A Meta-Analysis: Linguistic Variables Affecting Stuttering

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Abstract

The purpose of this poster is to provide an organized, cohesive, and quantitative analysis of the influence of linguistic complexity and stuttering. The role of linguistic factors such as utterance length and syntax on speech fluency were examined, in both children and adults who stutter, using a meta-analysis. This comprehensive summary of research linking increases in utterance length and syntactic complexity to stuttering supports current psycholinguistic models of speech production.

Background

In order to study the human speech system, researchers working from psycholinguistic perspectives argue that one must understand the function and organization of underlying speech and language processing components. For example, Levelt (1989) has provided a now classic model of speech production. Levelt divided the speech system into three disparate subsystems, which are outlined below:

Conceptualizer
- Responsible for pre-verbal message
- Communicative intentions

Formulator
- Grammatical Encoder (adds semantic, morphological, and syntactic properties to pre-verbal message)
- Phonological Encoder (adds phonetic and suprasegmental features to pre-verbal message)

Articulator
- Executes the phonetic plan

Levelt's model is a serial model, in that the products of one stage serve as the input to the next stage of processing. This creates an interesting hypothesis—increasing the processing load of early stages should be reflected by changes in articulation. We believe that there is a rich database derived from studies of adults and children who stutter that, when combined, will give robust support to Levelt's model.

Study Questions

- Across published studies, how large is the effect of linguistic complexity on stuttering frequency in adults and children who stutter?
- Do some linguistic variables have a larger effect size than others? In other words, is there evidence that one linguistic level contributes more to fluency breakdown than others?
- Can we use the rich data set derived from our knowledge of stuttering to corroborate or dispute current linguistic models of language processing?

Methods

To complete the meta-analysis, we first found the published articles that related to our topic (effects of syntactic/linguistic complexity on stuttering behavior). The search terms that lead to successful results are listed below, including the database into which the search terms were entered.

PsychInfo
- Stuttering and Sentences

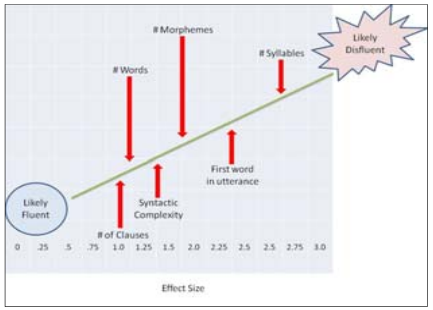
Medline
- Stuttering and "Language Development"
- Stuttering and Linguistics
- Stuttering and Psycholinguistics
- Stuttering and Language
- Stuttering and Disfluency and Language

ComDisDome
- Stuttering and Sentences
- Stuttering and Language Therapy
- Stuttering: Diagnosis
- Language Pathology and Stuttering
- Stuttering and Syntax
- Stuttering and Error Analysis

ASHA.org
- Stuttering and Speech

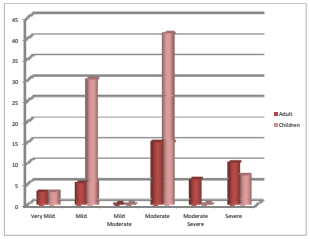
We coded each individual article to describe the subjects, including their age and stuttering severity, and which syntactic features were manipulated. We then used DSTAT to calculate our effect sizes for linguistic variables that were measured in at least five different studies. These variables were utterance length in morphemes, utterance length in syllables, utterance length in words, number of clauses, syntactic complexity, and sentential position of stuttered words.

Results



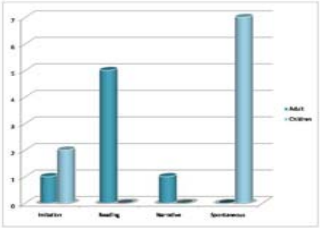
Linguistic Variables	Effect Size
Number of Clauses	-0.958093048
Number of Words	-1.074091526
Syntactic Complexity	-1.357573784
Number of Morphemes	-1.740441523
First Word in Utterance	-2.358599064
Number of Syllables	-2.672322863

Stuttering Severity



This graph compares the stuttering severity of the participants of the various studies which reported the stuttering severity level. In both adult and children who stutter, a moderate severity level was the most common.

Collection of Data



This graph compares the methods of data collection, based on whether they were adults or children. This shows that the most popular form of data collection for children was using their spontaneous speech, while for adults it was by having them read.

Conclusions

- Effect sizes for all linguistic variables that we examined were large. Because each of the variables showed such a large effect size, we do not believe that one factor contributes more to fluency breakdown than others. Increases in linguistic load are robustly associated with increases in overt stuttering behavior in both children and adults who stutter.
- We feel that this data provides rich evidence supporting current models of language production that emphasize interactions among stages of linguistic processing. Increasing linguistic demands clearly affects articulatory processes.
- We plan on continuing this project by collecting additional articles, adding dissertations, contacting people in the field that may contribute unpublished data, and expanding the project to include other linguistic variables that are not currently addressed.
- Because linguistic factors appear to play a predictive role in stuttering behavior, we feel that linguistic complexity should be addressed in treatment programs for adults and children who stutter.

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