WRITTEN LANGUAGE OF CHILDREN
WITH SPECIFIC LANGUAGE IMPAIRMENT

by

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ABSTRACT

Writing is an important academically and socially related language skill. However, few researchers have analyzed the written language samples of children with Specific Language Impairment (SLI). It is unknown if children with SLI produce different types of written language errors than children with typical language (TL). The purpose of this study was to increase understanding of the writing patterns of children with Specific Language Impairment. Specifically, this study analyzed the morphosyntactic and syntactic errors that children with SLI make and if they differ from the errors made by children with TL. Writing samples of children ages 7 to 10 were collected. The SLI group was determined by norm-referenced language assessments such as the Clinical Evaluation of Language Fundamentals – Fourth Edition. These samples were coded for errors based on a coding manual created by the authors of this study. Results revealed that children with SLI make more overall errors in complex sentences than children with TL. The errors made by children with SLI were syntactic word level errors, such as the addition or omission of one word. However, there was not a significant difference between the morphological errors made in writing samples of children with SLI and children with TL. The large age range of children within our SLI group may have impacted our conclusion that morphosyntax may not be a critical marker of SLI in children.

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INTRODUCTION

Writing is a necessary skill for achievement in school (Kim, Puranik, & Al Otaiba, 2015) and for success in the workplace (Conti-Ramsden, Durkin, and Walker, 2012; Conti-Ramsden, Durkin, Toseeb, Botting, and Pickles, 2018). Although writing is an important academic and vocational skill, written composition is a complex literary skill that forms over time (Kellogg, 2008; Gillam & Johnson, 1992). For some school-age children, written composition is a particularly difficult task. Children with Development Language Disorder (DLD) are much more likely than children with typical language (TL) to struggle with developing literary skills (Catts, Fey, Tomblin, & Zhang, 2002). Although there is vast knowledge of the listening, speaking, and reading deficiencies in children with SLI, relatively little is known about their writing skills (Gillam & Johnson, 1992). There is an extremely limited evidence base on specific syntactic and morphosyntactic errors in the written language of children with DLD. The current general knowledge of errors in written language is not effective for selecting specific errors to target during intervention. There is a need for documentation of differences in writing skills of children with DLD to identify specific areas of deficit (Dockrell, Ricketts, Charman & Lindsay, 2014; Koutsoftas & Gray, 2012). Given the negative impact of writing deficits on academic and employment success, there is a crucial need for a more extensive, comprehensive examination of the writing skills of children with DLD (Werfel, Schuele, & Reed, 2019). Therefore, the purpose of the study is to categorize grammatical errors in writing samples written by children with DLD and compare the frequency of errors within these categories to children with TL.

LITERATURE REVIEW

How Writing is Assessed and Analyzed

Written language samples are effective assessment tools that provide the necessary data to speech-language pathologists (SLPs) and educators who evaluate language, write therapy goals, and gauge response to treatment (Brimo & Hall-Mills, 2018). Writing samples can be used to determine if a child's use of language meets the standards of academic curriculum (Brimo & Hall-Mills, 2018). Most of the United States (n = 43/50 states, four territories, and the District of Columbia) include a writing proficiency section in their standardized assessment of English academic skills (Common Core State Standards Initiative, 2019). This state level testing is assessed by common core standards in the schools. For example, in Texas mastery of curriculum is measured through the Texas Essential Knowledge and Skills (TEKS) writing assessment in Grades 4, 7, 10, and 11 (exit) under the Texas Education Agency. State-level standards indicate that written compositions are graded based on focus and coherence, organization, development of ideas, voice, and conventions. Under the Conventions criteria, a student is scored on their conventions of the English language, including spelling, capitalization, punctuation, grammar, and sentence structure. These conventions may interfere with effective communication, and therefore are deemed vitally important for state standards of academic success.

Written language is distinctive from spoken language and, therefore, writing cannot be analyzed in the same manner as speaking (Gillam & Johnson, 1992). Much of past literature focuses on identifying an effective method of writing analysis. Writing is not unidimensional and, therefore, must be assessed by aspects that comprise the skill rather than as one cohesive body (Kim, Al Otaiba, Folsom, Greulich & Puranik, 2014). Previous examinations of writing have determined that a holistic rubrics for grading writing samples are highly correlated with

measure of content but not grammaticality or sentence complexity (Koutsoftas & Gray, 2012). Researchers have utilized multi-dimensional evaluations to gain an understanding of writing as whole as well as the quantifiable components of writing that may be used to capture writing performance and predictors (Kim, Al Otaiba, Folsom, Greulich & Puranik, 2014; Dockrell, Rickets, Charman & Lindsay, 2014). The most effectual way of analyzing a writing sample is by looking at individual measures of grammar in order to document incremental changes in writing or differences between samples.

Kim, Al Otaiba, Folsom, Greulich, and Puranik (2014) identified four dimensions for analyzing writing as a skill: substantive quality, productivity, spelling and writing conventions, and syntactic complexity. Substantive quality is determined by the ideas, organization, word choice, and sentence fluency of a written composition. Productivity is measured in the total number of words and the number of different words identified in a writing sample. Reduced productivity and lexical diversity were indicative of DLD in many research studies (Kim, Al Otaiba, Folsom, Greulich, & Puranik, 2014; Dockrell, Rickets, Charman, & Lindsay, 2014; Koutsoftas & Gray, 2012). Spelling and writing conventions included capitalization and punctuation. Previous research shows conflicting data for determining if spelling is a writing indicator of DLD. Complex syntax can be defined as utterances with one or more dependent clauses. Syntax develops in preschoolers' spoken language and gradually increases with development (Ardnt & Schuele, 2013). Syntactic complexity is commonly used as a measure of writing proficiency (Scott & Windsor, 2000; Brimo & Hall-Mills, 2018). Complex syntax is related to academic success (Scott & Balthazar, 2010) and the expression of complex ideas (Beers & Nagy, 2011; Brimo & Hall-Mills, 2018). Previous researchers have purported that complex syntax production is a predictor of writing quality (Beers & Nagy, 2009; Brimo & Hall-

Mills, 2018). Others purport that syntactic complexity corresponds to sentence-level language skill (e.g., Kim, Al Otaiba, Folsom, Greulich & Puranik, 2014).

