AN EXAMINATION OF ERRORS OF COHERENCE IN ADOLESCENT
SENTENCE COMBINING

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TABLE OF CONTENTS

LIST OF TABLES

ABSTRACT

Young adolescents should be able to write organized multi-paragraph compositions that develop a central idea and unfold in logical and sequential order, unified through the use of transitional words and phrases. In other words, the compositions should not just consist of a string of related sentences, but represent a dynamic text that has coherence. It is important that speech-language pathologists develop quick and reliable methods for assessing coherence to aid in making data driven decisions and progress monitoring consistent with principles of Responsiveness to Intervention. Yet, the holistic quality of coherence makes it difficult to assess, both within a composition and developmentally. The purpose of this study was to determine a) the ability of students to produce sentences that maintain coherence across the continuum of grade levels, and b) whether or not adolescents would produce fewer errors of coherence on sentence combining exercises following six weeks of Embedded Language Lessons (ELL) instruction as compared to Discrete Language Lessons (DLL) instruction. First, 115 students in grades 4-7 completed the Sentence Combining subtest of the Test of Written Language, Third Edition (Hammill & Larsen, 1996). Four of the test items required adherence to three different coherence relations using Kehler's (2002) classifications. Those subtest items were examined to assess the students' ability to create sentences that maintain coherence across the continuum of grade levels. Second, the two grade levels for which posttest data was returned were then examined for changes in coherence following a six-week classroom-based intervention designed to increase meta-awareness of coherence in text structure. Results of this study revealed evidence of a developmental progression in the ability to represent these coherence relations in written language, with the youngest students indicating the correct coherence relation in 25 to 45% of their responses and the oldest students in 41 to 79% of their responses. Only one significant group difference was found at posttest when the individual relations were considered.

A significant improvement in contiguity was observed for the fifth-graders in the ELL group. No group differences were observed with respect to the cause-effect relation or with parallel structure.

INTRODUCTION AND LITERATURE REVIEW

Young adolescents should be able to write compositions that are directed toward others, learning to persuade, entertain, and inform. They should write organized multi-paragraph compositions that develop a central idea. The ideas and events should unfold in logical and sequential order. Ideas should be elaborated, with facts, examples, or specific details strategically included. Most importantly, the points and ideas should be unified through the use of transitional words and phrases (Calkins, 2003; LA Department of Education, 2004). In other words, the compositions are not just a string of related sentences, but rather a dynamic whole that has coherence. Unfortunately, many students struggle to achieve this level of writing.

Coherence is a quality of comprehensible or understandable language. It is the result of many different factors that interact to make each word, phrase, sentence, and paragraph contribute to the meaning of the composition as a whole. However, this holistic quality makes coherence difficult to assess, both within a composition and developmentally. It also makes coherence difficult to both teach and learn (Connor 1990; Connor & Johns 1990).

Speech-language pathologists (SLPs) are becoming increasingly more involved in writing, both in their own interventions and as language consultants to classroom teachers in the Response to Intervention (RtI) model (ASHA, 2001; Ehren, 2009; Ehren & Nelson, 2005; National Joint Committee on Learning Disabilities, 2005; Nelson, 2003, 2007; Nippold, 2010; Troia, 2005). However, the focus of the SLP often is on syntax or vocabulary with little regard to coherence (Nelson, 2007; Nippold, Mansfield, Billow, & Tomblin, 2008, 2009). It is important that SLPs develop interventions that expand the focus from sentence-level grammar to include semantic-pragmatic features that produce coherence. It is equally important to develop

reliable and quick methods for assessing coherence to aid in making data driven decisions and progress monitoring consistent with principles of RtI.

This study is an initial attempt to address these needs by examining written sentences from a data set collected by Dinkins (2006) that includes pre- and posttest samples from students in grades 4 through 7. Of interest were sentences selected from the sentence combining subtest of the Test of Language Development, Third Edition (TOWL-3) (Hammill & Larsen, 1996) that represent three different coherence relations. The pretest corpus from this data set was used to examine the ability to produce sentences that maintain coherence across the continuum of grade levels. The two grade levels that also had posttest data (i.e., grades 5 and 7) were then examined for changes in coherence following a six-week classroom-based intervention designed to increase meta-awareness of coherence in text structure.

Cohesion, Coherence, and Grammar.

Grammar is a set of structural rules that bind words into sentences. The rules of grammar govern the composition of clauses, phrases, and words within sentences. It includes syntax, or the linguistic structures above the word level, but also the morphological structure of words (Huddleston & Pullum, 2002).

Cohesion includes grammar but also the lexical relationships within a sentence or larger text. This interface of sentence structure and vocabulary results in meaning. Thus, cohesion can be described as links that hold a text together and give it meaning. The words within a sentence should be linked through structure and meaning as well as the sentences within larger units such as paragraphs or stories (Halliday & Hasan, 1976). The links can be objectively counted, categorized and verified.

Coherence, on the other hand, has to do with the sense of the passage. It refers to the extent to which the passage is communicative. Coherence is more dependent on context and is determined by how well the reader/listener is able to infer the writer's/speaker's communicative intentions.

A text can be grammatical and cohesive but lack coherence. For example, the sentences below are grammatical, and they have cohesive ties that link them. But the passage is incoherent because we can't imagine a context in which it makes sense.

I have a cat. Cat rhymes with hat. But hats can mess your hair. Messy hair is a sign of poor grooming even though a sign can show you the way home.

A text could also lack complete grammatical structure and have no cohesive ties but still be coherent, as in the following:

Speaker A: *The doorbell.*

Speaker B: *I'm feeding the baby.*

Speaker A: *I don't have a shirt.*

These three sentences seem to be on different topics except one could easily imagine a context where they would make sense. Despite the sentence fragment and absence of vocabulary or pronouns that link to previous sentences, the text is coherent. Thus, grammar, cohesion, and coherence are different aspects of language that each contribute to communication. Because cohesion is more objective and context-independent than coherence, it has been used as a measure of good writing or speaking (Cain, 2003; Liles, 1989; Liles, Duffy, Merritt, & Purcell,

1995; Norris & Bruning, 1988; Peterson & Dodsworth, 1991; Shapiro & Hudson, 1991; Stein &

Glenn, 1979).

Cohesion and Grammar.

