

SYNTAX INTERVENTION: AN INTEGRATIVE REVIEW

by

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### **Abstract**

The purpose of this study was to conduct an integrative review of the current literature to identify studies that examined the effects of syntactic treatment on students' reading comprehension and writing composition skills. The primary investigator conducted an electronic search of articles in ERIC, PsycINFO, ComDisDome, and JSTOR databases with no date restrictions. Variations of the following keywords were used: *syntactic awareness, intervention, instruction, grammar, writing, reading, and sentence combining*. The search revealed 22 articles. Following full text reading, four articles that met the inclusionary criteria were included. To analyze the data, studies were coded for the following categories: number of participants, age of participants, assessments, interventionist training, treatment setting, length of treatment, intervention procedures, and results of the treatment. The primary investigator compared the results of the four articles and identified similarities and differences using the pre-determined categories. Three of four articles found that a syntactic awareness treatment was effective on improving students' reading comprehension and writing composition. Further research is encouraged to replicate the findings of studies that found significant treatment effects and investigate new syntactic awareness approaches.

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## **Introduction**

Syntax, the rules of language that govern how words are organized, is made of two separate but related constructs: knowledge and awareness (Cain, 2007). Syntactic knowledge tasks measure students' ability to comprehend different grammatical structures whereas syntactic awareness tasks assess students' ability to manipulate and reflect on the grammatical structures of language (e.g., Cain, 2007). In other words, syntactic awareness is a metalinguistic awareness skill (i.e., the ability to manipulate language as if it were an object; Roth, Speece, Cooper, & De La Paz, 1996; Zipke, Ehri, & Cairns, 2009). Syntactic awareness contributes to literacy skills such as reading comprehension and written composition (Crowhurst, 1980; Cutting & Scarborough, 2006; Demont & Gombert, 1996; Muter, Hulme, Neilsen & Piché, 1981; Muter, Hulme, Snowling, & Stevenson, 2004; Tunmer & Bowey, 1984). Since syntactic awareness contributes to literacy skills, students who struggle academically may also be those students with poor syntactic awareness. Thus, practitioners must seek interventions to improve students' syntactic awareness. Therefore, the purpose of this study will be to conduct an integrative review of the current literature to examine the effects of syntactic treatment on students' reading comprehension and written composition skills.

### **The Relation of Syntactic Awareness to Reading Comprehension and Written Composition**

Several researchers have examined the relation of syntax to reading comprehension skills. Muter, Hulme, Snowling, & Stevenson (2004) examined literacy skills of early elementary students and found that syntactic awareness predicted their later reading comprehension after controlling for other known literacy factors such as phonological awareness, word-level reading,

and receptive vocabulary. Muter et al. (2004) found that syntactic awareness was moderately correlated with word-level reading and reading comprehension; .56 and .61 respectively. Gaux and Gombert (1999) and Guo, Roehrig, and Williams (2011) explored the contributions of syntactic awareness to reading comprehension among adolescent students and adults. Gaux and Gombert (1999) found that syntactic awareness significantly contributed 4-5% of the variance in reading comprehension over reasoning, memory, and linguistic competency. Guo, et al. (2011) found that syntactic awareness contributed significant variance to vocabulary and reading comprehension. Syntactic awareness is an important factor that contributes to reading comprehension performance among adolescent students and adults (Gaux & Gombert, 1999; Guo, Roehrig & Williams, 2011).

Although limited, researchers also found a relation between syntax and written composition. Crowhurst (1980) examined the syntactic complexity of narrative or argumentative written compositions of adolescent students. Students in 10 twelfth-grade classes (N=206), 11 tenth-grade classes (N=228), and 8 sixth-grade classes (N=223) were randomly assigned to write either a narrative or argumentative composition. Crowhurst (1980) found that at Grades 10 and 12, argumentative written compositions with high syntactic complexity received higher quality scores than argumentative written compositions of low syntactic complexity. Additionally, Schmeling (1969) examined the relation between syntactic complexity and overall quality of written compositions produced by 88 college freshman. He found that students' whose overall quality ratings were classified as good had the highest mean sentence length and mean clause length, which are both measures of syntactic complexity.

