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Article

Speech Disfluency in School-Age Children's Conversational and Narrative Discourse

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Purpose: This study was designed to (a) compare the speech fluency of school-age children who do and do not stutter (CWS and CWNS, respectively) within 2 standard diagnostic speaking contexts (conversation and narration) while also controlling for speaking topic, and (b) examine the extent to which children's performance on such discourse tasks is affected by age.
Method: Participants were 44 school-age children who were divided evenly into four groups, depending on their age (older, younger) and fluency status (CWS, CWNS). Children conversed with an examiner about a series of pictures and then told a story about the same pictures.
Results: School-age CWS produced more instances of atypical (stuttering-like) disfluencies in the narrative context than in the conversational context. Younger school-age children produced more instances of typical (nonstuttering-like) disfluencies in the conversational sample than did older school-age children. Age did not affect the frequency of children's stuttering-like disfluencies in either the conversational or the narrative contexts.
Clinical Implications: These findings suggest that narration may offer a relatively efficient way of eliciting stuttering-like disfluencies during the assessment of stuttering. Thus, when assessing children to determine if they do or do not stutter, this type of sample should be considered in addition to the standard conversational sample.

Key Words: conversation, narrative, stuttering, school-age, children

Children who stutter (CWS) tend to be disfluent when they engage in bidirectional communicative exchanges (Conture, 2001). Therefore, the dynamics of stuttering are best understood within discourse contexts that involve interactions with other people. Clinicians typically rely on spontaneous conversational speech samples for analyzing speech disfluencies. Speech samples that are based on spontaneous conversation have good face validity, but the use of a more structured form of speech elicitation may allow for more efficient, reliable elicitation of stuttering-related behaviors and potentially better understanding of the nature of stuttering across young children (Scott-Trautman, Healey, Brown, Brown, & Jermano, 1999). Although some researchers have examined the effect of conversational sample length on measures of children's speech disfluency (e.g., Sawyer & Yairi, 2006), to date, there is relatively little research comparing the number and type of disfluencies that children produce across discourse elicitation contexts. Further, most of the research that has been conducted in this area is limited to conversational contexts with preschool children (e.g., Johnson, Conture, Karass, & Walden, 2009; Yaruss, 1997).

Narration offers a discourse elicitation context that is more structured than conversation because storytellers must weave together information about the characters, the circumstances that the characters are facing, actions that are causally and temporally related to the circumstances, solutions to problem(s), and the resulting outcomes (Johnston, 1982; Stein & Glenn, 1979). In addition, narration often contains more complex language than conversation (Stadler & Ward, 2005) because speakers use more adverbial clauses and elaborated noun phrases to tie multiple characters and actions together within and across utterances (Westby, 1984). Further, when producing a narrative, the speaker takes sole

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responsibility for planning and conveying the information to the listener as opposed to conversation, wherein two or more speakers co-construct the stream of topics and comments over time without attempting to conform to a prescribed global structure. Thus, it could be argued that narration places more linguistic, cognitive, and communicative demands on speakers than does conversation.

Research with both preschool (Weiss & Zebrowski, 1994) and school-age CWS (Nippold, Schwarz, & Jescheniak, 1991; Scott-Trautman et al., 1999) has demonstrated that CWS produce narratives that are similar in linguistic complexity to those produced by children who do not stutter (CWNS). For example, in a comparison study of 10 school-age CWS and 10 typically fluent children, Nippold et al. (1991) reported no differences between CWS and CWNS on any of the measures of narrative performance they examined, both in terms of the ability to retell a story and the ability to comprehend a story. To support their contention that delayed expressive language does not appear to be a characteristic that is inherent to the etiology of stuttering, Nippold et al. described the performance of one of their study participants in detail. This child produced a highly developed narrative despite the fact that he stuttered severely throughout his production. However, given that research has also shown that stuttering frequency increases when the length and complexity of a child's verbal output increases (see Zackheim & Conture, 2003, for review), one might predict that CWS would be more vulnerable to disfluency during narration than they would be in conversation because narration is often a more linguistically complex speaking task.

In a study of discourse-related fluency in preschool CWS, Yaruss (1997) examined variations in fluency across five types of speaking tasks (i.e., typically paced parent–child conversational interaction, play with a clinician, play with time pressure imposed, story retell narrative, and picture description). He reported that preschoolers were significantly more disfluent during the time-pressured conversational task than they were during other types of speaking tasks, including the typically paced parent–child conversational task and the narrative task. Most of the children showed higher levels of disfluency during the conversational tasks than they did during the narrative task. However, children's disfluency scores on the typically paced parent–child conversational task were not significantly correlated with those on the narrative task. Thus, Yaruss speculated that even though children produced more disfluencies during conversation than narration, there was individual variability in the impact of these situations on the children's ability to establish/maintain fluent speech, suggesting that for some children, one discourse task may elicit more stuttering than another. In other words, one might get an incomplete picture of a child's fluency performance when using only one elicitation task.

More recently, Johnson et al. (2009) explored the effects of two common diagnostic speaking tasks (i.e., conversation and narration) and two common contextual factors (i.e., physical location and speaking partner) on stuttering frequency in a group of preschool CWS and CWNS. The conversational sample was elicited by having children interact with a researcher in a play-based context until they produced a sample of 300 words. The narrative sample was elicited by having children construct a story that corresponded to the pictures in a wordless picture book. Johnson et al. reported that stuttering frequency was not significantly affected by either the physical location of the interaction (i.e., home vs. clinic) or the speaking partner (i.e., parent vs. clinician). However, there was partial support for a speaking task effect. That is, although the CWS did not stutter significantly more often during conversation than they did during narration, the proportion of all disfluencies that were stuttering like in nature was significantly higher in the conversational sample than in the narrative sample. Like Yaruss (1997), Johnson et al. concluded that the conversational sample may be the preferred diagnostic tool when analyzing the speech of preschool CWS.

