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■ ■ ■ # Fluency of School-Aged Children With a History of Specific Expressive Language Impairment: An Exploratory Study

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A large volume of literature now links language demand and fluency behaviors in children. Although it might be reasonable to assume that children with relatively weak language skills might demonstrate higher levels of disfluency, the sparse literature on this topic is characterized by conflicting findings on the relationship between language impairment and disfluency. However, in studies finding elevated disfluency in children with specific language impairment, a higher frequency of disfluencies more characteristic of stuttering has been noted. This study asks whether children with long-standing histories of language delay and impairment are more disfluent, and display different types of disfluencies than their typically developing, age-matched peers.

Elicited narratives from 22 pairs of 9-year-old children were analyzed for fluency characteristics. Half of the children had histories of specific expressive language impairment (HSLI-E), whereas the others had typical developmental histories. The children with HSLI-E were significantly more disfluent than their peers and produced more stutter-like disfluencies, although these behaviors were relatively infrequent in both groups. Implications for clinical intervention and future research are discussed.

Key Words: fluency, stuttering, language, expressive language impairment, specific language impairment (SLI)

Recently, there has been increased emphasis on the relationships between the demands of language formulation and fluency behaviors in children with typical and atypical language development (for review, see Bernstein Ratner, 1997; Tetnowski, 1998). During language acquisition, children's lexicons and their ability to understand and produce syntactically correct utterances are limited. Thus, it should not be surprising that disfluencies occur more frequently in children's spontaneous speech than in the speech of adults (Starkweather, 1987). In fact, past research has amply demonstrated that during language development many children undergo a period of normal disfluency, generally between ages 2 and 3 (Colburn & Mysak, 1982a, 1982b; Dejoy & Gregory, 1985; Hall, Yamashita, & Aram, 1993; Haynes & Hood, 1977; Wexler, 1982; Wexler & Mysak, 1982; Yairi, 1981). As Davis (1939) noted, repetitions and other disfluencies are common even in the speech of older preschoolers, a finding confirmed more recently by Ambrose and Yairi

(1999), who studied the relationship of age to disfluency quantity and type in 54 typically developing (TD) children ranging from 23 to 59 months old. Disfluencies often associated with stuttering (e.g., part-word and monosyllabic word-level repetitions) are actually present in so-called "normal developmental disfluency" and decreased in frequency over the age range from a high of 1.6% spoken words to under 1%, whereas disfluencies not typically seen as pathological, such as filled pauses, revisions, and repetitions of multisyllabic words and phrases actually increased somewhat, from 3.9% to 4.5%.

Kowal, O'Connell, and Sabin (1975) studied a larger and older cohort, beginning with kindergartners and ending with high school students. Their results suggested that overall disfluency rates continue to fall through the period of later language development, from roughly a 7–8% disfluency rate in kindergarten through 4th grade, to a 5–6% rate from the 6th to 12th grades. However, they noted that stutter-like disfluencies (SLDs) showed more dramatic

changes by age. For example, repetitions ranged from a high of 25 per 1,000 syllables among the kindergartners to only 4 per 1,000 syllables among the high school students. Thus, it appears that study of certain types of disfluencies, such as repetitions, which occur frequently in young language learners and are barely present in young adults, may provide insight into the development of fluent speech production.

What Explains the Course of Normal Fluency Development?

Evidence suggests that it is the specific task of using more advanced linguistic skills that provokes these patterns of fluency development. For example, Colburn and Mysak (1982a, 1982b) found that disfluencies increase with the production of new syntactic structures in children 2 to 3 years old. Case studies that analyze the loci of disfluencies also show interesting patterns of fluency development in children. Wijnen (1990) completed a case study of a Dutch boy beginning at age 2 years 4 months and ending at 2 years 11 months. When he analyzed the types of words where repetitions occurred, Wijnen discovered that repetitions did not appear frequently in any specific location during the earlier stages of combinatorial speech. However, during the later stages, they occurred predominantly on words at the beginning of sentences, suggesting that increased sentence planning burdens were affecting the child's ability to generate fluent speech. The relationship between specific linguistic structures and disfluency patterns was further confirmed by Bernstein (1981), who reported that TD children between ages 3 and 8 were most likely to experience fluency breakdown on words initiating sentence constituents, such as the verb phrase.

