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Investigating the use of graphic organizers for writing

Laura Nicole Delrose

Louisiana State University and Agricultural and Mechanical College

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INVESTIGATING THE USE OF GRAPHIC
ORGANIZERS FOR WRITING

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Arts

in

The Department of Communication Sciences and Disorders

by
Laura Nicole Delrose
B.A., University of California Santa Barbara, 2009
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ABSTRACT

Students are placed under increasing demands for more complex syntax and discourse structure in oral and written language as they age. Children with language and learning disabilities struggle to grasp the organization and relationships between the facts of the topic, making writing an increasingly daunting task. In addition, these students must also master conventions such as vocabulary, spelling, punctuation, and syntax to produce a written essay (Schumaker & Deshler, 2003). This study explored the efficacy of graphic organizers as a strategy to facilitate higher complexity of syntactic and discourse structures in sentence and story formation. After seven weeks of intervention, the impact of graphic organizers was assessed by comparing spontaneously written stories to scaffolded stories as well as comparing sentence combining skills from pre- to post-test. The results suggest that graphic organizers can be an effective tool used in the writing process to generate sentences and narratives containing more complex structure of syntax and discourse.

REVIEW OF LITERATURE

Learning to write is difficult for all children, but in particular for those with language based learning difficulties. These students struggle with the language skills of spelling, sentence formation, word choice, and punctuation, but also have difficulty with the cognitive processes of planning and organizing the topic for writing (Schumaker & Deshler, 2003). Despite their difficulties with all of these aspects of language (Catts, 1993; Catts, Adlof, & Weismer, 2006), students with language and learning disabilities are expected to write essays with sufficient complexity and coherence to pass high-stakes assessments. These tests are used to make decisions such as whether the child will progress to the next grade level (Gregg, Coleman, Davis, & Chalk, 2007). Therefore, it is critical to develop interventions that are effective in improving writing abilities for this population.

Writing Instruction

Writing instruction for first and second grades focuses on learning to spell, punctuate, print, and generate simple sentences that tell a single, simple fact. Third grade is when many students actually become writers. They have sufficient skills to write with some fluency and independently write simple sentences with a few basic adjectives (size, color) and verbs which they tend to use over and over again. In school, explicit instruction is presented to third graders on the use of conjunctions to combine sentences as an initial step toward becoming better writers. Students also are taught to write longer essays and stories that have greater structure, but in general still view writing as putting words down on paper (Calkins, 1994). However, writing becomes more refined as the school year progresses and new structures in syntax and discourse emerge.

Fourth graders and above are expected to use writing in nearly every subject area and to master the appropriate discourse structures for narrative writing, expository nonfiction writing, and persuasive writing. In school, explicit teaching focuses on the writing process, including prewriting organization, drafting, revising, editing and publishing. Longer, more complex, and more varied sentences are generated during this process, including adverbial and relative clauses. As children age, the syntactic complexity, including the number of sentences with dependent clauses, increases (Loban, 1976; Snow & Kim, 2010) and discourse structure becomes more embedded and refined (Calkins, 1994; Snow & Kim, 2010).

Syntactic Complexity

One of the primary measures of writing achievement is syntactic complexity. Measures such as average sentence length (Hunt, 1970; Loban, 1976) have been used to compare the writing of low-achieving and high-achieving children and adolescents. In his longitudinal study, Loban (1976) showed that high-achieving students had longer sentences and more clauses in their writing, including adverbial, adjectival, infinitive, conjoined, and embedded, at each grade level from 4th through 12th grades. According to Loban, 4th grade is the level where a variety of dependent clauses first appear in writing although they are present in oral language by first grade. In addition, high achieving students made greater gains in these measures for both oral and written language each year in school than low-achieving students, so the gap between them widened. In addition to shorter and less complex sentences (Anderson, 1982; Hunt, 1970; Loban, 1976), low-achieving students also make more grammatical errors when writing (Windsor, Scott, & Street, 2000). Currently in schools there is no tolerance for

grammatical errors in final draft writing, and increasing mastery over complex syntactic structures is expected (Gregg et al., 2007; Ravid & Tolchinsky, 2002). These findings suggest that improving syntactic skills in both speaking and writing is necessary for language and learning disabled students to achieve in academics.

Sentence Combining

Sentence combining has been found to be one of the most effective instructional methods for improving syntactic complexity in writing. In several reviews of the extant literature, sentence combining has been shown to be consistently more effective in improving writing scores than other grammatical approaches, including teaching parts of speech, sentence diagramming, or instruction in transformational grammar rules (Abrahamson, 1977; Amiran & Mann, 1982; Andrews et al., 2005; Hillocks, 1984). Mellon (1969) taught grammatical terms using transformational grammar rules along with a sentence combining component and found small significant gains. O'Hare (1973) replicated the study using sentence combining alone with no reference to the grammatical terminology or rules and showed significant gains. Hillock (1984) reviewed the extent research and concluded that syntactic complexity increased for subjects across studies comparing sentence combining to a control condition. In those studies, sentence combining instruction was more than twice as effective as other conditions for improving writing abilities. These findings held across age levels from third grade through secondary grades and for both typically developing and learning disabled students. Students with identified disabilities and disadvantaged students both showed greater change than higher performing peers following sentence combining practice, indicating

explicit instruction can help close the gap (Hunt & O'Donnell, 1970; Perron, 1975; Ross, 1972; Schuster, 1977; Waterfall, 1978).

Hudson (2000) conducted an analysis of 13 previous reviews and 28 additional studies and concluded that the evidence for the efficacy of using sentence combining to improve writing skills was much stronger than commonly supposed. Her analysis was consistent with others showing that traditional grammar teaching is ineffective but sentence combining does result in gains. Wyse (2001) came to a similar conclusion following a review of 15 studies, stating that sentence combining is the one method that was beneficial for fostering syntactic maturity in writing.

