

# **The Effects of Sample Size on Disfluency in School-Aged Children Who Stutter**

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## **Introduction**

- The quantification and measurement of stuttered speech has long been a topic of debate. Because stuttering is highly variable, one recommendation is to collect more than one speech sample in a variety of situational contexts for the school-aged child (Guitar, 2006, Ramig & Dodge, 2005; Susca, 2002).
- Recommendations for how long the speech sample should be for school-aged children have ranged from 200 (Ramig & Dodge, 2005) to 300 words (Conture, 2001), whereas some have recommended a range of 300 to 500 words (Guitar, 2006; Susca, 2002).
- The variability of disfluencies in a single speech sample has been investigated in preschool children and adults. Preschool children became more disfluent the longer they talked in a conversational speech sample (Sawyer & Yairi, 2006). The last 300 syllables of a 1200-syllable sample was significantly more disfluent than the first.
- For adults, longer speech samples are not necessarily more disfluent. A study of narrative speech in 10 adults revealed that half the adults were most disfluent in the first 300 syllables of an 1800-syllable sample (Logan and Haj-Tas, 2007).

## **Purpose of the study**

Investigate the effects of speech sample size on the disfluency counts in school-aged children. Specifically, these questions were addressed:

- Does the frequency of stuttering-like disfluency (SLD) per 100 syllables increase when the length of a speech sample increases as four consecutive 300-syllable sections of the speech sample are incorporated into the analysis?
- Do the number of SLD per 100 syllables in a long speech sample vary across four consecutive, 300-syllable sections?

- Do the number of repetitions per instance of disfluency vary as sample size increases?

## **Method**

### **Participants**

15 school-aged children between the ages of 6 to 11 (M=9;4). There were 11 boys and 3 girls in the study. They were recruited from speech-language clinics at the University of Arkansas/Little Rock and at Illinois State University.

The participants were regarded by their parents and one speech-language pathologist as exhibiting stuttering. Each child had a minimum of 3 stuttering-like disfluencies per 100 syllables in their speech and no history of neurologic disorders or abnormalities.

Stuttering severity was assessed using a weighted measure reflecting the extent or length of disfluencies (Ambrose & Yairi, 1999). 7 children were classified as having mild stuttering, 6 moderate, and 2 severe.

### **Procedure**

A conversational speech sample of at least 1200 syllables was audio- and videotaped. Each sample was divided into 4 300-syllable segments.

Following careful analysis by several experienced listeners, data on each child were reported in terms of stuttering-like disfluency (SLD) per 100 syllables. SLD includes part-word repetitions, single-syllable word repetitions, and disrhythmic phonation (prolongations, blocks, and broken words). The mean number of repetition units (RU) for each 300-syllable segment were also calculated.