Thus, as the movement to adult-like speech occurs, TD children's patterns of disfluencies reflect the new complexity of their speech. Tetnowski (1998) notes:

Based on available data, it can be hypothesized that the effects of word length and function, language complexity, and task difficulty stress the language operating system. It is also possible that language difficulty can operate independently of linguistic complexity. Increased demand on any of these variables can cause disfluency. (p. 232)

Strand's (1992) "Child Talk Model" provides an account of the integration of processing and motor demands during language acquisition. Demands on the language-learning child fall into broad categories of temporal planning and language formulation. Strand suggests that, as with many acquired skills, the automatic nature of speech production and its integration with linguistic code grow as children develop. This automaticity, in turn, encourages fluency. Strand suggests that reduced attention on motor and language processing allows the developing child to channel resources to ever-expanding, more complex linguistic demands. Finally, Strand claims that "the simultaneous, parallel, and interactive processes of verbal formulation and motor speech planning account for the influence of linguistic formulation on

speech motor control" (p. 103). Such formulation demands can lead to disruptions in verbal output, such as phonological or phonetic errors. Paul (1998) supports this view and extends it to include disruptions in fluency, stating that "the child cannot produce a fluent whole unless the component pieces are accessible from working memory and encodable with the amount of resources available. If this is not the case, the 'whole' will break down and trade-offs will become necessary" (p. 251). These trade-offs, potentially, could include disfluencies in spontaneous speech. Support for such trading relationships is provided by a recent study of disfluencies in the speech of 4- to 6-year-old normally fluent preschoolers (Yaruss, Newman, & Flora, 1999); for this group, utterances produced disfluently were more likely to be longer and more syntactically complex than those produced fluently.

Fluency in Children With Compromised Language

Ultimately, language growth and complexity appear to be correlated with disfluency. Thus, theoretically, one might predict increased levels of disfluency in children with compromised linguistic abilities. Although data to support this hypothesis are sparse, a few observations have been noted in the literature on language impairment.

Merits-Patterson and Reed (1981) were early investigators of normal disfluency in children with language impairments. They studied 27 four- to six-year-old children split into three groups: a normal control group, a language-delayed group receiving treatment, and a language-delayed group not receiving treatment. The study was undertaken in an attempt to examine the anecdotal claim that language intervention can lead to increased disfluency. Children were matched based on their performance on Lee's (1974) Developmental Sentence Scoring (DSS) assessment. All children in the experimental groups received DSS Language Age scores at least 1 year below their chronological age. Merits-Patterson and Reed (1981) found significant differences between the children with language delays who were receiving treatment and the other two groups. Their results showed that children with language delays who were receiving treatment produced disfluencies on 32.8% of their spontaneously produced words, nearly twice the rate seen in the normal and untreated language-delayed groups. Some types of disfluencies also were proportionally more numerous in the treated group. For example, the language-delayed group receiving treatment produced SLDs at a rate more than 10% higher than that of the normal and untreated language delayed groups. The authors suggested that pressure from language treatment might have been a factor in the participants' disfluency. An alternative explanation is that the children receiving treatment were overcoming delays in their language development as a result of the treatment and hence experienced the increase in disfluency seen in TD children using newly mastered language skills (Colburn & Mysak, 1982a, 1982b).

In case studies published by P. Hall (1977), the spontaneous speech of two children with language disorders was

analyzed. Hall determined that these children exhibited frequent part-word repetitions and suggested that the "disfluent behavior exhibited by some language disordered school-aged children is also a result of the struggle to cope with the acquisition of language" (p. 364).

In 1993, Hall, Yamashita, and Aram published a larger study that also investigated this issue. Their findings suggest that both the type and quantity of disfluencies produced by children with typical language acquisition differ from those of children with developmentally delayed language skills. This study investigated the conversational speech of 60 children who were diagnosed with language impairment using tightly controlled inclusionary criteria. The participants ranged from approximately 4 to 6 years old. None had been diagnosed as children who stuttered.