Discourse

While syntactic complexity is important to writing, so is the discourse. Discourse, or the structure of the text used to establish links between sentences, groups of sentences, and elements within sentences, is important for communicating meaning and intent. The style and structure of the discourse varies depending upon the type of writing (Britton, 1976). For example, a story would follow patterns of narrative discourse, while a report would conform to one or more expository text structures. In writing, discourse is parsed into paragraphs, with each paragraph focusing on a topic or theme. The opening sentence generally states the topic, with subsequent sentences developing and supporting the theme. The extent to which a text makes sense and maintains a focus is related to both cohesion and coherence (Halliday & Hasan, 1976).

Cohesion is the sense of a logical flow of information from previous ideas or statements to new information as the text is produced. This sense of flow is created by choices in words or word order that serve as ties, connecting each new sentence to those

that have gone before. Coherence is the sense that the writer of the text establishes a topic, and each succeeding sentence bears a logical relationship to that topic, highlighted by transitional phrases and words that enable the receiver to understand how the ideas are related to each other. Obviously, the grammar and word choices of individual sentences contribute to both the cohesion and coherence of the writing. But for a text to make sense, the writer must create a unified whole, with attention to the words and relationships of meaning expressed in the surrounding sentences and paragraphs (Halliday & Hasan, 1976).

To compose a coherent text, the writer must have the ability to structure a meaningful text using the conventions of written language. To accomplish this, the writer must simultaneously coordinate spelling, sentence formation, word choice, punctuation, and handwriting while developing a topic or theme within discourse. This can be a daunting task for typically developing writers who have relative proficiency with each of these components. For children with language learning disorders who have deficits across these abilities, writing can be overwhelming.

Graphic Organizers

One tool that has been shown to be effective for structuring written discourse is graphic organizers (Ellis & Howard, 2005). Graphic organizers (GO charts) are visual and spatial displays of information that graph the logical relationships between the key concepts, facts, terms, or ideas from the learning task (DiCecco & Gleason, 2002). Key concepts, usually single words or phrases, are arranged logically on the GO chart with lines, arrows, and spatial representations clearly highlighting interrelationships and providing a structured way to see a picture of the information. GO charts are designed to

extract salient information and eliminate extraneous information (i.e., the information that frequently distracts learning disabled students). They provide a foundation for an explicit, organized way of visually expressing the relationship between new and existing knowledge and profiling the connections between them (Ellis & Howard, 2005; Kim, Vaughn, Wanzek, & Wei, 2004).

Types of Graphic Organizers. Also referred to as semantic maps, cognitive maps, advance organizers, or concept diagrams, GO charts can be completed in many different formats such as cause-and-effect diagrams, compare-and-contrast diagrams, sequence charts, and main-idea-and-detail charts (Baxendell, 2003). Well structured GO charts can be used flexibly to represent multiple goals. For example, the cause-and-effect diagram aids students in visualizing the relationship between a single cause and a single effect, or the focus can be on a single main event and its primary causes and effects. This format allows students to organize thoughts before writing by displaying abstract relationships in a graphic representation where the relationships are clearly displayed (Kim et al., 2004). A different presentation of complex relationships is displayed in compare-and-contrast diagrams which visually depict the similarities and differences across main ideas. This format can be used to present one main idea with its supporting details along one strand in the diagram which is then contrasted with the opposing main idea, or the ideas can be compared and contrasted point by point across main ideas (Baxendell, 2003).

Sequence charts are used to illustrate a series of events. They flow in one direction, either right to left or top to bottom, and are often connected by arrows and numbered boxes to ensure clear understanding of the relationships of the sequence of

events. This format is beneficial to learning disabled students in the writing process since it visually organizes important events sequentially (Ellis & Howard, 2005). Another challenge faced by learning disabled students is difficulty conceptualizing and differentiating main ideas from details. The main-idea-and-detail chart helps to extract main ideas and supporting details from extraneous information, allowing the focus to remain on relevant information (Ellis & Howard, 2005). Students can use this format in the writing process to create paragraphs that focus on one main idea and details highlighting the importance of the main idea.

Suggestions for an Effective Graphic Organizer. According to Baxendell (2003), there are three components to a successful graphic organizer: consistency, coherence, and creativity. Although there are many different formats and types of GO charts, consistency is especially important for LD students since they benefit from routine and structure. The same type of GO chart should be used for the same type of writing activity. Consistency allows the students to become familiar with the layout of the organizer, so that they may process the information without the added burden of processing format. Internalization and generalization of information is more likely to occur when the student is already comfortable with the layout of the relationships.

Coherence is an especially important aspect of GO charts. The purpose of the GO chart is to present the information in a fluid, understandable manner and to aid in the reduction of cognitive load. A coherent GO chart is not visually distracting, doesn't contain too much information, has clear labels, and is a visual representation of the hierarchy of concepts. An incoherent GO chart can result in students becoming confused, disorganized, or frustrated (Baxendell, 2003; Ellis & Howard, 2005).

Creativity in the use of GO charts is also important for engaging the learning of LD students. In this context, creativity does not refer to the stylistic choice of making the GO charts themselves, rather it refers to how the GO charts are implemented by the teacher (Baxendell, 2003). Students need to be actively included in creating the GO chart, bringing prior knowledge and discussion to develop the main ideas and details (Ellis, Farmer, & Newman, 2005).

GO Charts and Writing

The efficacy of graphic organizers as a tool to guide students through the writing process was examined by Meyer (1995). This study was designed to evaluate the writing of third grade students along four dimensions: content and organization, usage, sentence construction, and mechanics. A pre- and post-writing sample was gathered and evaluated for each participant. Both groups were given the same writing topic and used the computer program Storybook Weaver by MECC to write their stories. The experimental group incorporated the use of a GO chart to complete writing assignments, while the control group completed writing assignments without a graphic organizer. Throughout the 12 weeks, the experimental group discussed advantages and other uses of a GO chart, completed organizers as a group and individually, and completed creative writing assignments using the graphic organizer.

At the beginning of the study, the control group demonstrated significantly higher scores on the writing sample. At the end of the study, the mean gain was 0.38 for the control group and 1.33 for the experimental group. Thus, the experimental group improved more than the control group, improving to almost the same level as the control

group at the beginning of the study. This improvement, while small, indicated the value of using graphic organizers in the writing process.