If, similar to preschoolers who stutter, school-age CWS speak less fluently in conversation than they do in narration, these findings could be used to help clinicians design assessment protocols that are maximally efficient at eliciting stuttering-related behaviors. However, it cannot be assumed that school-age children will show the same patterns of disfluency as preschoolers during conversation and narration because, between the ages of 5 and 12 years, children exhibit significant growth in their ability to construct complex narratives (e.g., Gillam & Johnston, 1992; Johnston, 1982; Scott, 1988; Tilstra & McMaster, 2007; Ukrainetz et al., 2005). Therefore, it is likely that narrative production will affect children's fluency differently as children progress from the preschool years through the elementary school years. Investigation of speech fluency during conversation and narration with a broad sample of school-age children (i.e., younger vs. older children) may clarify this issue.

In summary, given the variable nature of stuttering and the time constraints that clinicians face when performing diagnostic evaluations in school settings, it is important to identify tasks that are most efficient at eliciting samples of stuttering behavior. Previous research has directly compared the two most frequently used speech elicitation tasks (i.e., conversation and narration) in preschoolers. The purpose of the present study was to extend that research by examining the effects of speaking context and age on disfluency frequency in school-age children. This was accomplished using the Structured Conversation subtest and the Narration subtest from an experimental version of the Test of Childhood Stuttering (TOCS; Gillam, Logan, & Pearson, 2009). These subtests offered a way of comparing fluency within two fundamentally different language sampling contexts while simultaneously controlling for the content and form of both the adults' and the children's language. Results from this study will provide needed data regarding the types of speaking tasks that are most challenging for school-age CWS and should clarify whether any such speaking task effects are dependent on age. Such information has potential clinical value for speech-language pathologists (SLPs) who assess the speech fluency of school-age children.

METHOD

Participants

Thirty-four children who had been previously diagnosed with stuttering by certified school-based SLPs were recruited to participate in the present study as well as in another recently published study (Logan, Byrd, Mazzocchi, & Gillam, 2011) in which children's speaking rate was examined across a variety of production tasks. Stuttering diagnoses for the 34 children were confirmed unanimously by the three authors, each of whom has extensive experience in the assessment and diagnosis of stuttering. All children presented multiple instances of speech behaviors (e.g., part-word repetitions, sound prolongations) that the authors considered to be consistent with a diagnosis of stuttering. (See Logan et al., 2011, for additional details about participant selection and fluency characteristics.)

Based on reports from the SLPs, 12 of the 34 children who met criteria within their local school districts for stuttering also met criteria for concomitant articulation and/or language disorders. These 12 children were excluded from participation in the present study (but were included in the Logan et al., 2011 study) because these co-occurring disorders could have further compromised the children's speech production skills during the Structured Conversation and Narration subtests. The remaining 22 CWS were matched for age (±2 months) and gender to 22 CWNS who had no history of speech or language disorders. In addition to relying on the SLPs' reports, all three authors reviewed in detail each participant's audio recordings and resulting transcripts. None of the participants in either the CWS group (n = 22) or the CWNS group (n = 22) showed evidence of systematic syntactic, morphologic, phonologic, or pragmatic errors that would suggest the presence of a language impairment.

Children age 8 and above are considered to be more sophisticated at narration than younger children (e.g., Gillam & Johnston, 1992; Johnston, 1982; Scott, 1988; Tilstra & McMaster, 2007; Ukrainetz et al., 2005), and as children approach 10 years of age, they are more likely to tell stories that contain complex thematic, lexical, and syntactic structures than children who are several years younger (Karmiloff-Smith, 1985; Wigglesworth, 1997). Thus, the age grouping method employed in the present study allowed for a comparison of children who were likely to produce relatively sophisticated narratives (older group) and children who were not (younger group). The 22 children in each fluency group (CWS and CWNS) were divided into two age categories (older and younger) to create four groups of 11 participants each: (a) older CWNS (M_{age} = 9;6 [years;months]; SD = 11.78 months), (b) younger CWNS (M_{age} = 6;11; SD = 5.79 months), (c) older CWS (M_{age} = 9;5; SD = 11.66 months), and (d) younger CWS (M_{age} = 6;11; SD = 5.77 months). For both fluency groups, children in the younger groups ranged from 6;0 to 7;7, and children in the older groups ranged from 8;0 to 10;5. There were 9 males and 2 females in each of the two younger groups and 10 males and 1 female in each of the two older groups. All of the participants were native English speakers and, based on informal analysis of their conversational and narrative speech samples by each of the three authors, demonstrated excellent speech intelligibility.

Stuttering severity ratings were assigned to each participant who stutters using a 9-point stuttering severity rating scale (1 = *no stuttering,* 2 = *very mild stuttering,* 9 = *extremely severe stuttering*) described by Logan et al. (2011). This scale was modified from a stuttering severity scale that was developed by O'Brian, Packman, Onslow, and O'Brian (2004). The first and second authors independently rated one-half of the participants from the CWS group for stuttering severity using speech samples from the Narration subtest. The mean severity rating for the 11 participants in the younger group was 4.00 (SD = 2.14, Range = 2–8); the mean severity rating for the 11 participants in the older group was 5.09 (SD = 2.02, Range = 2–8). The difference in severity ratings between the two age groups was not statistically significant, $t(20) = 1.23$, $p = .23$.

The mean severity rating for all 22 CWS (i.e., younger and older combined) was 4.55 (SD = 2.11), with 11 participants receiving ratings of 2 or 3 (which would correspond to relatively mild stuttering); six participants receiving ratings of 4, 5, or 6 (which would correspond to relatively moderate stuttering); and five participants receiving ratings of 7 or 8 (which would correspond to relatively severe stuttering). Interjudge reliability for the severity ratings was assessed by having each author rate four of the 11 samples that had been rated previously by the other author. Overall, six of the eight ratings were identical to the original ratings, and the remaining two ratings were within 1 scale point of the original ratings.

General details about treatment history were available for 14 of the 22 CWS. Ten of the 14 CWS had reportedly received speech therapy for stuttering. One of these participants had attended between 16 to 20 sessions, eight had attended >20 sessions, and fluency treatment duration was not reported for the one remaining participant. Of the nine participants with data about fluency treatment duration, three had reportedly made minimal improvement in speech fluency, three had reportedly made moderate improvement, and three had reportedly made large improvement. We chose not to exclude children on the basis of treatment history because (a) there was no reason to suspect that exposure to fluency therapy would differentially affect individual children's performance on the two speaking tasks used in the study; (b) a previous analysis with these participants by Logan et al. (2011) revealed no effect for treatment participation on the children's articulation rate or speech rate, and (c) many CWS have access to fluency therapy during the school years; thus, inclusion of children who had participated in therapy is an important aspect of external validity in this study.