After the initial data analysis, Hall et al. (1993) separated children with language impairments into two groups in an attempt to support the hypothesis that such children can be grouped based on disfluency. One group was labeled "high disfluency" (HD) and the other "normal disfluency" (ND). The HD group consisted of 10 of the original 60 participants, whereas the ND group comprised the remaining 50 participants. Hall et al. (1993) reported that the HD group was distinguished from the ND group by poorer scores on a variety of standardized and non-standardized language assessment measures. Coupling these lower scores with the generally higher rates of SLDs by all participants, Hall et al. speculated that it is "children with considerable discrepancies in language development, as defined by greater semantic capacities than morpho-syntactic capacities, who present the most disruptions or greater frequency of disfluencies" (p. 578). Recent data reported by Anderson and Conture (2000) support this possibility, as children in their study who stuttered presented with larger discrepancies between lexical and syntactic abilities than did children in the normally fluent comparison group.

Hall (1996) has also completed a longitudinal study that followed a small sample of the participants from the 1993 study to evaluate changes in the nature and type of disfluency over time. Nine children drawn from Hall et al. (1993) participated in the investigation, which tracked fluency development between ages 7 and 9. She noted that the overall rate of disfluency fell substantially as the children moved from preschool to the older grades, but that some SLDs, defined as part-word repetitions, prolongations, tense pauses, and broken words, rose in frequency.

Conversely, a small collection of case studies recently presented by Lees, Anderson, and Martin (1999) did not substantiate the hypothesis that language impairment leads to an increase in speech disfluency. For four 5- to 6-year-old children with language disorders, disfluency rates were elevated by less than 1% when compared to those of TD peers. Moreover, when eight children who stuttered were divided into equally matched groups of children with and without concomitant language disorder, the children with language impairment were actually somewhat more fluent than their language-normal peers on sentence modeling and imitation tasks.

Similar results were found by Miranda, McCabe, and

Bliss (1998), who compared fluency of 9-year-old boys with SLI with that of their age- and language-matched peers during narrative production. Although a higher ratio of reformulations (retracings with correction) was seen for the children with language impairment, no differences were seen among the groups in frequency of repetitions, hesitations, and fillers. These results are consistent with a very recent study of twenty 11-year-old children with SLI and two age- and language-matched comparison groups (Scott & Windsor, 2000); fluency was not a measure that discriminated school-aged children with language impairment from their TD peers.

Recently, we have investigated fluency development of late-talking children and children with language disorders, as part of a longitudinal effort to relate language delay and disorder to achievement in other areas of communicative development, such as phonology (Rescorla & Ratner, 1996; Pharr, Ratner, & Rescorla, 2000). As a pilot investigation of fluency in this cohort, preliminary work to compare the fluency of 36-month-old toddlers with SLI and their age-matched, TD peers was completed by Hodge, Rescorla, and Ratner (1999). The analysis used spontaneous speech samples of five pairs of children with SLI and children developing normally who were randomly drawn from Rescorla's (1989) longitudinal database of 34 pairs of children with language delays and typical language development who were matched in terms of age, gender, and socioeconomic status (SES). The investigation revealed a large and significant difference in both the type and quantity of disfluencies observed in the two sets of children.

Specifically, the mean rate of disfluency was significantly different ($p < .005$). The TD children's mean disfluency rate was approximately 1.25% (range 0.50–2.00%) as opposed to 9.25% (range 6.50–12.00) for the children with language impairment. There was no overlap between the ranges of disfluency seen in the two groups. The least disfluent child with SLI showed more than three times as much disfluency as did the most disfluent TD child.

The types of disfluencies produced by the two groups also differed. The study tallied part-word repetitions, whole-word repetitions, phrase repetitions, hesitations, filled pauses, and phrase revisions when analyzing disfluency types. Children with SLI produced, on average, more part-word and whole-word repetitions. In fact, these types formed a large proportion of SLI disfluencies. This contrasts with patterns observed in the TD group, who most frequently produced phrase revisions. The proportion of SLDs, specifically part-word repetitions, calculated over all disfluencies, differed substantially between the two groups. The SLI group showed a 20% rate, whereas the TD group showed only a 3% rate for this particular disfluency type.

Taken together, the limited literature on fluency in children with language impairment suggests that the language-encoding difficulties of this population may reveal themselves in an increased number of disfluent behaviors; however, data are limited, and some conflicting findings have been observed. Moreover, there is some evidence that the types of fluency behaviors seen in this population may not be typical of those usually seen in children with normal language.

