

Linguistic Influences on Fine Phonetic Detail

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This study investigates the role of linguistic information in spontaneous speech. In particular, we examine how word frequency, collocational frequency, morphology, and semantic association influence the production of fine phonetic detail. Words in everyday, casual conversations are often produced in variable forms that are different from their citation form. For example, it has been shown that the duration of a word is produced longer in some contexts and shorter in others (Pluymaekers et al., 2006). Much work has been done on how different pieces of linguistic information affect the perception of this type of acoustic variation in speech processing (e.g., Ernestus et al., 2002). However, little research has been performed on how linguistic information can in turn affect speech production itself. The goal of the present study, then, is to ask to what extent does higher-level linguistic information play a role on the modulation of fine phonetic detail.

To address this theoretical question, we investigate a set of monosyllabic irregular English verbs. Items we included in this set consist of verbs that differ from their past and present tense form based solely on an alternation between vowels. For example “sing/sang” was included while “weep/wept” was not. This set of words provides us with the unique opportunity to look at the interaction of morphology with fine phonetic detail. As the morphological information for this set of words is captured entirely within the vowel, we are able to acoustically evaluate the differences in vowels in the present tense compared to those in the past tense. Any significant findings in terms of the phonetic detail of vowels in the past tense versus vowels in the present tense can be attributed to an effect of morphology. We extracted from the Buckeye Corpus of Conversational English (Pitt et al., 2007) the 7,034 vowels that come from the words belonging to our set of 54 irregular verbs occurring in the corpus. In an acoustic analysis, we measured the formant values, pitch, intensity, and duration for each of the vowels. Both linear and generalized additive modelling techniques were used to examine the influences of word frequency, collocational frequency, morphology, and semantic association on the acoustic measures gathered. We present our findings in terms of the role each linguistic factor plays in the modulation of phonetic detail. This study then concludes with a more holistic theory of speech production that takes into account the influence of higher-level linguistic information in spontaneous speech. The results indicate that probabilistic lexical information influences speech production, relying on collocative and word frequencies. Many models of speech production in the past have been developed independent of these additional linguistic factors and have not considered spontaneous speech. We, however, find support for a cognitive theory of speech production where distributional, semantic and morphological information influences production.

References

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