Theoretical Implications of the Initiatory Speech Gesture within the Neurological Stuttering Model (REVISED)

Recent research suggesting neurological involvement in stuttering [1-9] has implicated the Supplemental Motor Area (SMA) as an active component of the stuttering neural mechanism [2-3, 6, 39]. The SMA is frequently associated with cognitive initiation [35-38], including the initiation of speech gestures, and is integral in planning self-initiated movements [40-41]. When electrically stimulated, the SMA has been found to impede the initiation of speech [42]. If the SMA is a neural component related to the occurrence of stuttering, then inefficient or deficient processing of the SMA [7] may contribute to why people who stutter often fail to properly initiate their own speech, and why exogenous speech feedback [10-15], commonly known as a second speech signal [16-17, 27-28], is a necessary component for the production of induced natural sounding fluent speech.

In testing the effects of self-generated visual feedback on people who stutter, Snyder and Hough [27] noted that induced fluency occurred when study participants were cued to visually focus on the initiating movement of their own speech gestures within the visual feedback prior to speech production. This observation suggests that the strength of fluency enhancement may be found within an Initiating Speech Gesture (ISG) [33-34] embedded within a second speech signal. It is predicted that the second speech signal may not be necessary for fluency enhancement. Instead, it is hypothesized that the ISGs embedded within any auditory, visual, or tactile second speech signal are the primary contributors for the resulting fluency enhancement.

To test this hypothesis, the current investigation was undertaken to measure the effects of ISGs on stuttering frequency in a group of 10 adults with developmental stuttering. Study participants were instructed to speak while focusing on the initiation of self- and externally-generated approximated speech gestures from a hand-puppet, which isolates an ISG from a linguistic second speech signal. This study follows previously described protocols for speaking trials and stuttering analysis [27-28]. Speaking conditions include a no-gesture control condition, self-generated ISG without visual feedback (puppet outside the participants’ visual field), self-
generated ISG with visual feedback (puppet inside the participants’ visual field), and externally generated ISG with visual feedback (puppet inside the participants’ visual field).

Pilot data and initial study results have indicated that any ISG with visual feedback induces fluency comparable to the evoked fluency paradigm. Neural implications of induced fluency via visual feedback of an ISG, motoric production of an approximate ISG, or a combination of these will be discussed [43-49].
REFERENCES


