



Expository Discourse in Adolescents With Language Impairments: Examining Syntactic Development

Marilyn A. Nippold
Tracy C. Mansfield
Jesse L. Billow
University of Oregon, Eugene

J. Bruce Tomblin
University of Iowa, Iowa City

Purpose: This study examined syntactic development in a large cohort of adolescents. At kindergarten, each participant had been identified as having specific language impairment (SLI), nonspecific language impairment (NLI), or typical language development (TLD).

Method: The participants ($n = 444$) had a mean age of 13;11 (years;months; range = 12;10–15;5). Language samples were elicited in 2 genres, conversational and expository, and analyzed for mean length of T-unit and subordinate clause production.

Results: Mean length of T-unit and the use of nominal, relative, and adverbial clauses were greater during the expository task than the conversational task for all groups. Thus, even the SLI and NLI groups produced longer sentences

containing greater amounts of subordination when speaking in the expository genre than in the conversational genre. No group differences were revealed by the conversational task. However, on the expository task, the TLD group outperformed both the SLI and NLI groups on mean length of T-unit, and the TLD group outperformed the NLI group on relative clause use.

Conclusions: Speech-language pathologists may wish to employ expository discourse tasks rather than conversational tasks to examine syntactic development in adolescents.

Key Words: adolescents, language impairment, complex syntax, expository discourse

Expository discourse, the use of language to convey information (Bliss, 2002), is an important genre for examining natural language production in adolescents. Expository discourse is often required in educational, social, and vocational contexts, as when a high school student is asked to interpret the outcome of an historical event, describe methods to control global warming, or teach others how to perform a chemistry experiment, operate a new cell phone, or prepare a multicourse gourmet dinner. The complexity of these topics suggests that successful explanations require sophisticated language skills and specialized background knowledge. Although conversational and narrative discourse are also important genres, the greater epistemological demands that often accompany expository discourse may help to explain why expository tasks are generally more effective than conversational or narrative tasks in eliciting complex syntax in typically developing children, adolescents,

and adults (Berman & Verhoeven, 2002; Nippold, Hesketh, Duthie, & Mansfield, 2005; Nippold, Mansfield, & Billow, 2007; Scott & Windsor, 2000; Verhoeven et al., 2002). This is consistent with the view that complex ideas, to be explained successfully, require complex language (Nippold et al., 2005).

Given the frequency with which expository discourse occurs in a variety of natural communicative settings and its critical role in our modern, information-driven society, it is important for school-based speech-language pathologists (SLPs) to examine this genre in adolescents with language impairments. This is underscored by conditions in public schools today where students are required to demonstrate proficiency in expository discourse as they meet state benchmarks in public speaking. For example, in Oregon, eighth-grade students are required to make formal speeches on a wide variety of topics using accurate information, precise vocabulary, and appropriate grammar in a clear and organized

fashion that considers the background knowledge of different listeners (see www.ode.state.or.us). However, students with language disorders can be expected to show deficits in syntactic development when speaking in a variety of discourse genres, including conversational, narrative, and expository (Bishop & Donlan, 2005; Marinellie, 2004; Scott & Windsor, 2000; Ward-Lonergan, Liles, & Anderson, 1999).

Although preschool children with language disorders produce numerous grammatical errors in their spontaneous speech (Leonard, 1998), the syntactic deficits of school-age children and adolescents are more likely to be characterized by the production of short, simple sentences with limited subordination. Marinellie (2004) examined syntactic development in 10-year-old children ($n = 30$) during a conversation with an adult. One half of the participants in her study had specific language impairment (SLI), and the other half had typical language development (TLD). Each child's conversation was analyzed for the number of complex sentences and subordinate clauses it contained, and for clausal density. To determine clausal density, the researcher summed the number of main and subordinate clauses contained in the sample, and divided this figure by the total number of T-units produced. A T-unit consists of one main clause and any subordinate clauses that are attached to it (Hunt, 1970). The results indicated that the SLI group produced fewer complex sentences, fewer adverbial and relative clauses, and lower levels of clausal density than the TLD group, reflecting deficits in complex syntax.

Whereas Marinellie (2004) examined conversation, Bishop and Donlan (2005) examined narrative discourse. Their study involved three groups of children who were approximately 8 years old. One group had SLI with deficits primarily affecting expressive language development (SLI: E; $n = 29$); another group had SLI with deficits affecting both receptive and expressive language development (SLI: R; $n = 34$); and the third group had TLD (control; $n = 32$). Narrative discourse was elicited through a storytelling task. Each child was shown a series of photographs that depicted an engaging story. The child was asked to study the photographs carefully and then to tell the story to an adult. To measure syntactic development, the stories were analyzed for mean length of T-unit and total number of subordinate clauses produced. The results indicated that mean length of T-unit was greater for the control group than for the SLI: E group, and that the control group produced a greater number of subordinate clauses than did the SLI: R group. Thus, in narrative discourse, children with SLI used shorter and simpler sentences than their peers with TLD.

Scott and Windsor (2000) examined syntactic development in narrative and expository discourse. Their study included a group of 11-year-old children with language learning disabilities (LLD; $n = 20$) and another group of children with TLD matched to the LLD group on chronological age ($n = 20$). To elicit samples of narrative and expository discourse, each child watched a narrated film and then produced an oral summary of it for the examiner. For the narrative sample, the film presented a story about a boy who wanted to become a fisherman, and for the expository sample, the film presented information about life in the desert. Measures of syntactic development included mean length of T-unit and

clausal density. Although the groups did not differ in clausal density for either discourse genre, mean length of T-unit was greater for the TLD group than for the LLD group in both genres. Additionally, mean length of T-unit was greater in the expository genre than in the narrative for both groups.

In a study of young adolescents, Ward-Lonergan et al. (1999) examined syntactic development in expository discourse. The participants were boys who were 12 to 14 years old. One group had LLD ($n = 20$), and another group had normal language development ($n = 27$). To elicit expository discourse, each adolescent viewed a set of videotaped social studies lectures concerning a fictitious country. After viewing each tape, the adolescent retold the lecture to an adult. Each sample of expository discourse was analyzed by determining the number of subordinate clauses produced per T-unit. The results indicated that, for both lectures, the LLD group produced fewer subordinate clauses than the normal language development group, evidencing poorer syntactic development in expository discourse.