Halliday and Hasan (1976) describe cohesion as occurring "where the interpretation of

some element in the discourse is dependent on that of another" (p. 4). To link larger units of

Table 1

The Five Primary Classes of Cohesive Ties Proposed by Halliday and Hasan (1976)

Cohesive Tie	Description	Example
Reference	The use of referring expressions to indicate something or someone who has already been mentioned or will be mentioned in the discourse	Sherry dropped a book on her foot, and now *it* is sore.
Substitution	The replacement of one element for another without the use of personal pronouns	He caught two trout, but *one* got away.
Ellipsis	The deletion of an element when the elided element can be readily inferred	Who dropped a book on her foot? Sherry (~~dropped a book on her foot~~)
Conjunction	The use of conjunctions between units of discourse to demonstrate a meaningful pattern between those units of discourse	John likes fishing, *and* Sherry likes reading.
Lexical Reiteration and Collocation	The use of vocabulary that is similar in meaning or is used frequently in particular contexts to demonstrate cohesion in discourse	John caught a *trout,* a *bass*, and three *mackerel* on his *fishing* trip.

information at the discourse level, students' comprehension and use of cohesive devices, or "cohesive ties," is crucial in signaling relationships between ideas. Halliday and Hasan (1976) specified five primary classes of cohesive ties which are described in Table 1.

Lexical reiteration and collocation are semantic-driven forms of cohesion, that is, they are largely dependent on vocabulary knowledge. The reader's knowledge of the vocabulary influences his overall construction of the meaning of the text as a whole. The other cohesive ties are syntax-driven, that is, knowledge of grammar is necessary to accurately interpret the text. Knowledge of grammatical forms, such as personal pronouns and demonstratives, allows one to accurately identify the antecedent of the referential tie. The reader must be aware of constituents and phrase structure rules to accurately delete or replace constituents to use ellipsis or substitution cohesive ties. The use of conjunctive cohesive ties requires knowledge of conjunctive relations. The four categories of conjunctive relations suggested by Halliday and Hasan (1976) are shown in Table 2.

It is important to note that conjunction selection does not necessarily determine the conjunctive relationship. There are individual conjunctions that can be used to represent various conjunctive relationships. For example, *and* can be used to represent additive, causal, or temporal relationships as illustrated in examples (a), (b), and (c) below:

a. Sherry dropped a book on her foot, *and* John went fishing. (additive)
b. Sherry dropped a book on her foot, *and* it is sore. (causative)
c. John caught some fish and cooked them for dinner. (temporal)

Table 2

Conjunctive relations proposed by Halliday and Hasan (1976)

Conjunctive Relation	Description	Conjunctions frequently used
Additive	Used to add a portion of text to another portion of text to improve or alter it	and, or, furthermore
Adversative	Used to express a relationship that is contrary to an expectation between different parts of the text	but, yet, however
Causal	Used to express a cause-and-effect relationship between portions of the text	so, then, and
Temporal	Used to express a temporal sequence of the events in portions of the text	then, and, next

It would appear that although the reader can easily infer the conjunctive relationships represented in examples (a)-(c), the relationship is not determined by the conjunction alone. The reader must draw upon information outside of the text. They must draw upon their general knowledge and personal experiences from which they can assume predictable outcomes and sequences (e.g., *scripts* and *schemata*) to determine the relationships between the portions of text. For example, most readers have a general script for a fishing trip. Because of this background knowledge, the reader is unlikely to interpret example (a) as representing a causative or temporal relationship between *Sherry dropped a book on her foot* and *John went fishing* since a typical fishing trip script does not involve dropping books. The reader is left to infer that the two units of text are unrelated; one unit is simply presented in addition to the other. Similarly, a reader *is* likely to infer a causative relationship in example (b) since a *drop-heavy-object-on-foot* schema would likely include resultant soreness of that foot. In example (c), the reader would

presumably infer the temporal relationship of first *going fishing* and then *cooking fish* later because of the fishing trip script. In the interpretation of many conjunctive relations, cohesion is dependent on coherence.

Coherence and Grammar.

Van Dijk (p. 93) describes text coherence as a semantic property of discourse formed through the interpretation of each individual sentence relative to the interpretation of other sentences. Coherence is necessary for a reader to interpret a series of sentences or clauses. The reader must be able to infer whether or not a relationship exists between the sentences or clauses, as well as identify the nature of those relationships. Coherence is, consequently, not established when the reader cannot identify or infer relationships within the passage.

Several linguists claim that the coherence of a text arises from the coherence relations between the units of information within the text (Hobbs, 1979; Mann & Thompson, 1988; Sanders, Spooren, & Noordman, 1993). Without coherence relations, the units of text would be perceived as random strings of clauses or sentences. There are varying accounts for the classification of coherence relations (e.g., Hobbs, 1985; Knott & Dale, 1994; Mann & Thompson, 1988; Sanders, Spooren, & Noordman, 1992); however, the classifications proposed by Kehler (2002) will be discussed here.

Kehler (2002) adapted and modified coherence classifications proposed by the philosopher, David Hume (1748) and linguist, Jerry Hobbs (1990) in forming a theory of coherence relations that include three broad classes: cause-effect, contiguity, and resemblance. Each of the classes arises from the constraints imposed by each relation and the inference process that determines which relation will be used.

<u>Cause-effect Relations.</u>

Cause-effect relations are determined by coherence-driven theories, which use implicature and world knowledge to establish relations. The relations of result, explanation, violated expectation, and denial of preventer are subsumed in the category of cause-effect. Combining sentences that are intended to follow a logical sequence requires the writer to plot a line of implicature connecting two propositions P and Q contained in the original source sentences. For example, consider combinations of this pair of source sentences noted in Table 3, *Sherry's foot is sore* and *She had dropped a book on it.*

Table 3

Cause-Effect Relations

Relation	Presuppose	Example	Implication
Result	$P \rightarrow Q$	Sherry dropped a book on her foot *and* (now) it's sore.	Sherry dropped a book on her foot, and, as a result, her foot is sore.
Explanation	$Q \rightarrow P$	Sherry's foot is sore *because* she dropped a book on it.	Sherry's foot is sore as a result of dropping a book on it.
Violated Expectation	$P \rightarrow \neg Q$	Sherry dropped a book on her foot, *but* it's *not* sore.	Sherry expected that dropping a book on her foot would result in soreness, but that expectation was violated.
Denial of Preventer	$Q \rightarrow \neg P$	Sherry's foot is *not* sore, *even though* she dropped a book on it.	Sherry's foot is fine despite her expectation that dropping a book on it would make it sore.