Written Composition of Children with TD and Children with SLI

Almost all of previous research indicates a deficit in syntactic complexity in children with Specific Language Impairment (SLI), a group of children who have DLD (Dockrell & Mackie, 2004; Koutsoftas & Gray, 2012; Gillam & Johnson, 1992; Dockrell, Rickets, Charman, & Lindsay, 2014; Windsor, Scott, & Street, 2000). Difficulty with writing for children with SLI may show a vulnerability and deficit in using language structure (Dockrell, Rickets, Charman & Lindsay, 2014).

Gillam and Johnson (1992) demonstrated that children with DLD had writing difficulties. School age children with DLD produced fewer complex sentence than typically developing counterparts. Additionally, children with DLD produced significantly more grammatical errors in both complex and simple sentences. The biggest difference found between children with DLD and typical development was grammatical errors that reflect extensive difficulties with syntax as a whole. Dockrell, Rickets, Charman, and Lindsey (2014) established a strong correlation between presence of DLD and the number of grammatical errors produced in writing. Koutsoftas and Gray (2012) also found that grammatical accuracy was consistently the weakest writing component for children with DLD.

Although it is evident from previous research that children with DLD have writing difficulties, there is limited research regarding the specific types of grammatical errors being made by children with DLD. Most researchers report that children with DLD produce grammatical errors or report the percentage of ungrammatical sentences without classifying the types of grammatical errors being made. Scott and Windsor (2000) is the only study to report

that children with DLD omit grammatical morphemes, use run on sentences, and make subject-verb agreement errors and pronominal errors. Analysis of differences between the specific errors made and frequency of errors made by children with DLD and TL would be helpful to identify indicators of DLD in children's writing as well as inform the ways in which writing skills should be targeted in language therapy. Therefore, the purpose of this study is to compare writing errors of children with SLI and children with typical development.

Research Questions

Research questions addressed in this study are as follows:

1. How often do children with SLI make errors related to morphosyntax (verb tense and agreement) and syntax (word-order) in simple and complex sentences?
2. Do children with SLI make more errors related to morphosyntax and syntax in simple and complex sentences than children with typical language?

METHODOLOGY

Participants

Participants included 30 children with SLI and 33 children with TL. All participants were in second to fourth grade. Participants were originally recruited for a larger study by Dr. Krystal Werfel under the Vanderbilt University Institutional Review Board (Werfel, Schuele, & Reed, 2019). Participants attended public and private elementary schools in a southeastern U.S. state. Eligible participants spoke English as their first language, passed a hearing screening bilaterally, and had nonverbal intelligence in the average or above-average range as measured by the Test of Nonverbal Intelligence – Fourth Edition. The Clinical Evaluation of Language Fundamentals – Fourth Edition and the Peabody Picture Vocabulary Test – Fourth Edition were given to describe the participants' language skills. The SLI group was determined by a score below 85 on the Core Language Index subsection of the CELF–4 (Semel, Wiig, & Secord, 2003). Children who received a score of 85 or above on the CELF-4 Core Language Index were placed in the typical language group. The mean age of children with SLI was 9 years and 4 months, with an overall standard deviation of 13 months and the mean age of children with TL was 8 years and 7 months, with an overall standard deviation of 11 months.

TABLE 1: SLI Group Participant Data

	Mean Statistic	Standard Deviation Statistic
Age in Months	112.33	12.683
TONI-4	98.23	8.050
CELF-4	71.13	9.968
PPVT-4	88.33	12.650

TABLE 2: TL Group Participant Data

	Mean Statistic	Standard Deviation Statistic
Age in Months	104.30	10.884
TONI-4	105.03	8.357
CELF-4	106.82	10.418
PPVT-4	111.39	14.224

Procedures

The writing samples used in this study were collected by Dr. Krystal Werfel (Werfel, Schuele, & Reed, 2019). Assessments were conducted in quiet rooms at the participating students' schools. Test sessions lasted no more than two hours for each participant, and all testing for individual participants was conducted within one month.

Each participant completed the Test of Written Language- Fourth Edition (TOWL-4; Hammill & Larsen, 2009). The examiner showed a picture of scene, read a corresponding story example, and described necessary parts of a story. The example story told to the participants used decontextualized language, meaning that the story was set in the past tense. Then, the examiner showed a new picture to the participant and asked the child to write a story about the picture. Participants had five minutes to plan their story and 15 minutes to write their story. Each written sample was transcribed into t-units, sentence with a main clause and all dependent clauses (Hunt, 1965).

Coding Analysis

A coding manual for morphosyntactic analysis of writing was developed to identify morphosyntax and syntax errors. This coding manual combined methods described by Scott and Windsor (2000), such as identifying omitted grammatical morphemes and pronominal errors, and methods described by Dockrell and Mackie (2004), such as detailing differences between additions, omissions, and substitutions in morphological structures and whole words. See Appendix A for coding manual and procedures.