In sum, these studies that employed language-sampling techniques have shown that school-age children and adolescents with language impairments produce shorter and simpler sentences with less subordination compared to their typical peers when speaking in a variety of genres, including conversational, narrative, and expository. These findings highlight the importance of examining syntactic development using language samples. While standardized tests are helpful for diagnosing language disorders and measuring their severity, they do not necessarily reflect the way in which young people use language to communicate in natural settings, information that is needed to understand the practical implications of a disorder and to plan intervention (Paul, 2007). To obtain this more functional information, it is necessary to elicit and analyze language samples (Evans & Miller, 1999), an activity with potentially greater ecological validity (Paul, 2007).

In this article, we report on a study of adolescents and their use of complex syntax in two spoken genres, conversational and expository discourse. We examined a large cohort of adolescents whose language development had been tracked systematically since kindergarten. At kindergarten, each participant had been identified as having SLI, non-specific language impairment (NLI), or TLD during an epidemiological study of language impairment (Tomblin et al., 1997).

As part of a longitudinal project, these same participants were retested in second, fourth, and eighth grades. At each point in time, examiners who were trained and supervised by a licensed SLP administered a battery of assessment measures to each child. The purpose of the testing at each grade level was to monitor the development of spoken language skills as the children grew older, particularly in those who had been diagnosed in kindergarten as having SLI or NLI. For the present study, samples of conversational and expository discourse were elicited at eighth grade.

Although a previous study (Nippold et al., 2005) indicated that an expository task had yielded longer T-units with greater amounts of subordination than a conversational task in typically developing speakers ranging in age from 7 to 49 years, it was unknown whether adolescents with

language impairments would show a similar pattern, or whether their syntactic deficits would restrict their performance in both genres. Thus, we were interested in determining whether an expository task would lead these adolescents to tap into their syntactic competence more fully than a conversational task in the effort to explain a complex topic. We predicted that it would, because even typically developing children as young as age 7 did so in the previous study. If adolescents with language impairments perform in this way, this would suggest that an expository task is a better tool for examining syntactic development in adolescents than a conversational task.

As Lahey (1990) recommended, language assessment should determine how well a speaker performs when communicating in contexts that are more demanding than casual conversation. However, no previous studies had compared expository and conversational discourse in adolescents with language impairments to determine if indeed there would be a difference between genres. For this reason, we also examined the extent to which an expository task, when compared with a conversational task, would reveal differences between the diagnostic groups, SLI, NLI, and TLD. We predicted that the expository task would stress the language systems of these adolescents more fully than the conversational task, thereby revealing syntactic deficits more effectively.

In sum, we asked the following questions:

1. Would adolescents with SLI and NLI show better use of syntax during an expository task than a conversational task?
2. Would language-sampling tasks reveal syntactic deficits in the SLI and NLI groups? In particular, would an expository task differentiate between adolescents with impaired and typical language development more effectively than a conversational task?

Method

Participants

The participants were 444 students enrolled in eighth grade who were attending a public school located in a rural, suburban, or urban area in Iowa or Illinois. All spoke General American English as their primary language. In kindergarten, each child had participated in a large epidemiological study of language impairment (Tomblin et al., 1997). At that time, each participant had been administered the five core subtests from the Test of Language Development—Primary, Second Edition (Newcomer & Hammill, 1988), and a narrative task that examined story comprehension and recall (Culatta, Page, & Ellis, 1983). Raw scores were converted to standard scores on each measure. Using the standard scores, five different language composites were obtained: Vocabulary, Grammar, Narrative, Comprehension, and Expression. A child was said to have failed the language battery if two or more composite scores were at least 1.25 *SDs* below the mean for the child's chronological age. To evaluate nonverbal cognition, the Block Design and Picture Completion subtests of the Wechsler Preschool and Primary Scale of

Intelligence—Revised (Wechsler, 1989) were administered. Scaled scores from these two subtests were summed to form a composite Performance IQ (PIQ). A child was required to obtain a PIQ of at least 85 in order to pass this test. Based on the kindergarten testing, each child had met criteria for membership in one of three groups: low language but typical cognitive development (i.e., SLI; $n = 106$), low language and low cognitive development (i.e., NLI; $n = 84$), or typical language and cognitive development (i.e., TLD; $n = 254$). No child had shown signs of autism or had any known sensory or neurological deficits. At eighth grade, their mean age was 13;11 (years;months; range = 12;10–15;5). Mean ages (and ranges) for the groups were as follows: SLI = 13;11 (13;1–14;10); NLI = 13;11 (12;10–14;9); TLD = 13;11 (13;1–15;5). The three groups did not show a statistically significant difference in age, $F(2, 441) = 0.32$, $p = .7283$, $\eta = .04$.

Procedures

To verify that the groups continued to differ from each other at eighth grade in ways that were consistent with their original diagnostic categories, syntactic development and nonverbal cognition were tested using standardized measures. To examine syntax, two subtests from the Clinical Evaluation of Language Fundamentals, Third Edition (CELF–3; Semel, Wiig, & Secord, 1995) were administered: Concepts and Directions as an index of receptive syntax, and Recalling Sentences as an index of expressive syntax. For each participant, standard scores were obtained for these two subtests and the mean of these scores was used to form a composite of syntactic development (SYN). Other language domains (e.g., vocabulary) were not examined in the present study because of its focus on syntax. The Block Design and Picture Completion subtests of the Wechsler Intelligence Scale for Children—Third Edition (Wechsler, 1991) were also administered. Scaled scores for these subtests were used to form a composite of nonverbal cognition, the PIQ.

Language samples were elicited using a structured interview that had been employed in an earlier developmental study of conversational and expository discourse in children, adolescents, and adults (Nippold et al., 2005). Trained examiners, supervised by a licensed SLP, conducted the interviews in a quiet area at each adolescent's public school. These were the same examiners who had administered the standardized tests of language and cognition to the adolescent that same day. The language samples were later transcribed, coded, and analyzed by investigators at the University of Oregon.