Procedure

Speech samples were elicited using the Structured Conversation and Narration subtests from an experimental version of the TOCS. During these speech sample elicitations, the child and the examiner were seated at a table in a quiet room with an audio recorder and microphone placed nearby. Some samples were recorded using analog tape. These recordings were subsequently digitized for transcription and analysis.

Structured Conversation. This subtest includes a series of 29 requests that consisted primarily of open-ended commands (e.g., *Tell me about the two bicycles.*) and open-ended questions (e.g., *What are the boys thinking?*) to facilitate a conversational exchange. Participant responses that were an imitation of the examiner's request, unintelligible responses, and responses of *I don't know* were not included in the final data analysis. The conversational interaction was supported by eight, 8.5-in × 11-in picture cards that were presented one at a time. These eight pictures depicted a story about three children who encountered alien creatures. Wagner, Nettelbladt, Sahlen, and Nilholm (2000) also used this type of structured conversational format in their exploration of the conversational and narrative samples of children with language impairment as it allowed for a turn-based verbal interaction between a child and an adult while controlling for the content and general structure of the discourse interactions of both the speaker and the listener.

Narration. For this subtest, children were asked to generate a story that was related to what was discussed during the Structured Conversation subtest. The child was shown smaller versions (i.e., 4-in × 6-in) of the same eight illustrations that were used in the Structured Conversation subtest. The Structured Conversation subtest provided the "scaffolding" of the story content that was to be retold in the Narration subtest. The examiner arranged the pictures sequentially in front of the child. While pointing to the first picture in the row of eight, the examiner said: *Now, I'd like you to tell me the whole story all by yourself. We'll start with the first card. Tell me the best story you can. You can use the things we talked about earlier (i.e., from the Structured Conversation task) as guides.* The child then proceeded to tell the story without any verbal interruption and/or cuing by the examiner.

Data Analysis

Each participant's responses during the Structured Conversation and Narration subtests were audio-recorded, analyzed, and transcribed by graduate research assistants who were trained in both disfluency and language analysis using the Systematic Analysis of Language Transcripts (SALT) program (Miller, Iglesias, & Nockerts, 2006). Utterances were transcribed and segmented according to the SALT transcription conventions. Each utterance was then coded for disfluency type and disfluency frequency. The following disfluency types were identified in the children's speech output: monosyllabic word repetitions, audible sound prolongations, inaudible sound prolongations or blocks, sound or syllable repetitions, phrase repetitions, revisions, and interjections. These disfluency types were then divided into two broad categories: disfluency types more likely to be judged as stuttering (i.e., stuttering like,[1] to include monosyllabic word repetitions, audible sound prolongations, inaudible sound prolongations or blocks, and sound or syllable repetitions) and disfluency types less likely to be judged as stuttering (i.e., typical, to include phrase repetitions, revisions, and interjections) (Ambrose & Yairi, 1999; Yairi & Ambrose, 2005).

SALT provided a calculation of the total number of words and the total number of each disfluency type for each of the participants. These data were used to determine the percentage of stuttering-like disfluencies per total words, the percentage of nonstuttering-like disfluencies per total words, and the percentage of total disfluencies per total words in the conversational and narrative samples. SALT also provided the mean length of utterance in words (MLU_w) for the conversational and narrative samples. A word-based MLU was selected over a morpheme-based analysis because the two measures are very highly correlated with one another, and MLU_w has been argued by many researchers (e.g., Parker & Brorson, 2005; Thordardottir & Weismer, 1998) to be an easier, more reliable utterance-level analysis and also more appropriate to use with school-age children. Table 1 provides the descriptive statistics regarding number of words and MLU_w for the participants.

Reliability

Intra- and interrater reliability measures were completed for each of the identified individual moments of stuttering-like disfluencies and typical disfluencies. A trained doctoral student who completed the initial analysis of the participants' speech disfluency in the two speaking tasks reanalyzed the entire conversational sample and also the entire narrative sample of four of the participants from each age and talker group ($N = 16/44 = 36\%$ of the data). The intrarater reliability

[1]Each of these types of repetitions is produced significantly more frequently by CWS than CWNS (Ambrose & Yairi, 1999; Pellowski & Conture, 2002).

Table 1. Total number of words in the Structured Conversation subtest (SCTW), total number of words in the Narration subtest (NTW), mean length of utterance in words in the Structured Conversation subtest ($SCMLU_w$), and mean length of utterance in words in the Narration subtest ($NMLU_w$) for younger and older children who do (CWS) and do not stutter (CWNS).

Fluency group	*Age group*	*Age*	*SCTW*	*NTW*	*$SCMLU_w$*	*$NMLU_w$*
CWS	Younger	83.36 (5.77)	361.8 (105.76)	127.1 (63.35)	8.84 (2.54)	9.76 (2.70)
	Older	113.5 (11.66)	437.7 (146.77)	127.5 (52.42)	7.59 (0.78)	9.47 (1.43)
	All	98.41 (17.82)	399.8 (130.74)	127.32 (56.75)	8.21 (1.93)	9.62 (2.11)
CWNS	Younger	83.45 (5.79)	413.3 (149.27)	115.3 (67.38)	8.92 (2.24)	9.68 (2.35)
	Older	114.2 (11.78)	477.2 (100.64)	140.3 (58.74)	8.41 (2.06)	8.99 (2.40)
	All	98.82 (18.15)	445.2 (128.46)	127.8 (63.00)	8.67 (2.11)	9.33 (2.35)

Note. Standard deviations are presented in parentheses.

measurement for the conversational sample indicated that the percentage of agreement for the stuttering-like disfluencies was 97.87%, and the percentage of agreement for the typical disfluencies was 98.5%. For the narrative sample, the intrarater reliability measurement was 100% for both the stuttering-like disfluencies and the typical disfluencies. Interrater reliability measurements were completed by comparing the same trained doctoral student's initial disfluency analysis to that of another trained graduate student. Results for the conversational sample revealed 92.5% agreement for the stuttering-like disfluencies and 100% agreement for the typical disfluencies. For the narrative sample, the interrater reliability calculations yielded 97.5% agreement for the stuttering-like disfluencies and 100% agreement for the typical disfluencies.

