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Written Language of Children with a Diagnosis of Reading Disabilities from Grades 3 Through 6

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ABSTRACT

The ability to write is an important yet relatively unexplored topic for both normal and atypical learners. This study contrasted the written language of children diagnosed with reading disabilities and normally developing children at the discourse, sentence, and word levels. The children were read a passage and given 10 minutes to write down what they remembered from the passage. The analysis included examination of the total number of words and total number of ideas at the discourse level. At the sentence level, total number of T-units, MLT-units, clause density, grammatical errors, total number of sentences, and type of sentences were analyzed. At the word level the analysis included total number of different words, spelling errors, writing conventions, and lexical errors. Significant differences between normal and reading disabled children were found at the discourse, sentence, and word levels, with reading disabled students performing significantly worse than normally-developing students on most of the measures analyzed. Clinical implications and future research directions for studying written language in children with reading disabilities are discussed.

INTRODUCTION

Written language is dependent on both oral language and literacy skills, which provides the foundation that is necessary for writing (Brice, 2004). It is essential for students to have adequate writing skills because it is the primary basis for assessing a student's work and learning.

Even though writing is important for good academic performance, it appears that most children have difficulty with writing skills. Hooper and Montgomery (1993) reported the prevalence of writing problems exhibited across three samples of normally-developing middle school students. Analysis of the Spontaneous Writing portion of the Test of Written Language-2 TOWL-2 (Hammill & Larson, 1988) showed that all three samples showed evidence of writing difficulties after the written paragraphs were evaluated in accordance with standardized scoring procedures. These data suggest that there is a high incidence of writing problems in typically developing children and children enrolled in special education classes. If normally-developing children have difficulty with writing, this difficulty might be even more marked among learning disabled children.

The term learning disability (LD) encompasses a wide range of disorders which include disorders of listening, speaking, reading, writing, and mathematics (Lyon, Shaywitz, & Shaywitz, 2003). In a review of studies pertaining specifically to the writing abilities of students with learning disabilities, Newcomer and Barenbaum (1991) concluded that children diagnosed with learning disabilities were less proficient than other children in writing stories. LD children had difficulty with most aspects of writing including mechanics such as spelling and punctuation, syntax, and fluency as expressed by their decreased performance in word usage.

In addition, the compositions written by most LD students were short on critical components of stories such as setting, characters, conflict, and resolution. It was noted that students with LD lacked planning in their writing and also the composing skills needed to organize writing. Research depicts LD students as using immature and ineffective planning strategies resulting in a lack of focus and cohesion in writing. These findings from past studies show the amateur writing style of children with LD.

Anderson (1982) examined the written expression of five normal and five learning disabled fourth graders who were presented with the "I Wonder" picture from the Peabody Language Development Kit (Dunn & Smith, 1966). The stories were scored by assessing the syntax of each child's written language as prescribed by the Picture Story Language Test (Myklebust, 1965). The LD group made the largest number of errors in word usage followed by punctuation and word endings. The results showed that LD children had lower syntax scores than normally developing children.

In similar type of research, Morris and Crump (1982) compared learning disabled and non-learning disabled (NLD) students' syntactic structure and vocabulary development in written language. Their results indicated that the NLD students attained a greater score on syntactic maturity at each grade level than their LD peers. The lexical diversity and range of vocabulary exhibited in written language samples was also greater for NLD students than for the LD students. This study provides additional evidence supporting LD students' inferior written language skills when compared to NLD children.

At least 80% of the LD population is affected by reading disabilities, making it the most prevalent type of learning disability (Lyon, S. E. Shaywitz, & B. A. Shaywitz, 2003). Given that reading and writing achievement are correlated, it seems plausible that those with reading deficits will also have writing deficits. Although written language has been studied in LD groups, no study has specifically looked at subjects diagnosed with reading disabilities or dyslexia. Dyslexia or specific reading disability is a failure to acquire reading skills despite normal intelligence and sensory abilities. Dyslexic individuals have an unexpected and persistent difficulty to read text quickly, accurately, and with good understanding (Lyon, S. E. Shaywitz, & B. A. Shaywitz, 2003). It is characterized by difficulties in phonological decoding, word recognition, spelling, and reading fluency (Vellutino, Fletcher, Snowling, & Scanlon, 2004).

This study was designed to increase understanding of the written language skills and deficits in the reading disabled (RD) population. The specific question addressed by this research was: How do children diagnosed

with reading deficits compare with normally developing children in their writing at the discourse, sentence, and word level? It was hypothesized that the RD group will show significantly poorer performance on all dependent variables at the discourse, sentence, and word levels compared to control subjects matched with RD subjects on grade, age, and sex.

METHOD

The purpose of this study was to compare children diagnosed with reading deficits with normally developing children in their writing at the discourse, sentence, and word level.