The conversational interview always preceded the expository interview. This order was followed because it was thought that the more interactive, back-and-forth style of the conversation would be less intimidating to the adolescent and would allow the participant to become comfortable talking at length with the examiner. To elicit conversational discourse, the examiner began by asking the adolescent to talk about topics of general interest such as school, family, friends, and pets, with questions such as "Can you tell me something about your school?" "Do you have any brothers or sisters?" "What can you tell me about them?" When the

adolescent expressed interest in a topic, the examiner asked additional questions about that topic to stimulate conversation. After the conversation had ended and the adolescent appeared to have nothing more to say, the examiner presented the Favorite Game or Sport task to elicit expository discourse. For this activity, the adolescent was asked to select a favorite game or sport and to talk about it in response to a series of prompts. The examiner presented the task by reading aloud the following script to the adolescent (Nippold et al., 2005, p. 1052):

I am hoping to learn what people of different ages know about certain topics. There are no penalties for incorrect answers.

- A. What is your favorite game or sport?
- B. Why is [e.g., chess] your favorite game?
- C. I'm not too familiar with the game of [chess], so I would like you to tell me all about it. For example, tell me what the goals are, and how many people may play a game. Also, tell me about the rules that players need to follow. Tell me everything you can think of about the game of [chess] so that someone who has never played before will know how to play.
- D. Now I would like you to tell me what a player should do in order to *win* the game of [chess]. In other words, what are some key strategies that every good player should know?

After each prompt, the examiner paused, allowed the adolescent to continue speaking without interruption, and showed interest in the response by nodding, smiling, and saying, "Uh huh," "I see," or "OK." If an adolescent did not address some aspect of the prompt or requested repetition or clarification, the examiner presented that prompt again.

The language-sampling activity, including both discourse tasks, typically required about 9 min to complete. All samples were audio-recorded using an analog cassette tape recorder and later transferred to digital format for ease of transcription. They were then mailed to the University of Oregon Language Development Lab for processing.

Data Transcription, Coding, and Reliability

Although the conversational and expository interviews were recorded contiguously, each section of the interview was transcribed into its own file, with utterances being broken into T-units on-line. A T-unit consists of one main clause and any subordinate clauses that are attached to it (Hunt, 1970; see Appendix). Each file was formatted for entry into Systematic Analysis of Language Transcripts (SALT; Miller & Chapman, 2003), and coded for the use of main clauses and three types of subordinate clauses: nominal, relative, and adverbial (see Appendix).

All instances of maze behavior such as false starts and revisions (Loban, 1976) were excluded from analysis by placing them within parentheses, allowing the final reformulation to stand as a complete T-unit (see Appendix). Incomplete T-units were also excluded from analysis by using parentheses. Although mazes were excluded from the formal syntactic analyses, their frequency of occurrence in each

conversational and expository discourse sample was recorded in order to determine whether the groups differed in the amount of verbiage that had to be excluded. Similarly, the total number of complete T-units produced per sample was recorded in order to determine whether the groups differed in the amount of language that was available for syntactic analyses.

To assist in coding the files, two investigators (second and third authors) in consultation with a third investigator (first author) created a reference document that contained examples of main clauses and all types of subordinate clauses, including typical and atypical constructions. Using this document, the first 50 files were coded and then double-checked by the three investigators. Any disagreements were discussed and resolved, and the reference document was adjusted to reflect these changes. The second and third authors coded all remaining files. After a file was coded, it was double-checked by the other investigator. All points of disagreement were discussed, sometimes in consultation with the first author, who periodically reviewed the coded transcripts. Thus, every SALT file was checked at least twice. During this process, an initial agreement level of 97% was brought to 100% agreement.

Measures of Syntactic Development

To analyze each sample, we employed the same measures that had been used in the previous study (Nippold et al., 2005): mean length of T-unit, subordinate clause production, and clausal density. In the Appendix, we describe in detail the characteristics of each of these measures, provide examples of them, and explain how they were calculated. In the section below, we describe the rationale for using each measure.

Mean length of T-unit. In his cross-sectional research, Hunt (1970) reported that mean length of T-unit (or the average number of words per T-unit) increased during the school-age years, adolescence, and into adulthood, and that much of that growth resulted from the greater use of subordinate clauses within T-units. For this reason, Hunt argued that mean T-unit length was the best single measure of later syntactic development. Similarly, Loban (1976), in his longitudinal study of language development in children from kindergarten through 12th grade, found that mean length of C-unit (a slight variation of the T-unit that includes answers to questions in spoken language) was sensitive to syntactic growth. Additionally, Loban reported that speakers with higher levels of language proficiency consistently outperformed their peers with lower levels of proficiency on this measure. Given these findings, mean length of T-unit was expected to yield useful information because the present study involved groups of adolescents with impaired (SLI or NLI) and typical language development (TLD).

Subordinate clause production. Given that Hunt (1966, 1970) and Loban (1976) had reported that the use of subordinate clauses was a critical index of later syntactic development, in the present study we also examined participants' use of three main types of subordinate clauses: nominal ("She believed *it would snow*"), relative ("The boy *who ran a marathon* earned a medal"), and adverbial ("*Whenever*

it rains, I take my umbrella”). We emphasize that only subordinate clauses with finite verbs were coded. We considered coding nonfinite verbs (e.g., “A player *having* few pawns may lose”; “Her decision *to play* ultimate Frisbee was applauded”) as an additional measure of complex syntax. However, prior research indicated that nonfinite verb use was not a particularly sensitive index of syntactic development during adolescence and that it did not distinguish between speakers with high, low, or average levels of language proficiency (Loban, 1976). Thus, because the present study was designed to examine syntactic development in adolescents with SLI, NLI, and TLD, we chose to focus on finite verbs, using methods that were known to be sensitive to syntactic development in adolescents (Loban, 1976; Nippold et al., 2005, 2007; Scott & Windsor, 2000; Ward-Lonergan et al., 1999).

Clausal density. The third measure of syntactic development that we employed was clausal density, which is the average number of clauses per T-unit. Increases in clausal density reflect gains in the use of all types of subordinate clauses. Past research indicated that clausal density was a sensitive measure of syntactic growth, showing gradual increases during the school-age years, adolescence, and into adulthood (Hunt, 1966, 1970; Loban, 1976; Nippold et al., 2005, 2007). Past research also indicated that speakers with higher levels of language proficiency outperformed those with lower levels of proficiency on this measure during language-sampling tasks (Loban, 1976).