Reliability

Researchers in this study were blind to SLI and TL groups. No identifying information was included in the writing samples to prevent bias. Three undergraduate research assistants

underwent a rigorous training process to establish reliability using this coding manual (See Appendix B). To assure reliability in coding processes, each writing sample was coded by two research assistants. Any disagreements between samples were analyzed by a third coder and resolved by mutual consensus, resulting in final agreement of 100%.

Statistical Analysis

To answer the research questions, descriptive and non-parametric statistics using IBM SPSS Statistics for Windows version 26. Mann-Whitney test was used to analyze whether differences between the SLI and TL groups existed.

RESULTS

In order to determine if morphosyntactic errors in simple and complex sentences are similar or different in students with Specific Language Impairments (SLI) and Typical Language (TL), descriptive statistics were completed for each feature.

Research Question 1- How often do children with SLI make errors related to morphosyntax (verb tense and agreement) and syntax (word-order) in simple and complex sentences?

To begin our analysis, the total morphosyntactic errors for both simple and complex sentences were calculated. Transcripts were coded for error type. We coded for several types of morphosyntax errors, including subject verb agreement errors, past tense contractible and uncontractible copula errors, past progressive tense error, irregular tense errors, and future tense errors (See Appendix A). We calculated the ratio between the total number of morphosyntax errors and the total number of simple sentence as well as the ratio between the total number of morphosyntax errors and the total number of complex sentences.

The SLI group demonstrated morphosyntax errors in simple sentences at an average rate of 24.94%. However, the standard deviation was greater than the mean at 35.08%. There was a large range in the percentage of errors per number of utterances made within the SLI group, suggesting large variation in this group. The SLI group demonstrated morphosyntax errors in complex sentences at an average rate of 21.00% with a standard deviation of 33.34%. Again, the large standard deviation of scores showing variability in the percentage of errors within the SLI group.

We also coded for syntax errors in both simple and complex sentences. We coded by error type, including omission, addition and substitution word errors (coded as [errword]), and

incomplete utterances and word order errors (coded as [errsyntax]). We calculated four ratios to analyze syntax in written language: the total number of word errors in simple sentences, the total number of word errors in complex sentences, the total number of syntax errors in simple sentences, and the total number of syntax errors in complex sentences.

The SLI group demonstrated word errors in simple sentences at an average rate of 20.98%. However, the standard deviation was greater than the mean at 26.11%.
The SLI group demonstrated word errors in complex sentences at an average rate of 18.48% with a standard deviation of 26.85%. The large standard deviation in both simple and complex sentences points to the large variation in the SLI group once again.

For syntax (incomplete utterances and word order) errors, the SLI group demonstrated an average rate of 9.98% with a standard deviation of 17.08% in simple sentences. In complex sentences, the SLI group made syntax errors at an average rate of 9.28% with a standard deviation of 25.97%.

TABLE 3: SLI Group Syntax Errors Data

	Mean Statistic	Standard Deviation Statistic
Word errors in SS	20.98%	26.11%
Word errors in CS	18.48%	26.85%
Total word errors	24.03%	22.82%
Syntax errors in SS	9.98%	17.08%
Syntax errors in CS	9.28%	25.97%
Total syntax errors	11.44%	17.09%

Research Question 2 - Do children with SLI make more errors related to morphosyntax and syntax in simple and complex sentences than children with typical language?

We began our analysis by looking at normal distribution of each group because of large standard deviation of each group. We collapsed simple and complex sentences into one group for this analysis.

TABLE 4 - SLI Group Skewness and Kurtosis Data

	Total Morphosyntax Errors	Total Word Errors	Total Syntax Errors
Skewness	1.045	0.643	1.290
Std. Error of Skewness	0.427	0.427	0.427
Kurtosis	-0.034	-0.352	-0.273
Std. Error of Kurtosis	-0.833	-0.833	-0.833

TABLE 5 - TL Group Skewness and Kurtosis Data

	Total Morphosyntax Errors	Total Word Errors	Total Syntax Errors
Skewness	1.963	1.944	1.771
Std. Error of Skewness	0.409	0.409	0.409
Kurtosis	3.126	4.582	1.945
Std. Error of Kurtosis	0.798	0.798	0.798

Our analysis of normality data showed an abnormal distribution with a positive skew. The majority of data was right-skewed, indicating the median of the data set was less than the mean. In an ideal statistical model, the skewness would be zero. However, the skewness is greater than 1 (as seen in Table 4 and Table 5) showing that our data is not normally distributed. Because our data was not normally distributed, a Mann-Whitney test was used to analyze the data.

Children with SLI did not differ significantly from children with TL on total percentage of errors in syntax (SLI *Mdn* = <.01; TL *Mdn* = <.01; $U = 389.00$, $z = -1.77$, $p = .077$, $r = -.22$) and morphosyntax (SLI *Mdn* = .17; TL *Mdn* = .067; $U = 439.00$, $z = -.803$, $p = .422$, $r = -.10$). However, children with SLI (*Mdn* = .218) produced significantly more word errors than children with TL (*Mdn* = <.01) ($U = 262.5$, $z = -3.38$, $p = .001$, $r = -0.43$)