Participants

A total of forty children participated in this study. Twenty children were diagnosed with reading disabilities while the other twenty children were normal readers taken from another study on written language matched on grade, age, and sex. All of the children with reading disorders were enrolled in Einstein Montessori School in Gainesville, Florida, a special school for learning disabled children. Five children from each of grades 3 through 6 were selected for the study.

IRB approval from the University of Florida and permission from Einstein Montessori School were obtained for this project (Appendix A). Parental consent forms were distributed through the reading classes (Appendix B), and the first 5 children from each grade to return the forms were chosen for the study. The reading disabled subjects included 11 males and 9 females ranging in age from 8.07 to 13.04 years old.

The group of children with normal reading ability included 11 males and 9 females and ranged in age from 8.07 to 12.11. These children were developing normally with no history of reading or language disorders, sensory or behavioral impairments as determined from parent and teacher reports, and were recruited from elementary and middle schools in Tampa, FL. The parental consent forms distributed to these children were the same as those for the children with reading disabilities. Table 1 contains the demographic information for the reading disabled and normal populations.

Procedure

The testing was conducted in one session in groups of 4 children at a time. The children were read a passage called, "Where do people live?" (QRI-3) (Leslie & Caldwell, 2001) (Appendix C). The passage was read to the participants twice. The children were then asked to write down in sentence form what they remembered from the passage. The students were given ten minutes to write and allowed to make modifications to their written statements.

Table 1.

Means for Demographic Variables for Experimental and Control Groups

Grade/Group	3	4	5	6
RD Group				
Age	9.06	11.05	11.03	12.03
Gender	2M/3F	2M/3F	4M/1F	3M/2F
SES	2.8	3.2	3.2	2.8
Control Group				
Age	9.06	10.03	11.08	11.09
Gender	2M/3F	2M/3F	4M/1F	3M/2F
SES	3	2.6	3.4	3.2

Written Language Measures

The dependent measures were the written language variables evaluated at the discourse, sentence, and word levels (Appendix D). Analysis of these levels of language permits examination of the child's overall written language ability. The writing samples were entered into Systematic Analysis of Language Transcripts, (SALT v 7; Miller & Chapman, 2000). A modified version of Nelson et al. (2004) writing process and product worksheet guided the written language analysis.

At the discourse level, the analysis included examination of the total number of words and total number of ideas produced by the subject. Total number of words for each sample was calculated automatically by SALT. A list of 25 ideas was predetermined from the original passage (Appendix E). The total number of ideas was calculated by referring to those 25 ideas already obtained. The total number of words and ideas in a sample is a good indicator of fluency and productivity (Nelson et al., 2004).

At the sentence level total number of T-units, MLT-units, clause density, grammatical errors, total number of sentences, and type of sentences (simple versus complex), were analyzed.

1. Total number of T-units: A T-unit (Hunt, 1965) is an independent clause as well as any phrase embedded in it. It segments utterances at main clause boundaries, causing run-on sentences to be treated as separate T-units. Utterances were entered into SALT as T-units. The total number of T-units was calculated automatically by SALT.
2. Mean length of T-unit (MLT-unit): MLT-unit is the mean length of utterance per T-unit. This was calculated by total number of words divided by total number of T-units. The MLT-unit was calculated automatically by SALT.
3. Clause density: Clause density was the total number of clauses divided by the number of T-units (Scott &

Stokes, 1988).

4. Grammatical errors: Grammatical errors included errors of verb or pronoun tense agreement, omitted or substitution of grammatical elements, and violation of word order. Some examples of grammatical errors produced by the subjects were, "Farmers raise *cow*, *pig*, and chickens" and "The city *have* some zoos".
5. Total number of sentences: The number sentences were added together to determine the total number of sentences for each sample.
6. Type of sentence: Sentences were coded as complex when they had two or more main verbs. This included compound and embedded sentences. All other sentences were coded as simple.

At the word level, the analysis included total number of different words, spelling errors, writing conventions, and lexical errors. The total number of different words for each sample was calculated by SALT. Spelling errors were the total number of spelling errors made by the subject in his/her writing sample. The writing conventions reviewed in the written samples were capitalization (whether sentences were begun with capital letters or not) and punctuation (if a period was used at the end of the sentence). A lexical error was an error in word choice, which included nonspecific vocabulary used, word substitutions, and the use of non-words. Some examples of lexical errors produced by the subjects were, "People think that other people get *good* of both worlds" and "some live in between *that* is called the suburbs".

Reliability

This author and a clinical supervisor had several training sessions to analyze writing samples. After these training sessions were satisfactorily completed, ten samples (25%) were randomly scored to establish reliability. Reliability was 80-89% for the variables of sentence type, MLT-unit, grammatical errors, number of different words, and spelling errors. Reliability ranged from 90-100% for total number of words, ideas, number of sentences, T-units, lexical errors, capitalization, and punctuation.