Results

Table 1 reports the performance of the three groups of adolescents on the standardized measures of syntax and nonverbal cognition. A set of one-way analyses of variance (ANOVAs) yielded statistically significant differences between groups for both measures: SYN, $F(2, 441) = 143.36$, $p < .0001$, $\eta = .63$, and PIQ, $F(2, 441) = 80.62$, $p < .0001$, $\eta = .52$. Both effect sizes, calculated using the eta (η) coefficient (Meline & Schmitt, 1997), were large (Cohen,

TABLE 1. Performance on standardized measures of syntax (SYN) and nonverbal cognition (PIQ) for the three groups of adolescents at eighth grade.

	TLD	SLI	NLI
SYN			
<i>M</i>	9.36	6.51	5.07
<i>SD</i>	2.43	2.09	1.66
PIQ			
<i>M</i>	103.10	95.65	81.00
<i>SD</i>	14.17	12.47	14.75

Note. TLD = typical language development, $n = 254$; SLI = specific language impairment, $n = 106$; NLI = nonspecific language impairment, $n = 84$; SYN = composite based on Concepts and Directions and Recalling Sentences subtests from the Clinical Evaluation of Language Fundamentals, Third Edition (Semel et al., 1995); PIQ = Performance IQ, a composite based on Block Design and Picture Completion subtests from the Wechsler Intelligence Scale for Children—Third Edition (Wechsler, 1991).

1969, p. 276). Tukey tests indicated that, on each of these measures, the TLD group outperformed the SLI and NLI groups, and the SLI group outperformed the NLI group. These results confirmed that the three groups, originally defined in kindergarten, continued to differ in their performance on standardized measures of syntax and nonverbal cognition in ways that were consistent with their original categories.

The language-sampling tasks were effective in eliciting conversational and expository discourse from all adolescents. On the conversational task, they often talked about pets, family members, friends, or school activities, whereas on the expository task they often talked about sports such as football, basketball, and volleyball, and games such as *Monopoly*, *Clue*, and *Game Cube*. Table 2 reports the performance of the three groups of adolescents on both tasks. As a measure of language productivity, the number of complete T-units was reported. In addition, because mazes (e.g., false starts, revisions) within T-units were excluded from syntactic analyses, it was important to know whether this affected the amount of discourse that was available across groups. For this reason, maze production was reported as the percentage of T-units that contained mazes. Measures of syntactic development reported in Table 2 include mean length of T-unit, clausal density, and the use of nominal, relative, and adverbial clauses. For each type of subordinate clause, the results are reported as the percentage of T-units that contained each type.

To examine the effects of group and genre, a repeated measures ANOVA was performed on each dependent variable reported in Table 2. Given the large number of variables, a conservative level of alpha was used (.01) for all tests of main effects and interactions. Effect sizes were labeled *small* (.10–.23), *medium* (.24–.36), or *large* (.37–.71).

For total number of T-units produced, a statistically significant main effect was obtained for genre, $F(1, 441) = 396.53$, $p < .0001$, $\eta = .69$, but not for group, $F(2, 441) = 1.85$, $p = .1579$, $\eta = .09$; the interaction between genre and group was not statistically significant, $F(2, 441) = 0.58$, $p = .5581$, $\eta = .05$. The effect size was large for genre. Thus, for all three groups, a greater number of T-units occurred in the conversational genre than in the expository. For maze production, a statistically significant main effect was obtained for genre, $F(1, 441) = 99.42$, $p < .0001$, $\eta = .43$, but not for group, $F(2, 441) = 2.29$, $p = .1028$, $\eta = .10$; the interaction was not statistically significant, $F(2, 441) = 0.49$, $p = .6101$, $\eta = .05$. The effect size was large for genre. Thus, a greater number of mazes occurred in the expository genre. Given that the groups did not differ in the amount of language that was available for analysis (T-units) or in the amount that had to be excluded (mazes), it was reasonable to compare them on the syntax measures.

For mean length of T-unit, statistically significant main effects were obtained for genre, $F(1, 441) = 401.29$, $p < .0001$, $\eta = .69$, and group, $F(2, 441) = 6.95$, $p = .0011$, $\eta = .17$; the interaction between genre and group was statistically significant, $F(2, 441) = 9.37$, $p = .0001$, $\eta = .20$. The effect size was large for genre, small for group, and small for the interaction. Mean length of T-unit was greater in the expository

TABLE 2. Performance on the conversational (CON) and expository (EXP) discourse tasks for the three groups of adolescents at eighth grade.

	TLD		SLI		NLI	
	CON	EXP	CON	EXP	CON	EXP
Total T-units						
<i>M</i>	48.11	29.22	46.40	26.75	46.01	24.55
<i>SD</i>	19.88	17.15	18.25	16.36	18.73	13.15
Mazes*						
<i>M</i>	31.86	40.02	34.15	42.29	31.50	37.93
<i>SD</i>	11.95	14.61	12.82	15.29	13.70	15.48
Mean length of T-unit						
<i>M</i>	7.50	10.02	7.62	9.35	7.23	8.98
<i>SD</i>	1.31	2.08	1.32	2.01	1.29	1.80
Clausal density						
<i>M</i>	1.24	1.51	1.24	1.48	1.21	1.43
<i>SD</i>	0.13	0.23	0.13	0.23	0.13	0.23
Nominal clause use*						
<i>M</i>	9.67	14.95	9.38	14.19	8.73	14.98
<i>SD</i>	6.38	10.11	6.74	10.30	6.93	11.41
Relative clause use*						
<i>M</i>	4.74	8.90	4.29	7.46	4.41	5.86
<i>SD</i>	4.83	7.44	3.94	7.05	3.62	6.04
Adverbial clause use*						
<i>M</i>	9.39	27.61	10.61	26.46	8.25	22.40
<i>SD</i>	7.06	16.73	7.81	18.68	6.87	14.39

Note. TLD, $n = 254$; SLI, $n = 106$; NLI, $n = 84$.

*Reported as percentage of T-units per sample.

genre than in the conversational for all three groups. Tukey tests revealed that for the conversational genre, the groups did not differ, but for the expository genre, the TLD group outperformed the SLI and NLI groups. Hence, this variable distinguished the groups only in the expository genre. For clausal density, a statistically significant main effect occurred for genre, $F(1, 441) = 417.75, p < .0001, \eta = .70$, but not for group, $F(2, 441) = 4.02, p = .0185, \eta = .13$; the interaction between genre and group was not statistically significant, $F(2, 441) = 2.56, p = .0788, \eta = .11$. The effect size was large for genre. Clausal density was greater in expository discourse than in conversational for all groups.