The most logical and natural combinations make use of the result and explanation relations. It is fair to assume that the reader has the prior knowledge that dropping items on one's feet may result in soreness. This prior knowledge leads them down the path of implication that connects the pair of propositions in the most logically ordered manner.

Contiguity Relations.

Contiguity relations are related to attention-driven theories. The word selection of the speaker or writer assumes particular event-based knowledge of the listener or reader. The relation of occasion is the mechanism by which the events noted are congruent with or depart from the established schemata that are assumed to be held by both interlocutors. As Kehler (2002) explains, "Occasion can be seen as a mechanism for communicating a complex situation in a multi-utterance discourse by using states of affairs as points of connection between partial descriptions of that situation" (p. 22). For an occasion to be coherent, the reader must have adequate background knowledge related to that occasion from which he can construct a schema or script. The reader's schemata or scripts provide a foundation upon which the reader determines the likelihood or improbability of an event. In example (d), the reader's *fishing trip script* requires knowledge of the need for a fishing license to infer that the second sentence is an explanation of why John did not go fishing.

d. John did not go fishing. He needs a new license.

Without this knowledge, the reader is likely to interpret these two sentences as a series of unrelated facts.

<u>Resemblance Relations.</u>

Resemblance relations are determined by parallelism theory. "Parallelism is characterized in terms of a co-recursion in which the similarity of properties is defined in terms of the similarity of arguments, and the similarity of arguments is defined in terms of the similarity of properties" (Hobbs & Kehler, 1997, p. 395). Relations classified under resemblance must represent entities in one argument that correspond to entities in the other argument, either through similarity or contrast. The reader perceives a text as coherent under this relation when he can infer a commonality between the two arguments presented. The most conventional type of resemblance relation is the parallel relation. In the parallel relation, the inferred commonalities between the two arguments are in focus, as in example (e):

e. Sherry drops books, and John catches fish. (Parallel)

In example (e) the conjunction, *and*, helps to signal the parallel relation. When the focus is on the differences between the two arguments instead of the commonalities, the resemblance relation of contrast is perceived by the reader, as in example (f), where the conjunction, *but*, helps to signal the contrastive relationship:

f. Sherry drops books, but John catches fish. (Contrast)

The primary difference between the parallel and contrast relations is the focus of the author. The writer may intend to highlight the similarities between two entities or events, or the differences between them. He indicates his focus to the reader through his use of conjunctions. In the next resemblance relation, exemplification, the reader derives coherence between two clauses when recognizing that the first clause is a general statement and the second is an example of this general statement, as in example (g):

10

g. Men love being outdoors; (*for example*,) John is fishing right now. (Exemplification)

Generalization is similar to exemplification in that one clause represents a general statement and the other a specific example that is representative of the general statement, but the order is reversed. Example (h) below demonstrates the reciprocal nature of these two relations:

h. John is fishing right now; (*in general,*) men love being outdoors. (Generalization)

The exception relation is very similar to generalization and exemplification since it also involves one clause with a general statement and one with a specific example that is representative of the general statement, but exception involves negation:

i. Men love being outdoors; however, John likes going to the movies. (Exception)

In the last resemblance relation, elaboration, the two entities or events being presented are the same; however, the reader must infer this relationship from the text since it is not explicitly stated. The entity or event is presented in one clause, and then restated differently in the next, as in example (j):

j. Men love being outdoors; Glacier National Park received over 2 million male visitors during the months of June and July alone. (Elaboration)

In this example, the reader must perceive the two statements as referring to the same event. World knowledge of national parks must be consistent with *being outdoors*, and lexical knowledge is necessary to relate *men* and *males*.

Parallel Structure and Grammar.

Because resemblance relations are based on parallelism theory, a discussion of individual- and stage-level predication is warranted since combining various forms of predicates affects parallelism, as well. Parallelism in coherence relations is formed through the grammatical structure (syntax) and the pragmatic implicature of the text, whereas parallelism in individual- and stage-level predication is formed through the grammatical structure and the semantic meaning of text. Carlson (1996) noted the distinction between stage-level and individual-level predicates based on the properties of the element in question. While individual-level predicates refer to properties of the entity, stage-level predicates refer to the properties of a "temporal-spatial slice" of that entity. In the sentence, *the dog is brown*, the predicate, *is brown*, refers to a permanent property of the dog. In the sentence, *the dog is hungry*, the predicate, *is hungry*, refers to a temporal-spatial slice of the dog. Being hungry is not a permanent property of the dog, but a property of *a particular stage* of the dog. This distinction is important because of the different grammatical properties of the two predicates. A discussion of these numerous grammatical properties is beyond the scope of this paper; however, one of the properties is that stage-level predicates can serve as the predicate of an existential sentence, while individual-level predicates cannot. Examples of *there*-insertion have been included to illustrate this point:

k.   There are dogs hungry in the next room. (Stage-level predicate)

l.   *There are dogs brown in the next room. (Individual-level predicate)

Combining sentences containing both stage-level and individual-level properties requires alteration of adjectival positioning for readability. If the writer simply combines the two properties in the postverbal position using the connective *and*, (e.g., *the dog is brown and hungry*) the reader is temporarily disoriented attempting to recover a parallel connection between

12

the two properties. Balance and predictability are preserved when either the stage-level or individual-level predicate is moved to the prenominal position and the other predicate to the postverbal position, (e.g., *the brown dog is hungry* or *the hungry dog is brown*) In this formulation, the subject, *the brown dog* or *the hungry dog*, either the property of being brown or being hungry is subsumed in the thematic portion, or topic, of the sentence, followed by the rheme, or comment on the topic, *is hungry* or *is brown*.

Another similar imbalance in parallel structure is created in combining two individual-level predicates when one is expressed as an inalienable possession following HAVE, (e.g., "The dog has a tail") and one as a subject attribute following copula BE, (e.g., "The dog is brown."). Although both are individual-level predications of the same subject, simply combining the two predicates with the connective *and*, (e.g., "The dog is brown and has a tail") results in an awkward semantic construction that is less predictable to the reader. Moving the subject attribute following copula BE to the prenominal position, (e.g., "The brown dog has a tail") results in a construction that does not disrupt the reader's orientation to the text. The same is true of combining sentences when one contains an individual-level predicate following copula BE, (e.g., "The dog is brown") and the other is comprised of the same subject followed by a present progressive, (e.g., "The dog is running.") This construction is grammatically awkward, (e.g., "The dog is brown and running") due to the asymmetry of the constituent forms, that is, using BE as both copula and auxiliary. It is semantically awkward due to the imbalance of the individual-level predication (brown) and the stage-level predication (running.) In any of these cases, symmetry cannot be established between attributes simply by connecting with *and*, and adjectival repositioning should be used to preserve the semantic and syntactic relations. When

attempts to formulate parallel structures result in asymmetry, coherence of the message is disturbed.