RESULTS

The purpose of this study was to compare children diagnosed with reading deficits with normally developing children in their writing at the discourse, sentence, and word level.

Means and standard deviations for the written language measures are shown in Table 2. Results were analyzed using a multivariate analysis of covariance (MANCOVA) at each level with grade as a covariate, group (RD, controls) as the between subjects factor, and writing variables as the dependent measures. At the *discourse level*, two variables were analyzed: total number of words and total number of ideas. The results of the MANCOVA indicated a significant main effect for group, $F(2, 36) = 8.65, p < .001, \text{partial } \eta^2 = .33$ but not for grade $F(2, 36) = 2.27, p = .12$, suggesting that after controlling for age, the performance of the RD and the control group was significantly different from each other. The effect of group was significant for both variables at

the discourse level, total number of words $F(1, 37) = 16.071, p < .0001, \eta^2 = .30$ and total number of ideas $F(1, 37) = 15.76, p < .0001, \eta^2 = .30$

At the *sentence level*, five variables were analyzed: total number of T-units, clause density, number of correct sentences, number of complex correct sentences, and mean length of T-unit. The MANCOVA at the sentences level also showed a significant main effect for group, $F(5, 33) = 3.6, p < .01, \eta^2 = .355$ but not for grade $F(5, 33) = 1.03, p = .416, \eta^2 = .135$. Normal students significantly outperformed RD students on four out of five of the measures. These included: total number of T-units $F(1, 37) = 15.65, p < .0001, \eta^2 = .30$, clause density $F(1, 37) = 13.0, p < .001, \eta^2 = .26$, number of correct sentences $F(1, 37) = 18.04, p < .0001, \eta^2 = .33$, and number of complex correct sentences $F(1, 37) = 12.45, p < .001, \eta^2 = .252$. The difference between the two groups was not significant for MLT-unit $F(1, 37) = 1.24, p = .27, \eta^2 = .03$.

Table 2.
Means and Standard Deviations for Written Language Measurements

Grade	RD				Control			
	3	4	5	6	3	4	5	6
Discourse								
1. TNW	45.4 (26.02)	63.6 (27.86)	50.2 (18.97)	57.4 (28.88)	59.0 (14.58)	97.4 (33.74)	97.8 (32.93)	110.6 (41.2)
2. #Ideas	3.4 (1.95)	5.6 (2.61)	6.2 (3.49)	5.6 (3.51)	7.6 (3.58)	11.0 (3.0)	9.4 (4.62)	11.2 (6.18)
Sentence								
3. #T-unit	5.2 (2.39)	5.8 (2.77)	5.2 (1.92)	6.0 (2.0)	6.4 (2.7)	9.0 (2.92)	8.2 (2.28)	11.6 (3.29)
4. MLT	7.99 (2.89)	12.11 (2.44)	9.65 (1.29)	9.11 (2.67)	10.10 (2.79)	10.85 (1.57)	11.87 (1.36)	9.37 (1.08)
5. Clause Density	8.2 (4.55)	10.4 (5.9)	10.0 (4.3)	10.4 (5.03)	10.4 (1.82)	16.4 (5.32)	17.8 (7.5)	18.4 (6.77)
6. #CS	2.4 (2.07)	3.0 (1.58)	3.0 (1.41)	3.6 (2.07)	3.8 (2.39)	6.8 (2.28)	5.8 (2.28)	7.4 (3.29)
7. #CC	0.8 (0.84)	2.6 (1.52)	1.2 (1.79)	2.2 (0.84)	2.2 (1.3)	4.0 (1.22)	4.0 (2.55)	3.6 (1.52)
Word								

8. NDW	29.4 (17.05)	38.6 (8.26)	29.0 (7.91)	29.2 (12.58)	30.4 (7.57)	46.6 (13.05)	48.8 (11.21)	49.8 (10.28)
9. Spelerr	9.2 (7.19)	5.2 (1.1)	8.0 (6.82)	7.0 (2.35)	5.2 (3.63)	6.4 (3.13)	4.0 (1.87)	3.4 (3.21)
10. Punct	65.8 (37.99)	79.2 (32.8)	88.2 (16.47)	76.6 (43.45)	81.8 (21.38)	77.6 (30.96)	97.8 (4.92)	88.0 (26.83)

Note. TNW-total number of words, #Ideas-total number of ideas, #T-unit-total number of T-units, MLT-mean length of T-unit, Clause-clause density, #CS-number of correct sentences, #CC-number of complex correct sentences, NDW-total number of different words, Spelerr-spelling errors, Punct-punctuation

At the *word level*, three variables were analyzed: total number of different words, spelling errors, and punctuation errors. In keeping with the trend of analyses for the other two levels, the results of the MANCOVA also indicated a significant main effect for diagnosis $F(1, 37) = 6.28, p < .002, \eta^2 = .35$ but not for grade $F(3, 35) = 1.47, p = .24, \eta^2 = .11$. These were significant for both number of different words $F(1, 37) = 10.42, p < .003, \eta^2 = .22$ and number of spelling errors $F(1, 37) = 4.04, p < .05, \eta^2 = .10$, clearly indicating that the RD students used fewer different words and had more spelling errors in their written language samples than the group of students with normal reading ability. There was no significant main effect for punctuation $F(1, 37) = 1.0, p = .32, \eta^2 = .03$.