FIGURE 1: Morphosyntax Errors

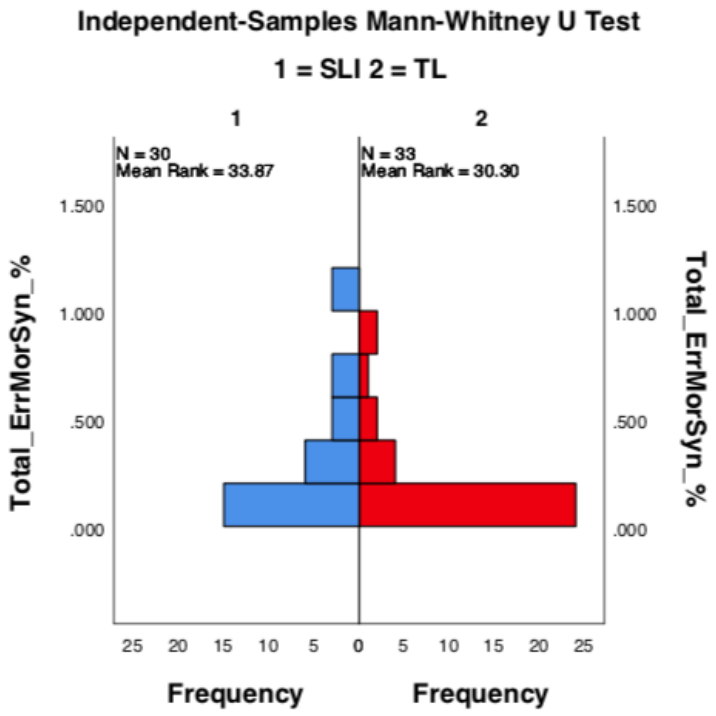


FIGURE 2: Syntax Errors

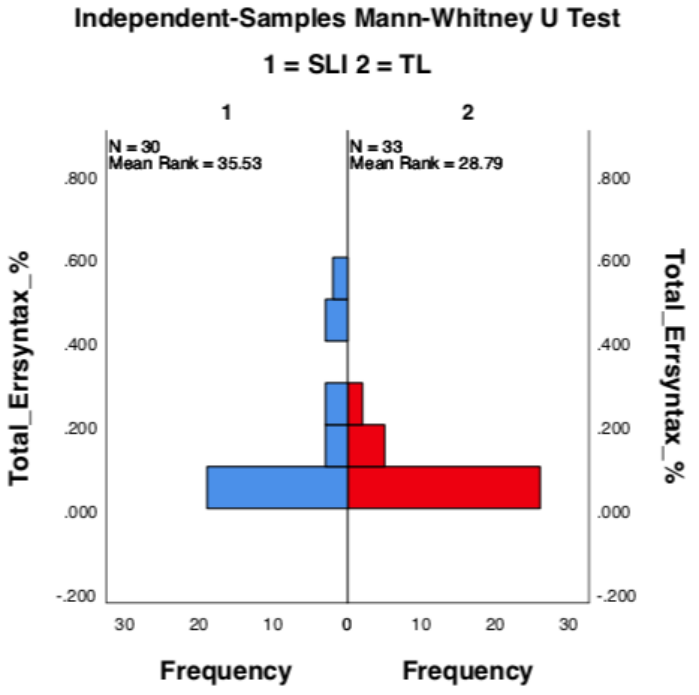
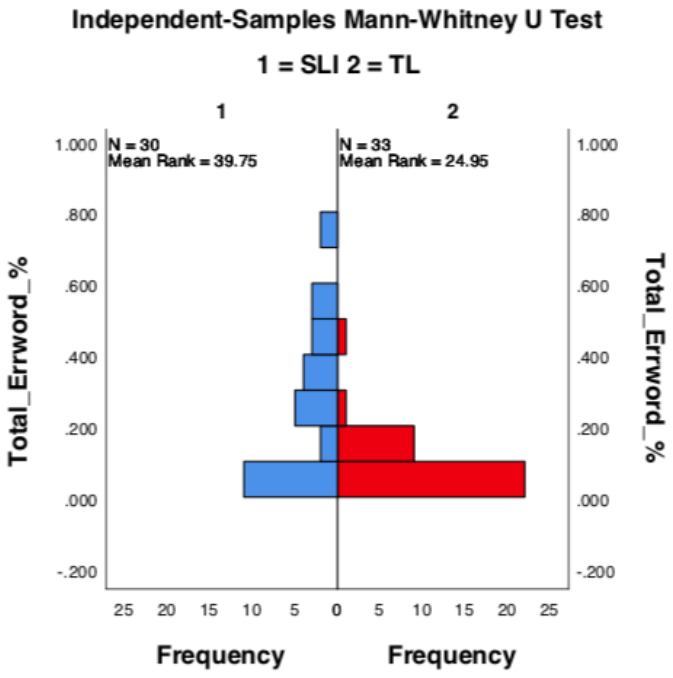


FIGURE 3: Word Errors


Independent-Samples Mann-Whitney U Test
1 = SLI 2 = TL
1
2
N = 30
Mean Rank = 39.75
N = 33
Mean Rank = 24.95
1.000
.800
.600
.400
.200
.000
-.200
Total_Errword_%
25 20 15 10 5 0 5 10 15 20 25
Frequency
Frequency

DISCUSSION

While there is vast research on the spoken language of children with SLI, little is known about their writing patterns. The purpose of this study was to examine the morphosyntax and syntax errors made in the written language of children with specific language impairment (SLI). Morphosyntax errors included subject-verb agreement errors and verb tense errors. Syntax errors were broken into two subgroups: word errors, including single word additions, omissions, or substitutions, and syntax errors, such as word order errors or incomplete utterances.

It was hypothesized that children with SLI would make more morphosyntax and syntax errors in both simple and complex sentences than children with TL. While tests showed that SLI children made more errors than children with TL in complex sentences, there was no statistical difference in the number of morphosyntax and syntax errors made in simple and complex sentences between the two groups. However, the SLI group made more word level errors in simple and complex sentences than children with TL.