Research on Errors of Coherence in Writing

Assessing Coherence.

Many studies have investigated individuals' use and comprehension of cohesive ties in both oral and written language. In these studies, specific cohesive ties are identified in an oral or written text and judged to be used correctly, incorrectly, or ambiguously. Cohesive ties have been examined for frequency of production, accuracy of production, accuracy of comprehension, how they link text elements across t-units, and the amount of textual distance between them (e.g., Cain, 2003; Liles, 1989; Liles, Duffy, Merritt, & Purcell, 1995; Norris & Bruning, 1988; Peterson & Dodsworth, 1991; Shapiro & Hudson, 1991; Stein & Glenn, 1979). In these analyses researchers have identified individual words and phrases that can be linked to other portions of the text through reference, substitution, ellipsis, conjunction, or lexical association. The identification of cohesive ties is therefore fairly objective and quantifiable.

Analysis of coherence has been more problematic since it does not involve targeting specific words. Coherence is a discourse-level property of the text which many contend is constructed in the minds of readers and based on their background knowledge and expectations (Bamberg, 1984; Kintcsh & van Dijk, 1978; Sanders & Noordman, 2000; Smith, 1984; Witte & Faigley, 1981). Although there are many instances in which cohesive ties may facilitate or may even be necessary for perceiving a text as coherent, coherence cannot be assumed from the presence or absence of cohesive ties. Thus, researchers and practitioners have explored other methods of evaluating texts for coherence.

Many of the methods for assessing coherence have been developed for purposes of analyzing students' writing. The National Assessment of Educational Progress (NAEP, 1975) developed a Paragraph Coherence Guide to assess the coherence of each separate paragraph in the essay. Each paragraph score was then summed and the mean percentage of coherent paragraphs was calculated. This method was found to be flawed in that coherence is created across paragraph boundaries, which was not accounted for using this scoring guide, and the mean percentage score was too heavily influenced by the number of paragraphs in the essay. Changes were made to the NAEP scoring process (NAEP, 1980) so that essay-level coherence was measured rather than paragraph-level coherence. This method was also found to be flawed in that it focused more on cohesion/cohesive ties than on overall text coherence (Bamberg, 1984). Many researchers viewed cohesion as a subcategory of coherence that, with other factors, contributes to the overall meaning of the text (e.g., Fitzgerald & Spiegel, 1986; Hasan, 1984; McCulley, 1985; Witte & Faigley, 1981), and they followed up with studies to determine the relationship between text cohesion and coherence with the intent of improving the methods for assessing essay coherence.

Witte and Faigley (1981) examined 10 student essays to examine the relationship between cohesion and coherence. Five essays had been rated as "high quality" and five as "poor quality." They found that the high quality essays contained a significantly greater number of cohesive ties than the poor quality essays, but contended that cohesion alone was not sufficient for a text to be coherent. Tierney and Mosenthal (1983), however, investigated the relationship between the number of cohesive ties in twelfth-graders' essays and the reported global coherence ranking assigned and found no significant correlation between the two measures. McCulley (1985) analyzed a random sample of 493 essays completed by students for the NAEP and found

that cohesion accounted for 53 percent of the variance in coherence. The findings of these various studies reported mixed results. Many researchers were critical of equating cohesion with coherence (e.g., Bamberg, 1984; Doyle, 1982; Morgan & Sellner, 1980; Tierney & Mosenthal, 1983; van Dijk, 1980), asserting that coherence is created by the reader and textual meaning is constructed based on each individual's experiences and schematic knowledge. Although many agreed that cohesion could not be equated with coherence, there was little agreement about how to measure coherence. Assessment of coherence has proven difficult since much of the measurement is largely subjective. Various researchers have attempted to define and quantify what makes a text coherent.

Bamberg (1984) described the examination of cohesive ties as identifying the discrete points in a text and showing how those points are linked, but showed how they lacked any method for examining what writers do to facilitate the reader's construction of meaning. Because of this, Bamberg (1984) developed the Holistic Coherence Scale to analyze seven aspects of coherence, with cohesion being one aspect. Other aspects examined included whether the author identified and sustained a topic, created a context to help orient the reader, organized the details, and wrote a concluding statement. Other researchers have simply adapted their own scales based on the 1984 Holistic Coherence Scale (e.g., Fitzgerald & Spiegel, 1986; Knudsen, 1992). Conceptual analysis (de Beaugrande, 1980; de Beaugrande & Dressler, 1981) was a technique developed to describe the relationship of the micro- (e.g., clauses, sentences) and macro-structures (the functional meaning in a particular context) of a text. A concept is described as "a configuration of knowledge (cognitive content) which can be recovered or activated with more or less unity and consistency in the mind" (de Beaugrande & Dressler, 1981, p.4). These concepts cohere due to both the surface structure and the inferences drawn by the reader. de

16

Beaugrande and Dressler (1981) contended that coherence is influenced by both textual cues, the reader's understanding of those cues, and the reader's world knowledge. They also proposed that readers use "primary concepts" (i.e., situation, event, action, and object) as points of orientation in the text and "secondary concepts," which are very similar to case grammars or thematic relations (Fillmore, 1977), as means of relating the primary concepts.

Although studies involving the analyses of coherence in school-aged children's writing are limited and vary in what they measure, results have all supported a developmental process with regard to the production of coherent texts. Bamberg (1984) used the Holistic Coherence Scale to reanalyze 2,698 of the 13- and 17-year-old students' written essays on the 1969, 1974, and 1979 National Assessments of Educational Progress (NAEP). She found that the essays produced by the 17-year-olds were significantly more coherent than those produced by the 13-year-olds. Fitzgerald and Spiegel (1986), using a modified version of Bamberg's (1984) Holistic Coherence Scale, found that the essays produced by sixth-grade students were significantly more coherent than those produced by third-grade students. Hasan (1984) developed a measure in which coherence is assessed, termed cohesive harmony. Cohesive harmony is examined to determine how cohesion contributes to coherence. Rentel, Pettigrew, and Pappas (1983) used Hasan's (1984) cohesive harmony measure to examine the essays of young school children (as cited in Golden & Vukelich, 1989) and found that the older children consistently produced more coherent essays than the younger children. Similarly, there is evidence for a developmental process underlying the production of narratives (Applebee, 1978; Bereiter & Scardamalia, 1982; Mandler & Johnson, 1977; Stein & Glenn, 1977). Narratives possess a predictable story organization which facilitates coherence. This structure prompts readers to anticipate information and to make logical predictions, and eases the generation of narratives for writers.

