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GRAMMATICAL ACCURACY AND SYNTACTIC COMPLEXITY IN THE ORAL AND WRITTEN NARRATIVES OF FOURTH GRADE TYPICALLY DEVELOPING CHILDREN

by

Angela W. Parkinson

A thesis

Submitted in partial fulfillment

of the requirements for the degree of

Master of Science in Speech Language Pathology

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August 2016

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To the Graduate Faculty:

The members of the committee appointed to examine the thesis of Angela W. Parkinson find it satisfactory and recommend that it be accepted.

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April 13, 2016

Angela Parkinson Comm Sci Disorders/Deaf Educ MS 8116

RE: regarding study number IRB-FY2016-283: Morphologic Accuracy and Syntactic Complexity in the Written and Oral Narratives of Fourth Grade Typically Developing Children

Dear Ms. Parkinson:

I agree that this study qualifies as exempt from review under the following guideline: Category 4: Collection or study of existing data. This letter is your approval, please, keep this document in a safe place.

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Sincerely,

Ralph Baergen, PhD, MPH, CIP Human Subjects Chair

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List of Tablesix
List of Abbreviationsx
Abstractxi
Chapter I: Literature Review1
Introduction1
Language Development and Complexity2
Narrative Discourse
Current Study13
Chapter II: Methodology15
Participants15
Stimuli16
Procedure16
Counter-balancing18
Transcription and Coding19
Data Analysis20
Reliability22
Chapter III: Results
Productivity23
Grammatical Accuracy
Syntactic Complexity24
Chapter IV: Discussion
Productivity

Table of Contents

Grammatical Accuracy	27
Syntactic Complexity	28
Clinical Applications	31
Limitations and Future Research	32
References	34
Appendix A	38
Appendix B	39

List of Tables

Table 1: Comparison of Productivity in the Oral and Written Modality	24
Table 2: Comparison of Accuracy in the Oral and Written Modality	25
Table 3.1: Comparison of Syntactic Complexity in the Oral and Written Modality	26
Table 3.2: Comparison of Subordinate Clause Use in the Oral and Written Modality	26

List of Abbreviations

- ADV: Adverbial clause
- CELF-5: Clinical Evaluation of Language Fundamentals, fifth edition
- CI: Clausal Index
- IEP: Individualized Education Plan
- INF: Infinitive clause
- LI: Language Impairment
- LLD: Language Learning Disability
- MLTU-w: Mean Length of T-unit in words
- MLU: Mean Length of Utterance
- NDW: Number of Different Words
- NOM: Nominal clause
- OTHER_COMP: Other complements
- PART: Participle clause
- **REL:** Relative clause
- SALT: Systematic Analysis of Language Transcripts
- SI: Subordination Index
- SLI: Specific Language Impairment
- SLP: Speech Language Pathology or Pathologist
- TL: Typically Developing Language
- TNL: Test of Narrative Language
- TNW: Total Number of Words
- TTU: Total T-units
- T-unit: Terminable Unit

GRAMMATICAL ACCURACY AND SYNTACTIC COMPLEXITY IN THE ORAL NARRATIVES OF FOURTH GRADE TYPICALLY DEVELOPING Thesis Abstract—Idaho State University (2016)

The purpose of this study was to examine the similarities and differences in productivity, grammatical accuracy, and syntactic complexity in the oral and written narratives of typically developing fourth graders. In this study, 21 typically developing fourth graders produced an oral and a written narrative. The narratives were transcribed and coded for productivity, accuracy and complexity. The results indicated that oral narratives were more productive than written narratives. The oral narratives were also more accurate, containing fewer errors and having a larger proportion of grammatical sentences. Oral narratives also contained more words per sentence. Syntactic complexity was measured in two ways, but there were no significant differences between modalities for either measure. There were no significant differences found between modalities for any of the clause types. The results support further exploration of oral and written narratives across the age span. Grammatical Accuracy and Syntactic Complexity in the Oral and Written Narratives of Fourth Grade Typically Developing Children

Chapter I – Literature Review

Introduction

Children use narratives to share experiences and to express ideas in school, at home, and on the playground. Parents use stories with their children both for entertainment and to teach lessons. Teachers and textbook authors use stories to teach a variety of subjects including history, science, and even math. Teachers also require their students to produce narratives in reports and to explain what went wrong on the playground. Narratives have even been shown to be a good predictor of literacy skills, because more advanced language skills improve literacy skills (Miller, Heilmann, Nockerts, Iglesias, Fabiano, & Francis, 2006). Narratives are essential to school success (Riley & Burrell, 2007) and their importance continues into the adolescent years (Nippold, 2010). Whether in the classroom, on the playground, or at home, narratives play a key role in a child's success in daily life.

The purpose of this study is to examine the similarities and differences of productivity, grammatical accuracy, and syntactic complexity in the oral and written narratives of typically developing fourth graders. In addition to studies of typical narrative development, much of what we currently know about the productivity, grammatical accuracy, and syntactic complexity in the narratives of typically developing children comes from comparisons of children with TL with children who have language impairments. In such studies, the language impairments are specified in many different ways including specific language impairment (SLI), language learning disability (LLD), language impairment (LI), etc. For ease of reading, the term LI will be used throughout this paper.

Language Development and Complexity

Before children enter school, language growth is measured by comparing progress to developmental norms, and growth in typical children is visible and rapid. For example, children generally babble at 6 months, say their first word at 12 months, and combine words at 18 months. Also, their utterance length increases with age as measured by mean length of utterance (MLU; Paul & Norbury, 2012). On the other hand, growth in the school-age years is more gradual, and there are fewer clearly defined milestones for aspects of language development (Nippold, 1995; Scott & Stokes, 1995).

Language growth in school-age children can be seen in vocabulary, morphology, syntax, and in various types of discourse. Vocabulary growth depends greatly upon the child's interests and activities (Nippold, 1995). For example, a school-age child who is interested in construction may learn a variety of names for different types of equipment, while another child may not. School-age children also begin to have a greater understanding of abstract language and a greater comprehension of multiple meanings for words. Syntactically, school-age children increase their use and variety of complex sentences and passive voice. Morphologically, school-age children begin to use more derivational prefixes and suffixes (Paul & Norbury, 2012).

