

# Effects of Utterance Function and Complexity on Children's Within-sample Fluency

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## Introduction

- It has long been recognized that people who stutter exhibit fluency variations across speaking tasks and over time.

- Recently, clinicians have examined the extent to which variability exists *within* individual speech samples and whether such variability might impact clinical decision-making (Logan & Haj-Tas, in press).

- Sawyer and Yairi (2006) found that children produced more stutter-like disfluency in the final 300 syllables of 1200-syllable samples than they did in the first 300 syllables.

- They hypothesized that the fluency variations resulted from changes in the children's comfort levels during sampling, which in turn led the children to use longer, more complex (and, hence, less fluent) utterances toward the end of sample.

- One way to examine Sawyer and Yairi's (2004) hypothesis would be to analyze complexity metrics at various points within a child's speech sample (e.g., # of syllables, words, or clauses per utterance).

- Another way to examine Sawyer and Yairi's (2004) hypothesis would be to analyze the pragmatic functions of utterances at various points within a child's speech sample (e.g., frequency of assertive and responsive speech acts).

- It may be that children do not, per se, feel "more comfortable," but rather that the nature of parent-child interactions change over time. In this view, parents' pragmatic behavior may influence the types of utterances that children use during various points of a speech sample.

- Purpose:** In the present study, we examined variations in children's fluency relative to measures of utterance length and complexity as well as the types of speech acts that children used.

- Results should identify linguistic sources of within-sample fluency variation for children, and thus suggest ways to improve the efficiency and validity of speech sampling activities.

## Questions

- Do children who stutter produce more disfluency during some segments of a speech sample than others? If so...

- Do "high fluency" segments of a speech sample differ from "low fluency" segments of a speech sample in terms of the speech act types that children produce within them?

- Do "high fluency" segments of speech sample differ from "low fluency" segments of a speech sample in terms of the length or complexity of utterances that children produce within them?

## Method

### Participants:

- 27 children who stutter (CWS).
- 23 males, 4 females
- Mean age = 4 years; 8 months ( $SD = 15$  months)
- All spoke English with native competence.
- None were enrolled in fluency therapy.

### Data Collection

- CWS conversed with one or both parents for ~ 30 min.
- Play-based setting with age-appropriate toys.
- Audio/video recordings were made for all samples.

### Data Analysis

#### Transcript Preparation

- An assistant prepared initial glosses of the conversations on utterance-by-utterance basis.
- Another assistant reviewed initial glosses to correct errors and omissions.
- One of the researchers reviewed the glosses again to correct errors and omissions, and to resolve discrepancies.

#### Fluency Analysis

- Disfluent segments were coded.
  - Repetitions/Prolongations (RPs): repeated speech (i.e., sounds, syllables, parts of words, whole words, multiple words) or prolongations of speech sounds and their associated postures.
  - Other disfluency types (i.e., interjections, revisions) were included in the transcripts, but not analyzed for this study.
- Syllables in fluent stretches of speech were counted. Word counts were divided into RP counts to compute "RPs per 100 syllables of speech."

#### Sample Segmentation

- Resultant samples were parsed into 200-syllable sub-samples.

#### Linguistic Analyses

- Speech act analysis** (after Fey, 1986).
  - Assertive acts: utterances not overtly solicited by parent (e.g., comments, statements, requests).
  - Responsive acts: utterances that complied with parents' requests (e.g., responses to requests for information) or utterances that acknowledged parents' utterances.
- Syntactic analysis:** number of words and clauses per utterance.

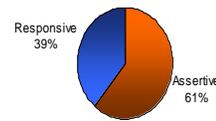
## Results and Discussion

### Overall Sample Characteristics

Table 1. Summary statistics for linguistic characteristics of speech samples. ( $N = 27$ )

	Utterances	Syllables	Words	Clauses
<i>M</i>	143	593	481	82
<i>SD</i>	72	285	226	50

Figure 1. Children produced more assertive speech acts than responsive speech acts ( $t(27) = 3.52, p = .002$ ). The pattern was observed in 19 of 27 children.



