

## A Cross-Language Study of Perceptual Asymmetry

T. F. Myers and J. J. Wolf

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## PROGRAM OF

# The Eighty-Third Meeting of the Acoustical Society of America

Statler Hilton Hotel

• Buffalo, New York •

18-21 April 1972

TUESDAY, 18 APRIL 1972

GEORGIAN ROOM, 9:00 A.M.

### Session A. Speech Communication I: Perception and Confusion

ARTHUR S. ABRAMSON, *Chairman*

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#### *Contributed Papers*

**A1. Certain Speech/Nonspeech Perceptual Contrasts.** DOROTHY A. HUNTINGTON AND CARL G. MÜLLER, *Hearing and Speech Science, Stanford University, Stanford, California 94305.*—The effects of changing stimulus durations were examined for speech and nonspeech signals. The aperiodic initial portion of the syllable [ʃa] was cut by progressive 7-msec decrements thus generating stimuli perceived as progressing, as expected, through several categories from unvoiced sibilant to voiced stop. These stimuli were presented in reversed sequential orders to listeners for identification. Two similar sets from a second talker were randomized and presented to 36 judges for identification and for discrimination. Additional stimuli of similar time course prepared from square gated white noise followed by a pulse train were judged for discriminability. Analyses showed that context effects in the sequential identification tasks were small. Discrimination scores reflected response preferences involving order of presentation for both speech and noise stimuli. Comparison of identifications and discriminations shows increasing evidence of categorical perception as category size diminishes or duration decreases. Discrimination and detection curves for speech and noise stimuli show marked contrasts. [We gratefully acknowledge the assistance of Earl D. Schubert.]

**A2. A Cross-Language Study of Perceptual Asymmetry.** T. F. MYERS AND J. J. WOLF,\* *Department of Psychology, University of Edinburgh, Great Britain.*—Recent findings that the speech-dominant hemisphere is specialized at the level of distinctive feature analysis entail a prediction that the processing of acoustic cues embodying a feature distinction in a particular language is asymmetric for "native" listeners, but not asymmetric for nonspeakers of the language if their own language does not employ the contrast. Russian- and English-speaking listeners were presented dichotic sequences of syllables for identification of the consonants, i.e., the stops, categorized in Russian, but not in English, as palatalized or nonpalatalized. The results are discussed in the context of a recognition model equipped with a "filter" for feature selection.

\*Now at Bolt Beranek and Newman, Inc., Cambridge, Mass. 02138.

**A3. Perceptual Features of Nine English Consonants Determined by Choice Reaction Time.** FREDERICK WEINER AND SADANAND SINGH, *Ohio University, Athens, Ohio.*—Nine English consonants were presented in pairs for the judgments of same/different to 10 subjects. Subject's choice reaction time (CRT), in making the above judgment, was considered

to represent the interpoint distance of the criterion phoneme in subjects' perceptual space. A multidimensional analysis (IND-SCAL) showed that the magnitude of subjects' CRT for determining the sameness or differentness of a phoneme pair was governed by the distinctive features of these sounds. The features retrieved from a three-dimensional analysis were (1) sibilant, (2) voicing, and (3) place. It was further shown that phoneme pairs distinct by zero, one, two, or three feature differences had significantly different CRTs. Pairs having a "zero" feature difference had significantly greater CRTs than pairs different by one-three features. Similarly, pairs with a one-feature difference had significantly greater CRTs than those with a three-feature difference. Within one-feature comparisons, CRT associated with sibilant was shortest following by the features place and voicing. This indicated greater distinctiveness of sibilant than place and voicing. Voicing showed the longest CRT, thus indicating minimal perceptual distinctiveness.

**A4. A Search for the Perceptual Features of the 29 Prevoicall Hindi Consonants.** SADANAND SINGH AND KALA SINGH, *School of Hearing and Speech Sciences, Ohio University, Athens, Ohio 45701.*—The 29 consonants of Hindi were recorded prevoicallly with the vowel /a/. Each consonant was included in proportion to its statistical probability in Hindi. Thus, while /p/ was included five times, /k/ 14 times. Ten native speakers of Hindi listened the stimuli in each ear separately in five S/N ratio conditions. Listeners responded in an open-choice manner. The responses were written in Devnāgri script. The tallies were made for all the errors which were then averaged for each stimulus consonant across the 10 subjects. The analysis of the 10 matrices (five S/N ratio × Ears) by IND-SCAL method provided best interpretation in five-dimensional space. The perceptual features obtained were best described in articulatory terms. The first two dimensions were interpreted as *voicing*, *aspiration*, and *sonorant* with further interpretation of *sonorant* as: *retroflexion*, *nasality*, *laterality*, and *semivowel*. A subset of 22 consonants, for which place of articulation was phonologically distinctive, was further analyzed. The analysis yielded perceptual features (with articulatory nomenclature) *front/back* and *palatal*. [This work was partially supported by a grant from NIH.]

**A5. Perception of Segments of Spoken (Hindi) Vowel-Consonant-Vowel Syllables.** S. S. AGRAWAL, *Central Electronics Engineering Research Institute, Pilani, India,* AND