Myrick and Siders (2007) examined the effects of using graphic organizers in a classroom setting on vocabulary development and writing abilities of sixth graders. Students were enrolled in the same curriculum and taught the same material; however, the control group was instructed using only traditional text-based strategies. The experimental group was instructed using the Makes Sense Strategies (MSS) model (Ellis, 2004) using graphic organizers in conjunction with traditional text-based methods. The MSS model is based on three principles: active engagement in processing new information in meaningful ways promotes better student learning, increasing the ease in synthesizing information is more effective than reducing the cognitive complexity of the information, and learning should not become a rote process. This model focuses on implementing techniques that enhance students' ability to process new information, connect it to prior knowledge, and synthesize the relationship between new and existing knowledge.

Improvements were determined by evaluating students' writing samples for degree of content knowledge, coherence, spelling and grammar, and neatness. For both groups, each element was rated on a scale of one to four points, representing the degree of performance in each area. In addition, the number of total words in each writing sample was counted. A pre-test, mid-test, and post-test were intended to be collected for both groups; however, due to a lack of funding, a post-test was only collected from the experimental group. Comparison between groups and within the control group was based

on pre- and mid-test scores. Comparison within with experimental group was based on pre- and post-test scores.

The experimental group demonstrated a 26% increase in average number of words contained in the writing sample from pre-test to post-test; while the control group demonstrated a significant decrease in average number of words used from pre-test to mid-test, decreasing by 48%. In the dimensions of coherence and depth of knowledge, the experimental group displayed improvements, and the control group displayed declines in overall scores. The authors attribute the control group's decrease in scores to disengagement from processing new information and due to a lack of interest in the topic. This study suggests that graphic organizers in conjunction with traditional text-based methods allow for an increase of clarity of new information, relation of new knowledge to prior knowledge, and ability to logically organize thoughts into a coherent sequence.

James, Abbott, and Greenwood (2001) tested a research-based model comprised of three main components: graphic organizers, a six-trait model for assessment, and a process-writing-model, termed writer's workshop. The model was implemented for nine weeks. Students were divided into two groups based on writing abilities. The higher-level students were instructed in the model described below for the first nine weeks, and the lower level students were instructed during the second nine weeks.

The writer's workshop incorporated pre-writing, drafting, self- and peer-editing, a teacher-student conference, revision, and publishing, all facilitated by the teacher. Two graphic organizers were used during the writer's workshop. One variation of a main-idea-and-detail graphic organizer was used during the pre-writing stage to aid students in formulating main ideas and details about the topic on the idea "light bulb." Another

graphic organizer combining two types, the main-idea-and-detail and the sequence graphic organizer, was implemented in the drafting stage. This “outline” graphic organizer assisted students in separating main ideas from details and synthesizing them into a coherent point. The high group’s “outline” graphic organizer also served as the foundation for structuring a five paragraph essay; while the low group’s organizer was a simplified version serving as the foundation for a single paragraph essay. The six-trait model identified and explained six important traits of good writers.

A wait list control group design was used where each group of students experienced an experimental phase for nine weeks, and a control, or no instruction, phase. Students were taught for 30 minutes daily and chose their own writing topics. Comparison of pre- and post-testing scores revealed that both groups made greater gains during the experimental phase, but the lower level group demonstrated greater improvement.

Graphic Organizers and Syntax

While graphic organizers have been used to support the discourse structures of writing, the same GO chart also can be used to support sentence formation. Hierarchical graphic organizers present information in a tree diagram with subordinate information placed in successively lower nodes (topic at the top level; subtopics below; main ideas below their respective subtopics; details subordinated under subtopics) (see Figure 1). The key points printed within nodes can provide a framework to generate sentences, including combining sentences to generate coherent ideas. The adult can help students generate sentences by pointing to successive words to be incorporated into grammatical utterances. The child can combine the words from the chart using function words to

form a sentence (e.g., “The desert is very hot during the day time.” Or “During the day, it is very hot in the desert.”) The child can then combine the words from another subtopic to form a second sentence and so forth, creating a passage with a coherent discourse structure supported by the same GO chart. While this strategy has been used clinically, no research exploring use of GO charts as a method of increasing syntactic complexity was found in this literature search.

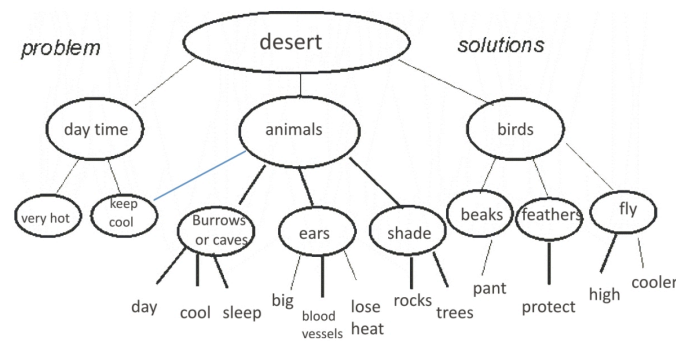


Figure 1. Hierarchical GO Chart Profiling Superordinate and Subordinate Nodes

The purpose of this study is to determine the effectiveness of incorporating graphic organizers into the writing process in both discourse and sentence formation. The specific questions of this study are:

1. Can GO charts be used as an effective tool to enable children to combine simple sentences into compound and complex structures with assistance?
2. Will the process of writing text using graphic organizers with a focus on combining sentences result in increases in oral and written sentence combining?
3. Will the process of writing text using graphic organizers results in more complex discourse structures in spontaneously generated stories?

4. Will the use of GO charts have a differential effect on 3rd graders compared to older but delayed writers?

METHODS

This study examined the effects of the use of Graphic Organizers (GO Charts) on the sentence combining and writing skills of children across a range of ages and developmental levels. Specifically, the effectiveness of using the same GO chart, with adult scaffolding directed at the child's individualized abilities, was examined. Comparisons were made between third grade students who are just being introduced to conjunctions and compound sentences in school versus older students who are expected to write using a wide range of sentence types.