Syntactic awareness contributes significant variance to reading comprehension. Additionally, previous research also supports that students who use more complexity in their written compositions receive better quality ratings of their writing. According to Tunmer and Bowey (1984), syntactic awareness aids reading comprehension by assisting with sentence and text-level integration and monitoring skills. It also has been suggested that syntactic awareness can aid students' ability to detect and correct word recognition errors, which may enhance their comprehension monitoring abilities (e.g., Bowey, 2005; Cain, 2007; Oakhill, Cain, & Bryant, 2003; Nation & Snowling, 2000). Several studies have documented that students who struggle with reading comprehension and writing also may have deficits in syntactic awareness (Ferrari, Bouffard, & Rainville, 1998; Graham & Harris, 2002; Tong, Deacon, & Cain, 2014). Therefore, it is important to provide syntactic awareness intervention to students who struggle with reading comprehension and written composition to improve their academic success. The purpose of this study was to conduct an integrative review of the current literature to identify studies that examined the effects of syntactic treatment on students' reading comprehension and written composition skills.

### **Method**

An integrative review design was chosen because it answers broad research questions and combines information from multiple sources (Kanagasabai, Mulligan, Mirfin-Veitch, Hale, 2014). The purpose of this study was to analyze any existing research concerning the effects of syntactic awareness instruction on reading and writing abilities among students.

## **Procedure**

The primary investigator conducted an electronic search of articles in ERIC, PsycINFO, ComDisDome, and JSTOR databases with no date restrictions. The following groups of keywords were used: *syntactic awareness*, *syntactic awareness and intervention*, *syntactic intervention*, *syntactic awareness instruction*, *syntactic training*, *syntactic instruction and grammar*, *syntactic instruction and reading*, *syntactic instruction and writing*, *syntactic intervention and writing*, *syntax intervention and reading*, *syntax intervention and writing*, *syntax instruction and writing*, *syntax awareness*, *syntax instruction*, and *sentence combining and writing*. The primary investigator independently screened titles and abstracts for articles that included syntax treatment. Articles were excluded that did not have a control group and solely examined the relation between syntax and reading and writing skills. Articles were included that investigated a syntactic awareness treatment on reading or writing skills.

## **Data Analysis and Synthesis**

To analyze the data, studies were coded for the following categories: Number of participants, age of participants, assessments, interventionist training, treatment setting, length of treatment, intervention procedures, and results of the treatment. The primary investigator compared the results of the four articles and identified similarities and differences using the pre-determined categories.



## **Results**

During the title and abstract screening, 22 studies included the word ‘syntax’ in some variation in the title or abstract. Following full text reading, four articles were included in the integrative review. Three of the four studies employed a group comparison design and one study employed a single-subject design. Two studies investigated the effects of syntactic treatment on reading comprehension while the other two investigated the effects on written composition. To identify similarities and differences across studies, comparisons were made on the sample of students, syntactic awareness assessments, intervention characteristics, control intervention, and intervention results. See Table 1.

<Insert Table 1>

### **Sample of Students**

Students in all four studies were in the 3<sup>rd</sup> or 4<sup>th</sup> grade and between the ages of eight to 10-years-old. Students included in the studies varied in their reading abilities. Layton, Robinson, Lawson (1998) included students who had a wide range of reading abilities while Weaver (1979) included students with average to above-average reading abilities. Saddler and Graham (2005) compared skilled and less skilled writers. Saddler, et al. (2008) is the only study to include students with learning disabilities and writing difficulties.

### **Syntactic Awareness Assessments**

Three of the four studies reviewed measured syntactic awareness with a norm-referenced assessment. Layton, et al. (1998), Saddler and Graham (2005), and Saddler, et al. (2008) used the

sentence combining subtests from the TOWL-3 (Hammill & Larsen, 1996) or TOLD-2 (Hammill & Newcomer, 1988). These subtests measured students' ability to combine simple sentences to create complex sentences. Layton, et al. (1998) also used the grammatic comprehension subtest from the TOLD-2 which measured students' ability to identify whether a sentence was grammatically correct or incorrect. To gather more information about students' syntactic awareness, researchers also used criterion-referenced assessments. Saddler and Graham (2005) utilized a researcher-created sentence-combining task, a written composition task, and a sentence-combining revision task. Layton, et al. (1998) used a syntactic awareness questionnaire to measure students' ability to explain the rules of syntax and reflect on their syntactic knowledge. Weaver (1979) is the only study that did not use a norm-referenced assessment. Instead, he used a researcher-created sentence anagram assessment which measured students' ability to rearrange words to create a complex sentence.