Knowledge of this structure increases and becomes more elaborate with age (Applebee, 1978; Stein & Glenn, 1977).

Interventions to Improve Writing.

While the relationship between cohesion, coherence, and grammar has been difficult to parse out in assessment, it has been equally controversial for instruction in writing. The National Commission on Writing (2003) reported that while most adolescent students have mastered the basics, few can create compositions that are "precise, engaging, and coherent" (p. 16), roughly equivalent to what the National Assessment of Educational Progress terms "proficient"(Salahu-Din, Persky, & Miller, 2008). This report echoes an earlier study by Gebhard (1978) who analyzed college freshmen's essays rated as "high" or "low" by English instructors and found that with few exceptions, they differed little on the basis of grammatical features. The errors that differentiated the low-rated group from the high-rated group included production of a greater number of incomplete referential cohesive ties and poor use of coordinating conjunctions. Gerbhard (1978) described the errors as interfering with overall textual coherence, cohesion, and parallel structure. Many researchers have viewed the instructional methods used to teach writing as one reason that adolescents struggle to write coherent text.

<u>Direct Instructional Approach</u>.

Direct instruction is the traditional approach of teaching grammar. Language Arts workbooks used in most schools are typical of this mode of instruction. The direct instructional approach is based on the transmission model of education which arose from the principles of behavioral psychology (Weaver, 1996). According to the behavioral psychologists of the 1920s, practice and habituation were necessary for learning to take place. Edward Thornedike (as

explained in K.S. Goodman et al., 1988, pp 11-13) formulated the four "laws of learning" based on the tenets of behavioral psychology. The first, *the law of readiness*, states that learning is sequential, that is, students should be presented with materials in a linear fashion and must master one skill before moving to the next. The second, *the law of exercise*, states drills and exercises strengthen the connection between a given stimulus and a given response. The third, *the law of effect*, states that the stimulus-response connection is also strengthened by reward. Finally, *the law of identical elements*, states that learned stimulus-response connections should be examined separately and examined under conditions identical to those under which they were learned. Under the transmission model based on Thornedike's laws, lessons are direct, uniform, and linear in sequence, all students receive identical instruction, students practice drills and memorize facts, skills are taught and tested in isolation rather than in context, and there is an emphasis on the teach/practice/test cycle.

For decades students in the upper elementary grades through high school have been taught grammar through direct instruction in the belief that such grammar study will result in improvements in written language performance. Yet, numerous studies have illustrated that instructional approaches directly targeting grammatical forms isolated at the word, phrase, and sentence level result in no measurable benefits in the writing abilities of their students (e.g., Calkins & Graves, 1980; DiStefano & Killion, 1984; Elley et al., 1976; McQuade, 1980; O'Hare, 1973). Grammatical exercises such as these separate the skill being taught from the actual composing process. Without the contextual support of meaningful text the skill being taught is stripped of the meaning and function provided by that text. Although the teaching of grammar may serve to increase students' meta-awareness of language form, use, and function, (Glenn, 1995) no quality studies have provided evidence that such awareness generalizes to

improvements in the written compositions of children in the upper-elementary through high school grades (Andrews, et al., 2004a; Braddock, Lloyd-Jones, & Schoer, 1963; Hillocks, 1984; Hillocks & Smith, 1991). McQuade (1980) reported that in his high school level course, even when increases were seen in measures of grammer such as T-units and clauses per T-unit, the post-course essays were inferior to the pre-course essays in every other way. He summarized, "their principal method of organization is a series of afterthoughts, and their sentences are awkwardly and I believe self-consciously constructed to honor correctness above all other virtues, including sense" (p. 29).

       <u>Writing Process Approach</u>.

Many researchers recognize that students require guidance through the writing process (e.g., Calkins, 1986; Graves, 1983; Murray, 1985). Because of this, the writing process approach to teaching composition has been adopted in English language arts classes over the past three decades (Applebee & Langer, 2006; Hillocks, 2003). Writing instruction has targeted the *5-step approach*: prewriting, drafting, revising, proofreading, and publishing (e.g., Hillocks, 2003; Weaver, 1996). The prewriting step, also described as brainstorming, typically involves having individual students or an entire class list ideas with the intention of generating and developing topics about which they can compose. Drafting refers to generating a rough draft without emphasis on correctness of form. Revision involves organization of the composition. The *5-paragraph essay* is a tool frequently used for organizing the composition in which students create an introductory paragraph, three paragraphs representing the body of the composition, and a concluding paragraph (Hillocks, 2003). Proofreading primarily consists of checking for errors in grammar and mechanics. Publishing refers to creation of a final error-free draft, which may or may not be shared with an audience other than the teacher. The writing process approach

emphasizes the process of writing instead of only focusing on the end product. This approach also emphasizes the structure of the composition with less attention to audience, perspective, and other elements of writing important to coherence.

Sentence Combining.

In *Syntactic Structures* (1957), Chomsky introduced the idea that grammar was an intuitive component of a speaker's language system, rather than an external mechanism by which each speaker's productions should be analyzed. This new perspective led researchers to further question the validity of the systematic explicit teaching of grammar. If the ability to comprehend and use grammar is unconscious and is acquired naturally, should formal lessons be replaced with more functional activities that foster the development of grammar? A number of researchers influenced by Chomsky's claims responded with a flurry of studies during the 1960s and 1970s that examined the impact of sentence combining exercises on the development of syntactic fluency. Sentence combining allows students enough structure (two or more kernel sentences are provided) and scaffolding (the provision of support to facilitate student learning) that they may focus their attention on the mechanics involved in blending the given sentences into a logical, coherent single sentence. This activity is more functional than memorization of grammatical rules and allows for a certain degree of self-teaching.

