moreover, subjects judged nonsense words with strong–weak stress patterns as constituting “better” sounding English words than nonsense words with weak–strong patterns. No interaction between phonotactic probability and stress was observed. These results will be discussed in light of recent findings regarding adults’ (Auer and Luce, 1993) and infants’ (Jusczyk, Luce, and Charles-Luce, 1994) sensitivity to the phonotactic configurations of spoken stimuli. [Work supported by NIDCD.]

4aSC8. The segmental representation of words as revealed by priming in a lexical decision task. James R. Sawusch and Nancy J. Palmer (Dept. of Psych., Park Hall, SUNY, Buffalo, NY 14260)

In previous studies, a priming task has been used to explore the nature of the segmental representation of words. The phonetic overlap between a prime and a target was varied and the speed of naming or lexical decision to the target examined. The previous results showed that when phonemes occurred in the same syllable position in prime and target, responses to the target were faster than for control trials where the prime and target had no phonemes in common. In contrast, when prime and target shared pho-