

PHONOLOGICAL GRAMMAR IN SPEECH PERCEPTION

A Dissertation Presented

by

ELLIOTT MORETON

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Department of Linguistics

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ALFRED ELLIOTT MORETON

Approved as to style and content by:

John Kingston, Chair

Lyn Frazier, Member

Charles E. Clifton, Member

Elisabeth O. Selkirk, Department Head
Department of Linguistics

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ABSTRACT

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ELLIOTT MORETON, B. A., SWARTHMORE COLLEGE

Ph.D., UNIVERSITY OF MASSACHUSETTS, AMHERST

Directed by: Professor John Kingston

This dissertation investigates the ways in which speech perception is guided by the expectation that the stimulus is an utterance in the perceiver's language, with a particular focus on how phonotactics affects the interpretation of acoustically ambiguous segments. A model is proposed in which phonological grammar, expressed here as a system of ranked and violable constraints within the framework of phonological Optimality Theory, is used to select among competing candidate parses of the acoustic input. This grammar-based theory is contrasted with two grammarless alternative accounts of perception: the connectionist network TRACE, which derives phonotactic perceptual effects from the lexicon, and a statistical theory based on transitional probabilities.

Experimental evidence is presented to show (1) that English listeners' judgments of vowels and of consonant clusters disfavor configurations which are grammatically illegal in the language, (2) that the dispreference for illegal configurations is far stronger than that for configurations which are legal but have zero frequency, and (3) that it is due to a response dependency, rather than to auditory or other stimulus factors, and cannot be explained by foreign-language exposure. Two experiments with Japanese listeners find

that (1) the lexical stratum membership of nonsense words can produce a phonotactic perceptual effect, (2) that the triggering and target segments can be up to three segments distant, and (3) that the stratum-phonotactic effect is larger than a word-superiority effect obtained with the same listeners and paradigm.

These results are shown to be consistent with the grammar-based model, but inconsistent with the two grammarless alternatives. Analysis of the three models reveals that the shortcomings of the alternatives is due to their inability to abstract over phoneme classes and larger linguistic structures. It is concluded that the mechanisms of speech perception have access to a full-fledged phonological competence.