

Constructing Neighborhood Density from Spoken Word Recognition Errors

Most theories of word recognition posit a stage where words that partially match an input stimulus are activated in the lexicon and compete with one another for access. Numerous studies have shown that these competitors – referred to as “neighbors” – have an inhibitory effect on speed and accuracy of spoken word recognition (e.g. Luce, 1986; Luce & Pisoni, 1998). Most studies have defined neighbors as words differing in only one segment from the target word. While this definition has been adequate at predicting effects of neighborhood density for monosyllabic words, it is unclear whether this definition holds for longer words. Given the view that “neighbors” are those words which compete for lexical access, the present work attempts to derive a definition of neighborhood density by analyzing errors from spoken word recognition tasks, as these error responses are a direct reflection of the words that are activated in the lexicon during spoken word recognition. To generalize the concept of neighbor over the entire lexicon, we have constructed a list of 1428 words, designed to be a representative sample of the entire English lexicon. The sample was matched with the Hoosier Mental Lexicon (Nusbaum et al., 1984) on number of syllables, number of phonemes, initial phoneme, syllable structure, and lexical frequency. These words were presented in multi-talker babble to 196 normal-hearing listeners. The results reveal several patterns that inform our understanding of phonological neighbors: (1) Less than 1/3 of the errors were neighbors according to the traditional definition of neighborhood density; (2) Errors tend to be of higher frequency than the target word; and (3) Incorrect responses were very close to the target words in terms of number of phonemes and syllables. We use these findings to construct a new definition of neighborhood that includes words that differ by more than one phoneme, and takes into account a more global measure of similarity, including length, syllable structure, and confusability.

References

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