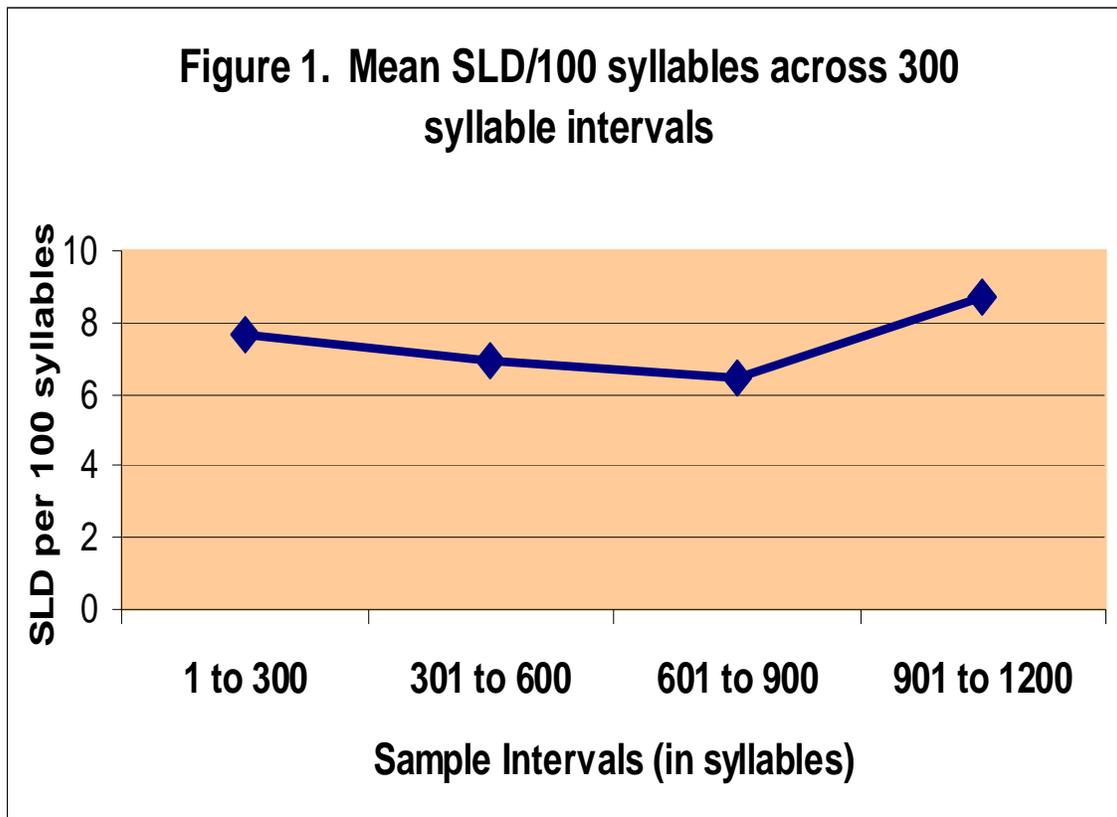
A cumulative SLD and RU score was derived for the first 300 syllables, the first 600 syllables, the first 900 syllables, and for the total 1,200 syllable sample. Group means for each cumulative segment were compared to assess the variability of SLD per 100 syllables and RU as the sample size increased in length.

The location of each child's highest levels of SLD and RU were compared to determine if there were any co-occurrences of these levels in particular segments of the speech sample.

### **Results**

**1. Do the number of disfluencies per 100 syllables vary in a single speech sample, as measured in 4 different consecutive segments of 300 syllables?**

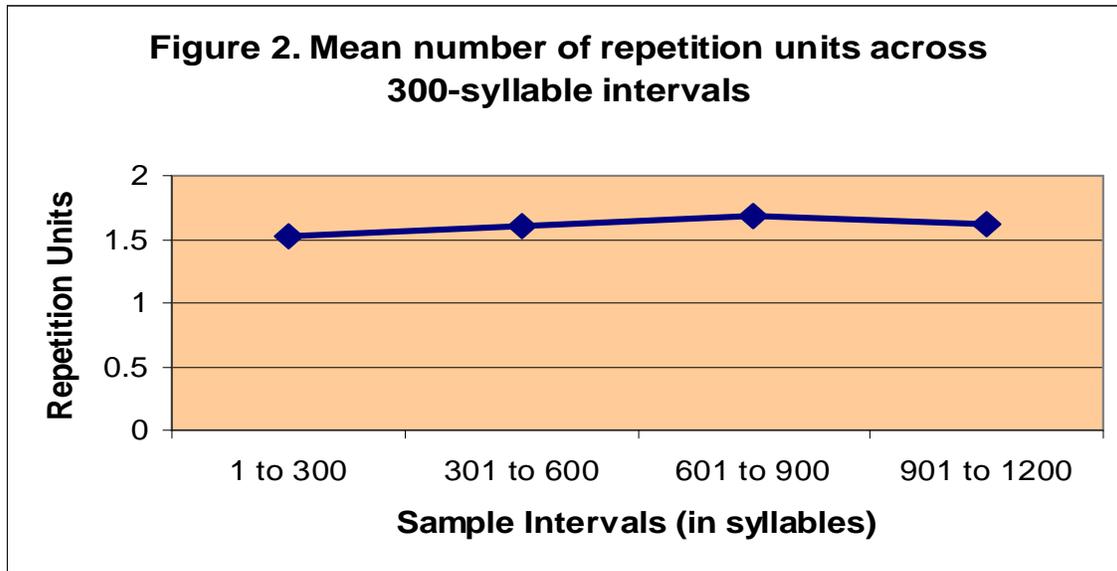
Figure 1 shows that the SLD means were fairly consistent throughout the speech sample, growing slightly larger later in the speech sample, segment by segment.