### **Intervention Characteristics**

All four intervention studies were conducted by the primary investigators or trained graduate students and took place outside of the general education classroom. Layton, Robinson, and Lawson (1998) and Weaver (1979) did not provide information about whether training was conducted. However, Saddler and Graham (2005) and Saddler, et al. (2008) provided a description of the intervention training. The length, number of lessons, and what was taught in the lessons varied across all the studies examined. Layton, Robinson, and Lawson (1998) had a total of six 30-minute lessons. Layton, et al. (1998) taught students about the functions of words (i.e., nouns, verbs, and articles) and used a cloze activity at the sentence and text-levels for

students to practice using words. Weaver (1979) had a range of 15-18 sessions with varying lengths of time. Weaver (1979) taught students a word-grouping strategy which included a series of steps to help students think about how words were related to a verb in a sentence. Students practiced the word-grouping strategy on tasks where a series of words were out of order. Students were required to generate sentences with the words. Saddler and Graham (2005) and Saddler, Asaro, and Behforooz (2008) had similar interventions. Saddler and Graham (2005) had a total of 30 lessons each lasting 25 minutes. The intervention occurred three times a week for a total of 10 weeks. Saddler, et al. (2008) had a total of eighteen 35-minute lessons. Intervention proceeded for three weeks. Saddler and Graham (2005) and Saddler et al. (2008) taught students to edit sentences in their written compositions by combining simple sentences to create a complex sentence. Saddler, Asaro, and Behforooz (2008) implemented an oral warm-up activity and asked students how to combine the sentences.

### **Control Intervention**

Two of the four studies implemented a control intervention (i.e., Layton, et al., 1998; Saddler & Graham, 2005). Saddler's et al. (2008) employed a single-subject design; therefore all students received the syntactic awareness intervention but implementation of the design was delayed across each student. Weaver's (1979) control students received no treatment and remained in the classroom. Layton, et al. (1998) implemented a semantic intervention to compare effects of the syntactic awareness intervention. The students in the semantic control group met once with the researcher. Students were asked the following two questions: 'What is the easiest and hardest thing about reading?' and 'What do you like and not like most about reading?'

Students also were taught homophones, multiple meaning words, and synonyms. Syntactic errors were not discussed or corrected. Saddler and Graham (2005) used the same activities for the experimental and control groups; however, the content of the activities was different. The control group intervention focused on enhancing the precision of students' vocabulary in their writing. Students were taught to use descriptive nouns, verbs, adjectives, and adverbs. Students practiced using the vocabulary in teacher-guided and peer group written practice. Students also independently wrote stories using the taught vocabulary words.

### **Treatment Results**

Overall, the effects of syntactic awareness treatment were mixed across the reading comprehension and writing composition studies. Layton, et al. (1998) found that instructing students on the function of words can improve students' syntactic awareness; however, they did not find treatment effects on word-level reading or reading comprehension. These results suggest that students may be able to achieve a high level of syntactic awareness without being able to apply it at a functional level. Weaver (1979) found that teaching students a "word-grouping" strategy significantly improved students' syntactic awareness and reading comprehension abilities. Additionally, Weaver (1979) found significant differences between the average and above average readers on both accuracy and speed on the syntactic awareness assessment. The studies investigating the effects of a syntactic awareness treatment on written composition found positive results regarding students' quality of writing. Saddler and Graham (2005) found that more skilled writers had higher sentence-combining scores than did less skilled writers. Students receiving the syntactic awareness treatment became more adept at combining simpler sentences

into more complex sentences, at producing a correct written sentence on the unit tests, and at producing better quality of written composition. Saddler, Asaro, and Behforooz (2008) extended Saddler and Graham's (2005) study by attempting to improve transfer of taught skills by introducing generalization training to the sentence combining treatment. Sentence-combining instruction led to gains in story quality, use of taught constructions, and number of revisions among students with learning disabilities. Saddler and Graham (2005) and Saddler, Asaro, and Behforooz (2008) implemented a peer-assisted learning component which was found to maximize the success of students' writing.

