## THE INFLUENCE OF SPEECH PRODUCTION EXPERIENCE ON THE SIZE AND THE STRUCTURE OF THE SPEECH MOTOR PROGRAM

Schema theory (1975) proposed that information about relative timing and force of movements and the order of motor events is stored in Generalized Motor Programs (GMPs). Because some researchers (e. g., Löfqvist, 1991; Max & Caruso, 1997) observed consistent relative timing information in some, but not all, speech rate contexts, this study attempted to provide an alternative explanation for these inconsistent findings of proportional relationships in the trajectories of speech movements. Motivated by Verwey and colleagues (1995, 1996; 1996), who observed changes in production modes from preparing a key press motor response in advance to preparing it in a concurrent manner as the sequence length increased, this study proposes two possible reasons for increased variability in movement trajectories: various motor program sizes and changes in the production mode between advance programming and concurrent programming. The current study hypothesizes that more experienced speakers preserve more proportional relationship information, utilize larger size stored motor programs, and make more flexible switches in their production modes.

Twenty-four native Mandarin and twenty-four non-Mandarin male speakers (19-30 years of age) with normal speech and language functions were recruited. They produced three-syllable, six-syllable, and nine-syllable length Mandarin tone sequences. Interactions between Group and Sequence Length Conditions were investigated in the hierarchical generalized linear model. Several timing, GMP error, and parameter error measurements were examined.

Significant interactions were observed between Group and Sequence Length Condition on the GMP errors per syllable, Hamming distance difference per syllable between slope and parsons' code measurements, and Hamming distance per syllable for parsons' code measurement. In addition, many other significant Group and Sequence Length Condition main or simple main effects were observed.

Results revealed that once motor programs are retrieved, they are executed without being reparameterized. The existence of GMP for lexical tones was supported. Also, it appeared that both native Mandarin and non-Mandarin speakers could switch between advance programming and concurrent programming as the sequence length increased. The timing of this switch occurred later in more-experienced speakers. Furthermore, the attempt to concatenate motor programs appeared to increase variability in movement outcome trajectories, supporting the hypotheses of this study.