The next set of analyses focused on the three types of subordinate clauses. For nominal clause use, the main effect was statistically significant for genre, $F(1, 441) = 84.36, p < .0001, \eta = .40$, but not for group, $F(2, 441) = 0.30, p = .7397, \eta = .04$; the interaction between genre and group was not statistically significant, $F(2, 441) = 0.40, p = .6713, \eta = .04$. The effect size was large for genre. Thus, the findings showed that nominal clauses occurred more often in the expository genre than in the conversational.

For relative clause use, a statistically significant main effect was obtained for genre, $F(1, 441) = 53.14, p < .0001, \eta = .33$, and group, $F(2, 441) = 4.87, p = .0081, \eta = .15$; the interaction between genre and group was not statistically significant, $F(2, 441) = 4.12, p = .0169, \eta = .14$. The effect size was medium for genre and small for group. Relative clauses occurred more often in the expository genre than in the conversational. Tukey tests showed that

the TLD group outperformed the NLI group on relative clauses.

Finally, for adverbial clause use, the main effect for genre was statistically significant, $F(1, 441) = 320.49, p < .0001, \eta = .65$, but the main effect for group was not, $F(2, 441) = 3.61, p = .0278, \eta = .13$; the interaction between genre and group was not statistically significant, $F(2, 441) = 2.09, p = .1254, \eta = .10$. The effect size was large for genre. As with the other two types of subordinate clauses, adverbial clauses were used more frequently in the expository genre than in the conversational.

Because T-unit length is influenced by the amount of subordination a speaker produces (Hunt, 1970), it was of interest to examine the association between mean length of T-unit and clausal density in these adolescents. For each genre, Pearson product-moment correlation coefficients were calculated using each participant's scores on these two variables. The results were statistically significant and strongly positive for both the conversational ($r = .79, p < .0001$) and the expository ($r = .76, p < .0001$) genres. This confirms the view that greater use of subordination coincides with longer T-units.

In sum, the results of this investigation indicated that at eighth grade, adolescents originally identified as having SLI and NLI continued to lag behind adolescents originally identified as having TLD, as shown by the standardized testing. In addition, language-sampling tasks indicated that performance was higher in the expository genre than in the conversational genre for all three groups, on all syntactic

variables: mean length of T-unit; clausal density; and nominal, relative, and adverbial clause use. Although the groups did not differ on the conversational task, on the expository task, the TLD group outperformed the SLI and NLI groups in mean length of T-unit, and the TLD group outperformed the NLI group in relative clause use.

Discussion

In this investigation, we examined syntactic development in a large cohort of adolescents whose language development had been tracked systematically since kindergarten. At that time, each participant had met criteria for placement in one of three groups: SLI, NLI, or TLD (Tomblin et al., 1997). At eighth grade, standardized testing of syntax and nonverbal cognition indicated that the groups differed from each other in ways that were consistent with their original diagnostic labels. Given the importance of examining natural language production in adolescents, the study was designed to determine (a) whether participants in the SLI and NLI groups would show better use of syntax in expository discourse than in conversational discourse, (b) whether language-sampling tasks would reveal syntactic deficits in the SLI and NLI groups, and (c) whether an expository task, in particular, would be more sensitive to those deficits than a conversational task.

All three groups of adolescents, including those with SLI and NLI, performed at a higher level when speaking in the expository genre than in the conversational genre, on all syntactic variables: mean length of T-unit; clausal density; and nominal, relative, and adverbial clause use. Although the conversational task did not reveal any differences between groups, the expository task showed that the TLD group outperformed both the SLI and NLI groups on mean length of T-unit, and that the TLD group outperformed the NLI group on relative clause use. No other differences occurred between the TLD and SLI groups, or between the SLI and NLI groups.

The findings with respect to genre are consistent with previous research that employed the same language-sampling methods with typically developing children, adolescents, and adults of a wide age range (Nippold et al., 2005). They are also consistent with the view that conversational discourse may not challenge a speaker's linguistic competence as well as expository discourse to reveal syntactic deficits (Lahey, 1990). Nevertheless, the absence of any group differences on the conversational task differs from Marinellie's (2004) study, which found that 10-year-old children with SLI evidenced poorer use of syntax than their peers with TLD during a conversation with an adult. It is unknown why this discrepancy occurred. However, given that Marinellie's participants were 3 years younger than those in the present study, it may be useful in future research to examine the possibility that samples of conversational discourse are more sensitive to syntactic deficits in children compared to adolescents.

The finding that even the SLI and NLI groups produced longer T-units with greater amounts of subordination during the expository task indicates that these adolescents were able to tap into their syntactic competence when asked to

explain a complex topic such as the rules and strategies needed to win their favorite game or sport. Had they not been asked to do this, their ability to speak in this more elaborate fashion would not have been revealed. Nevertheless, both the SLI and NLI groups were less proficient than the TLD group on the expository task as measured by mean length of T-unit, and the NLI group used proportionately fewer relative clauses than did the TLD group. These findings are consistent with previous research indicating that students with language disorders show poorer use of syntax than their peers with TLD when speaking in the expository genre (Scott & Windsor, 2000; Ward-Lonergan et al., 1999). Although the SLI, NLI, and TLD groups did not differ on clausal density on the expository task, the findings for mean length of T-unit are consistent with Hunt's (1970) view that this is the most useful index of later syntactic development.

Nevertheless, given that the CELF-3 testing at eighth grade had indicated clear differences in syntactic development between each of the three groups, it was surprising that a greater number of differences were not revealed by the expository task, especially between the TLD and SLI groups, and between the SLI and NLI groups. We suggest that these findings may reflect differences in the way in which syntax is evaluated, one more constraining than the other. Whereas the CELF-3 subtests required precise responses that were marked as either correct or incorrect, the expository interview allowed a speaker greater latitude in choosing how to respond to the examiner's prompts. For example, if a speaker was quite knowledgeable about strategies needed to win a tennis match, perhaps that individual would provide a longer and syntactically more complex explanation than one who was less familiar with the game and had less enthusiasm for it. Thus, it seems likely that performance on the Favorite Game or Sport task may partially be a function of factors beyond syntactic competence. In the present study, we were unable to perform an objective evaluation of each participant's knowledge and enjoyment of the chosen activity. Hence, it is unknown how these factors may have influenced the results. In future research, it may be profitable to examine the extent to which these and other factors affect an adolescent's use of complex syntax in expository discourse.