In the research to be described here, we assessed the fluency outcomes of the larger cohort of children from which Hodge et al.'s (1999) pilot study data are derived. In this study, we ask whether children with significant histories of language delay and impairment are less fluent at follow-up than children with typical language development. Because much of the conflicting data in the literature come from relatively older children, we decided to concentrate our efforts on fluency characteristics of children at age 9, a central time frame for a number of the studies reported above, and an age for which relatively long oral narrative samples were available for analysis. In doing so, we had the following questions:

1. Are school-age children with depressed language abilities more likely to show an increased incidence of disfluency than their TD peers?

2. Given some reports that suggest that SLDs are more likely to be frequent in the speech of less mature and less proficient language learners, are the patterns of disfluency type similar between children with typical and delayed language development?

Method

Participants

The participants were selected from Rescorla's (1989) longitudinal database of 34 pairs of age-, gender-, and SES-matched children. At age 2, half of the children were originally classified as having specific expressive language impairment (SLI-E), using the Language Development Survey (LDS; Rescorla, 1989), whereas half were classified as developing typically. All children were studied from ages 2 to 11. These children were studied extensively and the work has been published in a number of articles (for additional information, see Rescorla & Fechnay, 1996; Rescorla & Ratner, 1996; Rescorla & Schwartz, 1990).

For the current study, groups were evaluated at age 9, as preliminary but conflicting data exist to characterize the fluency of children with SLI at this age (Hall, 1996; Miranda et al., 1999; Scott & Windsor, 2000). In the Rescorla study, because of participant loss over time, age 9 data were available for only 22 TD children and 30 children originally classified as being language delayed. By this time, most of the children with language impairment had developed sufficient language skills to remove them from clinical concern; however, as will be noted, they continued to demonstrate much weaker language skills than their comparison peers. For the purposes of this investigation, these children are called children with histories of expressive specific language impairment (HSLI-E). As noted above, the two groups were not balanced in number by age 9 because of participant loss. To balance the groups and create the largest potential samples for analysis, the 8 children with language impairment who had the fewest number of words in their storytelling activity were excluded before fluency analysis. This resulted in two groups of 22 children each.

These two groups, each consisting of 21 boys and 1 girl, did not differ in Hollingshead SES scores computed at intake at age 2. The TD children had demonstrated scores at intake of 0.300 on the Reynell Developmental Language Scales; their average LDS score was 227.74. Such performance contrasted significantly with that of the HSLI-E group, who had average scores of 1.758 on the Reynell and 22.79 on the LDS when first recruited into the longitudinal study. All of these scores were significantly different at $p = .001$. By age 9, the differences between the two groups had narrowed. Although, as noted, no child in the late-talking group was considered to be clinically language impaired, scores for all language measures were depressed in this group when contrasted to performance by the TD group.

All participants were given a standardized language measure, the CELF-R, at age 8, followed by academic testing and language sample analysis at age 9. The children with HSLI-E scored much more poorly on all measures. Language scores on subtests of the CELF-R were significantly poorer for children with HSLI-E for the following subtests: linguistic concepts ($p = .05$), formulated sentences ($p = .003$), semantic relationships ($p = .008$), word classes ($p = .002$), and listening to paragraphs ($p = .002$). Scores approached significance on the word association subtest and showed no significant differences on the sentence assembly subtest.

At age 9, all participants produced narratives in response to a wordless picture book (*Frog, Where Are You?*, Mayer, 1969; see details below). A series of analyses was conducted on the syntactic and narrative properties of the children's samples (Manhardt, 1999). Briefly, four factors were compiled: a syntactic factor (use of subordinate clauses and relatively complex sentences), a story grammar factor (use of story grammar elements), a cohesion factor (use of linking devices such as pronominal reference, conjunctions, and ellipsis), and an evaluative device factor (use of information about characters' emotions, use of character speech, and use of causal links between plot events). The children with a history of SLI performed significantly worse ($p < .05$, 2-tailed) than their TD peers on the story grammar and evaluative information factors, slightly worse than their peers on the syntax factor, and somewhat better than their peers on the cohesion factor. Taken together, these analyses suggest residual language production differences between children with a history of clinical SLI and TD children without such a history.