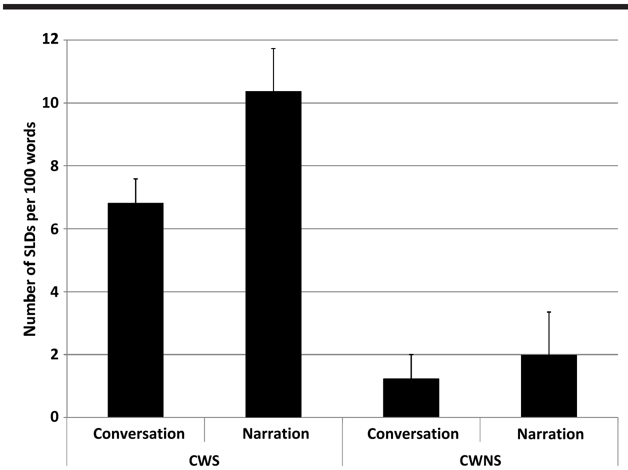
RESULTS

The purpose of this study was to further our knowledge of the effects of discourse type (i.e., Structured Conversation vs. Narration) and age on disfluency frequency in school-age CWS and CWNS. Three sets of analyses were performed. The first set of analyses explored the children's production of stuttering-like disfluencies and the second set explored their production of typical disfluencies. The third set of analyses was post hoc in nature and explored the difference in MLU_w between the conversational and narrative samples for both talker groups.

Stuttering-Like Disfluencies

To explore the stuttering-like disfluencies, a three-way repeated measures ANOVA was completed, with number of stuttering-like disfluencies per 100 words as the dependent variable (i.e., monosyllabic word repetitions, audible sound prolongations, inaudible sound prolongations or blocks, and sound or syllable repetitions), discourse type as the within-subjects factor, and age and fluency group as the between-subjects factors. There was a significant main effect for discourse type, $F(1, 40) = 10.135$, $p = .003$, $\eta_p^2 = 0.202$; a significant between-subjects effect for fluency group, $F(1, 40) = 23.948$, $p \leq .0001$, $\eta_p^2 = 0.374$; and a significant Discourse Type × Fluency Group interaction, $F(1, 40) = 4.284$, $p = .045$, $\eta_p^2 = .097$ (see Figure 1). Significantly more stuttering-like disfluencies were produced in the Narration subtest than in the Structured Conversation subtest. Also, as would be expected, the CWS produced significantly more stuttering-like disfluencies than did the CWNS. There was no Fluency Group × Age Group interaction ($p = .278$) and no between-subjects effect for age ($p = .297$) (Figure 2). In addition, there was not a significant Discourse Type × Age Group interaction ($p = .392$). Thus, the frequency with which the participants produced stuttering-like disfluencies was not mediated by age. Exploration of the significant Discourse

Figure 1. Mean number of stuttering-like disfluencies (SLDs) per 100 words in conversation versus narration for children who stutter (CWS) versus children who do not stutter (CWNS).



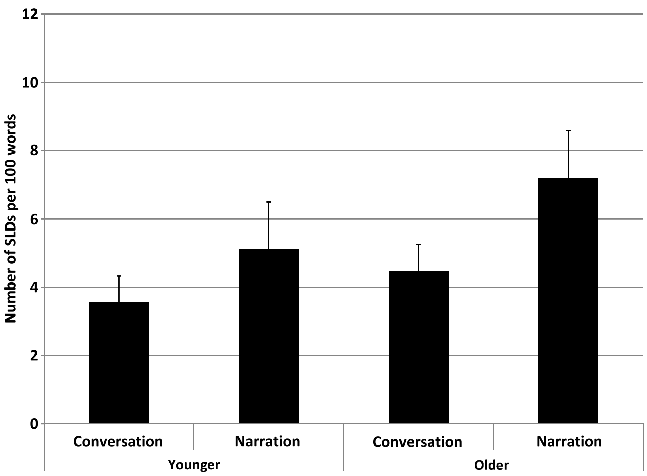


Figure 2. Mean number of SLDs per 100 words in conversation versus narration for younger versus older children.

Type × Fluency Group interaction indicated that the CWS produced significantly more stuttering-like disfluencies in narration than in conversation, $t(21) = -2.789$, $p = .011$; $d = .40$. There was not a significant difference in the frequency of stuttering-like disfluencies in the Structured Conversation versus the Narration task for the CWNS ($p = .067$).

Typical Disfluencies

Summary results for the analysis of typical disfluencies are presented in Figure 3. A three-way repeated measures analysis of variance (ANOVA) was again completed, with number of typical disfluencies per 100 words (i.e., phrase repetitions, revisions, and interjections) as the dependent variable, discourse type (i.e., Structured Conversation and Narration) as the within-subjects factor, and age (i.e., younger vs. older children) and fluency group (i.e., CWS vs. CWNS) as the between-subjects factors. There was no main effect for discourse type ($p = .284$); that is, there was not a significant difference in the frequency of typical speech disfluencies produced in the Structured Conversation subtest as compared to the Narration subtest. There also was no significant between-subjects effect for fluency group ($p = .244$), suggesting that the frequency of typical disfluencies did not significantly differ between the CWS and the CWNS. In addition, neither the Discourse Type × Fluency Group ($p = .598$) nor the Age Group × Fluency Group ($p = .398$) interactions were significant, indicating that younger and older CWS and CWNS produced similar amounts of typical disfluencies in conversational and narrative samples. There was not a significant between-subjects effect for age ($p = .418$), but there was a significant Discourse Type × Age Group interaction, $F(1, 40) = 5.900$, $p = .020$, $\eta_p^2 = 0.129$ (see Figure 4). Follow-up pairwise comparisons revealed that the younger children produced significantly more typical disfluencies in the Structured Conversation task than in the Narration task, $t(21) = 2.219$, $p = .038$; $d = 0.46$; however, no such difference in the frequency of typical disfluencies was found between the discourse samples for the older children ($p = .304$).