Because of time constraints, we evaluated expository discourse in only one context. The Favorite Game or Sport task represents just one type of expository discourse, and there are many other types that could be examined in adolescents. For example, middle school and high school students are called upon to use expository discourse as part of the curriculum. This is particularly germane in history, science, mathematics, health, and social studies classes where adolescents make oral presentations on topics they are learning about in school. In future research, it would be worthwhile to examine expository discourse in the context of school assignments, where it may be possible also to evaluate their knowledge of the subject matter to determine how this might affect their use of complex syntax when explaining specific details to others.

In the present study, the conversational interview always preceded the expository interview. It was thought that the more supportive nature of the conversation might assist the adolescent to feel comfortable talking at length with the

examiner. Future research that involves a comparison of conversational and expository discourse in adolescents may wish to alternate these tasks to control for possible order effects. Then, to promote rapport, perhaps an additional, briefer conversation could precede the two interviews.

Clinical Implications

Language sampling in conversation has long been used to document syntactic deficits in young children (e.g., Lee, 1974; Miller, 1981; Tyack & Gottsleben, 1977). However, it does not appear to be useful for this purpose with adolescents. In conversation, a speaker is engaged in a dialogue and may rely on the co-conversationalist for a certain amount of structure and input. In contrast, with expository discourse, the speaker is engaged in a monologue and must bear most of the responsibility for clear communication while attempting to inform the listener. These conditions suggest that expository discourse is a more demanding genre and, as such, is more likely to require the speaker to use complex syntax for the purpose of expressing complex thoughts. For these reasons, expository discourse may be a more fruitful genre than conversational for examining syntactic development in adolescents with language impairments. This is not to say that conversational discourse is irrelevant. In the present study, although the conversational task failed to reveal any group differences in syntactic development, it elicited a greater amount of language output than the expository task. Thus, it may be worthwhile for SLPs to elicit conversational discourse from their adolescent clients as a way of establishing rapport and encouraging verbal interaction with adults.

As predicted, the expository discourse task revealed syntactic deficits in adolescents who, as kindergartners, had been identified as having language impairments. This was particularly true of those with NLI who produced shorter utterances with fewer relative clauses compared to their peers with TLD. In contrast, a conversational task was ineffective in revealing group differences. However, both language-sampling tasks were less effective than standardized testing in revealing syntactic deficits in these adolescents. This reinforces the importance of using standardized tests such as the CELF-3 to document syntactic deficits objectively. Nevertheless, in planning intervention, SLPs need information about how an adolescent actually uses language to communicate in natural contexts. The Favorite Game or Sport task may be helpful as a clinical tool for examining an adolescent's use of syntax in a less contrived manner. The benefits of using this task become apparent when two brief excerpts are compared of adolescents who were explaining the rules of football (Note: All mazes and incomplete T-units have been removed; IC = independent clause, NOM = nominal clause, REL = relative clause, ADV = adverbial clause). The first example is from a 14-year-old boy in the NLI group:

You just try [IC] to get a team. It doesn't [IC] matter how many you need [NOM]. You just got [IC] like six. Play [IC] three on three or something like that. And just get [IC] a football or something like a cup or something. And just play [IC]. Make [IC] a field and stuff.

Few grammatical errors were produced during this boy's language sample. However, in this excerpt of seven T-units, he produced only one complex sentence, which contained a nominal clause, and most of his T-units were quite short. In contrast, a 13-year-old boy in the TLD group explained the rules of football as follows:

You try [IC] to take that ball and run with it as far as you can [ADV] and try not to get hit by the defenders. The defenders could grab [IC] other players and throw them out of their way. And the linebackers what they do [NOM] is [IC] they just basically stand [NOM] there and watch if anyone's gonna come [NOM] out and around. So if the line gets [ADV] past the offensive line, the offensive line on the other hand can't just grab [IC] people and throw them out of their way. They have [IC] to push them. They can't just pick [IC] them up and throw them out because then they will be called [ADV] for holding, which is [REL] an illegal move. And you'll get [IC] penalized 5 yards for that.

This excerpt also consists of seven T-units, but four of those T-units were complex sentences, and two of them contained more than one subordinate clause. The complexity of this boy's natural language use, revealed by the expository task, contrasts sharply with that of his peer who has a serious language impairment coupled with low cognition.

Once a sample of expository discourse has been elicited and transcribed, the SLP may wish to enter it into SALT and break it into T-units. In the present study, mean length of T-unit was more sensitive to group differences than any of the other syntactic variables. It was also found that mean length of T-unit was closely associated with clausal density, indicating that longer T-units can be expected to coincide with greater subordination. Thus, the SLP may not need to code all main and subordinate clauses, and may choose instead to focus on mean length of T-unit as a key variable. This variable is also desirable because of its comparative simplicity. Loban (1976) reported that mean length of C-unit, a minor variation of the T-unit, was easier to calculate than other measures such as the Weighted Index of Elaboration, a laborious and time-consuming procedure that required the investigator to count and assign a specific number of points to each instance of 22 different language variables (e.g., use of adjectives, possessives, determiners, modals, appositives, objective complements). Despite the detailed information that the Index of Elaboration provided, it yielded essentially the same outcome as mean length of C-unit in determining language proficiency levels.

Until a large normative database has been established for the Favorite Game or Sport task, we recommend that it be used only as an informal measure of syntactic development in adolescents. Other tasks could be employed as well. As previously mentioned, expository discourse can be examined in many other contexts besides the Favorite Game or Sport task. For example, adolescents are expected to display their knowledge of complex topics they are learning about in school (e.g., alternative sources of energy, equal rights, Eastern religions, the reconstruction of Eastern Europe). Thus, it is in these contexts that language intervention can have the greatest impact on an adolescent's academic success. In

evaluating a student's use of expository discourse in school contexts, a reasonable objective is to identify patterns that suggest syntactic deficits such as a preponderance of short, simple sentences. Once those problems have been properly documented, they should be addressed by promoting the use of complex syntax in meaningful communicative tasks that are relevant to classroom success.