A one-way repeated measures ANOVA revealed no significant differences ( $F(1, 13)=1.09$ ;  $p=3.15$ ).

**2. Do the number of repetitions per instance of disfluency of SLD vary as the sample size increases?**

Figure 2 shows that RU means showed little variation throughout the speech sample.



A one-way repeated measures ANOVA revealed no significant differences ( $F(1, 13)=1.09$ ;  $p=3.15$ ).

**3. Does the frequency of SLD per 100 syllables vary as four 300-syllable sections of the speech sample are incorporated into the analysis?**

Table 1 shows the means for SLD to be very consistent over the various sample sizes, but considerable individual variability. Five children had their highest SLD in the shortest sample, and six in the longest sample.

**Table 1. Individual SLD counts, group means, and SD for 300, 600, 900, and 1,200 syllables, with highest level of SLD in red.**

Participant	Sample Size in Syllables			
	300	600	900	1200
1	11	9.17	<b>9.22</b>	11
2	<b>20</b>	16.17	14.67	13
3	<b>6</b>	5.33	4.33	5.67
4	3.33	2	2.67	<b>3.58</b>
5	<b>3</b>	2.83	2.44	2.25
6	11.33	9.83	11.44	<b>11.83</b>
7	2	4	<b>4.11</b>	3.75
8	1.33	3.17	2.78	<b>3.42</b>
9	6.3	8.83	10.4	<b>10.92</b>
10	<b>5.66</b>	4.33	3.67	5.05
11	17	<b>15.17</b>	11.33	9.25
12	8.7	9	9.11	<b>9.12</b>
13	4	2.17	3.22	<b>3.42</b>
14	<b>11.33</b>	8	8.11	7.5
15	4.33	<b>9.17</b>	9	9.08
Group Mean	<b>7.69</b>	<b>7.28</b>	<b>7.1</b>	<b>7.26</b>
SD	5.5	4.43	3.98	3.58

## Discussion

**Disfluencies Across A Speech Sample.** Disfluency, as measured in SLD per 100 syllables and RU, was consistent across the speech sample for school-aged children. This result set them apart from preschool children, who became more disfluent the longer they talked (Sawyer & Yairi, 2006). Disfluencies across a speech sample for this age group were similar to those of adults (Logan & Haj-Tas, 2007).

**Cumulative Disfluencies.** School-aged children showed individual variability across cumulative speech samples. Whereas several children had their largest number of SLD in the longer sample, the gains were minimal and group means

were similar. Results for this group were similar to those found in adults (Logan & Haj-Tas, 2007).

**Clinical Implications.** For the school-aged child, a longer sample does not necessarily mean a more disfluent sample. Best practice in assessing stuttering does mean that clinicians should gather multiple samples, but results here suggest the samples do not necessarily have to be long samples.

## References

- Ambrose, N., & Yairi, E. (1999). Normative disfluency data for early childhood stuttering. *Journal of Speech, Language, and Hearing Research, 42*, 895-909.
- Couture, E. G. (2001). *Stuttering: Its nature, diagnosis and treatment*. Boston: Allyn & Bacon.
- Guitar, B. (2006). *Stuttering: An integrated approach to its nature and treatment* (3rd ed.) Philadelphia: Lippincott Williams & Williams.
- Logan, K. J., & Haj-Tas, M. A. (2007) Effect of sample size on the measurement of stutter-like disfluencies. *Perspectives on Fluency and Fluency Disorders, 17*(3), 3-6.
- Ramig, P. R., & Dodge, D. M. (2005). *Child and adolescent stuttering treatment and activity resource guide*. Clifton Park, NJ: Thomson Delmar Learning.
- Sawyer, J. & Yairi, E. (2006). The effect of sample size on the assessment of stuttering severity. *American Journal of Speech-Language Pathology, 15*, 36-44.
- Susca, M. (2002). Diagnosing stuttering in the school environment. *Seminars in Speech and Language, 23*, 165-171.

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