Data Coding and Analysis

The raw data exist in videotape form. As part of her longitudinal study, Rescorla (1989) gathered elicited language samples from all the children at age 9, when they were asked to tell a story from a picture book. With the exception of one participant, whose mother was also in the room, all participants performed the storytelling activity with only a researcher present. Each participant told the story after reviewing *Frog, Where Are You?* (Mayer, 1969), using the book as a visual aid. All videotapes were originally transcribed orthographically into Codes for the Human Analysis of Transcripts (CHAT; MacWhinney, 1995) by students who were unaware of the purpose of the current investigation. These transcriptions were analyzed

and coded for disfluency in the current investigation. Once coded, the disfluencies were grouped by type as defined below.

The orthographic transcriptions were used to code the data. The first author coded the samples, which ranged from 237 to 449 words for the SLI group and 136 to 588 words for the TD group. Total number of words was calculated by running the transcripts through the FREQ utility of the CHILDES Computerized Language Analysis (CLAN) programs (MacWhinney, 1998). The average sample size was 304 words for the children with HSLI-E, while it was 315 words for the TD children. This difference in average sample size was not significant ($t = .4644$, $p = .6446$). The following counts were made for each participant.

Frequency. Frequency is the total number of disfluencies divided by the number of intended words spoken for each participant to yield the percentage of disfluent words.

Type. Previous work suggests that children with language impairment use a high proportion of disfluencies that share properties with stuttering (Hall et al., 1993). This study employed the same coding used by Hall et al. (1993) in their study of the nature of disfluencies of children with SLI. The disfluencies are separated into *normal disfluencies*: whole-word repetitions (WWR), phrase repetitions (PHR), revisions (R), and interjections (I); and *stutter-like disfluencies*: part-word repetitions (PWR), prolongations (PR), broken words (BW), and blocks/tense pauses (TP). The number of occurrences of normal disfluencies and SLDs was divided by the total number of intended words for each participant, yielding proportional rates of distinct disfluency types. Disfluencies contained within revisions were classified as revisions only to avoid double counting of fluency behaviors. No other categories of disfluency appeared jointly in the transcripts.

Measurement Reliability

Measurement reliability was calculated for the three variables of total disfluency, normal disfluency, and stutterlike disfluency. A second transcriber identified the occurrence of disfluencies, classified as either normal or stutter-like, from videotapes of approximately 17% of the total sample in each group. Reliability data were collected for 4 participants from each group. As predicted by Lewis (1994), total disfluency proved to be the most reliable measure. Pearson product-moment correlation produced reliable agreement with Cronbach's alpha at .967 for total disfluencies, .892 for normal disfluencies, and .783 for stutter-like disfluencies. Given the relatively strong reliability found between coders, the first author's (BB's) fluency coding was used for all statistical analyses to maintain consistency across samples.

Results

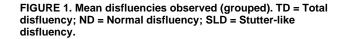### Comparison of Total Disfluency Means

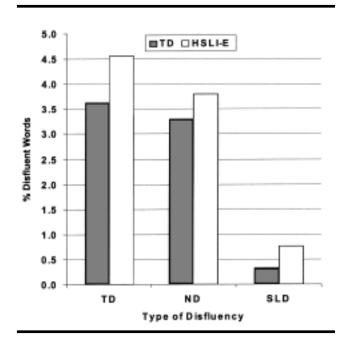Because of unequal variances for many of the fluency measures, nonparametric statistics were used in the data

analyses reported in this section. As noted earlier, the total number of words available for analysis from each group did not differ significantly. The children with HSLI-E told stories that averaged 304 words, with a range from 227 to 449 words, whereas their TD peers averaged 315 words, with a range of 136 to 588 words. Each sample met a minimal assessment standard of 100 words.

As a group, the children with HSLI-E produced more disfluencies than their TD peers. From the coded transcriptions of the storytelling activity, children with HSLI-E produced an average rate of 4.56% disfluent words, with a standard deviation of 1.7%; their TD peers produced an average of 3.3% disfluent words, with a standard deviation of 1.9%. The total disfluency rates for individual children within the HSLI-E group ranged from 2.1% to 7.7%, and the TD group's rates ranged from 1.0% to 5.2%. This difference in total disfluency rate was significant (Mann-Whitney corrected for tied ranks to yield Wilcoxon $Z = -2.6487$, $p < .01$). Figure 1 highlights this comparison.