Though our research did find that children with SLI produced grammatical errors, morphosyntax and syntax, we did not find that they were significantly different from their typical language peers. There are a couple of possible reasons for this result. First, some of the children with SLI were accurate at marking tense in writing likely because of the age range of the sample of children. The SLI group contained students aged 7 years to 10 years-old. Typical children use morphosyntax, such as past tense -ed, accurately by kindergarten while children with SLI use morphosyntax accurately by third and fourth grade (Rice, Tomblin, Hoffman, Richman, & Marquis, 2004). Rice et al. (2004) reported the children with SLI mark past tense –ed with 97 to 98% accuracy. It seems that the older children in the SLI group may have remediated their morphosyntactic errors also in their written language. For example, one participant with SLI

(Appendix C) produced very few grammatical errors – one morphosyntactic error in a complex utterance and one word error in a complex utterance. Our data supports the evidence that a majority of children with SLI are going to mark morphosyntax in their writing by the time they reach 10 years old. Therefore, morphosyntax may not be the best indicator of SLI in writing because children with SLI who are nine and ten years old present with a wide range of performance.

Second, some children with SLI do not write enough sentences or produce enough opportunities of past tense verbs to analyze their use of morphosyntax and syntax. For example, a writing sample produced by one child with SLI contained only two utterances (Appendix C). The utterances contained one use of a past tense -ed verb. Thus, this child's use of morphosyntax and syntax was 100% accurate. The limited productivity in our writing samples may contribute to the large variance within our SLI group. When looking at syntactic errors, the results of this study are in line with results from Gilliam and Johnson (1992). This study tested children ages 9 to 12, and stated that children with learning and language impairments produced less grammatically correct utterances and had more pervasive difficulties with syntax in general. However, because the children in our SLI did not produce an equivalent number of written utterances to analyze, we did not prove

.

Limitations and Future Directions

There were some factors that could have impacted the results of this study and should be examined in future research. First, this study used non-authentic writing sample collected from a norm-referenced assessment. These writing samples may not reflect what students are writing in their educational curriculum and may not be a full representation of their writing capabilities. For future research, a more organically sourced writing sample may be used to show children's natural writing skills. Additionally, the current analysis of errors may have affected the recording of errors within each sample. The data currently analyzed did not account for the total number of correct use of morphosyntax or syntax. Future research should use the ratio of each errors to correct usage of the morphosyntactic or syntactic element for each factor to determine the percentage of correct usages in additional to overall morphosyntax and syntax usage. Additional research, including replication studies, may provide meaningful data to support our understanding of morphosyntactic errors and syntax errors in simple and complex sentences to identify specific language impairment and our intervention and treatment of this clinical population.

CONCLUSION

Written language samples of children ages 7 to 10 years old were analyzed using a coding manual written by the authors of this study. The coding manual marked morphosyntax, syntax, and word errors. Research revealed that children with SLI made more overall errors in complex sentences than children with TL; however, there was not a statistically significant difference in the number of errors by the two groups. Analysis of syntactic errors revealed that children with SLI made more word level errors than children with TL. The word level errors made by children with SLI were the addition or omission of just one word. The age range of children within our SLI group may have impacted the results of this study. Morphosyntax should still be considered as a possible intervention target for children with SLI with future research.

REFERENCES

Arndt, K. B., & Schuele, C. M. (2013). Multiclausal utterances aren't just for big kids: A framework for analysis of complex syntax production in spoken language of preschool- and early school-age children. *Topics in Language Disorders*, 33(2), 125–139. doi:10.1097/TLD.0b013e31828f9ee8

Beers, S. F., & Nagy, W. E. (2011). Writing development in four genres from grades three to seven: Syntactic complexity and genre differentiation. *Reading and Writing*, 24(2), 183–202. doi:10.1007/s11145-010-9264-9

Berman, R. A., & Nir-Sagiv, B. (2007). Comparing narrative and expository text construction across adolescence: A developmental paradox. *Discourse Processes*, 43(2), 79–120. doi:10.1080/ 01638530709336894

Brimo, D. & Hall-Mills, S. (2018): Adolescents' production of complex syntax in spoken and written expository and persuasive genres, *Clinical Linguistics & Phonetics*, doi:10.1080/02699206.2018.1504987

Catts, H., Fey, M., Tomblin, J., & Zhang, X. (2002). A Longitudinal Investigation of Reading Outcomes in Children With Language Impairments. *Journal of speech, language, and hearing research*, 45. 1142-57. 10.1044/1092-4388(2002/093).

Common Core State Standards Initiative (CCSS). (2019). *Common Core State Standards for English Language Arts*. Retrieved from www.corestandards.org

Conti-Ramsden, G., Durkin, K., Toseeb, U., Botting, N., & Pickles, A. (2018). Education and employment outcomes of young adults with a history of developmental language disorder. *International Journal of Language & Communication Disorders*, *53*(2), 237–255. https://doi.org/10.1111/1460-6984.12338

Conti-Ramsden, G., Durkin, K. and Walker, A.J. (2012), The messages they send: e-mail use by adolescents with and without a history of specific language impairment (SLI). *International Journal of Language & Communication Disorders*, 47: 217-228. doi:10.1111/j.1460-6984.2011.00096.x

Dockrell, J., Ricketts, J., Charman, T., & Lindsay, G. (2014). Exploring writing products in students with language impairments and autism spectrum disorders. *Learning and Instruction*. 32. 81–90. 10.1016/j.learninstruc.2014.01.008.

Gillam, R. B., & Johnston, J. R. (1992). Spoken and written language relationships in language/ learning-impaired and normally achieving school-age children. *Journal of Speech, Language, and Hearing Research*, 35(6), 1303–1315. doi:10.1044/jshr.3506.1303

Hammell, D. D. & Larsen, S. C. (2009). Test of Written Language – Fourth Edition. Austin, TX: Pro-Ed.