In summary, the results found several differences between between normal and reading-disabled students at the discourse, sentence, and word levels, even after statistically controlling for age of the student. RD students performed significantly worse than normal students on most of the measures tested, including total number of words and total number of ideas at the discourse level, total number of T-units, clause density, number of correct sentences, and number of complex sentences (but not MLT-units) at the sentence level, and total number of different words and spelling errors (but not punctuation) at the word level.

DISCUSSION

The results of this study indicated a significant difference for diagnosis in the performance level between the RD and normally-developing students. The RD students scored significantly below the normally-developing students on most measures at the discourse, sentence, and word levels.

Discourse Level

Previous research has shown that LD children produce a fewer number of total words compared to normally developing children and have less knowledge about generating or grouping ideas together than NLD children (Scott & Windsor, 2000; Nelson et al., 2004). The findings of this study coincide with the results of other studies showing decreased performance of RD children compared to normally developing children at

the discourse level.

Sentence Level

Past studies have shown that children with LD use fewer T-units than their chronological age (CA) matched peers (Scott & Windsor, 2000). Another study has reported that LD children produce a higher number of grammatically incorrect T-units and produce less complex sentences than their NLD peers (Gillam et al., 1992). The findings of the current study match the results of previous research reporting decreased performance of RD children compared to normally developing children along the measures of total number of T-units, complex sentences, and complex correct sentences. Previous research has also shown a decrease in MLT-unit for the LD population compared to the CA group and reported no significant difference in clause density between the two groups (Scott & Windsor, 2000). These findings contrast with the present study which found no significant difference between the RD group and the control group for MLT-unit and a decrease in clause density for the RD group compared to the controls.

Word Level

Previous research has shown that LD children demonstrate few number of different words than their age matched peers (Scott & Windsor, 2000). Further, Newcomer and Barenbaum (1991) reported LD children have a persistent deficit in spelling. Both studies are consistent with the findings of this study reporting the decreased performance at the word level of RD children. Previous research also reported punctuation as a deficit among LD populations (Newcomer & Barenbaum, 1991). The present study contrasts with this earlier research, finding no difference in punctuation between the RD and control groups.

Also in contrast to earlier research, the present study also found that normally-developing students outperformed their RD peers on mean length of T-unit, clause density and punctuation errors. Several reasons might account for the contrasting results. The term learning disability (LD) encompasses a broad range of learning disabilities, including language learning disabilities and reading disabilities. Also the methodological difference of how the samples were collected could be the cause of the conflicting results. The nature and complexity of the stories used in each study might also provide an explanation to the differences between the current study and past research.

Significance of Research and Directions for Future Research

The results of this research revealed the decreased written language performance of RD children compared to normally developing children. An increased understanding of the specific written language skills and deficits in the RD population provide a foundation for intervention planning. This study can be used to better define the written language deficits in the RD population and allow teachers to focus on those specific areas. A better understanding of the written language skills of children with RD will allow teachers to accommodate those students and facilitate a better learning environment.

The goal of future research in this area will be to corroborate the findings of this study. In addition, future research would need to extend a more detailed analysis at this discourse, sentence, and word levels. More detailed analysis at the discourse level should include refining total number of words by category. This would distribute the words into categories such as verbs, adverbs, and nouns. Total number of ideas should be broken down into three categories: beginning, middle, and end of passage. At the sentence level clause density should be labeled by the different types of clauses. This would give more detailed information on the type of clauses used by RD children compared to normally developing children. Detailed analysis at the word level should also include refining the total number of different words by categories such as verbs, adverbs, and nouns. Spelling errors should be broken down into the nature of the spelling error such as a phonetic spelling error or an orthographic spelling error. An example of a phonetic spelling error would be "natshun" instead of "nation".

Writing is an important, relatively unexplored topic for both normal and atypical learners. It shows where an individual's difficulties lie and his or her performance level. Continued research in this area with a more detailed analysis would give a better understanding of writing deficits in the reading disordered population and allow for clinical interventions to improve their writing.

APPENDICES

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(Includes Protocol Form, Informed Consent Letter for Parents and Guardians, Parent Consent Form, Instructions for written language sample, Protocol for analyzing Written Language Sample, and Number of ideas.)

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