Comparison of Disfluency by Type

As seen with total disfluencies, a similar trend emerged when evaluating the rate of production of SLDs. No child in either group carried a clinical diagnosis of stuttering, and SLDs were infrequent in both groups. However, the children with histories of language impairment did produce significantly more SLDs. As shown in Figure 1, the TD group produced an average of 0.33% (standard deviation 0.4%) words characterized by SLDs, whereas the HSLI-E group produced an average of 0.76% (standard deviation 0.5%) words with SLDs. The rate of SLDs for individual

FIGURE 1. Mean disfluencies observed (grouped). TD = Total disfluency; ND = Normal disfluency; SLD = Stutter-like disfluency.

children in both groups ranged from none to 1.7%. Additionally, the number of children who exhibited some SLDs was higher for the HSLI-E group (78%) than for the TD group (52%). The difference between the two groups' proportional usage of SLDs was significant at $p < .02$ (Mann-Whitney-Wilcoxon $Z = -2.3589$).

Differences in the distribution of normal disfluencies approached but did not achieve significance. As seen in Figure 1, the HSLI-E group did produce slightly more normal disfluencies, at a 3.8% rate (standard deviation 1.9%), than the TD group, which produced an average 3.3% (standard deviation 1.6%). The HSLI-E group's normal disfluency rates ranged from 1.7% to 7.9%, whereas the TD group's disfluency rates ranged from 1.0% to 6.7%.

A series of t tests was run to compare specific disfluency types. The means and ranges of each disfluency type are shown in Table 1. The distribution of disfluencies across the two groups of children was similar. To accommodate the multiple comparisons, alpha for this analysis was set at $p < .01$. No single disfluency type differentiated the groups.

Assessment of the individual types of disfluencies revealed that broken words were the rarest type of stutter-like disfluency. They were produced by 2 of the 44 children, with 1 child in each group. Although there was no significant difference in blocks between groups, the children with HSLI-E produced seven times more blocks than their TD peers. Further, nearly 33% of the HSLI-E children produced blocks, whereas only 1 of the TD children (4%) had blocks in his speech. The children with HSLI-E produced three times as many part-word repetitions as their TD peers. Not all participants produced part-word repetitions. Approximately 50% of the children with HSLI-E produced them, as opposed to only 33% of the TD children. All other disfluency types were essentially equivalent between groups.

Discussion

In this study, school-age children with HSLI-E were more disfluent than their age-, gender-, and SES-matched peers. Specifically, they produced more SLDs than children with typical development. Although our findings are not consistent with those of Miranda et al. (1998) and Scott and Windsor (2000), who found that children with language impairment are not at risk for increased levels of disfluency, they agree with those of Hall (1996), who found that school-age children with frank language impairment produced an excessive number of SLDs. Our findings suggest that, even when children with SLI improve their skills to fall within the range of normal ability, they continue to exhibit fluency patterns that distinguish them from TD peers. One interpretation of these results is that even subtle language formulation difficulties or task variations contribute to fluency break-down, a position consistent with a larger volume of literature on sentence formulation in adults and the literature on fluency and language interactions in children who stutter and children with normal fluency (Bernstein

Ratner, 1997; Masterson & Kamhi, 1991; Tetnowski, 1998; Yaruss et al., 1999). Under this assumption, current language impairment or even a history of language difficulty affects the production of fluent speech, as in this sample, when clinical language disability is no longer evident but subtle depression of language skills continues to be evident on standardized testing and language sample analysis.

Clinicians often report that children with language impairment exhibit increased disfluency, and that some SLI-E children appear to have a concomitant stuttering problem (Hall, 1977). These findings suggest that this impression may be valid if the results of this study can be generalized to the speech behavior of other children with language disorders. The higher frequency of disfluencies in the HSLI-E group is particularly interesting because of the presence of SLDs, which were significantly more frequent in their speech than in the output of the TD group. Part-word repetitions and prolongations were the most frequently observed SLDs among the children with a history of language impairment. Although the mean frequency of these behaviors was very low, the individual variance in fluency within the language-impaired group was large, suggesting that some individual HSLI-E children were much more disfluent than others, and that their speech fluency could have aroused clinical concern. A logical extension is that children with more obvious language impairment would demonstrate more of these behaviors. Importantly, however, none of these children demonstrated the struggle behaviors often associated with both children and adults who stutter.