We have gained a great deal of knowledge about school-age language production from comparisons of various forms of discourse including conversation, narratives, and exposition. Conversational samples have been used to describe syntactic and morphological errors as well as MLU and use of subordination (Johnston & Kahmi, 1984; Marinellie, 2004; Nippold, Frantz-Kasper, Cramond, Hayward-Mayhew, & MacKinnon, 2014; Thordardottir, 2008; Wagner, Nettelbladt, Sahlén, & Nilholm, 2000). However, as children enter the school-age and adolescent years, syntactic errors in conversation are less common (Marinellie, 2004). More demanding types of discourse, such as narratives, become a better measure of language ability than conversational samples at this time (Nippold et al., 2014).

Several studies have shown that grammatical accuracy and syntactic complexity vary depending on the type of discourse that is being evaluated. Narrative samples can reveal children's language strengths and deficits where conversational samples would not, especially in terms of morphology and syntax. Thordardottir (2008) found that the oral narratives of English speaking school-age children with TL contained significantly more errors in verb morphology and had a significantly lower MLU than conversational samples. Wagner and colleagues (2000) also concluded that oral narratives elicit language that is more morphologically and syntactically complex than conversation. In their study, the narratives produced by Swedish children with LI contained more expanded phrases, a greater number of grammatical morphemes, and a higher MLU in words when compared to the children's conversational samples.

Nippold and colleagues (2014) found similar results with English-speaking adolescents with TL. In their study of 40 eighth graders, the students produced one conversational language sample and two oral narratives. In the conversational samples the students were asked to talk about every day topics such as pets, sports, family, friends, etc. For the narrative, the students were asked to read and look at a picture while the examiner read a fable. The students were then asked to retell the fable with the help of an illustration. The researchers found that the eighth graders' sentences were significantly longer and contained more subordination during the narrative samples than during the conversational sample. In other words, the narratives elicited more complex language than conversation.

Marinellie (2004) evaluated syntactic complexity of the conversational language samples from 15 school-age children grades 3-5 with LI and 15 of their peers with TL. Syntactic complexity refers to the use of subordination or dependent clauses. Marinellie found that the school-age children with TL used more subordination, which made their samples more complex than children with LI. This was determined using clausal density. Clausal density is calculated by dividing the total number of clauses by the total number of utterances in the sample. Specifying the types of subordination that are used by children can shed further insight on typical development. Marinellie confirmed that adverbial phrases of cause and reason occur most frequently in conversational language of school-age children both with TL and LI. Similarly, Nippold, Mansfield, Billow, and Tomblin (2008) found that adolescents with and without LI used relative, adverbial, and nominal clauses more frequently in oral expository language than in conversation.

Nippold, Hesketh, Duthie, and Mansfield (2005) examined the use of adverbial, nominal, and relative clauses across the age-span. In this study, a conversational language sample was elicited along with a verbal expository account of how to play a favorite game from 120 participants with TL ages 7-49. Each sample was assessed for total Tunits (TTU), mean length of T-units in words (MLTU-w), and clausal density, as well as the use of relative, adverbial, and nominal clauses. A T-unit or terminable unit is the main clause in a sample with its associated subordinating clause(s) within written communication (Hunt, 1970). The participants were split up into 6 groups according to age with 20 participants in each group. The researchers found that syntactic complexity for both genres increased with age up to ages 20-29, and that expository language samples elicited more syntactic complexity than conversational samples as measured by clausal density and use of embedded clauses. In addition, the researchers warned that although there was a general increase in syntactic complexity and specific clause types, there was also a lot of individual variability. For instance, some school-age children used as many subordinate or dependent clauses as other participants in their 20's.

Narrative Discourse

Simply stated, narratives are stories such as the sharing of personal experiences (personal narratives), story re-tells, describing how things happened in an event, or creating a fictional story about people, animals, or objects, that must tackle a problem and reach a solution (Paul & Norbury, 2012). Narratives can have cultural, moral, and social significance such as is found in Aesop's fables, which are used to entertain and teach lessons (Nippold et al., 2014). Hughes, McGillivray, and Shmidek (1997) described the development of oral narratives in accordance with the research of Hedberg and Westby (1993), Hudson and Shapiro (1991), Kemper (1984), and Peterson and McCabe (1983). Children begin to attempt to tell stories around age 2. In the beginning their stories are little more than "heaps" of facts. By the age of 3-4, children are better able to organize their stories temporally, and goal-directed narratives emerge. However, most of their narratives at this age are story re-tells rather than stories that they created on their own. By age 5, children are able to produce true narratives with a climax, goal-directed behavior, and a resolution. Around ages 7-8, children create stories such as personal

narratives with multiple episodes and show the character's reactions to events. From ages 8-11 they continue to develop and refine their narrative skills. Finally, by age 11, students are able to produce complex narratives, embedded narratives, and fictional narratives. In complex narratives there is a primary problem with additional complications that the characters must plan for and overcome. In embedded narratives, one episode is embedded inside another.

Because the development of written narratives depends heavily on state/school education standards, expected characteristics and milestones vary. In Idaho's Common Core Standards, it indicates that kindergarteners should use a combination of writing, drawing pictures, and dictating to describe an event. In first grade the children are asked to write stories that have temporally sequenced events and that contain an attempt at closure or resolution. Second graders are asked to use more details, and third graders are asked to use cohesive language and dialogue. In fourth and fifth grade, the students should be writing stories with a setting, logically ordered events, transitions, and a conclusion. From sixth grade on, the focus shifts from developing the structure of the narrative to using more creative, precise, and figurative language to create a certain tone in the narrative (Common Core State Standards Initiative, 2016).

Macrostructure. Both written and oral narratives can be examined on the macrostructural and microstructural levels. *Macrostructure* includes story grammar (e.g., setting, problem, consequence, etc.) and organization as a whole (Hughes et al., 1997). Berman and Verhoeven (2002) examined macrostructure by using a short video to elicit written and oral narratives and expository language samples. In their study, seven different languages and four different age groups were assessed with 20 participants in

each group. The school-age language group, which consisted of fourth grade children ages 9-10, produced narratives that were chronologically sequenced, and contained a beginning, middle and an end across all languages including English. However, their narratives were not as cohesive and elaborated as the older students. This study would be more easily interpreted if the authors had provided the descriptive statistics.

