Speech Production as a Function of Lexical and Sublexical Variables

Chasse Guerrera, Laura Sturm, Lindsey Suddaby
Faculty Sponsor: Dr. Skott Jones

Articulation can be defined as the production of speech sounds using the mouth, tongue, lips, and other anatomical structures (for example, making an "r" sound by moving your tongue to a specific position in the mouth). Often times, the specific word being produced can affect how it is articulated. Variables such as word frequency (WF), phonotactic probability (PP), and neighborhood density (ND) have been known to impact articulation. These variables will be defined below.

Word frequency is a measure of how often words are produced in a language, with "rare" words being used less often. This is measured using a word corpus, or a collection of written texts. Phonotactic probability refers to how frequently sequences of sounds occur in a language or the likelihood that certain sounds will occur next to each other. Lastly, neighborhood density measures the number of words that differ from the initial target word by adding, deleting or changing a single sound to create a different word. Words with high ND have a lot of words that differ only in one sound, in words with low ND have few words that can be produced by changing one sound. The number of words that can be generated changing one sound describes the neighborhood size. Previous studies have determined that these three lexical factors have effects on speech production.

WF has been found to predict the kinds of errors that children will make. German and Newman (2004) found that phonological error patterns were predicted by WF. Words that were lower in frequency, or "rare" words, resulted in more productive errors. WF has also been noted as a significant predictor of production variability, or when a word is produced inconsistently, with high frequency words being less variable in production (Sosa & Stoell-Gammon, 2012).

In terms of PP, the more likely sounds are to co-occur, the more accurately children produce them (Munson, Kurtz & Windsor, 2005). Additionally, a variety of studies have shown sounds occurring in few words are repeated less accurately (Munson, Edwards, & Beckman, 2005).

Finally, previous research conducted on the impact of ND on children's picture naming found that children more accurately named and articulated words with high ND vs. low ND (Freedman, 2013). Similarly, it has been found that the number of neighbors a target word has significantly predicted whether a child would accurately retrieve a word (Newman & German, 2004).

The purpose of the current study was to examine these three variables in their effects on stimuli (words presented) in four tests of articulation: The Khan-Lewis Phonological Analysis, Hodson Assessment of Phonological Patterns (HAPP-3, Hodson, 2004), the Goldman-Fristoe Test of Articulation (GFTA-3, Goldman & Fristoe, 2015), and the Photo Articulation Test (PAT-3, Lippke, Dickey, Selmar, & Soder, 1997). Results varied depending on the stimuli used by each test of articulation, with implications for how

speech production is assessed given the nature of the stimuli in terms of the three lexical factors.