In the present study, clausal density was closely associated with mean length of T-unit. This suggests that as the student's use of nominal, relative, and adverbial clauses increases in spoken discourse, gains in mean length of T-unit should be observed as well. Suggestions for encouraging the use of subordinate clauses through modeling and sentence-combining activities are available in Eisenberg (2006), Scott (1995), and Strong (1986). In implementing intervention activities designed to increase subordination, it is wise to remember that the higher goal is to assist the language user to communicate more effectively when expressing complex thoughts. Therefore, in addition to focusing on language *form*, it is important to consider the *content* and *use* of language by respecting the adolescents' knowledge base, interest in the topic, and motivation for talking.

Acknowledgments

Grant 2P50DC02746-06A1 from the National Institute on Deafness and Other Communication Disorders supported this project. The authors express sincere gratitude to the granting agency, the adolescents who participated in this project, their parents and guardians who granted permission, and to the following individuals who assisted with participant recruitment and data collection and management: Marlea O'Brien, Xuyang Zhang, Paula Buckwalter, and Connie Ferguson. Portions of this project were presented at the Symposium for Research in Child Language Disorders, Madison, WI, June 2005, and at the Afasic 4th International Symposium, Warwick, United Kingdom, April 2007.

References

- Berman, R. A., & Verhoeven, L. (2002). Cross-linguistic perspectives on the development of text-production abilities: Speech and writing. *Written Language and Literacy*, 5(1), 1–43.
- Bishop, D. V. M., & Donlan, C. (2005). The role of syntax in encoding and recall of pictorial narratives: Evidence from specific language impairment. *British Journal of Developmental Psychology*, 23, 25–46.
- Bliss, L. S. (2002). *Discourse impairments: Assessment and intervention applications*. Boston: Allyn & Bacon.
- Cohen, J. (1969). *Statistical power analysis for the behavioral sciences*. New York: Academic Press.
- Crews, F. (1977). *The Random House handbook* (2nd ed.). New York: Random House.
- Culatta, B., Page, J., & Ellis, J. (1983). Story retelling as a communicative performance screening tool. *Language, Speech, and Hearing Services in Schools*, 14, 66–74.
- Eisenberg, S. L. (2006). Grammar: How can I say that better? In T. A. Ukrainetz (Ed.), *Contextualized language intervention: Scaffolding PreK-12 literacy achievement* (pp. 145–194). Eau Claire, WI: Thinking Publications.
- Evans, J. L., & Miller, J. (1999). Language sample analysis in the 21st century. *Seminars in Speech and Language*, 20(2), 101–116.
- Hunt, K. W. (1966). Recent measures in syntactic development. *Elementary English*, 43, 732–739.
- Hunt, K. W. (1970). Syntactic maturity in school children and adults. *Monographs of the Society for Research in Child Development*, 35(1, Serial No. 134).
- Lahey, M. (1990). Who shall be called language disordered? Some reflections and one perspective. *Journal of Speech and Hearing Disorders*, 55, 612–620.
- Lee, L. L. (1974). *Developmental sentence analysis: A grammatical assessment procedure for speech and language clinicians*. Evanston, IL: Northwestern University Press.
- Leonard, L. B. (1998). *Children with specific language impairment*. Cambridge, MA: MIT Press.
- Loban, W. (1976). *Language development: Kindergarten through grade twelve*. Urbana, IL: National Council of Teachers of English.
- Marinellie, S. A. (2004). Complex syntax used by school-age children with specific language impairment (SLI) in child-adult conversation. *Journal of Communication Disorders*, 37, 517–533.
- Meline, T., & Schmitt, J. F. (1997). Case studies for evaluating statistical significance in group designs. *American Journal of Speech-Language Pathology*, 6, 33–41.
- Miller, J. F. (1981). *Assessing language production in children: Experimental procedures*. Baltimore: University Park Press.
- Miller, J. F., & Chapman, R. (2003). SALT: Systematic Analysis of Language Transcripts [Computer software]. Madison: University of Wisconsin-Madison, Waisman Center, Language Analysis Laboratory.
- Newcomer, P., & Hammill, D. (1988). *Test of Language Development—Primary, Second Edition*. Austin, TX: Pro-Ed.
- Nippold, M. A., Hesketh, L. J., Duthie, J. K., & Mansfield, T. C. (2005). Conversational versus expository discourse: A study of syntactic development in children, adolescents, and adults. *Journal of Speech, Language, and Hearing Research*, 48, 1048–1064.
- Nippold, M. A., Mansfield, T. C., & Billow, J. L. (2007). Peer conflict explanations in children, adolescents, and adults: Examining the development of complex syntax. *American Journal of Speech-Language Pathology*, 16, 1–10.
- Paul, R. (2007). *Language disorders from infancy through adolescence: Assessment and intervention* (3rd ed.). St. Louis, MO: Mosby.
- Quirk, R., & Greenbaum, S. (1973). *A concise grammar of contemporary English*. New York: Harcourt Brace Jovanovich.
- Scott, C. M. (1995). A discourse approach to syntax teaching. In D. F. Tibbits (Ed.), *Language intervention: Beyond the primary grades* (pp. 435–463). Austin, TX: Pro-Ed.
- Scott, C. M., & Windsor, J. (2000). General language performance measures in spoken and written narrative and expository discourse of school-age children with language learning disabilities. *Journal of Speech, Language, and Hearing Research*, 43, 324–339.
- Semel, E., Wiig, E. H., & Secord, W. A. (1995). *Clinical Evaluation of Language Fundamentals, Third Edition*. San Antonio, TX: The Psychological Corporation.
- Strong, W. (1986). *Creative approaches to sentence combining*. Urbana, IL: ERIC Clearinghouse on Reading and Composition Skills and the National Conference on Research in English.
- Tomblin, J. B., Records, N. L., Buckwalter, P., Zhang, X., Smith, E., & O'Brien, M. (1997). Prevalence of specific language impairment in kindergarten children. *Journal of Speech, Language, and Hearing Research*, 40, 1245–1260.
- Tyack, D., & Gottsleben, R. (1977). *Language sampling, analysis, and training: A handbook for teachers and clinicians* (Rev. ed.). Palo Alto, CA: Consulting Psychologists Press.