Microstructure. *Microstructure* refers to vocabulary choice, syntax, morphology, sentence organization, and cohesion (Hughes et al., 1997). In general, length of utterance and complexity of microstructure increases with age regardless of modality (Hughes et al., 1997; Nippold et al., 2005; Puranik, Lombardino, & Altman, 2008; Sun & Nippold, 2012). Moyle, Karinski, Weismer, and Gorman (2011) found that few errors are expected for school-age children with TL as exemplified by the accuracy rates of above 97% in narratives of children in their study ages 6;0-9;9.

The microstructural element of subordination in the language samples of schoolage children is of particular interest to people who study school-age language. Loban (1976) stated that, "Subordination is typically a more mature and difficult form of syntactical structure than simple parallel statements connected by *and* or *but*" (p. 23). Using subordination connects ideas together in a cohesive manner and is important in a child's everyday life. School-age children use subordination, such as adverbial, relative, and nominal clauses, to "describe, persuade, report, predict outcomes, imagine, direct, and infer cause in daily classroom oral and written activities" (Marinellie, 2004, p. 518).

Both microstructure and the macrostructure are important in analyzing the narratives of school-age children. For example, it has been suggested that as macrostructure improves, accuracy and complexity of microstructure might temporarily decrease and vice versa. In other words, when a child attempts to create a narrative that is more cohesive, contains more story grammar constituents, etc., their grammatical accuracy may decrease (Gillam & Johnson 1992; Scott & Windsor 2000). The focus of the current study is on microstructure and more specifically on children's production of complex sentences.

Microstructure of oral narratives. Various elements of microstructure such as productivity, grammatical accuracy, and syntactic complexity have been analyzed in oral narratives. Thordardottir (2008) examined the grammatical accuracy in 20 English and 22 Icelandic speaking school-age children's conversational, narrative, and expository language. She focused on the microstructural elements of verb and noun morphology by looking at morphology of school-age children with and without LI. She found that narrative and expository samples from the English speaking children with TL contained significantly more errors in verb morphology, but not in noun morphology, than the conversational samples. On the other hand, accuracy of verb and noun morphology was not different between narrative and expository samples. She also found that the MLU in morphemes was lower in conversation than in the other two types of discourse for both the LI and TL English speakers.

Moyle and colleagues (2011) also examined the use of verb and noun morphology. In their study, 50 school-age children with TL and 50 school-age children with LI, ages 6;0-9;9 produced an oral narrative or expository language sample. The researchers found that the children with TL made very few errors. They were on average 97.76% accurate with verb morphology and 98.92% accurate with noun morphology. These results are consistent with Puranik and colleagues (2008) who did not find a significant difference for grammatical accuracy between third through sixth graders with TL in an expository retell task.

Justice and colleagues (2006) studied microstructure in the narratives of schoolage children. In their study, narratives of 250 children ages 5-12 with TL were examined. Each child was given the Test of Narrative Language (TNL; Gillam & Johnston, 2004). One purpose of the study was to create a tool to assess microstructure using the TNL protocol. The researchers also realized that the commonly used terms of productivity and syntactic complexity had not yet been looked at empirically. Therefore, another purpose of this study was to empirically examine productivity and syntactic complexity by looking at the inter-correlations of eight variables including number of different words (NDW), total number of words (TNW), complex T-unit use, coordinate conjunction use, subordinate conjunction use, number of complex T-units, and MLTU in words and morphemes. The researchers found empirical evidence for the two factors representing productivity and syntactic complexity. The first factor that is consistent with productivity included NDW, TNW, total number of T-units, and total number of complex T-units. The second factor that is consistent with syntactic complexity included MLTU-w, total number of subordinating conjunctions, and proportion of complex T-units. They were also able to create a tool for assessing the microstructure of stories produced during the TNL. Justice and colleagues made an important contribution to the knowledge base of microstructure as they had a large group of participants. However, they did not explore the specific types of subordinate clauses used, nor did they explore the difference between the oral and written modality.

Written narratives. To better understand the characteristics of child language, it is necessary to look not only at a child's oral narratives, but also at their written narratives. Oral and written modalities are highly associated. Goodman and Goodman (1976) explained that as oral language improves, so does written language when they stated,

Written language development draws on competence in oral language since both share underlying structures and since for most learners oral language competence reaches a high level earlier. As children become literate the two systems become interactive and they use each to support the other when they need to (p. 158).

This means that children's ability to read and write fosters growth in their oral language, and as children's oral language becomes more complex, so should their written language. Written language, however, is a challenging modality of communication. The mechanics of writing such as using punctuation, capitalization, etc. make writing challenging. In addition, the organization of processing one's ideas and of writing in paragraphs can be difficult (Berman & Verhoeven, 2002). Writing also requires sufficient working memory for planning, precise word choice, and topic maintenance (Moats, Foorman, & Taylor, 2006).

On the other hand, in written language there is more time to formulate ideas than in oral language (Scott & Stokes, 1995). Berman and Verhoeven (2002) found that the fourth graders in their study wrote differently than they spoke in narrative and expository samples. For example, they left out the filler words like *umm*, *ya*, and *ya know* in their writing of narratives even though such terms were abundant in the speech. In addition, the students made fewer grammatical errors, and were less repetitive with their choice of words in written narratives. These differences were also seen in the older children, teenagers, and adults in the study.

Hall-Mills and Apel (2015) examined macrostructure and microstructure development in written narratives and expository samples of 89 typically developing second, third, and fourth graders. The students were provided with a written prompt and given 15 minutes for each sample. Each narrative was encoded in the Systematic Analysis of Language Transcripts (SALT) and analyzed for productivity, grammatical accuracy, syntactic complexity, lexical diversity, and macrostructure. For narratives, there was a significant increase in productivity by grade level. This was assessed through TNW, TTU, and NDW. However, there was not a significant increase across grades in syntactic complexity as measured by MLU-w, clauses per sentence, and clausal density. Neither was there a significant increase in grammatical accuracy or lexical diversity. Specifically, the 28 typically developing fourth graders in this study had an average TTU of 9.59 with a mean T-unit length of 7.98 words and a clausal density of 1.46. The average number of grammatical errors per T-unit was .23. For the expository language samples, there was a significant increase in productivity by grade level. There was also a significant increase in syntactic complexity between the second and fourth graders, but not between the third and the fourth graders. Similar to the narratives, there was not a significant effect for grammatical accuracy or lexical diversity for the expository samples. Hall-Mills and Apel (2015) examined a large array of microstructure elements in the school-age children's writing, but they did not explore the comparison between oral and written narratives, nor did they analyze the types of dependent clauses that the children used.