Participants

Participants were 10 children, nine males and one female, participating in an after school language-reading-writing program for language based academic delays. The program met for 2 hours one day per week. Participants were referred by their parents as performing below peers in reading and/or writing. The third grade group, designated the younger group (Y) was comprised of five participants ranging in age from 8;4 to 9;0 years. The older group (O) was comprised of five participants, including three fourth graders (age 10;2-10;11), one sixth grader (13;4 years) and one eighth grader (14;5 years).

Each participant was administered an assessment battery at pre-test and post-test comprised of the *Gray Oral Reading Test – 4th Edition* (GORT-4) (Wiederholt & Bryant, 2001), the Sentence Combining subtest of the *Test of Language Development – Intermediate 3rd Edition* (TOLD I:3) (Newcomer & Hammill 1997), *Test of Nonverbal Intelligence* (TONI-2) (Brown, Sherbenou, & Johnsen, 1990), and the spontaneous written story subtests of the *Test of Written Language – 3rd Edition* (TOWL-3) (Hammill & Larsen, 1996). TONI and GORT report quotient scores with a mean of 100 and SD of

15; TOWL and TOLD I-3 report scaled scores with a mean of 10 and SD of 2. Table 1 presents a profile of participants at pre-test.

Table 1
Profile of Participants by Age, Grade, Standard Writing Score, Oral Language Scores, and Nonverbal Quotient.

<u>Par</u>	<u>Gender</u>	<u>CA</u>	<u>Grade</u>	<u>Oral</u> <u>SenCom</u>	<u>TOWL</u>			<u>GORT</u>	<u>TONI</u>
					<u>Written</u> <u>SenCom</u>	<u>Context</u> <u>Lang</u>	<u>Story</u> <u>Construct</u>		
Younger Group									
1	M	8;4	3	4	11	9	7	100	--
2	M	8;8	3	9	9	12	8	85	107
3	M	8;10	3	9	12	9	6	67	120
4	F	8;11	3	14	11	10	9	100	112
5	M	9;0	3	7	7	7	7	100	108
Older Group									
6	M	10;2	4	8	11	10	10	94	115
7	M	10;5	4	4	8	7	10	85	81
8	M	10;11	4	6	--	12	11	76	--
9	M	13;4	6	2	4	2	3	67	97
10	M	14;5	8	8	4	4	10	70	101

The test results revealed that all but one participant performed in the average range for nonverbal intelligence (TONI) with missing data for two participants. Six participants showed standard scores in reading in the average range, while eight ranged from very poor to below average. All but two of the participants produced written stories

in the average range for Story Construction, while four ranged from very poor to below average for Contextual Language. Three students scored poor to below average for written sentence combining while five scored very poor to below average for oral sentence combining.

Test Battery

The GORT-4 (Wiederholt & Bryant, 2001) assesses reading accuracy, fluency, and comprehension using oral reading of passages and responses to comprehension questions. The GORT-4 yields two standard scores (Fluency and Comprehension) that are combined into an overall reading quotient.

The Sentence Combining subtest of the TOLD I:3 (Newcomer & Hammill, 1997) is designed to assess complex syntactic abilities by orally combining two sentences into the shortest form possible that includes all key elements in the stimulus sentences.

The TONI-2 (Brown, Sherbenou, & Johnsen, 1990) is a measure of intelligence that does not rely on spoken language. It requires subjects to solve increasingly more complex problems by completing a visual pattern in which parts of the pattern are missing.

The TOWL-3 (Hammill & Larsen, 1996) evaluates skills of writing for children from 7;0 years through 17;11 years of age. The contextualized subtest was given which measures language (syntax, punctuation, spelling) and story construction within stories generated in response to a picture stimulus. One of the contrived subtests, Sentence Combining, was administered to all subjects. Two different forms of the test were given at pre-test and post-test.

Materials

GO Charts. A series of Hierarchical Graphic Organizers (i.e., GO Charts) were used across eight weeks of intervention. Each GO Chart was used to generate the writing for the week (i.e., two sessions) and contributed to the theme of similarities and differences between brown bears and polar bears. The theme corresponded with a focus on bears in the stories each group read. The GO Charts included information about topics such as comparing physical appearance, habitat, diet, and care of young. An example GO Chart is shown in Figure 2.

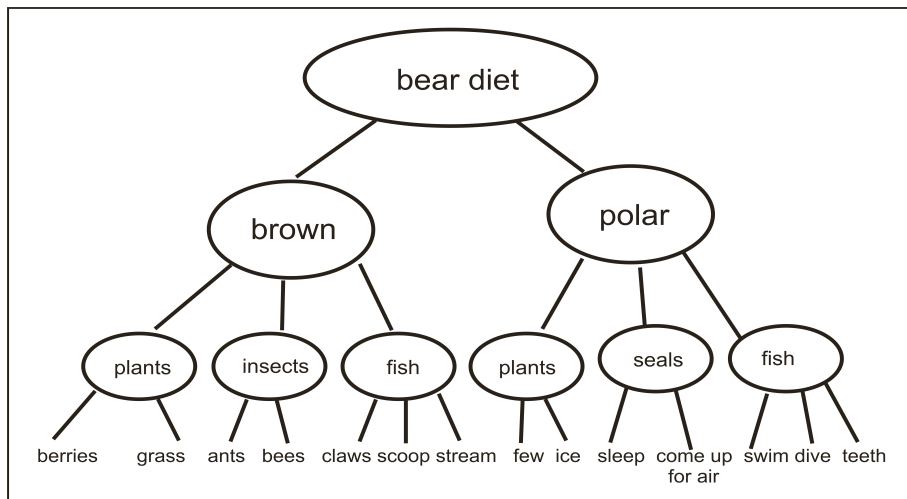


Figure 2. Example of GO Chart Used to Organize Information for Writing

Probes. Two pairs of sentences were presented each week as a sentence combining probe. For one set, both sentences were simple, following a NP + VP + Ob pattern. The object of the sentence varied, including a NP, PP, Adverb or Adjective. The second set was composed of more complex sentence structures. The children were instructed to combine the sentences by generating two written sentences that combined each pair. The two sentence pairs were read to the subjects while they followed along.