Clinicians concerned that a particular client requires treatment for both language impairment and stuttering should consider that clinical stuttering is almost always characterized by behaviors that go beyond overt disfluency and involve reactions to the fluency breakdown, such as struggle or avoidance. Verification of a concomitant stuttering problem in a child with language impairment may be improved by considering the relative frequency of fluency breakdowns, their nature, the child's reaction to such breakdowns, and other typical features of develop-

TABLE 1. Disfluency type means and ranges by group (in percentages).

Type	HSLI-E		TD	
	M	Range	M	Range
Normal Disfluencies				
Whole-word repetitions	0.7	(0–2.0)	0.5	(0–1.94)
Phrase repetitions	0.6	(0–2.0)	0.6	(0–2.2)
Revisions	1.1	(0–2.1)	1.1	(0–2.9)
Interjections (filled pauses)	1.4	(0–4.8)	1.1	(0–4.1)
Stutter-Like Disfluencies				
Part-word repetitions	0.3	(0–1.6)	0.2	(0–1.0)
Prolongations	0.3	(0–1.1)	0.1	(0–1.2)
Blocks	0.14	(0–1.1)	0.02	(0–0.5)
Broken words	0.02	(0–0.04)	0.01	(0–.02)

mental stuttering, such as relatively early onset (ages 2–5) and positive family history. In the absence of such confirmatory findings, clinicians may be witnessing disfluencies that stem more directly from problems in expressive language formulation. Such disfluencies may best be treated through language intervention that strengthens linguistic abilities, although the efficacy of such an approach is currently unknown.

Not all children with histories of language impairment exhibited SLDs. However, since 78% of them did produce SLDs, this aspect of the spontaneous speech of children with language impairment may be considered to be another indicator of difficulty with the formulation and execution of expressive language. Given common clinical concern and increasing evidence of co-existing fluency and language disorders in children on the language-impairment caseload (Arndt & Healey, 2001), it will be important to conduct further studies of children with significant language impairment to further describe the frequency and quality characteristics of fluency breakdowns in this population.

It is possible that the conflicting reports of fluency abilities in children with language impairment may be because fluency impairment characterizes only a particular subgroup of such children, rather than the population in general, which is known to be heterogeneous. Fletcher (1992) noted that only one of the four subgroups of children with language impairment was more likely to demonstrate elevated disfluency. Similarly, Lees et al. (1999) were unable to detect higher than normal rates of disfluency in their children with language impairment, but the children in that study were selected primarily on the basis of receptive deficits.

Why Might Children With Language Impairments Be More Disfluent?

On controlled tasks, such as sentence imitation, and in general conversation, attempts by children to produce utterances at the limits of their spoken language abilities are known to produce higher levels of disfluency (e.g., Bernstein Ratner & Sih, 1987; Yaruss et al., 1999). In children with depressed language abilities, one might assume that these limits are reached more frequently, as the Child Talk model (Strand, 1992) proposes. Some specific language tasks may also stress fluency abilities in children. A study by MacLachlan and Chapman (1988) suggests that fluency breakdown in children with language impairment may be inextricably tied to the length and complexity of the utterances they attempt. Although they could not detect significant differences in disfluency rates among children with SLI and age- and language-matched peers on conversational and narrative tasks, narratives clearly posed the highest fluency burden on the children with SLI, and disfluencies rose steeply as sentence length increased in this task. Scott and Windsor (2000) also noted that disfluency rates rose when children with language impairment and those with typical language development were required to produce spoken narratives, suggesting that this task taxes fluency considerably and may reveal disfluency

patterns not otherwise characteristic of the children's speech. The children in this study were also observed in a narrative task situation, which may have served to elicit the distinctive profiles of fluency we observed.