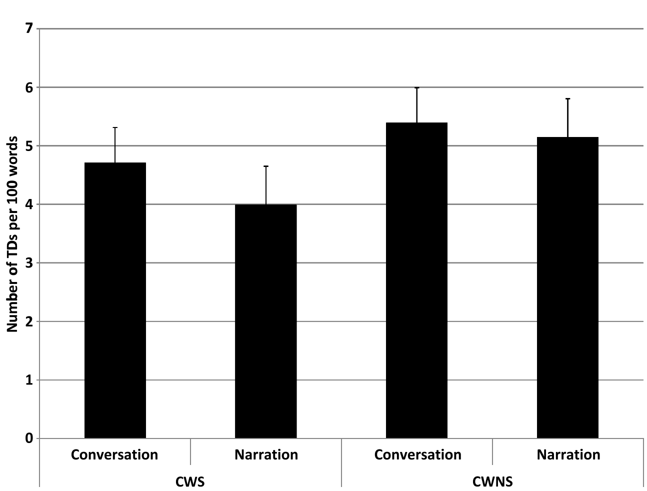


Figure 3. Mean number of typical disfluencies (TDs) per 100 words in conversation versus narration for CWS versus CWNS.

MLU_w

Given that there was a Discourse Type × Fluency Group interaction for the production of stuttering-like disfluencies, it seemed important to explore what may have contributed to this difference. The most obvious contributor, based on examination of the raw individual data (and findings from

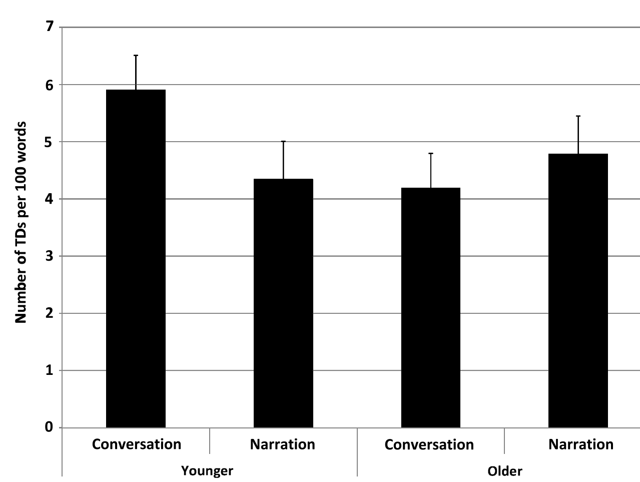


Figure 4. Mean number of TDs per 100 words in conversation versus narration for younger versus older children.

previous research [e.g., Zackheim & Conture, 2003]), was MLU_w (see Table 1). Paired-samples *t* tests revealed that the MLU_w for CWS was significantly longer in the Narration subtest ($M = 8.21$; $SD = 1.9$) than it was in the Structured Conversation subtest ($M = 9.34$; $SD = 2.3$), $t(21) = -3.965$, $p = .001$; $d = .69$. For the CWNS, there was no significant difference in MLU_w during narration ($M = 9.34$; $SD = 2.3$) and conversation ($M = 8.67$; $SD = 2.1$), $t(21) = -1.619$, $p = .120$; $d = 0.30$. Thus, the utterances elicited in the narrative condition may have had a deleterious effect on fluency in the CWS but did not appear to impact the speech fluency of the CWNS.

To further investigate the possibility that the MLU_w of the CWS was uniquely related to the differences in disfluency produced, we computed a Pearson product–moment correlation coefficient between the MLU_w in conversation and the percentage of stuttering-like disfluencies per total words ($r = -.052$, $p = .819$) and also between the MLU_w in narration and the percentage of stuttering-like disfluencies per total words ($r = -.074$, $p = .742$). Results revealed no significant correlations between the amount of stuttered speech and the MLU_w for either sample.

Finally, given the expectation that narrative production improves with age, an additional consideration we made was whether the MLU_w in the conversational versus narrative sample differed for either fluency group relative to age. A univariate ANOVA with age as the between-subjects factor and MLU_w in the Structured Conversation task as the dependent variable yielded no significant difference in MLU_w for the younger versus older CWS ($p > .05$). This analysis was also completed relative to MLU_w in the Narration task, with the results again revealing no significant difference between the younger versus older CWS. Similar results were found when these two analyses were completed with the CWNS. Thus, neither a participant's age or fluency status significantly affected his or her MLU.

DISCUSSION

A formal assessment of stuttering typically includes a conversational analysis (Bloodstein & Bernstein Ratner, 2008). However, this type of analysis alone may not be sufficient to elicit stuttering in school-age children. The purpose of the present study was to compare school-age children's speech fluency during a structured conversational task to their speech fluency during a narrative task. The content of both discourse tasks was based on a common set of pictorial stimuli. Such an approach allows for a more tightly controlled comparison of the effects of discourse modality on stuttered speech than is possible during casual conversation and narration, and it could possibly lead to a better understanding of the independent value of each type of speech elicitation task in the assessment of children's fluency. Further, given that children's narrative production skills significantly improve over the course of the elementary school-age years, an additional purpose was to explore whether potential task effects on children's fluency were mediated by age.

Conversation Versus Narration

The frequency of typical disfluencies did not differ significantly for either fluency group between the conversational and narrative samples, but the narrative samples of the CWS contained significantly more stuttering-like disfluencies than did the conversational samples. These results highlight the well-known tendency for CWS to show variations in speech fluency across speaking tasks (Bloodstein & Bernstein Ratner, 2008; Yaruss, 1997). Further, in the present study, there was a medium effect size (Cohen, 1988) for speaking task on the frequency of stuttering-like disfluencies. Thus, the differences that were noted in the frequency of stuttering-like disfluencies between the two tasks are of a magnitude that would likely be noticeable in clinical settings.