They then wrote the combined sentences with no assistance or feedback. The probe was discontinued after six minutes.

The probes were scored using a 0-1 scale, with 0.5 credit possible. The following rubric was used to score the sentences generated by the subjects:

Score	Criteria
0	Did not combine sentences in any way Key constituents of one or more sentences missing No added conjunctions or relative pronouns Re-copied sentences verbatim
.5	Combined sentences, but not with the appropriate conjunction or relative pronoun Combined sentences appropriately, but key constituents of one or more sentences missing
1	Combined sentences using adverbial clause or relative clause All key constituents of both sentences present

Procedure

The concepts to be explored were prepared ahead of time, but a blank GO Chart was presented on a white board. Illustrated picture books were used to explore the planned concepts interactively with the children. The adult then prompted the children to determine what key concepts should be written on the GO Chart and where they should be placed. Once constructed, the adult prompted the children to generate a sentence by asking children to combine key words into a complete sentence. For example, as the

adult pointed successively to the words “diet” “brown bear” “plants” “berries” “grass” the children generated a sentence such as “The diet of the brown bear includes plants like berries and grass.” Several children were invited to generate a sentence using the key words, and assisted by the adult as needed. The procedure would then be repeated using the next nodes on the GO Chart.

Following the oral practice creating sentences using the GO Chart, each child would begin to write his passage using the GO Chart. During this time, the clinician would provide feedback to the child on the syntax, word choice, punctuation, or spelling. Children with less developed writing skills would be helped to write a sentence using only a few key concepts. More advanced writers would be encouraged to write a more challenging sentence, such as one that compared and contrasted the brown bear and polar bear.

Data Analysis

Following seven weeks of intervention, alternate forms of the TOLD oral sentence combining and the TOWL writing subtests were administered. Results were subjected to a two-way analysis of variance to compare gain scores between pre-test and post-test for age groups for the oral sentence combining and writing measures.

Inter-rater consistency for the probe measures were determined by comparing scores of a doctorate student from the Department of Communication Sciences and Disorders at LSU and the scores of the experimenter who independently scored all daily probes for all subjects. Inter-rater agreement was 84.8%. Disagreements in scoring were resolved using consensus between the two scorers.

RESULTS

For each dependent variable a 2 (age group) by 2 (time of measurement) mixed model analysis of variance was calculated. If Mauchly's Test of Sphericity indicated that the error covariance matrix of the dependent variable was proportional to an identity matrix, the uncorrected F values were used. Otherwise, the Greenhouse-Geisser correction was applied.

Oral Sentence Combining

The mean pre-test and post-test scores for the younger and older subjects are profiled in Figure 3 for Oral Sentence Combining. At pre-test the younger group produced a mean oral sentence score of 8.60 (standard deviation = 3.65) compared to the older group's mean of 5.60 (standard deviation = 3.38). The younger group improved by 2.0 to a mean of 10.6 (standard deviation = 3.65) while the older group improved by 1.2 to a mean of 6.8 (standard deviation = 2.59).

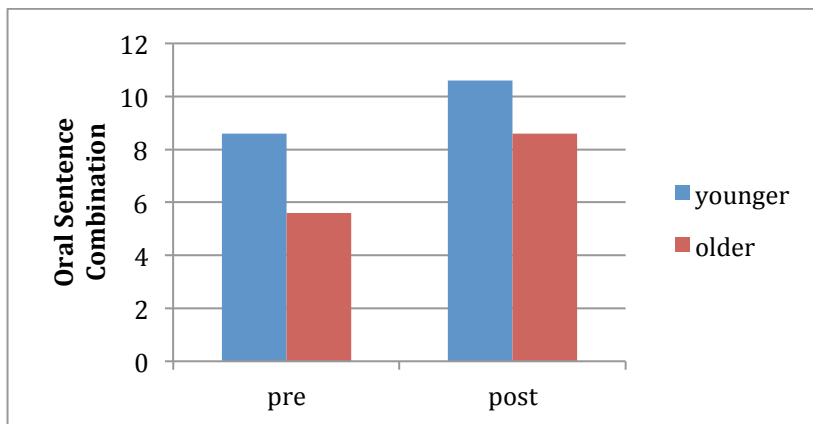


Figure 3. Mean Oral Sentence Combining Scores by Age and Time

The significant effect for time of measurement ($F = 7.642$, $df 1,8$, $p < .05$) showed that the children, as a group, improved from pre-test to post-test. The non-significant

interaction of subject group by time of measurement ($F < 1.0$, $df\ 1,8$, $p < .509$), showed that there was no difference in the improvements of one group compared to the other.

Written Sentence Combining

The mean pre-test and post-test scores for the younger and older subjects are profiled in Figure 4 for Written Sentence Combining. At pre-test the younger group produced a mean oral sentence score of 10.0 (standard deviation = 2.0) compared to the older group's mean of 5.40 (standard deviation = 4.22). The younger group did not improve at post-test (mean 10.6, standard deviation = 3.65) while the older group improved by 0.8 to a mean of 6.2 (standard deviation = 4.20). The non-significant effect for time of measurement ($F = 1.000$, $df\ 1,0$, $p < .347$) showed no group gains from pre-test to post-test. The non-significant interaction of subject group by time of measurement ($F = 1.000$, $df\ 1,0$, $p < .347$) showed that there was no difference in the improvements of one group compared to the other.