Much of the literature to date has confined itself to frequency and type analyses of disfluencies in children with language impairment. The locus (location) of such disfluencies may be of interest as well. An informal review of transcripts revealed potentially intriguing results regarding the location of the SLDs. The low numbers of SLDs produced by TD children occurred in loci consistent with the adult fluency literature (Silverman, 1995; Van Riper, 1982), namely on longer, content words, and appeared to relate to lexical retrieval. For example, one TD participant produced a part-word repetition on the verb *found* in the utterance "the boy found a family of frogs." Another TD child exhibited a prolongation on the verb *climbed* in the sentence "then he climbed on a rock looking for the frog." This contrasted with the SLDs produced by the children with histories of language impairment. Their disfluencies were most frequently located on function words, particularly articles. This is consistent with the stuttering literature regarding the loci of children's disfluency, where stuttered disfluencies are likely to occur on the first words of utterances or sentence constituents (Bernstein, 1981). For example, one HSLI-E child produced a prolongation on the word *and* in the utterance "they started calling and walking into the woods," and another exhibited a part-word repetition on the second occurrence of the word *his* in the utterance "The kid and his dog are staring at his pet frog." A third HSLI-E child produced a block on the word *the* in the sentence "the bees started flying past." Articles are late arriving in typical language development and are frequently omitted by children with SLI. For instance, Leonard et al. (1992) found that Italian children diagnosed with SLI had difficulty with obligatory articles. This suggests that the location of disfluencies noted in the current investigation may indeed be related to sentence planning. The second most frequent occurrence of SLDs for the SLI group was on nominative case pronouns, a well-documented difficulty for children with language impairments (Loeb & Leonard, 1988; Loeb & Leonard, 1991).

Moreover, the fact that more linguistically proficient children demonstrated patterns of fluency that were more adult-like, and that the children with histories of language difficulty produced more child-like patterns of disfluency may have implications for understanding fluency development in both populations. This further implies that more extensive analysis of the loci of disfluencies in children with SLI over the course of their development may be informative.

Of the studies that have found elevated levels of disfluency in children with language delay or impairment, all have commented that the frequency of SLDs is particularly elevated in this population. The finding that children with HSLI-E specifically produced more SLDs is not accounted for by any current model of the relationship between language formulation and fluency. That is, though many models predict a higher frequency of disfluencies in

general, none would predict different distributions of disfluency types across diagnostic groups. Even in the stuttering literature, few models distinguish between the supposed deficits or levels of breakdown that yield different disfluencies (but see Kolk & Postma, 1997). It is currently impossible to reach any conclusions regarding the genesis of SLDs in these children, but the question seems to warrant further investigation.

Future Directions

As noted, because the children participating in this study had progressed past the point of showing clinical language impairment, it will be important to extend these findings by examining the fluency behaviors of children currently receiving treatment for SLI-E. Also, as these children are drawn from a longitudinal database and their fluency characteristics have been analyzed only at ages 3 and 9, it is difficult to determine whether the disfluency patterns of both groups follow the trends reported in the stuttering literature and the trends shown on the continuum of normal fluency development compiled by Kowal et al. (1975). Interesting comparisons could be drawn by comparing the performance of each full group throughout the age range in which they were followed (ages 3–11). This knowledge may enable clinicians to add the analysis of fluency to their evaluation of school-age children with language impairment. It may also enable the clinician to distinguish between a child with language impairment who exhibits stuttering disfluencies without concomitant struggle behaviors from a child with language impairment who shows both disfluencies and struggle behaviors and therefore merits treatment for both conditions.

The fact that the locus of fluency breakdown was not identical for the two groups of children in this study may be a fruitful area for further research. Additionally, because children with SLI in other language communities experience difficulty with different aspects of language structure in languages that differ in typology (Leonard, 1998), investigation of the location of SLDs would be a worthy cross-linguistic endeavor to inform the nature of language processing difficulties that are characteristic of SLI regardless of the specifics of the grammatical systems used by the children.

Ultimately, this investigation suggests that, even by age 9, children with HSLI-E may have persistent subtle difficulty with language formulation, which results in both increased disfluency and elevated levels of SLDs. Key within these results is the lack of struggle behaviors typically associated with fluency disorders. This differentiation is important, as intervention to decrease disfluency to normal levels may be best achieved by bolstering the expressive language skills of the child with language impairment instead of providing fluency-based treatment. Fluency-shaping treatment would not seem to address a fluency pattern stemming from language formulation difficulties, whereas stuttering modification treatment would not seem appropriate in the absence of struggle accompanying disfluencies. The hypothesis that language intervention is the most appropriate treatment for fluency problems in SLI-E children showing frequent fluency breakdowns not involving struggle would need to be investigated in future research.

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