Oral and written narrative comparisons. Differences in morphological and syntactic errors are often seen in the comparison of oral and written language. Scott and Windsor's (2000) study focused on the oral and written narratives and expository samples of 20 school-age children with LI and their 20 chronologically and 20 language matched peers with TL. The mean ages of the groups are as follows: LI 11;5, age-matched 11;6, language-matched 8;11. Using a video prompt, the student's narrative and expository samples were analyzed for productivity, grammatical accuracy, syntactic complexity and lexical diversity. Unlike the results of the Berman and Verhoeven (2002) study, higher error rates were observed in written communication when compared to oral communication for both narratives and expository discourse for all participants. The written samples also had lower productivity and were produced at a slower rate, but there was no significant difference in syntactic complexity between the oral and written samples.

Windsor, Scott, and Street (2000) found similar results as they examined noun and verb morphology in 20 school-age children ages 10-12 with LI. Each of the children with LI was matched with two typically developing peers: one match was based on chronological age and the other was based on language age. There were a total of 60 participants in all. The typically developing children's ages ranged from 7 to 12. The children were asked to produce a narrative and expository sample in both the oral and written modalities. The children with TL had slightly more errors in their written language than their spoken language for the morphemes past tense -ed, third person singular 3s, copula and auxiliary BE, plural -*s* and articles. The highest error rate for the spoken samples was 2.5%, which is similar to the results found in Moyle and colleagues (2011). The highest error rate for the written samples was 5%. However, the difference in accuracy of morphology between the spoken and written samples was not significant. Although these studies provide a comparison for the grammatical accuracy in narratives of typically developing fourth graders in the oral and written modalities, the researchers did not examine differences in syntactic complexity.

In addition to differing in morphological accuracy, Gillam and Johnston (1992) reported that written language differs from oral language in sentence length. Participants in their study included 40 school-age children ages 9-12. Ten of the school-age children had LI and each of those ten were matched with three same-gender typically developing children for age, reading, and spoken language ability. All of the children were asked to produce two oral narratives and two written narratives when provided with various picture prompts. Overall, it was found that the oral narratives included longer sentences, but were not more complex than the written narratives. This finding is in agreement with the results of Scott and Windsor (2000). Gillam and Johnston, however, did not explore the specific types of subordination used by the school-age children.

Current Study

The purpose of the current study is to examine the differences in productivity, grammatical accuracy, and syntactic complexity between oral and written narratives produced by fourth graders with typically developing language. Specifically, this study will contribute to the current knowledge base about the types and frequency of subordination used by school-age children with TL in both oral and written narration. Currently, the types of subordinating clauses used and the frequency with which they are employed have not yet been studied in all types of discourse and with all ages. Although they have been studied in conversation and oral expository discourse, there is limited information on the types of complex sentences used in oral as compared to written narratives in school-age children.

This study compared the narrative productivity, grammatical accuracy, and the frequency and types of dependent clauses used in oral and written narratives by fourth grade students. These measures were calculated in both oral and written samples. The following predictions are based on previous research and current understanding of oral versus written language. It is predicted that the fourth grade children in this study will have greater accuracy (fewer grammatical errors) and greater productivity in their oral language samples than in their written samples (Scott & Windsor, 2000; Windsor et al., 2000). Given the past findings by Scott and Windsor, (2000), no differences in syntactic complexity overall are expected. However, it is predicted that children will use a greater number and variety of dependent clauses in written narratives than in oral narratives, as the written modality may allow for more time and careful sentence formulation than the oral modality.

Chapter II - Methodology

Participants

The data utilized in this study is a subset of data from a larger research project that is in progress. The selection criteria for the study included that the children be fourth grade native speakers of English with typically language and learning abilities. At the time of data collection, the children were at the end of their fourth grade year and lived in a rural town in the western United States. The children included in the analysis ranged from ages 9;1 to 10;7 with age calculated on the first day of testing. According to the school district's office, the overall socioeconomic status of the school is rated as low.

The participants were recruited in the following manner: The teachers in each of the five fourth grade classes handed out permission slips that explained the research study to parents and asked parents for their signed consent if they were willing to have their child participate. Some teachers gave permissions slips only to children who were native English speakers and did not have an individualized educational plan (IEP), while others gave permission slips to any child who desired to participate. The data for those children who did not meet selection criteria but participated in the study were excluded from the analysis. As a result, the data for four children was excluded because they were nonnative English speakers, and the data for three children were excluded because they had an IEP. Five children's data were not included because they did not participate in the entire study due to time limitations. One child's data was not included because, due to a scheduling issue, both the oral and written narratives were obtained on the same day. Another child's data was excluded from the analysis because it was an outlier. The child's oral narrative was five times longer than the average of the other children's oral narratives. Thus, the data for 21 typically developing fourth grade children, 11 boys and 10 girls, was included in the current study.

Stimuli

Two pictures were used to elicit the narratives. Picture one, which will be referred to as *Show and Tell*, depicted a boy in a classroom trying to catch his frog that had escaped from him. Also featured in the picture were two classmates and a teacher, and the words *Show & Tell* written on the chalkboard. Picture two, which will be referred to as *No Girl's Club*, depicted a fort in the woods with boys sitting in it. The sign on the fort said, *No Girl's Club*. In the background, a few girls glared at the boys, one with hands on her hips. (Wiechmann, Rudebusch, & Kuhles, 2012). A copy of the stimulus pictures is provided in Appendix A.