### **Discussion**

The purpose of this integrative review was to examine the existing research on the effects of syntactic treatment on reading comprehension and written composition skills of school-age students. Very few syntactic treatment studies were found. Among the four studies reviewed, the findings suggest that implementing a syntactic awareness treatment is effective for improving students' syntactic awareness, writing composition, and reading comprehension. The treatment and assessment of syntactic awareness was very different across the studies, which has major implications for practitioners.

Researchers either assessed syntactic awareness with a norm-referenced assessment or an experimental syntactic awareness task. Layton, et al. (1998), Saddler and Graham (2005), and Saddler, et al. (2008) used the sentence combining subtests from the TOWL-3 (Hammill & Larsen, 1996) or TOLD-2 (Hammill & Newcomer, 1988). Norm-referenced assessments are used by researchers because published psychometric information (i.e., validity and reliability) is

available to ensure accurate analyses of students' syntax. Although norm-referenced assessments are used, they may not be the best measure because they were not designed to be sensitive to changes in students' scores over a short amount of time (McCauley & Swisher, 1984). Norm-referenced assessments may not capture changes in the students' syntactic awareness after intervention. For example, Layton, et al. (1998) did not find a significant treatment effect on the TOLD-2 subtests. These results may be related to the type of measures used in their study and not that their syntactic awareness intervention was not effective. The researchers who utilized experimental tasks found significant effects. Experimental tasks are designed to monitor progress across a short time span (McCauley, 1996; McCauley & Swisher, 1984; Popham & Husek, 1969); however, psychometric information is not provided.

The syntactic awareness treatments that were found to be effective included the sentence-combining strategy implemented by Saddler and Graham (2005) and Saddler, et al. (2008) and the word-grouping strategy implemented by Weaver (1979). Layton et al.'s (1998) intervention was only found to be effective on their experimental task (i.e., questionnaire). Practitioners can utilize these interventions to improve students' syntactic awareness, writing composition, and/or reading comprehension; however, precautions should be noted. The researchers used experimental tasks, but did not report reliability or validity information. It is unknown whether the experimental tasks were reliable or valid tasks; therefore the significant effects should be analyzed with caution. Additionally, the studies included students with a variety of reading and writing skills. Specifically, Saddler and Graham (2005), and Saddler, et al. (2008) included students with average to below average writing skills and students with learning disabilities. Layton, et al. (1998) included students with a wide range of reading abilities. Weaver

(1979) included students with average to above-average reading abilities. Not all the interventions included students with below average reading skills (e.g., Weaver, 1979); therefore, it is unknown whether these strategies would be effective for them. Further, all lessons were administered outside of the classroom by the researcher or a trained graduate student and varied in the length of intervention. More research is needed to investigate whether the same strategies implemented by teachers or special educators in an ideal setting would result in the significant effects that were found.

### **Implications for Future Research**

The results presented in these studies need to be interpreted carefully and compared with future research. The length of training and number of participants may not have been enough for a good representation of the effects from syntax instruction to be noticed. Furthermore, Layton et. al (1998) posed the question of whether syntactic ‘awareness’ directly leads to an improvement in reading ability and whether that can be applied across all levels of syntactic awareness. Future researchers may need to look deeper at the “sequence of metalinguistic development”. Weaver (1979) discusses how including a control intervention in future research is necessary to definitively conclude that syntactic intervention is superior and results were “not due to extra time spent with the experimenter”. It also suggests that instruction in skills other than decoding and vocabulary may enhance the quality of reading comprehension. As stated in the introduction, students performing poorly academically may lack syntactic awareness, and the Saddler and Graham (2005) and Saddler, et. al (2008) articles offer sentence-combining as a way to achieve this. Sentence combining may be the best way to help students

become syntactically aware in both their reading and writing skills. In the future, a more diverse sample is needed and generalization outcomes need to be explored in greater detail. Examining the cognitive aspects of how students approach a sentence-combining task and the specific way instruction may help reorganize existing schemas about sentence construction are suggested by Saddler, et. al (2008). Further research is encouraged to replicate the findings of these studies as well as discover new approaches to improve sentence-construction skills (Saddler, Graham).