Post hoc analysis revealed a significant difference for the CWS in the MLU_w they produced in the two discourse contexts—a finding that is consistent with results from Wagner et al.'s (2000) study of MLU during conversation and narration in children with language impairment. It appeared that the tendency for the CWS to produce more stuttering-like disfluencies during narration was driven, in part, by the relatively complex linguistic demands associated with the task as the effect size associated with the difference in MLU_w between samples was moderately large. That being said, there was no significant correlation between the percentage of stuttering produced and the MLU_w for either sample type. However, the lack of correlation may have been related to the minimal variability in the MLU_w within each fluency group.

In contrast, the overall length of the speech sample seemed to have little effect on the frequency of stuttering-like disfluencies. CWS produced conversation samples ($M = 400$ words) that were on average more than three times as long as their narrative productions ($M = 127$ words), yet a significantly higher frequency of stuttering-like disfluencies occurred in narration. One could argue that the reduced length of the narrative sample as compared to the conversational sample may have contributed to the significant disfluency frequency difference. However, given the effect size for both the amount of stuttering-like disfluencies produced in the Structured Conversation versus Narration subtest (medium effect size), and also for the difference in MLU_w between the two samples (moderately large effect size), it seems that if the CWS had produced longer narratives, it would still be more likely that they would have produced more examples of disfluent speech in the narrative than in the conversational sample.

We are not suggesting that the present findings point toward an inherent impairment in narrative formulation skills among CWS, as previous research has refuted such a suggestion (Nippold et al., 1991; Scott-Trautman et al., 1999;

Weiss & Zebrowski, 1994). We are suggesting, however, that the narrative task itself appears to elicit more stuttering behavior than does conversation, presumably because of the communicative differences between the two tasks. Previous research (e.g., Byrd, Coalson, & Bush, 2010; Weiss & Zebrowski, 1992) has demonstrated that CWS tend to produce more stuttering-like disfluencies when the verbal output has a higher level of communicative responsibility (e.g., when they carry the weight of communicating the entire message) (Eisenson & Horowitz, 1945; Eisenson & Wells, 1942; Stocker, 1980; Stocker & Gerstman, 1983; Stocker & Usprich, 1976). This is precisely the case in the narrative task as opposed to the conversational task; that is, the speaker producing the narrative has the added demand of knowing that the listener is evaluating how well the speaker tells a story or even how entertaining the speaker's story is. School-age children seem to have a greater awareness of listener expectations regarding their narrative output than do preschool children (McCabe & Peterson, 1991). Thus, during narration, the lack of joint participation in message development (a characteristic that *is* present in conversational discourse) may be another key factor that results in school-age children being more disfluent during narrative production (vs. conversation).

There are also critical conceptual and linguistic differences between conversational and narrative discourse. In narration, storytellers must construct a communicative context, infer the information needs of their audience, and create a coherent text that conveys the message and meets the listener's perceived need for information at the same time. Storytellers make lexical choices that convey their intended meanings by formulating sentences that interconnect the content elements of the story. Storytellers must also organize the story and hold important details in memory as their story progresses. These conceptual and linguistic processes co-occur and interact, creating a situation in which the storyteller must talk and organize future utterances at the same time, with little or no assistance from the listener (Gillam & Johnston, 1992). The online demands of conversation are considerably weaker: Both participants create the topic, words are shared between speakers, and there are breaks in the speech stream during the conversational partner's turns. Therefore, conversation affords speakers some conceptual and linguistic advantages over narration, but additional research is needed to explore the extent to which school-age children's disfluency levels during narration correspond to their speech in less structured conversational tasks (e.g., Yaruss, 1997). Additional research is also needed to examine the extent to which disfluency data from scaffolded narrative tasks such as the one used in the present study correspond to other forms of narration (e.g., Johnson et al., 2009).

The potential cognitive and motoric differences between the conversational and narrative task cannot be ignored. The narrative task required children to hold a series of sequential intentions in memory while simultaneously planning and executing the motor movements required for the production of those intentions. Smith and colleagues (e.g., Kleinow & Smith, 2000; Smith & Kleinow, 2000; Smith, Sadagopan, Walsh, & Weber-Fox, 2010) reported that persons who stutter demonstrate greater spatiotemporal variability in the motor movements they make during speech associated with long, linguistically complex utterances than they do when producing short, relatively linguistically simple utterances. Specific to this motoric instability, one could argue that the CWS may have been speaking more rapidly in the narrative versus the conversational sample, thereby uniquely compromising their ability to maintain fluent speech during that sample. Further, it is possible that these children may have taken longer (in duration) to produce one sample as compared to the other due to self-imposed constraints. This argument, though plausible, is not supported as results from Logan et al. (2011) indicate no significant differences in articulation rate between the two speaking tasks. Then again, MLU data from the present study suggest that the utterances the CWS produced during narration were longer than the utterances they produced during conversation, thus creating the context for motor system instability of the sort described by Smith and colleagues (Kleinow & Smith, 2000; Smith & Kleinow, 2000; Smith, Sadagopan, Walsh, & Weber-Fox, 2010).

Finally, it is important to note that the finding of more frequent stuttering-like disfluencies during narration versus conversation is inconsistent with two previous studies (i.e., Johnson et al., 2009; Yaruss, 1997) in which stuttering frequency during conversation and narrative tasks was compared. There are reasonable explanations for these conflicting findings, with the first and most obvious one being that the previous studies were completed with preschoolers and the present one was completed with school-age children. It is likely that the stories produced by preschoolers were less complex than the stories told by the school-age children in the present study. Second, the speaking tasks completed in studies by Yaruss (1997) and by Johnson et al. (2009) differed from the tasks in the present study. Yaruss reported that preschoolers stuttered more in a conversational task that had explicit and implicit time constraints. There was no time pressure associated with our conversational task. It would be hypothesized, however, that the addition of time pressure to either of the speech elicitation tasks used in the present study would exacerbate the occurrence of stuttering-like disfluencies, particularly for the CWS. Third, the conversational task used in the present study was more structured than the conversational tasks that were used in previous studies. As noted in the Method section, children were presented with a series of open-ended questions or requests for information that pertained to shared referents (i.e., the pictures) rather than engaging in a conversation that was completely free to vary relative to the topic(s) discussed. The approach employed in the present study is useful because it affords control over potentially confounding variables such as speaking topic and linguistic complexity; however, it is possible that

CWS would produce more stuttering-like disfluencies in less controlled conversational settings. That being said, both conversation and narration are important tools in the analysis of speech fluency as their impact may vary as the child develops the ability to navigate more diverse forms of discourse.