Mellon (1969) conducted a study in which he compared the writing performance of three groups of students following one year of either transformational grammar instruction with practice in sentence combining (experimental group), traditional grammar instruction (control group), or no grammar instruction, but additional exposure to literature and composition (placebo group). The experimental group demonstrated significant gains in twelve measures of syntax,

while the control and placebo groups only demonstrated equivalent gains in three of the twelve measures. It was concluded that it was the sentence combining practice rather than the grammar lessons based on transformational theory that resulted in these improvements. However, in spite of the noted gains in isolated measures, Mellon did not find any discernable differences in the overall compositional quality of the three groups. One notable limitation of Mellon's study was that the experimental group received both instruction in transformational grammar *and* sentence combining practice. Results were unclear as to whether gains in syntax were due to the grammar instruction, the sentence combining practice, or a combination of both. A criticism of this study by Frank O'Hare (1971) involved the discussion of transformational grammar during the sentence combining activities. He posited that such discussion was cumbersome and unnecessary and suggested that it interfered with the subjects' writing fluency. O'Hare suggested that this may have also hindered generalization of these writing skills to the students' compositions.

O'Hare's (1971) study of the sentence combining abilities of 83 seventh-graders focused on the content of the students' compositions but eliminated the study of grammar. He presented students with several kernel sentences to be combined, nearly identical to those in Mellon's 1969 study. The primary difference was that he refrained from using grammatical terms during instruction. O'Hare instead turned the focus of instruction to creating complex sentences by replacing Mellon's abbreviated grammatical instructions with word cues that focused students' attention to the intended *meaning* of the target sentence. O'Hare attempted to simplify the sentence combining process so that the students could keep larger units of discourse in working memory and manipulate those units in meaningful ways. In his experiment, half of the seventh-graders engaged in extensive sentence combining activities (experimental condition) while the

others studied no grammar, using that classroom time engaged in other areas of the language arts curriculum (control condition). The student compositions produced under the experimental condition demonstrated syntactic maturity beyond that considered typical for eighth-graders and on average showed a greater number of words per T-unit, clauses per T-unit, number of words per clause, noun clauses per 100 T-units, adjective clauses per 100 T-unit, and adverb clauses per 100 T-units. Additionally, the experimental groups' compositions were judged to be better in overall compositional quality according to a five-point rating scale completed by their teachers.

While numerous studies similar to that conducted by O'Hare resulted in improved syntax in the written compositions of their subjects of various ages who engaged in sentence combining activities (e.g., Hunt, 1965; Combs, 1976; Faigley, 1979; Ney, 1974; and Morenberg, Daiker, & Kerek, 1978), not all studies reported favorable results. Sullivan (1979) reported no difference in the writing performance of eleventh-graders who engaged in sentence combining when compared to those who received traditional grammar instruction. Hake and Williams (1979) reported that a significant number of subjects in their sentence combining study (76 of 212) simply increased the number of words per T-unit, resulting in long and ill-formed, rather than organized and coherent sentences. These results indicated that sentence combining alone was not sufficient for students' improvements in written composition. How the exercise was presented appeared to play a key role in generalization of skills.

Crowhurst (1983) noted three components that were vital to the success of the experiments that she examined in a review of sentence combining studies. First, studies using "open" exercises that allowed subjects a degree of self-discovery demonstrated improvements in students' compositions over studies that used "cued" exercises. In open exercises, the students were encouraged to produce several different combinations and decide which best served the

23

rhetorical purpose, whereas cued exercises limited the students to a single correct response. Secondly, studies that used discourse-level problems rather than sentence-level problems resulted in increased syntactic complexity as well as overall improvements in composition quality. Lastly, studies that devoted a substantial amount of time to class discussion of the sentences that the students produced outperformed those that focused primarily on independent work. Discussion and feedback about students' writing appeared to be essential in increasing their metalinguistic skills.

Text Structure Approaches.

It has long been recognized that since coherence is a difficult concept to define, it is also difficult to teach (Connor & Johns, 1990). Even when a student's writing can be identified as lacking coherence, teachers and interventionists often do not know how to proceed in guiding the student to make improvements. One promising area of research is that of teaching narrative structure. Several studies have shown improvements in children's overall narrative structure following instruction that teaches the narrative elements (e.g., Davies, Shanks, and Davies, 2004; Gillam, McFadden, & van Kleek, 1995; Hayward & Schneider, 2000; Klecan-Aker, Flahive & Fleming, 1997; Petersen, Gillam, & Gillam, 2008; Swanson, Fey, Mills, & Hood, 2005). Another area in which positive outcomes have been reported is instruction of English as a second language. Lee (2002) conducted a study with 16 students learning English as a second language in which she made an attempt to operationalize the teaching of coherence. The students were presented with a series of coherence topics beginning with how the explicitness of purpose and awareness of audience and context contribute to coherence. Next they were taught the overall structure of the texts they were to read and write. The students were then presented with strategies for organizing information so that that information contributes to the development of

the overall text. The students revised their texts to make unclear portions more explicit through the use of techniques such as elaboration and exemplification. The students were also instructed in the different types of cohesive ties and metadiscourse markers. Lee (2002) found that 14 of the 16 students made dramatic improvements in the coherence and overall quality of their written essays following her intervention. Since teaching the components of these discourse structures resulted in positive outcomes in these two populations, it follows that there is potential for other discourse structures to be successfully taught in other populations.

Embedded Language Lessons

Dinkins (2006) implemented an RtI study in collaboration with classroom teachers that simultaneously addressed the teachers' language arts goals and the SLP's goals for increased understanding of text coherence. The purpose was to explore coherence with students by analyzing age-appropriate literature for the effects of form (i.e., teacher's curriculum) on meaning (i.e., SLP's goal). Termed Embedded Language Lessons, the teacher explored language within authentic contexts of reading with the class. A passage from interesting grade appropriate literature was used to teach grade-level language arts skills in a manner that examined their occurrence for form, function, and meaning.

For example, the passage "By the roadside, a very scared Johnny Adams hunkered down. He knew he couldn't take the main road but instead should cross the river at the low spot where he would be out of sight," could be examined. If the grammatical form *preposition* was a target, the first word of the sentence was pointed to and identified as a preposition. The unusual position of the form could be discussed (e.g., "Usually, prepositional phrases are at the end of the sentence, after the verb where they function as adverbs.") The sentence in its predicted order

25

then could be read to show the contrast, as in "A very scared Johnny Adams hunkered down by the roadside." The reasons for changing the sentence order then could be discussed (i.e., "By moving the preposition to the front of the sentence, the author first explains where he is hiding and then tells s how he feels. His location first establishes how close he is to the soldiers and helps us understand why he feels so frightened."). In this manner, the term "preposition" is defined, identified, shown how it can take on different positions within the sentence (form) and how a change in form alters function and places a different emphasis on meaningful sentence elements. These transformations all contribute to the coherence of the passage, including the changes in meaning and sense that are communicated using variations of word order.