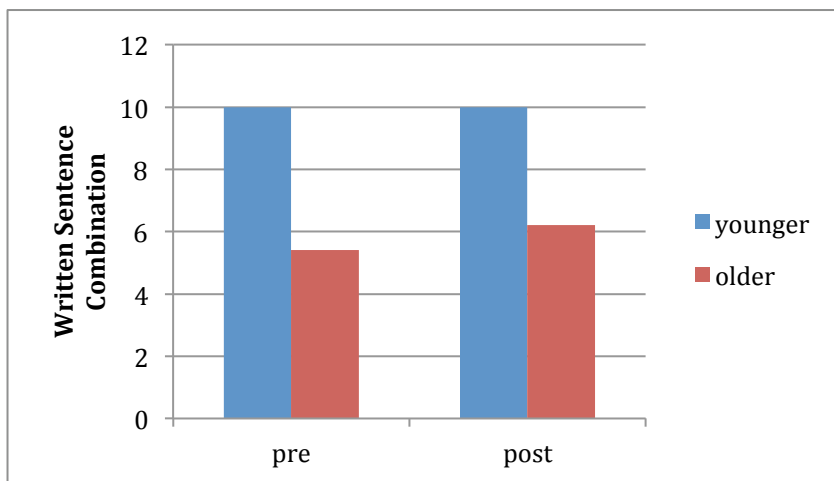


Figure 4. Mean Written Sentence Combining Scores by Age and Time

Table 2 profiles the scores for the two weekly written sentences obtained from probes. The total number of sentences combined using conjunctions “and,” “or,” or “but”

are tallied under “C” while those sentences that formed adverbial clauses (i.e., “because,” “so,” “since”) are tallied under “A.” No instances of the use of relative clauses occurred. Totals are provided for individuals and by groups.

Contextual Language

Table 3 provides an analysis of the syntactic complexity of sentences generated using the Hierarchical GO Chart with feedback and prompts provided. All ten subjects produced a complex syntactic structure, either a sentence using one a simple or adverbial conjunction, or a relative pronoun. Seven of the ten subjects produced at least one relative clause. Four of these subjects were from the younger group, and only three were from the older group. The younger group produced more conjunctions, relative, and adverbial clauses, thus producing a greater number of complex syntactic structures overall. The stories were also graded using the TOWL rubric and scored using the standard score to provide a comparison to the subject’s story with support and without support. The rubric scores indicate that if the sentences would have been spontaneously generated by the subject, both the Contextual Language and Story Construction would have scored in the average to superior range.

The scaffolded story was compared to the spontaneously generated stories generated at pre-test and post-test. The mean pre-test, post-test, and scaffolded scores for the younger and older subjects are profiled in Figure 5 for Written Contextual Language, measured within a written narrative. At pre-test the younger group produced a mean standard score of 9.4 (standard deviation = 1.81) compared to the older group’s mean of 7.00 (standard deviation = 4.12). The younger group did not improve at post-test (mean

9.4, standard deviation = 1.67) while the older group decreased their standard score by 1.8 to a mean of 6.4 (standard deviation = 1.81).

Table 2
Profile of Syntactic Structures, Contextual Language, and Story Construction Scores for Final Written Stories Generated Using GO Charts and Adult Prompts and Feedback by Age.

Subject	Total	<u>Conjunctions</u>		<u>Clauses</u>		<u>Rubric Scores</u>	
		Types		Type		CL	SC
		<u>Coord</u>	<u>Corr</u>	<u>Rel</u>	<u>Adv</u>	<u>SS</u>	<u>SS</u>
1	4	3	1	0	1	13	12
2	3	3	0	1	4	17	15
3	0	0	0	1	0	13	12
4	7	7	0	2	1	15	13
5	1	1	0	1	1	12	11
Y	<u>15</u>			<u>5</u>	<u>7</u>		
6	3	3	0	0	0	13	12
7	4	4	0	1	1	13	10
8	1	1	0	0	0	11	11
9	2	2	0	1	0	8	9
10	0	0	0	1	3	13	13
O	<u>10</u>			<u>3</u>	<u>4</u>		

The mean of the younger group for the scaffolded story was 14.0 (standard deviation = 2.0), while for the older group the mean was 11.6 (standard deviation 2.19).

Table 3
Profile of Conjunctions (C) and Adverbial Clauses (A) Produced by Younger and Older Subjects in the Weekly Written Sentence Combining Probes.

WRITTEN SENTENCE COMBINING PROBES																
	Week 1		Week 2		Week 3		Week 4		Week 5		Week 6		Week 7		Totals	
	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	C	A
1	0	0	0	0	--	--	0	0	0	0	0	0	0	0	0	0
2	0	.5	.5	.5	.5	.5	.5	.5	0	.5	.5	.5	1	0	10	1
3	.5	.5	.5	.5	--	--	.5	0	.5	.5	0	0	--	--	7	0
4	0	0	0	0	1	--	0	0	0	0	0	0	0	0	0	1
5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	<u>14</u>	<u>0</u>
	C	A	C	A	C	A	C	A	C	A	C	A	C	A		
Y	5	0	6	0	4	1	5	0	5	0	4	0	2	1	31	2
6	.5	.5	.5	.5	--	--	.5	1	0	.5	1	0	1	0	6	3
7	.5	.5	0	.5	1	1	.5	.5	0	0	1	0	.5	.5	7	3
8	.5	.5	--	--	--	--	.5	1	0	--	0	0	0	1	3	2
9	--	--	--	--	--	--	0	0	.5	.5	1	.5	.5	0	4	1
10	1	.5	0	0	1	.5	0	0	1	1	1	0	0	.5	<u>3</u>	<u>5</u>
	C	A	C	A	C	A	C	A	C	A	C	A	C	A		
O	7	1	3	0	0	3	4	2	3	2	0	4	4	2	23	14

A significant effect for time of measurement ($F = 28.98$, $df\ 1,0$, $p < .001$) was found. Pairwise comparisons between the stories generated by the pre-test, post-test and

the scaffolded stories were conducted, adjusted for multiple comparisons using Bonferroni. Results indicated the only significant differences were for the scaffolded stories compared to the pre and post stories. The non-significant interaction of subject group by time of measurement ($F = 1.00$, $df 1,0$, $p < .478$), showed that there was no difference in the improvements of one group compared to the other.