Procedure

The sentence repetition subtest of the Clinical Evaluation of Language Fundamentals fifth edition (CELF-5) was administered to each child following the oral narrative portion of the study as a screening (Wiig, Semel, & Secord, 2013) to aid in identifying children that may present with LI, who would be disqualified from the study. Each child appeared to have typically developing language skills based on their score. All of the children obtained a score at or above one standard deviation below the mean.

Prior to data collection, informed consent was obtained from parents/guardians for each child who participated in the study. Additionally, an assent statement was read to each child and they were given the opportunity to sign the assent form or decline participation. All of the children signed the assent form. The children were asked to produce both an oral and a written narrative across two study sessions on different days. Both narratives were elicited using a picture and verbal prompt. Testing occurred in unoccupied classrooms provided by the school.

Written narrative. Prior to writing their own narratives, the examiner orally provided the children with a model narrative using the narrative, the *Dragon Story* from the Test of Narrative Language (TNL; Gillam & Johnston, 2004). After hearing the *Dragon Story* told by the examiner, the children were reminded that, "Stories have a beginning, things that happen, and an ending," and were asked to, "Tell a story that's as good as one in your favorite book." They were then provided with one of the picture prompts and with the prompt of "Last week Miss Clarkson's fourth grade class …" written on a blank piece of lined paper. The children were encouraged to take a minute or two to think about what they would write before they began.

During the written portion, occasional prompts, such as *How does the story begin?* were allowed. If a child was observed to be erasing a lot, the examiner would comment, "If you make a mistake while you are writing, it is okay to just cross it out and keep writing." The children were given a maximum of 30 minutes to complete their story with a 3 minute warning before time was up. The written portion was administered to the participants in a group setting of 4-24 students in a classroom at a time.

Oral narratives. The oral portion was administered by the examiner to each child individually in a separate classroom. The examiner orally provided the child with a model narrative using the narrative the *Dragon Story* from the TNL (Gillam & Johnston, 2004) prior to eliciting the narrative from the child. The child was then asked to "Tell a story that's as good as one in your favorite book." After being reminded that "Stories have a beginning, things that happen, and an ending," they were given 1 minute to think about

the story they would tell based on the picture prompt. After a minute passed, the child was asked to tell a story starting with the prompt, "Last week Miss Clarkson's fourth grade class ..."

During the oral portion, the following prompts were allowed, *How does the story begin?*

Go ahead and start. As well as up to two repetitions of the prompt, "Last week Miss Clarkson's fourth grade class..." If the child's story consisted of only a few sentences, the following prompt was given one time, *Can you tell me anything else about your story?* Each child was given no more than 30 minutes to tell their story with a 3 minute warning.

Counter-balancing

Counterbalancing was used to prevent bias in syntactic complexity based on which picture or modality children were assigned to first. It also prevented bias due to having already done one narrative activity in the previous session. Half of the children received picture one, *Show and Tell*, in the first session and the other half received picture two, *No Girl's Club*, in the first session. In addition, half of the children started with the written portion while the other half of the children started with the oral portion. Then in the second session, each child received the opposite picture in the opposite modality. The breakdown of modalities according to sessions is as follows: 14 children did the written portion first and 7 children did the oral portion first. 12 students did *Show and Tell* first and 9 students did *No Girls Club* first. The unbalance was due to the exclusion of participants as explained above. All testing was completed within a two week period.

Transcription and Coding

The narrative assessments were administered by speech-language pathology (SLP) graduate students who had received coursework and training in administering school-age narratives. The oral narratives were recorded digitally for future transcription.

After testing was completed, SLP graduate and undergraduate students trained in SALT (Miller & Chapman, 2012) transcribed and coded both the written and the oral narratives for standard SALT conventions as well as lab specific conventions. Additionally, the author reviewed all of the transcripts, coded all of the dependent clauses by clause type, and calculated the subordination index and clausal index. The dependent clauses were coded in the following manner: adverbial clauses [ADV], nominal clauses [NOM], relative clauses [REL], infinitive clauses [INF], participle clauses [PART], and other propositional complements [OTHER_COMP]. These codes are similar to the one used in Nippold et al. (2014). For definitions and examples of each clause type, see Appendix B. The nominal, relative, and participle clauses were also coded by whether they referred to the subject or object of the sentence. For example, nominal clauses in the subject position were coded as [NOM_S] while nominal clauses in the object position were coded as [NOM_O]. However, because there were so few clauses in the subject position, the analyses of the clauses were combined into the general categories of adverbial, nominal, and relative clauses without the distinction of sentence position. Other complement clauses included propositional complement clauses that do not fit into the other categories. For example, I am happy that you came, where that you came modifies the adjective *happy*, but cannot be classified as another clause type within the coding schema that was adopted.

Data Analysis

Using repeated measures statistical analyses, eight elements of microstructure were analyzed representing productivity, grammatical accuracy, and syntactic complexity similar to Hall-Mills and Apel (2015) and Justice and colleagues (2006). Each measure was compared within subjects across the oral and written modalities.

Productivity was measured by total number or words, total T-units, and number of different words each transcript. A T-unit or terminable unit is the main clause in a sample with their associated subordinating clause(s) within written communication (Hunt, 1970) and non-conversational oral language. During Brown's stages, MLU in morphemes is used to assess the progress of language ability. However, by about age 5, children with typically developing language have essentially acquired all of the basic grammatical morphemes (Paul & Norbury, 2012). Therefore, in the school-age years, mean length of T-units in words is considered a better measure of child language (Nippold, 2010). T-units were used in this study to create a direct comparison with the written narratives and with other studies that have used T-units (Halls-Mills & Apel, 2015; Justice et al., 2006; Nippold et al., 2005).

Grammatical accuracy included both morphological and syntactic errors such as omission of morphemes, omission of words, and words produced in error. Grammatical accuracy was measured by percent grammatical T-units and average errors per T-unit. Mazes, including false starts, stuttered words, etc. were excluded and not counted as an error. Incomplete, unintelligible, and uninterpretable utterances were also excluded.