Age Effects

As noted earlier, a variety of researchers have found that narrative production is a skill that develops over time (Gillam & Johnston, 1992; Peterson & McCabe, 1983), with onset of use reported to be at ~3 to 4 years of age (Westby, 1984). This skill growth reflects not only children's expanding facility with language use and narrative structure but also their increasing awareness of listeners' informational needs (McCabe & Peterson, 1991). This increased ability to fulfill communicative responsibilities may also explain why narration evoked more stuttering-like disfluencies in school-age CWS than it did in past studies of narrative fluency with preschoolers (e.g., Johnson et al., 2009; Yaruss, 1997). However, there were no significant age group differences for either fluency group relative to their MLU in the conversational or the narrative sample. Thus, any linguistic advancements that may have occurred in their narrative production may not have been adequately reflected in this measure.

An additional consideration related to age is that the younger school-age children produced significantly more typical disfluencies in the conversational sample than the older children did, regardless of whether they stuttered or not. However, no such relationship was observed in their production of stuttering-like disfluencies. Other researchers have reported that typical disfluencies decrease in frequency during conversation as children age (e.g., Wijnen, 1990, 1991). These researchers have also suggested that the change reflects maturation in the linguistic and pragmatic skills required for this form of discourse. In contrast, the frequency of stuttering-like disfluencies did not differ between the age groups in the present study. For CWS, this finding is consistent with previous studies of age effects on stuttering-like disfluencies in this age range (e.g., Gillam et al., 2009; Logan et al., 2011).

Limitations and Future Directions

Because the tasks in the present study were conducted within the context of test development, the order of task presentation was fixed; that is, each participant completed the Structured Conversation task before the Narration task. The rationale for this approach was to increase the likelihood that children would produce complex, well-developed narratives—an approach that has been used by other researchers (e.g., Wagner et al., 2000). Findings from the MLU analysis suggest that this goal was met, as children's sentence length in the Narration task was either similar to (i.e., CWNS) or longer than (i.e., CWS) their sentence length in the Structured Conversation task. As noted earlier, additional research is necessary with school-age children to compare disfluency frequency in CWS and CWNS during other narrative contexts such as those that have been used in studies with preschoolers. Weiss and Zebrowski (1994) reported that CWS produced longer utterances and more disfluency in a story retell task than they did in an original (i.e., unsupported) story task. Thus, children's narrative complexity increased when they were provided with external support for how the story might be formulated. The extent to which the structured conversational task that was used in the present study may have afforded children similar support is unknown. Additional research is necessary to examine differences in children's fluency across unsupported (i.e., original narrative) and supported (e.g., retell narrative, narrative following a related conversation about narrative events) tasks to explore this issue.

The effect of treatment history on the children's performance in the present study cannot be precisely determined. We had speculated during the participant selection process that exposure to fluency therapy would have minimal impact on the children's performance in the experimental tasks that were used. This seemed to be the case as *all* of the CWS (i.e., even those who had participated in fluency therapy) produced more stuttering-like disfluencies in the Narration subtest than they did in the Structured Conversation subtest. Further, rather than considering treatment history as a limitation, given the age of the participants in the present study, including children who had in fact participated in speech therapy strengthened the external validity of the present study. In other words, it would be difficult to find a cohort of school-age CWS who had no treatment history, as such a group would not be representative of this population.

Conclusion

The act of stuttering is affected by the bidirectional nature of communication (Conture, 2001). That is, persons who stutter are significantly disfluent when they talk with other people. In addition, disfluency frequency often varies, sometimes markedly, across contexts. Findings from the present study demonstrate how clinicians can gain greater insight into the extent to which school-age children's disfluency varies by examining speech in *both* conversational and narrative contexts. In this study, narration was shown to be more likely than structured conversation to elicit exemplars of school-age children's stuttering-related behavior. With additional research, we hope to clarify ways in which speech elicitation tasks such as the ones described in this study can be modified to result in assessment tools that are maximally efficient as well as highly valid and reliable. We also hope that clinicians will use these findings to support use of a narrative task *in addition to* (i.e., not in place of) the standard conversational task in their assessment of stuttering in school-age children.

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REFERENCES

Ambrose, N. G., & Yairi, E. (1999). Normative disfluency data for early childhood stuttering. *Journal of Speech, Language, and Hearing Research, 42,* 895–909.

Bloodstein, O., & Bernstein Ratner, N. (2008). *A handbook on stuttering* (6th ed.). Clifton Park, NY: Thomson Delmar Learning.

Byrd, C., Coalson, G., & Bush, C. (2010). The communicative intent of stuttered utterances. *Journal of Interactional Research in Communication Disorders, 1,* 253–275.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillside, NJ: Erlbaum.

Conture, E. (2001). *Stuttering: Its nature, diagnosis, and treatment*. Boston, MA: Allyn & Bacon.

Eisenson, J., & Horowitz, E. (1945). The influence of propositionality on stuttering. *Journal of Speech Disorders, 10,* 193–197.

Eisenson, J., & Wells, C. (1942). A study of the influence of communicative responsibility in a choral speech situation for stutterers. *Journal of Speech Disorders, 7,* 259–262.

Gillam, R. B., & Johnston, J. R. (1992). Spoken and written language relationships in language/learning-impaired and normally achieving school-age children. *Journal of Speech and Hearing Research, 35,* 1303–1315.

Gillam, R. B., Logan, K. J., & Pearson, N. (2009). *Test of Childhood Stuttering*. Austin, TX: Pro-Ed.

Johnson, K. N., Conture, E. G., Karass, J., & Walden, T. (2009). Influence of stuttering variation on talker group classification in preschool children: Preliminary findings. *Journal of Communication Disorders, 42,* 195–210.