Hunt, K.W. (1965). Grammatical structures written at three grade levels (Research report No. 3). Urbana, IL: National Council of Teachers of English.

IBM Corp. Released 2019. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp

Kellogg, R. T. (2008). Training writing skills: A cognitive developmental perspective. *Journal of Writing Research*, 1, 1–26.

Kim, Y.-S., Al Otaiba, S., Folsom, J. S., Gruelich, L., & Puranik, C. (2014). Evaluating the dimensionality of first grade written composition. *Journal of Speech, Language, and Hearing Research*, 57, 199 –211. 10.1044/1092-4388(2013/12-0152).

Kim, Y. S., Puranik, C., & Otaiba, S. A. (2015). Developmental trajectories of writing skills in first grade: Examining the effects of SES and language and/or speech impairments. *The Elementary School Journal*, *115*(4), 593–613. https://doi.org/10.1086/681971

Koutsoftas, A. D., & Gray, S. (2012). Comparison of narrative and expository writing in students with and without language- learning disabilities. *Language, Speech, and Hearing Services in Schools*, *43*(4), 395-409. https://doi.org/10.1044/0161-1461(2012/11-0018)

Mackie, C., & Dockrell, J. (2005). The Nature of Written Language Deficits in Children With SLI. *Journal of Speech, Language, and Hearing Research*, 47. 1469-83. 10.1044/1092-4388(2004/109).

Rice, M.L., Tomblin, J.B., Hoffman, L., Richman, W.A., & Marquis, J. (2004). Grammatical tense deficits in children with SLI and Nonspecific Language Impairment: Relationships with nonverbal IQ over time. Journal of Speech, Language, and Hearing Research, 47 (*4*), 816-834. doi: https://doi.org/10.1044/1092-4388(2004/061)

Rosenthal, R. (1991). Effect sizes: Pearson's correlation, its display via the BESD, and alternative indices. *American Psychologist, 46*(10), 10861087. https://doi.org/10.1037/0003066X.46.10.1086

Semel, E., Wiig, E., & Secord, W. (2003). Clinical Evaluation of Language Fundamentals–Fourth Edition. San Antonio, TX: The Psychological Corporation.

Scott, C. M., & Balthazar, C. H. (2010). The grammar of information: Challenges for older students with language impairments. *Topics in Language Disorders*, 30(4), 288–307. doi:10.1097/ TLD.0b013e3181f90878

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(2), 324–339. doi:10.1044/jslhr.4302.324

Werfel, K. L., Melanie Schuele, C., & Reed, P. (2019). Linguistic Contributions to Word-Level Spelling Accuracy in Elementary School Children With and Without Specific Language Impairment. *American Journal of Speech-Language Pathology*, *28*(2), 599–611. https://doi.org/10.1044/2018_AJSLP-18-0064

Windsor, J., Scott, C. M., & Street, C. K. (2000). Verb and noun morphology in the spoken and written language of children with language learning disabilities. *Journal of Speech, Language, and Hearing Research*, 43, 1322–1336.

APPENDIX A

Writing Analysis Codes

I. Simple versus Complex Sentences

i. [ss] Simple sentence = only one verb OR one verb with a helping verb
   1. EX. She was breathing[ss].
   2. EX. He is in the other room[ss].
   3. EX. They were skiing down the mountain[ss].

ii. [cs] Complex sentence = more than one main verb
   1. Includes infinitive
   2. Dialogue is complex syntax.
   3. EX. They had to call the police[cs].
   4. EX. He came home and cooked his dinner[cs].

II. Verb and Noun Morphology Analysis

a. Correct in simple sentences

i. [uncop] = past tense using uncontractible copula (was, were) in a simple sentence.
   1. EX. She was[uncop] hurt.

ii. [unaux] = past progressive tense using uncontractible auxiliary (was, were) in a simple sentence.
   1. EX. She was[unaux] laughing.
   2. EX. They were[unaux] helping their mom.

iii. [past] = irregular (gave) and regular past tense (-ed), regular (had baked) and irregular (had hidden) past perfect tense, and regular past perfect progressive tense (had been hiding) in a simple sentence
   1. EX. She baked[past].
   2. EX. She had baked[past] bread earlier.
   3. EX. He had hidden[past] the key.
   4. EX. He had been hiding[past] under the table.

iv. [future] = future tense (will), future progressive tense (will be), future perfect tense (will have), and future perfect progressive tense (will have been) in a simple sentence
   1. EX. He will go[future] to the mall.
   2. EX. He will be[future] at the funeral.
   3. EX. They will have[future] four children this fall.
   4. EX. They will have spent[future] $300.
   5. EX. She will have been[future] in school for 3 years.

b. Correct in complex sentences

i. [uncop_cs] = past tense using uncontractible copula (was, were) in a complex sentence.
   1. EX. He was[uncop_cs] envious when watching the performance.

ii. [unaux_cs] = past progressive tense using uncontractible auxiliary (was, were) in a complex sentence.
   1. EX. He was[unaux_cs] walking home when he saw the wreck.

iii. [past_cs] = irregular and regular past tense, regular and irregular perfect past tense, and regular past perfect progressive tense in a complex sentence
   1. EX. He walked[past_cs] to class after eating his lunch.

2. EX. She had baked[past_cs] bread when she was in college.
3. EX. He had hidden[past_cs] the key where no one would find it.
4. EX. He had been hiding[past_cs] because his friends were playing hide and seek.

iv. [future_cs] = future tense, future progressive tense, future perfect tense, and future perfect progressive tense in a complex sentence
1. EX. He will go[future_cs] to the mall when he is in Nashville.
2. EX. He will be[future_cs] in the wedding and give a speech.
3. EX. They will have[future_cs] four children when she gives birth.
4. EX. They will have spent[future_cs] $300 on clothes they do not need.
5. EX. She will have been[future_cs] in school for 3 years when she graduates.

c. Incorrect in simple sentences

i. [SVA] = subject verb agreement plural error in a simple sentence
1. EX. They was [SVA] at the store.