Dinkins (2006) evaluated the results of her intervention using measures of reading fluency and comprehension. In addition, she administered the sentence combining and spontaneous written story portions of the TOWL-3 (Hammill & Larsen, 1996), resulting in a data set of 495 written language samples from grades 4 through 8.

Rationale for the Current Study

As the SLP's role expands to include language-based classroom interventions implemented in collaboration with teachers, it is critical to be able to quickly assess students' ability to write with coherence and to monitor progress resulting from interventions. The use of rubrics to assess coherence in written text is too time consuming to evaluate large groups of students and has problems with reliability. Sentence combining is an alternative that has been shown to be a valid and reliable method for measuring written language ability. Students must incorporate the meaning of two or more sentences to form a single sentence by using complex

syntactic structures. The resulting sentences must include all of the information and be grammatically correct to be coherent (Hammill & Larsen, 1996).

While a normative score on the sentence combining subtest of the TOWL-3 (Hammill & Larsen, 1996) provides an indication of overall ability, it provides few insights into the types of coherence relations that students fail to understand. The Sentence Combining subtest was designed as a measure of syntactic competence and scores are assigned based on the student's ability to incorporate the meanings of two or more kernel sentences into a comprehensive single sentence. However, sentences that are representative of Kehler's (2002) coherence classifications can be used to examine his three classes of coherence relations: cause-effect, contiguity, and resemblance. Since each of the classes arises from the constraints imposed by each relation and the inference process that determines which relation will be used, errors in sentence combining can be used to explore developmental trends and specific deficits. Sentence combining probes may be an economical method for identifying which students will experience difficulty recognizing the coherent relationship between a set of sentences. Thus, the first purpose of this study was to use sentences from Dinkins' pretest data set to examine the ability of fourth through eighth grade students to generate sentences that maintain coherence and to explore developmental trends and deficits.

The second purpose was to determine if instruction that explored the coherence in language would result in greater coherence in writing. The pretest-posttest data sets for fifth and seventh grades were used to determine if the English language arts instruction provided in the context of examining meaningful texts, termed Embedded Language Lessons (ELL) resulted in greater gains in coherence than traditional discrete skill language lessons (DLL). Specific questions guiding this study are as follows:

1) Are there differences in the ability to maintain coherence in written sentences for four types of coherence relations among students in grades 4-8?

2) When instruction is provided that focuses on coherence, will adolescents produce written sentences that conform to coherence relationships?

   a) Are there group differences between adolescents receiving ELL and DLL for combining sentences that adhere to the cause-effect coherence relation of result?

   b) Are there group differences between adolescents receiving ELL and DLL for combining sentences that adhere to the coherence relation of contiguity?

   c) Are there group differences between adolescents receiving ELL and DLL for combining sentences that treat copula BE and auxiliary BE as two separate forms?

   d) Are there group differences between adolescents receiving ELL and DLL for combining sentences that adhere to parallel structure when combining sentences with stage-level predication and sentences with individual-level predication?

With regard to question 1, it is predicted that like other aspects of language, a greater number of errors will be observed in the younger subjects with those numbers decreasing with maturation. With regard to questions 2a and 2b, it is predicted that adolescents receiving ELL, which places primary focus on the content of the text in which the grammar lesson is embedded, will produce fewer errors of cohesion when combining kernel sentences that require attention to cause-and-effect relationships and to temporal sequencing. With respect to question 2c, although the variable being examined is based on syntax (copula BE v. auxiliary BE), the adolescent must attend to the meaning and function of BE in each kernel sentence since the surface form is identical. It is predicted that the adolescents receiving ELL, whose instruction has emphasized the content of the message over form of the message will be more sensitive to differences in the

meaning and function of BE (copula v. auxiliary), and will subsequently produce fewer errors in treating copula BE and auxiliary BE as a singular form when combining both forms into single sentences. For question 2d, it is predicted that adolescents receiving ELL will produce fewer errors of equating stage-level and individual-level predication when combining both forms into single sentences. The difference between individual- and stage-level predicates is not attributed to the grammatical properties of the predicates, but to the types of meaning the predicates express. These differences are not explicitly taught under either condition; they are not typically taught at all in the English language arts curriculum. The differences are learned through exposure to different linguistic constructions, and adolescents receiving ELL are given greater exposure to authentic, meaningful texts than those receiving DLL. For each of the questions it is predicted that the ELL group will attend to the overall meaning of kernel sentences being combined to a greater degree than the DLL group because of the six weeks of instruction that emphasized meaning derived from discourse-level texts. It is predicted that the DLL group will exhibit a greater number of errors of cohesion because of discrete skills instruction that emphasized grammatical forms over meaning and targeted sentence-level texts.

METHODS

An analysis of coherence was conducted using written language samples from a data set collected by Dinkins (2006). The samples were collected from classrooms that had participated in a teacher mentoring program termed Oral Written Language Literacy Strategies (OWLLS). Pretests were available for grades 4 through 7 and these were used to determine if the ability to combine sentences coherently showed a developmental progression. Of this group for whom pretest data was collected, a subgroup had also completed a posttest following a six-week intervention period. Posttest data were collected from students in grades 5 and 7 and were examined for changes in coherence following a classroom-based intervention designed to increase meta-awareness of coherence in text structure.

Participants

A total of 150 test protocols from the Dinkins' data set were analyzed in this study. Ninety-five of the protocols were comprised of pretest data for subjects who met the following criteria:

1. Had on file a signed consent for participation form.

2. Completed the pretest (Form A) Sentence Combining subtest of the Test of Written Language, Third Edition (Hammill & Larsen, 1996).

3. Completed the items of interest for this analysis (i.e., items 8, 11, 13, and 14 on Form A and items 7, 9, 11, and 15 on Form B).

An additional 55 protocols comprised of posttest data (Form B) for subjects in grades 5 and 7 were analyzed for changes following intervention.

