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The effect of speech rate on the voicing effect in English

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**1. Acknowledgements**

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**2. Introduction**

The basis for this project is the well-established fact that vowels preceding voiced consonants have longer durations than those which precede voiceless consonants. This voicing effect (hereafter VE) is the subject of my study. My question is whether the rate of speech of the speaker has an impact on the VE, and if so, how?

There are multiple theoretical explanations for the VE. According to Durvasula 2014, the most recent account uses speech perception to explain the existence of the VE. The key to this explanation is that they draw a link between the existence of the VE and “the fact that closure durations of voiced consonants are shorter than those of voiceless consonants.” The idea here is that to increase the contrast for listeners, speakers produce a long vowel which “enhances the perceptual cue of a short closure duration on the following consonant…” In essence, the context provided by the vowel length helps to enhance the perceived shortness of the voiced consonant closure and vice versa.

Given this background information, the central question is how the VE is affected by speech rate. Does the difference between vowels preceding voiced and voiceless consonants change based on the rate of speech at all? Does it change proportionally to the difference in speech rate? I hypothesize that the VE will change in proportion to the change in speech rate to maintain a constant perceptual distance between voiced and voiceless consonants. This is based on research by Solé (2007) which states that “acoustic properties targeted by the speaker adjust to durational variations triggered by changes in speaking rate so as to maintain a constant perceptual distance across rates…” The ratio of the length of vowels preceding voiced consonants to those preceding voiceless consonants has been suggested to be between 1.2 to 1.6, according to Tanner (2019, p. 1). Tanner describes the VE as being “larger than otherwise explainable by purely articulatory properties” (p. 1). This description suggests we should predict the VE to be roughly proportional across speech rates. For example, we might expect a 1.4 voiced to voiceless ratio at slow, normal and fast speech rates, with both vowel lengths increasing or decreasing *together* based on the rate.

Also relevant to my research question, Tanner notes that “the size of the effect has been shown to be at least partially modulated by the effects of… speech rate” (p. 1). Later continuing, “it is possible that VE is neutralized on fast speech, where there may be some upper limit on the extent to which a syllable can be shortened, resulting from some form of ‘maximal compression’ of a vowel.”