=was/were

ii. [err_cop] = past tense error using contractible copula (is, am, are) in a simple sentence
1. When a sentence does not mark verbs as past tense, this code is used.
2. This code can be used in conjunction with another code if there is an additional error to the verb.

iii. [err_uncop] = past tense error using uncontractible copula (was, were) in a simple sentence.
1. This code is used for omission of the uncontractible copula.
   a. She *was [err_uncop] at the ballpark.
2. This code can be used in conjunction with another code if there is an additional error to the verb.
   a. We was [SVA] [err_uncop] at the ballpark.

iv. [err_aux] = past tense error using contractible auxiliary (am, is, are) in a simple sentence
1. Present tense use of the auxiliary verb in place of a past tense auxiliary verb
   a. EX. They are [err_aux] running to the store.
2. This code can be used in conjunction with another code if there is an additional error to the verb.
   a. EX. They is running [SVA] [err_aux] to the store

v. [err_unaux] = past progressive tense error using uncontractible auxiliary (was, were) in a simple sentence.
1. Omissions must mark what is omitted with * directly before the word that was omitted
2. They *were [err_unaux] running to the store.

vi. [err_past] = tense error in the irregular (gave) and regular past tense (-ed), regular (had baked) and irregular (had hidden) past perfect tense, and regular past perfect progressive tense (had been hiding) in a simple sentence

vii. [err_future] = tense error in the simple future tense (will), future progressive tense (will be), future perfect tense (will have), and future perfect progressive tense (will have been) in a simple sentence

d. Incorrect in complex sentences

i. [SVA_cs] = subject verb agreement plural error in a complex sentence.

ii. [err_cop_cs] = substitution of past tense error using contractible copula (is, am, are) in a complex sentence

iii. [err_uncop_cs] = past tense error using an uncontractible copula (was, were) in a complex sentence.

iv. [err_unaux_cs] = past progressive tense error using an uncontractible auxiliary (was, were) in a complex sentence.

v. [err_past_cs] = tense error in the irregular (gave) and regular past tense (-ed), regular (had baked) and irregular (had hidden) past perfect tense, and regular past perfect progressive tense (had been hiding) in a complex sentence

vi. [err_future_cs] = tense error in the simple future tense (will), future progressive tense (will be), future perfect tense (will have), and future perfect progressive tense (will have been) in a complex sentence

III. **Syntax Analysis**

a. **Simple sentences**

i. [errword] = general error (omission, addition, or substitution) of a word for another word in the same syntactic category (pronoun/noun) in simple sentence

1. Omissions must mark what is omitted with * directly before the word that was omitted
2. EX. Give it *to [errword] me.

ii. [errsyntax] = incomplete utterances, word order error

1. EX. a student driver [errsyntax].

b. Complex sentence

i. [errword_cs] = general error (omission, addition, or substitution) of a word for another word in the same syntactic category (pronoun/noun) in simple sentence

1. Omissions must mark what is omitted with * directly before the word that was omitted
2. EX. Give it *to [errword_cs] me after you come home.

ii. [errsyntax_cs] = word order error

APPENDIX B

WRITTEN LANGUAGE OF CHILDREN WITH SPECIFIC LANGUAGE IMPAIRMENT
THESIS
SLI WRITTEN LANGUAGE PROJECT
DAVIES SCHOOL OF COMMUNICATION SCIENCES AND DISORDERS
TEXAS CHRISTIAN UNIVERSITY

CODING TRAINING MANUAL

Danielle Brimo, PhD
Kavi Nallamala, Student Researcher

This manual is written to (a) provide a training protocol for learning to code written language samples for syntax and morphology and (b) to provide guidance for consistent coding policies within the Written Language of Children with Specific Language Impairment Thesis.

The generation of this manual was based on Schuele (2009) and some parts are copied verbatim. Schuele's transcription and coding manual provides guidance for coding language samples in the Child Language and Literacy Lab at Vanderbilt University.

Conventions of Coding

What is the definition of a transcript in this research project?

Research language transcripts include utterances written by participants in the research study. The elicitation method included narrative prompts from TOWL-4 Form A. Note that transcripts in this lab are prepared to enable analysis with SALT (Systematic Analysis of Language Transcripts).

What is syntax? What is morphology? What are the types of syntax?

Syntax is sentence structure, or the way words are ordered and structured to formulate sentences. Morphology is word structure, or the way parts of words are combined to give the word meaning. These two facets of language are important in the formation and understanding of language.

For the purpose of this study, there are two types of syntax: simple and complex. Simple syntax includes sentences with only one verb or one verb with a helping verb. Complex syntax, a later developing writing skill, has more than one main verb, including infinitives. Noun and verb morphology will be designated within the simple and complex syntax framework. This includes subject verb plural agreement, omitted words, substitution errors, and verb tenses.

How do I start coding a file?

1. Download the file you are to transcribe as a Microsoft Word document from BOX.
2. At the top of the document, replace current header with the following information:
   + Child Code = (Remains from previous header)
   + Coder = (Fill in your name)
   + Date this file was last worked on = (Fill in date)
   + Note: (If there is a note on the current header, please leave it)
3. When coding is complete, save the final Microsoft Word document as: Child code _(Your first initial)(Your last initial)
   For example, Kavi Nallamala would save the file for sample ALEMM as "ALEMM_KN".

