

Shifts in production variability as a function of input and learning in  
typical and disordered language development  
Lisa Goffman, Meredith Saletta, Allison Gladfelter, and Janet Vuolo  
Speech, Language, and Hearing Sciences  
Purdue University

Variability in the input influences perceptual (Houston, 2000; Singh, 2008) and production (Richtsmeier, Gerken, Goffman, & Hogan, 2009) learning. Direct analyses of movement have long been used to evaluate acquisition of tasks such as reaching (e.g., Corbetta & Snapp-Childs, 2009), walking (Thelen & Smith, 1996), and more recently cognitive tasks, such as the A-not-B error (Spencer, Smith, & Thelen, 2001). The application of the complex construct of variability is beginning to be incorporated into analyses of speech production (e.g., McMillen, Corley, & Lickley, 2009; Heisler, Goffman, & Younger, 2010).

Current investigators argue that phonetic and phonological and lexical processing levels are highly interactive (e.g., Goldrick, Baker, Murphy, & Baese-Berk, 2011). Methodologies for assessing such interactivity may include acoustic and articulatory analyses, including of variability.

We combine perspectives from linguistics, motor control and dynamical systems to address processes underlying speech production. We evaluate shifts in articulatory variability across input cues (e.g., the inclusion of semantic information) as well as across time. We also are interested in how different components of processing load influence articulatory movement variability. This poster will summarize some of our results about changes in articulatory variability as a function of learning and of processing load. Four empirical themes will be addressed:

1. Children, both typically developing and with specific language impairment (SLI) somewhat surprisingly show increased variability in their production of earlier developing trochaic nouns compared with more difficult iambic nouns. This “iambic” advantage has also been observed in acquisition, with variability decreasing more rapidly in iambs than trochees as a function of short term perceptual and production learning.
2. Semantic and lexical factors also influence variability as a child (both typical and SLI) acquires a novel word. Variability decreases when a novel word form is provided with lexical or semantic information.
3. As linguistic load is increased (e.g., in a word retrieval or sentence priming task compared with a word or sentence imitation task) variability decreases. Thus, shifts in variability may be used to index load.
4. Finally, shifts in variability are observed across longer term learning. With consolidation, children with SLI show different trajectories in their variability profiles compared with the typical peers.