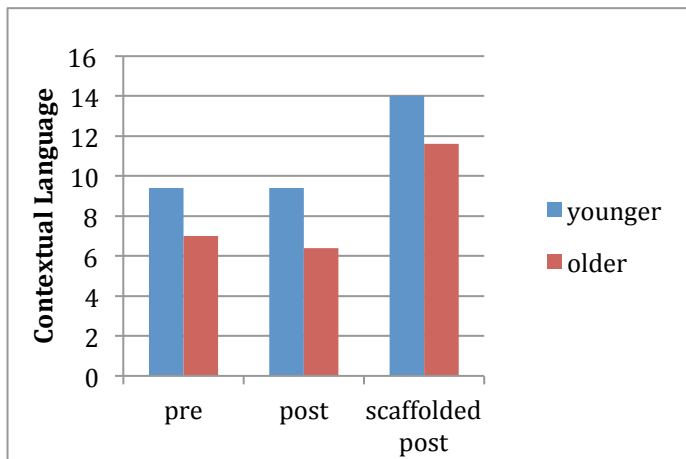


Figure 5. Mean Written Contextual Language Scores by Age and Time

Story Construction

The mean pre-test and post-test scores for the younger and older subjects are profiled in Figure 6 for Written Contextual Language, measured within a written narrative. At pre-test the younger group produced a mean standard score of 7.4 (standard deviation = 1.14) compared to the older group's mean of 8.8 (standard deviation = 3.27). The younger group increased their score by 1.0 at post-test (mean 8.4, standard deviation = 1.34) while the older group did not change (mean of 8.8, standard deviation = 1.78). In addition, the final story generated from the Hierarchical GO Chart with scaffolding from the clinician was graded using the TOWL rubric and scored using the standard score to provide a comparison to the subject's story with support and without support. The mean

of the younger group for the scaffolded story was 12.4 (standard deviation = 2.0), while for the older group the mean was 11.6 (standard deviation 1.73).

A significant effect for time of measurement ($F = 37.26$, $df\ 1,0$, $p < .0001$) was found. Pairwise comparisons between the stories generated by the pre-test, post-test and the scaffolded stories were conducted, adjusted for multiple comparisons using Bonferroni. Results indicated the only significant differences were for the scaffolded stories compared to the pre and post stories. The non-significant interaction of subject group by time of measurement ($F = .929$, $df\ 1,0$, $p < .430$), showed that there was no difference in the improvements of one group compared to the other.

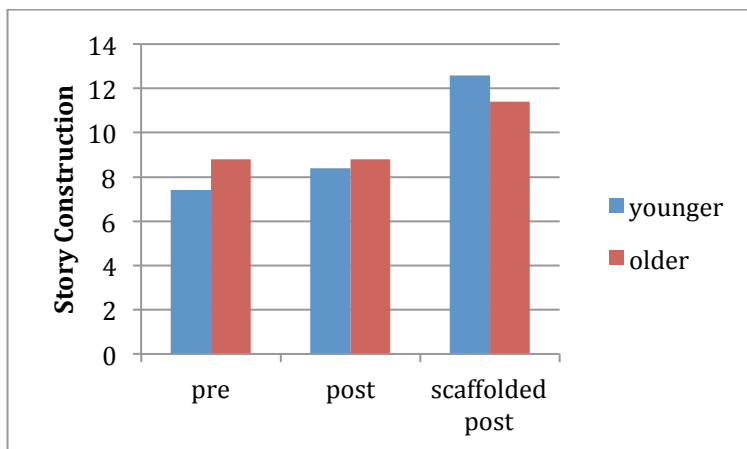


Figure 6. Mean Written Story Construction Scores by Age and Time

Summary

The subjects significantly increased their standard scores in oral sentence combining but did not change their written language scores for sentence combining, contextualized language, or story construction. Analysis of daily probes showed more participants producing adverbial clauses during the final two weeks, particularly in the older grade levels.

DISCUSSION

Learning to write is a challenge for children with language based learning difficulties, with syntactic complexity one of the primary areas of weakness. This study explored whether Hierarchical Graphic Organizers (GO Charts) could be used as a tool to increase syntactic complexity and discourse structure. The GO Charts were used during intervention to provide a scaffold to students, enabling them to generate complete sentences and to combine sentences in oral practice prior to writing. The GO Chart also remained in view during writing, providing visual support for producing more complex written sentences, as well as for organizing the sentence into discourse.

Effectiveness of GO Charts

The scaffolded stories written by the subjects using the GO charts with prompts and feedback from the adult did support the first question of this study. The subjects were able to generate compound and complex sentences that included relative clauses as well as coordinating, subordinating, and correlative conjunctions. The sentences were significantly more complex than those spontaneously produced in the written stories at post-test. Subjects did not generate relative clauses during spontaneous written narratives, only simple conjunctions were generated in this condition. In addition, results of the ANOVA revealed higher complexity of the scaffolded stories.

Syntax

The findings of this study suggest that the GO Charts may be an effective tool for increasing syntactic complexity in spontaneously generated isolated sentences. Significant gains were made in oral sentence combining from pre-test to post-test, with

both younger and older subjects making comparable gains. This is an expected finding because oral language development precedes written language development (Loban, 1976). Written language requires processes such as spelling and handwriting not present in oral language. Writing is also much slower than speech and so the intended sentence must be retained in memory while the student writes and simultaneously tries to spell, punctuate, and print. Oral language is free of these constraints and so changes are likely to initially appear in this mode. However, age level differences were not found. The changes in the younger subjects were comparable to those of the older students.

While five subjects (two younger, three older) made gains in written sentence combining, five did not, resulting in non-significant gains for both groups. Older subjects made relatively greater change than the younger subjects but not significantly so. Four of the five who made written language gains had also made gains in oral sentence combining, supporting the expectation that oral changes would develop in conjunction with written changes. Parallel changes also were found in the daily written sentence combining probes when the subject's most complex structures were considered. During the first two weeks, seven of the subjects from both high and low groups produced sentences with conjunctions and only one subject in the high group produced an adverbial clause. During the last two weeks, five of the subjects from both the high and low groups produced sentences with conjunctions. One of the subjects in the low group and four of the subjects in the high group produced an adverbial clause (two subjects from the low group produced essentially no complex structures across all seven probes). In contrast, all five of the older subjects produced adverbial clauses as their most complex structure during the final two probes. These findings are consistent with the differences between

3rd grade writers who are just starting to be explicitly taught and expected to use conjunction in their writing compared to older students who use a wider variety of complex sentence types (Gregg et al., 2007; Loban, 1976). Even when taught adverbial clauses, the younger children were not able to use them, while all of the older subjects began to produce them.