-
- Verhoeven, L., Aparici, M., Cahana-Amitay, D., van Hell, J., Kriz, S., & Viguie-Simon, A.** (2002). Clause packaging in writing and speech: A cross-linguistic developmental analysis. *Written Language and Literacy*, 5(2), 135–162.
- Ward-Lonergan, J. M., Liles, B. Z., & Anderson, A. M.** (1999). Verbal retelling abilities in adolescents with and without language-learning disabilities for social studies lectures. *Journal of Learning Disabilities*, 32(3), 213–223.
- Wechsler, D.** (1989). *WPPSI-R Manual: Wechsler Preschool and Primary Scale of Intelligence—Revised*. New York: The Psychological Corporation.

Wechsler, D. (1991). *Wechsler Intelligence Scale for Children—Third Edition*. San Antonio, TX: The Psychological Corporation.

Received June 28, 2007

Revision received November 8, 2007

Accepted February 23, 2008

DOI: 10.1044/1058-0360(2008/07-0049)

Contact author: Marilyn A. Nippold, Communication Disorders and Sciences, College of Education, University of Oregon, Eugene, OR 97403. E-mail: nippold@uoregon.edu.

Appendix

Measures of Syntactic Development

Mean Length of T-Unit

A T-unit consists of one main clause and any subordinate clauses that are attached to it (Hunt, 1970). A main clause must contain a subject and a finite verb (Crews, 1977). In the utterance "She ate popcorn," *she* is the subject and *ate* is the finite verb. Because this utterance comprises a main clause, it is able to stand alone as a single T-unit. In the present study, subjects were usually nouns (*Sports provide entertainment*), noun phrases (*The state meet was in Davenport*), pronouns (*I enjoy swimming*), or proper names (*Pat saw a doctor*). However, we allowed gerund (*Running marathons is strenuous exercise*) and infinitive (*To win the race was his goal*) phrases when used in subject position.

The following utterance is a single T-unit but has an additional subordinate clause, making it a complex sentence: "She ate popcorn *while she watched the movie*." As Hunt (1970) explained, "any complex or simple sentence would be one T-unit, but any compound or compound-complex sentence would consist of two or more T-units" (p. 4). Thus, in the present study, if a speaker produced two or more main clauses continuously, joined by a coordinating conjunction such as *and*, *but*, or *so*, that utterance was broken into separate T-units. For example, the following utterance, a compound sentence spoken continuously, is actually two T-units, separated at the slash:

So your arms are doing the same thing/and your legs are doing the same thing.

As another example, the following utterance, a compound-complex sentence that was spoken continuously, was broken into two T-units, separated at the slash, where the first T-unit is a simple sentence and the second one is a complex sentence:

They are set up into heats from slowest to fastest/and so if you're starting out, you'll probably be in heat one.

In the present study, SALT automatically calculated mean length of T-unit for each language sample by dividing the total number of words by the total number of T-units (excluding all words contained within parentheses).

Subordinate Clauses

There are three types of subordinate clauses: nominal, relative, and adverbial (Crews, 1977; Quirk & Greenbaum, 1973).

1. Nominal clauses express feelings, attitudes, or beliefs (e.g., "She thinks *chocolate tastes better*").
2. Relative clauses describe nouns (e.g., "The cat *that has no tail* is a Manx").
3. Adverbial clauses express conditionality, time, or purpose (e.g., "*When we get home*, can we have ice cream?").

For the present study, all subordinate clauses were required to have a subject and a finite verb (Crews, 1977). Each T-unit produced in the conversational and expository samples was coded for its main (i.e., independent) clause (IC) and each instance of nominal (NOM), relative (REL), or adverbial (ADV) clause. This is illustrated below where each T-unit is numbered, and each code is placed right after the main verb of the clause:

1. So if you see [ADV] the quarterback look like he's handing [NOM] it off, try [IC] to follow the player that has [REL] it.
2. And if he stands [ADV] up, which most of the players do [ADV] and just kind of drop their arms, and he doesn't have [ADV] the football, try [IC] to look for the other man who was running [REL] behind him.
3. If that man doesn't have [ADV] the ball, look [IC] at him.
4. And if he does have [ADV] that ball, you run [IC] straight at him because he's either gonna pass [ADV] or he's gonna run [ADV] with it.
5. Then the only other big strategy you have [REL] to know is [IC] you have [NOM] to know what the plays mean [NOM] because the coaches will call [ADV] out some name so the other team won't know [ADV] what it is [NOM].

Notes. In T-units #1 and #3, the subject of the main clause (you) is understood because the clause is an imperative. In T-unit #2, the verb phrase "and just kind of drop their arms" was not coded as an adverbial clause because it did not contain a subject [the players]. In T-unit #4, two adverbial clauses share the same subordinate conjunction, *because*. In T-unit #5, the subject of the main clause is actually a noun phrase (the only other big strategy) modified by a relative clause ([that] you have to know).

Clausal Density

Clausal density reflects the amount of subordination a speaker uses. This was calculated by summing all of the coded main and subordinate clauses contained in the sample, and dividing this number by the total number of T-units produced (or the total number of main clauses produced because every T-unit has just one main clause), a method developed by Hunt (1966, 1970). This procedure is illustrated below:

95 = Main clauses
46 = Subordinate clauses:
 14 = Nominal
 17 = Relative
 15 = Adverbial
141 = Total clauses
95 = Total T-units
1.48 = Clausal density

Excluded Language Production

Mazes. Mazes included false starts (e.g., uh, well, uh, the, um), revisions (e.g., people I mean pieces), and parenthetical utterances (e.g., lemme see). All instances of these behaviors were excluded from analysis by using parentheses.

Incomplete T-units. An incomplete T-unit occurred when an utterance lacked a main clause in that it was missing a subject, finite verb, or both (e.g., So yup, tennis; mine; to the store; never). These behaviors also were excluded from analysis by using parentheses. Exceptions to this rule occurred when a speaker deleted the subject in a conventionalized manner (e.g., Examiner [E]: "What will happen?" Adolescent [A]: "Depends on if he catches the ball"), used an imperative ("Don't drink orange juice"; "Take it easy"), or answered a question with the subordinate conjunction *because* (E: "Why did he do that?" A: "Because he was sick"). These types of utterances were classified as complete T-units. Although utterances that began with subordinate conjunctions technically were adverbial clauses, we made an exception for *because* when it began a clause that was a "stand-alone" answer to a question, and counted these utterances as main clauses and therefore T-units. We did this in order to avoid excluding a large number of utterances from the data set that actually functioned as T-units. Thus, we emphasize that no T-units were excluded from analysis unless they were incomplete (and therefore did not meet the criteria for being a T-unit).