Syntactic complexity was measured by mean length of T-unit in words, subordination index, and clausal index. Clausal density is the total number of clauses divided by the total number of utterances (Hunt, 1970; Loban, 1976). Clausal density has been found to be an accurate and useful measurement of complexity in a variety of recent studies (Colozzo, Gillam, Wood, Schnell, & Johnston, 2011; Ebert & Scott, 2014; Nippold et al., 2014; Sun & Nippold, 2012). However, different researchers count clauses in different ways, including anywhere from one to thirteen categories. For example, many researchers have counted only the full clauses which contain an overt subject and a verb, using the functional clause categories of adverbial, nominal, and relative clauses (Halls-Mills & Apel, 2015; Miller & Chapman, 2012; Nippold et al., 2005). This is consistent with the subordination index (SI) calculated in SALT. Nippold and colleagues (2014), on the other hand, included both the full clauses previously mentioned and clauses that only include a predicate such as infinitive, participial, and gerund clauses. Schuele (2009) created a coding scheme containing 13 different clause types based on detailed syntactic structure, and also included both full clauses and those that only include a predicate. The present study adopted a modified functional coding schema that included adverbial, nominal, relative, infinitive, participle and other-complement clauses. This schema provides a descriptive framework that is easily clinically applicable but also includes both full clauses as well as those that do not have a separate subject.

This study utilized two measures of clausal density that reflect both of these approaches. Following SALT (Miller & Chapman, 2012), the SI was calculated based on the number of occurrences of full subject-verb clauses. These include adverbial, nominal, relative clauses. A second measure of clausal density, which was labeled clausal index (CI), was calculated using both the full clauses and predicate clauses that do not have their own overt subject. These include infinitive, participle, and other propositional complement clauses. In accordance with Eisenberg (2013), the CI also included coordinated clauses. For example in the sentence *The boy ran to the store and bought some milk* there are two clauses *The boy ran to the store* and *The boy bought some milk* with a common subject. This sentence would have an SI of one because it has only one overt subject and a CI of two because it has two verb phrases. Both SI and CI were indicated after each complete, intelligible, and interpretable T-unit with the coding [SI-#] and [CI-#]. Further examination of the type and frequency of clauses that the children used will shine light on the typical development of subordination in both modalities and potential differences in subordination between the modalities in fourth grade students.

Reliability

Inter-rater reliability for coding SI, CI, and dependent clause types was calculated for all complete, intelligible, and interpretable utterances. It was accomplished by comparing the author's coding to the coding of another SLP graduate student with similar coursework and training. The reliability check was performed on the oral and narrative transcripts of one child who was randomly selected. Overall there was 89% reliability.

Chapter III - Results

Productivity

Productivity measures included total number of words, total T-units, and total number of different words. See Table 1 for the means and standard deviations for each of the productivity measures in each modality. A repeated measures multivariate analysis of variance (MANOVA) was used to analyze the data for significant differences in the variables between modalities. The results of the MANOVA indicated a main effect of modality, F(3, 18) = 4.352, p = .018, $\eta_p^2 = .42$. Inspection of the univariate results indicated a difference between the modalities for TTU, F(1, 20) = 8.844, p = .008, $\eta_p^2 = .307$; for TNW, F(1, 20) = 13.352, p = .002, $\eta_p^2 = .4$; and for NDW, F(1, 20) = 8.063, p = .010, $\eta_p^2 = .287$. All the measures resulted in a large effect size with greater productivity in the oral modality over the written modality.

Table 1

Comparison of Productivity in the Oral and Written Modality

	TTU _		TNW		NDW	
Productivity	Μ	SD	Μ	SD	Μ	SD
Oral	25.76	12.36	232.81	114.21	95.67	29.16
Written	18.05	9.27	140.29	70.91	74.76	28.27

Note. TTU= Total T-units; TNW= Total Number of Words; NDW= Number of Different Words

Grammatical Accuracy

Grammatical accuracy was measured by percent grammatical T-units and average number of errors per T-unit. See Table 2 for the means and standard deviations for each of the accuracy measures in each modality. A repeated measures MANOVA was used to analyze the accuracy data for significant differences in the variables between modalities. The results of the MANOVA suggested a main effect of modality, F(2, 19) = 3.454, p = .053, $\eta_p^2 = .267$, with the p value very close to the alpha level of .05. Inspection of the univariate results indicated a difference between the modalities for percent grammatical T-units, F(1, 20) = 6.601, p = .018, $\eta_p^2 = .248$, with a greater number of grammatical T-units in the oral modality, and for average number of errors per T-unit, F(1, 20) = 6.978, p = .016, $\eta_p^2 = .259$, with a greater error rate in the written modality. Overall, grammatical accuracy was better in the oral modality. All the measures resulted in a large effect size with greater accuracy in the oral modality over the written modality.

Table 2

Comparison of Accuracy in the Oral and Written Modality

	<u>% grammat</u>	ical T-units	Average Errors per T-unit	
Accuracy	Μ	SD	Μ	SD
Oral	.92	.05	.09	.07
Written	.85	.15	.20	.21

Syntactic Complexity

Syntactic complexity was measured by mean length of T-unit in words (MLTUw) and by two types of clausal density, namely SI and CI. See Table 3 for the means and standard deviations for each of the complexity measures in each modality. Complexity measures were analyzed using a repeated measures MANOVA. The results of the MANOVA did not indicate a main effect of modality for complexity, F(3, 18) = 1.88, p =.169, $\eta_p^2 = .239$.

Table 3.1

Syntactic	MLTU-w		Subordinat	Subordination Index		Clausal Index	
Complexity	Μ	SD	Μ	SD	Μ	SD	
Oral	9.22	1.65	1.34	.15	1.72	.32	
Written	7.96	1.34	1.27	.11	1.58	.25	
Note MITLL $w = Mean length of T$ unit in words							

Comparison of Syntactic Complexity in the Oral and Written Modality

Note. MLTU-w = Mean length of T –unit in words.

Syntactic complexity was also examined by looking at the average number of clause types used in both the oral and the written modalities. Table 3.2 reports the mean frequency and standard deviation of each clause type used in the oral and written modalities. The GLIMMIX procedure was used to analyze the clause types because it fits statistical models to data with correlations or non-constant variability and where the response is not necessarily normally distributed. These models are known as generalized linear mixed models (GLMM). Because the response represents count data, SAS statistical package GLIMIX procedure was used for the analyses given its ability to analyze the resulting Poisson distribution. The analyses incorporated the nested design with different 6 different measures within the 2 modalities. Examining this omnibus analyses there were no significant differences in modality or the interaction of modality and clause type. As would be expected, there was a significant difference between the clause types.