When spontaneous narratives were examined, differences in the production of complex sentences were not found. Neither group showed gains in the contextual language score which measures change at the sentence level within the story. The spontaneous narrative is a more demanding task. In both the oral and written sentence combining tasks, the basic sentences are provided and only the transformed sentences must be generated by the subject. In spontaneous writing, the subject must generate a topic that fits the picture and generate a series of sentences to develop the topic. The vocabulary, syntax, spelling, and punctuation for each sentence must be generated by the writer without the prompts provided by the GO Chart.

Discourse

Hierarchical GO Charts display a possible discourse structure for the writer. The nodes display the topic, main ideas, subordinate ideas and details. The discourse is generated as one sentence is completed and the next related idea is generated. During intervention, the GO Chart was visible throughout the writing process. In addition, a clinician provided prompts and feedback as the subject wrote. This scaffolding resulted in narratives that were written at a level significantly more difficult than the child could produce independently within the session. The sentences within the scaffolded narratives

also were produced at a level significantly more difficult than those in the child's spontaneously generated narratives at pre-test or post-test.

These findings suggest that the Hierarchical GO Charts can be used effectively to enable the child to generate both sentences and discourse structures. However, the seven week intervention period was not sufficient for the child to independently produce more elaborated narratives containing complex sentences. Gains were not significant for either age group in the sentence complexity within spontaneously generated narratives or for story construction. However, differences in the number and complexity of syntactic structures were noted between the groups. The younger group generated a higher number of overall syntactic structures with four of the five subjects producing at least one relative clause. Only three of the subjects in the older group produced a relative clause in the scaffolded condition, and they generated a lower number of complex syntactic structures overall. However, the older group produced more complex structures in daily probes and sentence combining. This suggests that fourth grade subjects were less able to generalize instruction with complex structures into sentence combining tasks or spontaneous writing. Even with greater exposure, they were unable to use these sentence types.

Limitations

The proposed study had several limitations. There were no control groups to which to compare the discourse structure and syntactic complexity of the experimental groups. Thus, it cannot be conclusively shown that the GO charts prompted the changes in oral sentence combining. While the groups differed on grade level and writing abilities, other confounding variables including reading instruction that also occurred during the weekly sessions may have contributed to the findings. In addition, there was

no scaffolded writing sample collected at pre-test to compare to the final scaffolded stories written at post-test. A pre-test scaffolded writing sample would have provided a better baseline for students' discourse structure and syntactic complexity under scaffolded conditions. Changes in the ability to write under scaffolded conditions might reveal changes before appear in spontaneous writing.

The subjects were not provided with a model sentence introducing the probes each week, thus generalization to the probes did not occur and subjects continued to make errors. The sentences generated using the GO charts should have been better controlled to include adverbial and relative clauses with specific feedback following the probes. The writing generated using the graphic organizers was expository nonfiction but the TOWL assesses written narrative. Several studies show that genre does make a difference (Snow & Kim, 2010) and an assessment using the same discourse structure may have provided a better measure of change. While the graphic organizer was explored as a group so that everybody had the same input, the writing was assessed by a different clinician for each subject. The complexity of the modeled sentences, prompts during writing, and corrective feedback differed between dyads. This was determined in part by the individual writing skills of each subject as well as the skill of the clinician and added variability.

Future Studies

Future research should include control groups and manualized instruction to explore the use of graphic organizers as a tool for generating complex sentences and discourse structures. The manualized instruction would control for the number of

dependent clauses taught and the difficulty of the vocabulary and sentence length, as well as the discourse structure.

This study took place within a clinical program that required participants to be provided instruction throughout the session. Future research should examine spontaneous writing generated using the graphic organizer without the assistance of the adult. Additional research should examine writing resulting from a graphic organizer constructed either independently or with support from the adult as a pre-writing or drafting activity. The current study examined the effects of a specific type of graphic organizer that was completed by prompting the children to generate key concepts that were prepared by the adult prior to the session. However, if the student is an active participant in the creation of the type, layout, structure, and key concepts of the graphic organizer, instead of generating pre-determined specific key concepts, results may yield greater improvements in writing and syntactic complexity. Additionally, future research should compare hierarchical graphic organizers with different types of graphic organizers for the same activity. The layout and structure of the graphic organizer may influence the effects on student's spontaneous written discourse.

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VITA

Laura Delrose was born and raised in Palm Springs, California. She received a Bachelor of Arts degree in Interdisciplinary Studies with concentration in psychology, linguistics, and speech and hearing sciences at the University of California, Santa Barbara in 2009. Her love for research began when she completed an undergraduate thesis project under the guidance of Dr. Janis Costello Ingham entitled *Whole Language: What Is It? Is It Effective in Reading Instruction and Intervention*. This paper reviewed Dr. Jan Norris' research of the whole language theory in depth.

Ms. Delrose moved across the country to Baton Rouge, Louisiana to continue her educational journey to enroll in the master's program in communication sciences and disorders at Louisiana State University and Agricultural and Mechanical College. She decided to complete a graduate thesis project under the guidance of Dr. Norris in partial fulfillment of the requirements for her Master of Arts degree, to be awarded May 2011. Ms. Delrose was a speaker at the annual American Speech-Language-Hearing Association (ASHA) convention in November 2010, presenting ways that graphic organizers can be used in language intervention as well as articulation and fluency. Upon graduation, Ms. Delrose intends to fulfill her educational endeavors by continuing at LSU to receive a doctoral degree in communication sciences and disorders and continue research exploring language-based learning disorders under the guidance of Jan Norris, Ph.D.