### Assertive versus Responsive Utterances

Figure 2. Assertive utterances had significantly more clauses, words, and syllables than responsive utterances ( $p < .001$ ).

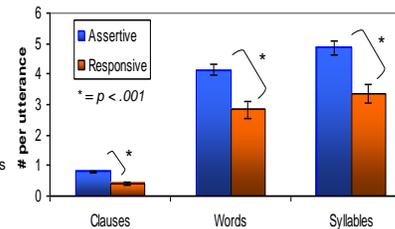


Figure 3. The difference in Repetitions and Prolongation (RPs) frequency between assertive and responsive utterances approached significance ( $t(27) = 1.94, p = .06$ ).

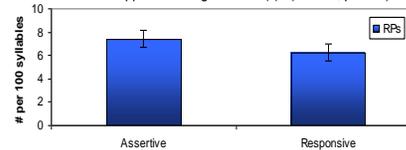
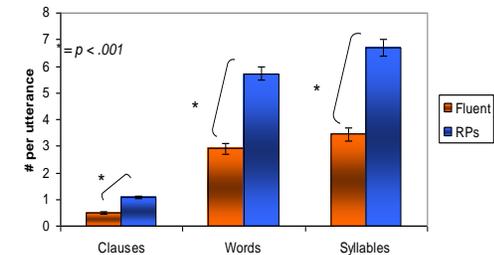


Figure 4. Utterances containing Repetitions and/or Prolongations (RPs) had significantly more clauses, words, and syllables than utterances that were spoken fluently.



### Fluency variations within speech samples

- 10 participants' samples had > 800 syllables.
- RP frequency across 200 syllable segments of their samples was compared. (See Table 1.)
- There was no difference in RP frequency across speech sample segments ( $F(3, 27) = 1.439; p = .253$ )

Table 1. RPs per 100 syllables across four 200-syllable segments within the speech samples.

	Speech Sample Segment			
	0 to 200	201 to 400	401 to 600	601 to 800
<i>M</i>	6.46	8.22	7.37	8.63
<i>S.E.</i>	0.99	1.44	0.93	1.33

- 19 participants' samples had > 400 syllables.
- Language and fluency characteristics from the *Most* and the *Least* disfluent segments were compared.
- Most Disfluent* segments ( $M = 9.38$ ) contained nearly 2x as many RPs per 100 syllables as *Least Disfluent* segments ( $M = 5.21$ ),  $t(18) 6.61; p < .001$ .
- Most Disfluent* (59%) segments contained a comparable percent of assertive acts as *Least Disfluent* (60%) segments ( $p > .05$ )
- Other segment comparisons yielded results that were in the hypothesized directions, but none were significant. (See Table 2.)

Table 2. Number of clauses, words, and syllables per utterance in 200-syllable sample segments containing most and least RP disfluency.

Linguistic Unit	Sample Segment Type		t	df	p
	Most disfluent	Least Disfluent			
Clauses	0.75	0.7	1.45	18	0.2
Words	4.04	3.82	1.50	18	0.2
Syllables	4.77	4.53	1.16	18	0.3

## Conclusions

- Repetitions and prolongations are produced more often in utterances containing relatively many clauses, words, and syllables.
- Results do not support the idea that later segments of a speech sample contain more disfluency than earlier segments.
- Children produced more assertive acts than responsive acts, suggesting that most parents were not highly directive in these clinical interactions.
- Assertive utterances were more complex than responsive utterances. Accordingly there was a trend toward responsive utterances being spoken with greater fluency than assertive utterances. Parent requests seemed to facilitate fluency in most cases.

## References

- Logan, K.J., & Haj-Tas, M. (in press). Effect of sample size on the measurement of stutter-like disfluency. *Perspectives on Fluency and Fluency Disorders*.
- 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.