Table 3.2

Comparison of Subordinate Clause Use in the Oral and Written Modality

	Nominal	Adverbial	Relative	Infinitive	Participle	Other –Comp
Clauses	M SD	M SD	M SD	M SD	M SD	M SD
Oral	5.29 4.35	3.33 2.47	.90 1.51	5.14 3.68	1.29 1.62	0.00 0.00
Written	3.43 3.75	2.10 1.97	.57 .81	2.33 2.24	.90 1.00	.14 .36

Note. Other-Comp = Other complement clauses, not previously classified.

Chapter IV - Discussion

Productivity

The purpose of this study was to examine the potential differences in productivity, grammatical accuracy, and syntactic complexity between oral and written narratives of fourth graders with TL. As predicted, the student's productivity was significantly higher in the oral narratives when compared to the written narratives. All three measures of productivity including total T-units, total number of words, and number of different words were greater in the spoken stories. The results for productivity were consistent with previous studies (Berman & Verhoeven, 2002; Gillam & Johnston, 1992; Scott & Windsor, 2000).

Similar to Berman and Verhoeven (2002) children in the current study asked if spelling was important and some said that his/her hand hurt after writing for a period of time. For fourth graders, the mechanics and modality of writing are difficult and cumbersome. This may have contributed to the shorter written narratives because it was easier to speak than it was to write a narrative. Productivity has been found to increase with age (Berman & Verhoeven, 2002; Puranik et al., 2008). However, it is not yet clear in the literature if productivity continues to be greater in oral narratives with age, or if at some time in development there is a switch when written narratives become longer. There is likely an age where a person would write a short story or a novel that would be longer than any story that would be told around a dinner table or a campfire; however, time constraints may result in more productive oral narratives when compared to written narratives.

Grammatical Accuracy

As predicted, the student's accuracy was significantly greater in their oral narratives when compared to their written narratives. The students had a greater percentage of grammatical sentences in their spoken samples and had fewer errors per Tunit in their spoken narratives. The results for accuracy were similar to previous studies that compared the accuracy of oral and written language samples (Scott & Windsor, 2000; Windsor et al., 2000). However, the results were different from Berman and Verhoeven (2002) who found fewer errors in writing than in the oral modality in the written narrative and expository samples of TL fourth graders. However, Berman and Verhoeven did not present descriptive statistics to validate their claim. They also sampled seven languages and did not specify accuracy rates for each discourse type across ages, whereas the other researchers were only studying native English speaker's narrative samples. It was not clear whether Berman and Verhoeven excluded mazes, as is standard SALT procedure in the oral samples (Miller & Chapman, 2012). If they did not, this would have greatly impacted the number of errors counted in the oral samples versus the written samples and would explain the difference in accuracy between the studies.

The decreased accuracy of the written narratives in the current study may have be due to the likelihood that much of the fourth grader's time was focused on the mechanics and processes of writing instead of being focused on grammatical accuracy. As the children focus more on the mechanics of writing, errors in word choice or tense may be more likely. However, the accuracy rates for the written narratives in this study were almost identical to the accuracy rates of the written narratives in Halls-Mills and Apel (2015). The question remains about whether or not there a point in development when a student's narrative skills and writing skills are better developed and therefore written narratives may be more error-free. Because the printed word allows for revision, there may be a time when written narratives such as short stories and essays are more grammatically accurate than stories spoken aloud to entertain. More information from larger cross-sectional studies is needed to understand when or if the difference in accuracy changes during language development.

Syntactic Complexity

As hypothesized, there was not a significant difference overall for syntactic complexity overall. MLTU-w of the written samples in this study was almost identical to MLTU-w of fourth grader's written narratives in Halls-Mills and Apel (2015). The MLTU-w of the oral samples in this study was only slightly greater than the MLTU-w of the oral samples in Justice and colleagues (2006) when comparing same age children's narratives. Although the MANOVA was not significant for MLTU-w, numerically the students had MLTU-w greater in the oral narratives. Having a greater MLTU-w in the oral samples may be due to the fourth grader's still developing writing skills. In fourth grade, students are still getting comfortable with the mechanics of written language such as using quotation marks and writing in paragraphs. Much of their energy is spent on how they write instead of what they write. Over the years as written language develops, the writing process and writing mechanics may become less burdensome and students may begin to write longer utterances containing more clauses, thereby having a greater MLTU-w (Sun & Nippold, 2012).

The subordination index and the clausal index were not significantly different between the oral and written narratives. The lack of significant difference in complexity

28

between the oral and written samples is consistent with previous research (Scott & Windsor, 2000) with children slightly older than those studied here. Clausal density may not be sensitive enough to pick up subtle differences in grammatical complexity. For example, Puranik and colleagues (2008) did not find a significant increase in clausal density with an increase in grade level of expository samples; however, they did find a significant increase in the total number of clauses produced with an increase in grade. Also, Sun and Nippold (2012) found a greater clausal density difference between the written narrative samples of 11-year-olds and 14-year-olds, but not between the samples of 14-year-olds and the 17-year-olds. This shows that clausal density increased with age from ages 11 to 14, but it does not explain what happened in the older years. One wonders if there was a plateau in the development of clauses, or if the increase in clausal density was so gradual that it did not reach statistical significance. Another possibility is that there are developmental periods of marked increase in complexity followed by periods of relative stability. Longitudinal studies are needed to address this issue.

Other measures may be a better judge of the development of syntactic complexity such as MLTU-w which has been found in some studies to increase with age (Berman & Verhoeven, 2002; Nippold et al., 2005). However, clausal density still provides valuable information as shown by Nippold and colleagues (2005) who found a higher clausal density in expository language samples over conversational samples.