What are the steps I need to take to code for syntax and morphology?

Accuracy and reliability are top priorities when coding a research language sample. Accurate, reliable coding is time consuming. Ensure that your work environment is quiet and that you have adequate access to the Writing Analysis Coding Manual for this study. Please follow the steps below to become efficient, reliable coders of written language samples associated with the SLI Writing Intervention Project:

1. Review the Coding Training Manual and Writing Analysis Coding Manual. Have them available while you code so that you can reference them.

2. Read over the sample as a whole.
3. Code each line for simple versus complex syntax.
    a. Designate the line as simple syntax or complex syntax and add the code to the end of the utterance.
    b. Go line by line through the writing sample.
4. Add / to designate bound grammatical morphemes.
    a. -ing, -ed, plural s, possessive s
        i. -ing is designated as /ing
        ii. -ed is designated as /ed
        iii. Plural s is designated as /s
        iv. Contracted verb "is" is designated as /'s
        v. Contracted verb "are" is designated as /'re
        vi. Contracted verb "am" is designated as /'m
        vii. Possessive s is designated as /z
    b. When you are marking grammatical morphemes, make sure it is the complete word before the slash.
        i. EX. If the utterance said "exploded", it would be marked explode/ed
    c. These codes may be completed for you. If so, anything you change should be marked with a purple highlight.
5. Write in all omissions with the * code.
    a. If the omission was a verb, add the correct code. Do not add simple or complex syntax at this stage.
6. Highlight all errors in yellow.
    a. This includes verb errors, subject verb plural agreement errors, pronoun errors, etc.
    b. Omissions denoted in the step above should also be highlighted in yellow.
    c. As you add the code for each error in the following steps, remove the highlight from the error unless otherwise noted.
7. Code all syntax word errors [errword] and [errsyntax].
8. Code all subject verb plural agreement errors [SVA]. Leave highlighted until verb is coded.
9. Go through each verb in the written sample. Code uncop, unaux, past, or future as necessary.
    a. If the verb is highlighted (indicating it is errored), add "err_" to the beginning of the code.
        i. EX. [err_uncop]
        ii. EX. [err_past]
    b. Do not code simple or complex at this stage.
10. Go back through all complex sentences. For each complex sentence, add the "_cs" to the end of the code.
    a. EX. [err_unaux_cs]
    b. EX. [past_cs]

Important notes:

For errored words, the correct form of the words should be written under the utterance in the form = errored/correct.

EX. They are [err_aux] running to the store.
= are/were

The order of = errored/ correct below the utterance should be transcribed in the order of the errors in the C-unit.

EX. They was [SVA] crying and helping a [errword] owl.
=was/were
=a/an

Do not change any of the transcribed words in the sample.

If you have a question about how something should be coded, please highlight the word or phrase in question with blue and submit to Student Researcher for clarification.

Where do I place a code in the written sample?

Code should be placed right after the word that is being coded
There should be one space between the word and the code.
EX. She was breathing [ss].
Transcribe the correct form of the word below the utterance.
EX. She were [SVA] breathing [ss].
= were/was
ALL codes must be before the period at the end of the utterance.

What about when words in the sample are spelled incorrectly?

In this study, we are not coding for spelling errors.
Do not correct the misspelled word.
Infer what the word was and write it below the line with the incorrect spelling / the correct spelling
EX. The dog ture the hose.
= ture/tore
Code the sentence based on your inference of the word
EX. The dog ture [past] the hose [ss].
= ture/tore

What about if there is an omitted word?

Mark what was omitted with a * directly before the word that was omitted.
EX. Give it *to me.
Code the sentence based on your inference of the word.
EX. Give it *to [errword] me.
Assume omitted words were in the correct subject-verb plural agreement.
Assume omitted words were in the past tense, as stories are told in the past tense.

.

What if there is dialogue?

Dialogue is complex syntax as should be marked as such
In stories, dialogue should be in the past tense. If dialogue is marked in the past tense (i.e. with the verb "said"), you do not need to mark other present tense verbs within the dialogue as errored.
Past tense verbs should still be coded.

Should I code for modal verbs?

The only modal verb that should be coded is "will".

EX. He will go [future] to the mall.
EX. He will be [future] at the funeral.
EX. They will have [future] four children this fall.

Other modal verbs should not be coded. Models include forms of the verbs can, could, should, would, must, and may.

What about when there are two codes for a single word?

Place both codes directly after the word.
Put one space between the codes.

EX. And they is [SVA] [err_cop] pleased [ss].
=is/were

What punctuation goes at the beginning and end of each line?

Each line should begin with a capital C.

EX. C She ran [ss].

There must be a period at the end of every line of written language in the sample
All codes must be <u>before</u> the period at the end of the utterance.

APPENDIX C

+ Child Code = BBLAC
+ Coder = Kavi Nallamala/Brimo
+ Date this file was last worked on = 12/3/19
+ Note: spelling corrected and punctuation added by researcher for use in SALT. see Exact file for child's spelling and punctuation.

c Once there was [uncop_cs] a girl that drove [past_cs] the student car [cs].
c and then the girl wreck/ed [past] into a fire hydrant [ss].
c and then a police came [past_cs] and gave [past] her a ticket [cs].
c and then there was [err_SVA_cs] two boy/s that were [unaux_cs] talk/ing to *one [errword_cs] another [cs].
=was/were
c and there was [uncop] a dog [ss].

+ Child Code = BDELE
+ Coder = Kavi Nallamala/Brimo
+ Date this file was last worked on = 12/1/19

C One day a car crash/ed [past] into a red firehydren [ss].
C target [errsyntax] [ss].