Appendix 1: Table 1

Author, Yr	Age/Grade	Classification	Sample Size	Control Group	Control Intervention	Measures	
						Syntactic Awareness	Other
Layton, Robinson, Lawson, 1998	8 years 9 months to 10 years 4 months/ 4th grade	Wide-range of reading ability.	30 (17 Treatment, 13 Control)	Y	Y	Grammatical Comprehension and Sentence Combining subtests from TOLD-2; Syntactic Awareness Questionnaire	Neale Analysis of Reading Ability (NARA); Progressive Achievement Tests (PAT)
Weaver, 1979	3rd grade	Average to above-average reading ability.	31 (16 Treatment, 15 Control)	Y	N	Sentence Anagram Test (Students were required to rearrange words to create a sentence).	Timed sentence recognition task, a cloze comprehension test, a prompted sentence recall test, a passage-question test, and follow the dots test.
Saddler & Graham, 2005	9 years 3 months/4th grade	Skilled and less skilled writers	44 (22 Treatment and 22 Control)	Y	Y	Researcher-created sentence-combining assessment; Sentence Combining subtest from the TOWL-3; Writing assessment (students wrote in response to a picture); sentence-combining revision measure.	N/A
Saddler, Asaro, & Behforooz (2008).	9 years/4th grade	Learning Disability with low writing skills	4 students	Y	N	Sentence Combining subtest from the TOWL-3; Number of complex sentences used in writing.	Holistic Writing Rating; Number and quality of revisions.

Table 1 continued

Author, Yr	Intervention	Training	#of students/group	Setting	Length	Steps of the Intervention	Findings
Layton, Robinson, Lawson, 1998	Researcher	No	4-5/4 groups	Outside of classroom	6, 30-minute lessons	Lesson 1: Intro to the use of context in identifying topics and words. Lesson 2-5: Training on the 'jobs words do' (i.e., nouns, articles, verbs) and the cloze exercise at sentence and text levels. Lesson 6: Review of the previous lessons, emphasizing the 'jobs words do' and the rules of language that had been discussed.	Syntactic awareness intervention improved students' ability to identify the rules of syntax and reflect on their knowledge of syntax but did not improve students' word-level reading, reading comprehension, sentence comprehension, and sentence combining skills.
Weaver, 1979	Researcher	No	1 (Individual instruction)	Outside of classroom	15.75-18.12 sessions; varied time limit	The students were taught the word-grouping strategy: Find the action word (verb), ask a series of questions to group remaining words, and determine how word groups are related to the verb. Students also were taught definitions of the following terms: Verb, WH question, sensibility, and complete sentence.	Syntactic awareness treatment improved students' ability to rearrange words to generate a grammatical sentence and reading comprehension.
Saddler & Graham, 2005	Six college students majoring in education.	Yes	2/group; one skilled writer and one less-skilled writer.	Outside of classroom	30 lessons, 25 min/ lesson, 3 times/week	Lesson 1 and 2: Instructor introduced sentence-combining procedure and students practiced procedure. Lesson 3: Students practiced sentence-combining in paragraphs. Lesson 4: Students practiced sentence-combining in connected writing. Lesson 5: Students completed sentence-combining test and wrote a story using a picture prompt. Lesson 6: Students revised their story they wrote in lesson 5.	Syntactic awareness intervention improved students' ability to combine sentences to generate complex sentences in writing, make revisions on written compositions improving the overall quality of their writing. However, statistically significant effects were not evident for overall writing quality.
Saddler, Asaro, & Behforooz (2008).	Two graduate students.	Yes	2/2 groups	Outside of classroom	18 lessons, 35 minutes/lesson, 3 times/week	Lessons 1 and 2: Instructor introduced the sentence-combining procedure; students practiced combining sentences with feedback from instructor; students explained the sentence-combining process. Lesson 3: Students practiced sentence-combining in paragraphs with feedback from the other student in the pair. Lesson 4: Students individually practiced sentence-combining in connected writing with picture prompts. Lesson 5: Students used a Peer-Editor Checklist to revise his/her partner's story draft completed in Lesson Four after an instructor model. Lesson 6: Students discussed each other's story using the completed Peer-Editor Checklist, made revisions, and read the stories out loud. Adjective and prepositional phrases and conjunctions "but" and "because" were taught across each lesson.	Syntactic awareness intervention improved students' overall quality of narrative written composition, use of taught constructions, number of revisions, and sentence-combining skills.

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