Syntactic complexity was also examined by looking at the frequency means and standard deviations of each type of clause. In both modalities, nominal clauses were used more frequently than any other clause type. This was largely due to the children's use of dialogue. For example in the sentence, *The teacher said*, *"Everybody run!"* the phrase

Everybody run! acts as a nominal clause and the object of the verb. Dialogue occurred often in both the oral and written narratives. On the other hand, participle clauses and other propositional complements were the least frequently used clauses. This may be because they are not yet developed at this age or because they are less common in narrative language in comparison to other clauses such as nominal and adverbial clauses.

Nippold and colleagues (2005) found that adverbial clauses occurred most frequently in the oral expository samples of individuals with TL ages 7-49, and adverbial or nominal clauses prevailed in the conversational samples depending on the age group. For the two age groups closest to the children in this study with mean ages of 8;1 and 11;4, adverbial clauses were most prevalent in conversation. This contrast between more nominal clauses in narratives and more adverbial clauses in expository and conversational samples may indicate a difference in syntactic complexity between types of discourse. It may be that different types of discourse have more or less of different types of dependent clauses than another type of discourse.

Overall the average number of each clause type used in the current study was less than that found in Nippold and colleagues (2005), even for children that were on average younger than the participants in this study. This may be due to the difference in discourse type as discussed above, or it may also be due to the length of the samples. The conversational and expository samples for Nippold and colleagues were longer in general than the oral and written narratives in this study. It is likely that longer narratives would have produced a larger number of clauses with results more similar to those found by Nippold and colleagues. In contrast to predictions, there was not a significant difference between modalities for the frequency of each type of clause. For example, there was not a significant difference between the average number of nominal clauses used in the oral narratives when compared to the average number of nominal clauses used in the written narratives. This may be due to the students' focus on the mechanics of writing. With more practice and training the students may learn to focus on clarity, creativity, and revision which would result in more clauses in writing. However, because this is the first study of its kind to compare the frequency of specific clause types in the oral and written modalities, it is unclear why this occurred. There were, on the other hand, differences between the clausal types as would be expected because some types of clauses are used more than others.

Clinical Applications

Although the purpose of this study was to examine the differences in productivity, grammatical accuracy, and syntactic complexity between oral and written narratives in fourth graders with TL, the overarching idea is that as more knowledge is obtained about typical language development, the better we can identify and help children with language impairment. This is especially important in the examination of subordination which is an important grammatical skill that is often difficult for children with LI to master (Arndt & Schuele, 2013).

Without the ability to clearly express themselves, school-age children are at a great disadvantage, a disadvantage that affects many aspects of their lives. Narrative language sample analysis allows SLPs to more clearly evaluate the language of school-age children and is a key component in the assessment process to identify children with

LI. Having a general standard of accuracy, productivity, and syntactic complexity for children with TDL, helps SLPs in goal setting and providing treatment for children with LI that are not currently able to reach those standards. As with any language task, the more that is known about the typical development of children's narratives, the easier it will be to recognize and treat children with LI.

Limitations and Future Research

One possible limitation of this study is its small scope. The written and narrative samples for this study were only taken from one age-group. Language continues to develop throughout the school-age years and even into young adulthood (Nippold et al., 2005). Writing becomes even more of a focus as students enter high school and college. Is there a point in one's education or language development where written narratives become more productive, accurate, and/or complex? Further research, including multiple grade-levels and even up through college and adulthood, is needed to understand the development of oral and written narratives across the age-span. As more research is performed across the age span, the answers to the questions posed in the discussion will become clearer. First, we will better understand if or when there is greater productivity and accuracy in narratives in the written modality when compared to the oral modality. We will also gain a greater understanding of the gradual increase in syntactic complexity and clause use and know which measure(s) are best to assess and track progress of syntactic complexity. Further research in the form of larger cross-sectional studies and longitudinal studies will also help us better understand the frequency of different types of clauses used in narratives across the age-span and between modalities.

Another limitation is the type of narrative that was elicited. In this study, a fictional story was elicited with a picture prompt and a lead-in phrase. However, other types of narratives include personal narratives, scripts, and story-retell. These different types of narratives may tap into different thought processes and may have different results. For example, story re-tell relies on working memory to recall important points in the story while personal narratives may require long term memory to recall past events. In addition to different types of narratives, other prompts may be used such as sequenced pictures, picture books, and asking the child to tell you a story. These various types of narratives and narrative elicitation methods are used by SLPs in assessment and treatment as well as in the general education classroom (Justice et al., 2006). Further research should include various types of narratives and elicitation methods to examine the difference between oral and written narratives. Studies should focus on the different types of narratives and compare them to each other along with comparing written and oral samples of them. This would help us understand differences not only between oral and written narratives, but between different types of narratives. Understanding this difference may help SLPs better assess and treat narratives.

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Appendix A





Appendix B

Table B

Clause Types with Definitions (Nippold, 2010) and Examples

FULL CLAUSES

Coding	Clause	Definition	Example(s)
N/A	Main Clause	An independent clause that can stand by itself. It contains a subject and a verb.	<u>I need food</u> .
N/A	Coordinate Clause	Connected to the original main clause with a coordinate clause (e.g., and, but, etc.) and can have an elided or shared subject.	The boy went to the store <u>and bought some</u> <u>milk</u> .
[ADV]	Adverbial Clause	Describe manner, contrast, reason, conditionality, comparison, place, time, and purpose.	Because it was cold, I put on my coat.
[REL]	Relative Clause	Add information about the subject or object and often start with a relative pronoun."	The boy <u>who waved</u> is my brother.
[NOM]	Nominal Clause	Finish an idea that began in the main clause. Can come after a metacognitive (e.g., know, believe, think) or metalinguistic verb (e.g., say, tell, ask), and can be found in dialogue.	I know <u>that you love</u> <u>me</u> . Sara said, "That looks great!"
PREDICATE CLAUSES			
Coding	Clause	Definition	Example(s)
[INF]	Infinitive Clause	A verb phrase where person, tense, and number is not specified. The word <i>to</i> may or may not be present.	I want <u>to know</u> . I can <u>watch him</u> .
[PART]	Participle Clause	A non-finite clause with a past or present participle.	Running out of steam, the bullet fell to the ground. <u>Plastered with paint</u> , I went home to shower.
[OTHER_COMP]	Other Propositional Complement Clauses	Propositional complement clauses that do not fit into the other categories.	I am happy <i>that you came</i> .