Johnston, J. R. (1982). Narratives: A new look at communication problems in older language-disordered children. *Language, Speech, and Hearing Services in Schools, 13,* 144–155.

Karmiloff-Smith, A. (1985). Language and cognitive processes from a developmental perspective. *Language and Cognitive Processes, 1,* 61–85.

Kleinow, J., & Smith, A. (2000). Influences of length and syntactic complexity on the speech and motor stability of the fluent speech of adults who stutter. *Journal of Speech, Language, and Hearing Research, 43,* 548–559.

Logan, K. J., Byrd, C., Mazzochi, E. M., & Gillam, R. B. (2011). Speaking rate characteristics of elementary school-aged children who do and do not stutter. *Journal of Communication Disorders, 44,* 130–147.

McCabe, A., & Peterson, C. (Eds.). (1991). *Developing narrative structure*. Hillsdale, NJ: Erlbaum.

Miller, J. F., Iglesias, A., & Nockerts, A. (2006). *Systematic Analysis of Language Transcripts* (Research Version 9) [Computer software]. Madison, WI: Language Analysis Lab.

Nippold, M., Schwarz, I., & Jescheniak, J. (1991). Narrative ability in school-age stuttering boys: A preliminary investigation. *Journal of Fluency Disorders, 16,* 289–308.

O'Brian, S., Packman, A., Onslow, M., & O'Brian, N. (2004). Measurement of stuttering in adults: Comparison of stuttering-rate and severity-scaling methods. *Journal of Speech, Language, and Hearing Research, 47,* 1081–1087.

Parker, M. D., & Brorson, K. (2005). A comparative study between mean length of utterance in morphemes (MLU_m) and mean length of utterance in words (MLU_w). *First Language, 25,* 365–376.

Pellowski, M. W., & Conture, E. G. (2002). Characteristics of speech disfluency and stuttering behaviors in 3- and 4-year-old children. *Journal of Speech, Language, and Hearing Research, 45,* 20–34.

Peterson, C., & McCabe, A. (1983). *Developmental psycholinguistics: Three ways of looking at a child's narrative*. New York, NY: Plenum.

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.

Scott, C. M. (1988). A perspective on the evaluation of school children's narratives. *Language, Speech, and Hearing Services in Schools, 19,* 67–82.

Scott-Trautman, L. S., Healey, E. C., Brown, T. A., Brown, P., & Jermano, S. (1999). A further analysis of narrative skills of children who stutter. *Journal of Communication Disorders, 32,* 297–315.

Smith, A., & Kleinow, J. (2000). Kinematic correlates of speaking rate changes in stuttering and normally fluent adults. *Journal of Speech, Language, and Hearing Research, 43,* 521–536.

Smith, A., Sadagopan, N., Walsh, B., & Weber-Fox, C. (2010). Increasing phonological complexity reveals heightened instability in inter-articulatory coordination in adults who stutter. *Journal of Fluency Disorders, 35,* 1–18.

Stadler, M. A., & Ward, G. C. (2005). Supporting the narrative development of young children. *Early Childhood Education Journal, 33*(2), 73–80.

Stein, N., & Glenn, C. (1979). An analysis of story comprehension in elementary school children. In R. Freedle (Ed.), *New directions in discourse processing* (Vol. 2, pp. 53–120). Norwood, NJ: Ablex.

Stocker, B. (1980). *The Stocker probe technique for diagnosis and treatment of stuttering in young children*. Tulsa, OK: Modern Education.

Stocker, B., & Gerstman, L. (1983). A comparison of the probe technique and conventional therapy for young stutterers. *Journal of Fluency Disorders, 8,* 331–339.

Stocker, B., & Usprich, C. (1976). Stuttering in young children and level of demand. *Journal of Fluency Disorders, 1,* 116–131.

Thordardottir, E. T., & Weismer, S. E. (1998). Mean length of utterance and other language sample measures in early Icelandic. *First Language, 18,* 1–32.

Tilstra, J., & McMaster, K. (2007). Productivity, fluency, and grammaticality measures from narratives. *Communication Disorders Quarterly, 29*(1), 43–53.

Ukrainetz, T. A., Justice, L. M., Kaderavek, J. N., Eisenberg, S. L., Gillam, R. B., & Harm, H. M. (2005). The development of expressive elaboration in fictional narratives. *Journal of Speech, Language, and Hearing Research, 48,* 1363–1377.

Yairi, E., & Ambrose, N. (2005). *Early childhood stuttering: For clinicians by clinicians*. Austin, TX: ProEd.

Yaruss, J. S. (1997). Clinical implications of situational variability in preschool children who stutter. *Journal of Fluency Disorders, 22,* 187–203.

Wagner, C. R., Nettelbladt, U., Sahlen, B., & Nilholm, C. (2000). Conversation versus narration in pre-school children with language impairment. *International Journal of Language & Communication Disorders, 35,* 83–93.

Weiss, A. L., & Zebrowski, P. M. (1992). Disfluencies in the conversations of young children who stutter: Some answers about questions. *Journal of Speech and Hearing Research, 35,* 1230–1238.

Weiss, A. L., & Zebrowski, P. M. (1994). The narrative productions of children who stutter: A preliminary view. *Journal of Fluency Disorders, 19,* 39–63.

Westby, C. (1984). Development of narrative language abilities. In G. Wallach & K. Butler (Eds.), *Language learning disabilities in school-age children* (pp. 103–127). Baltimore, MD: Williams & Wilkins.

Wigglesworth, G. (1997). Children's individual approaches to the organization of narrative. *Journal of Child Language, 24,* 279–309.

Wijnen, F. (1990). The development of sentence planning. *Journal of Child Language, 17,* 651–675.

Wijnen, F. (1991). The role of language formulation in developmental disfluency. In *Proceedings of the XIIth International Congress of Phonetic Sciences,* Université de Provence, Aix-en-Provence.

Zackheim, C. T., & Conture, E. G. (2003). Childhood stuttering and speech disfluencies in relation to children's mean length of utterance: A preliminary study. *Journal of Fluency Disorders, 28,* 115–142.