The forty participants in grade 5 ranged in age from 10;3 to 13;9 (years; months, mean= 11;4). Approximately 79% of the fifth-graders were African American, 20% were Caucasian, and 1% were classified as other. Ninety-three percent of the fifth-grade participants were economically disadvantaged as evidenced by their eligibility for free or reduced price school lunch. The seventy participants in grade 7 ranged from 12;0 to 14;11 (years; months, mean= 12;10). Approximately 59% of the seventh-graders were African American, 40% were Caucasian, and 1% were classified as other. Sixty-one percent of the seventh-grade participants were economically disadvantaged as evidenced by their eligibility for free or reduced price school lunch. The demographic profiles of the participants are shown in Table 4.

Table 4

Demographic Profiles of Participants in Grades 5 and 7

| | Age | | Gender | | Race | | | Number | Free/Red | Learning |
Group	Mean	Range	M	F	AA	CA	Other	Retained	Lunch	Disability
Grade 5 Control	11;4	10;3-13;1	9	11	18	1	1	7	20	0
Grade 5 Experiment	11;4	10;3-13;9	9	11	13	7	0	11	17	1
Grade 7 Control	12;9	12;3-14;0	13	22	17	18	0	4	21	2
Grade 7 Experiment	12;9	12;0-14;11	16	19	24	10	1	3	22	4

Pretest Performance

Because participants in the fifth and seventh grades were selected based on classroom placement and teacher, they were not randomly assigned to groups. To determine whether or not the control and experimental groups were similar at pretest, paired independent samples t-tests

were conducted for each of the four dependent measures to compare the two groups' pretest

scores. There were no significant differences at the p<.05 level between the control and

experimental groups on any of the four dependent measures at pretest. Table 5 profiles means at

pretest for the DLL and ELL groups.

Table 5

Independent Samples t-tests Comparing Mean Scores on Dependent Measures at Pretest for
Grades 5 and 7

| Variable | Control Group | | Experimental Group | | *t* | df | Sig. |
	Mean	SD	Mean	SD			
Cause-effect	.65	.480	.58	.498	.780	108	.437
Contiguity	.56	.501	.55	.503	.190	108	.850
Parallel structure/ BE	.47	.504	.64	.485	-1.734	108	.086
Parallel structure/stage	.44	.501	.62	.490	-1.925	108	.057

All participants were receiving English language arts instruction in the general education

classroom. All of the schools had been identified based on the previous year's state and national

test scores as being among those having the lowest school performance scores in the state, with

rankings in the unacceptable range for language arts. According to school records, 23% of the

participants had been retained for at least one academic year and 6% had been identified with a

learning disability. An additional 40 randomly selected test protocols were examined at pretest;

20 from grade 4 and 20 from grade 6. These additional samples were used to analyze coherence

across grade levels. The demographic profiles of these subjects are shown in Table 6.

Since participants were selected based on classroom placement and teacher, they were

not randomly selected. Chi-square tests of independence were performed to determine whether

the subjects in grades 4-7 differed with respect to socio-economic status, race, the number of

students who had been retained, gender, and the number of students who were diagnosed with a

language learning disability. There were no significant differences between the two groups with respect to gender, $X^2 = 2.69$, df= 3, p= 0.443, and the number of students who had been diagnosed with a language learning disability, $X^2 = 3.50$, df= 3, p= 0.320.

Table 6

Demographic Profiles of Participants in Grades 4 and 6

	Age		Gender		Race			Number	Free/Red	Learning
	Mean	Range	M	F	AA	CA	Other	Retained	Lunch	Disability
Grade										
Grade 4	9;9	8;9 - 11;10	12	8	7	13	0	0	9	0
Grade 6	11;10	11;4- 13;1	9	11	19	1	0	0	20	0

Differences were observed with respect to socio-economic status, $X^2 = 26.2$, df= 3, p= 0.000, race, $X^2 = 31.0$, df= 6, p= 0.000, and the number of students who had been retained, $X^2 = 16$, df= 3, p= 0.001.

Procedures for Language Arts Instruction

Within project OWLLS, each classroom teacher delivered instruction in either the embedded language lessons (ELL) or discrete language lessons (DLL) instructional conditions during the regular language arts period. The treatment activity was implemented for approximately 15-20 minutes each Monday through Thursday for 6 weeks, resulting in 24 instructional sessions. All materials were provided to the teachers in both instructional conditions.

Embedded Language Lessons.

In the embedded language condition, the teachers introduced one paragraph of expository text. The teacher read the entire paragraph aloud while students followed along reading the image from an overhead projector. Next, the teacher pointed to a target sentence within the

paragraph, usually one of the most complex sentences that contained several of the language arts skills addressed in this study. The teachers then would follow a step-by-step written script for analyzing that sentence with their students. The script asked them to a) teach a vocabulary word, including picturing, defining, examining the word structure, and generating a synonym; b) identify the sentence type, including subjects and predicates (simple, complex, compound); c) examine the punctuation for its type (declarative, interrogative, etc.), and for its function within the sentence to order, organize, or emphasize meaning; d) identify parts of speech for target words, and have children explain why the author made that word choice; e) analyze the sentence for its grammatical structure, including identifying different sentence clauses and their function within the sentence; and f) summarize the information from the paragraph in words and by drawing a picture. Under ELL instruction, the meaning of the text was emphasized as much as the linguistic forms used, and discourse-level meaning was emphasized as much as sentence-level meaning.

The teachers were trained to implement embedded language instruction by the lead researcher. They attended a workshop describing the procedure, and practiced generating lessons and correlating them to state grade level expectations and their language arts text. One of the researchers involved with the OWLLS project then modeled the procedure at least once in each teacher's classroom with the entire class. Finally, one of the OWLLS researchers observed each teacher at least once during the 6 weeks to assure that the procedure was being implemented according to protocol and provided feedback and suggestions. A researcher involved in OWLLS was present at each school at least 3 times to answer questions or provide models over the duration of the project.

Discrete Language Lessons.

The control group classroom continued to use the traditional worksheet approach. Each teacher verified this was the primary strategy for teaching the targeted skills in his/her class. To assure that all of the skills addressed in the embedded language condition were also addressed in the explicit teaching condition (i.e., parts of speech, punctuation, and vocabulary suffixes or synonyms), worksheets were matched with the skills in embedded language lessons. A grade-appropriate worksheet previously adopted by the school districts was presented during each day of the study focusing on the same target skills (e.g., during week 1, the worksheets addressed nouns, singular/plural nouns, pronouns, and nouns as direct/indirect objects). Under DLL instruction, students were presented with isolated sentences rather than a discourse-level text, and form received significantly more emphasis than meaning.

Treatment Fidelity.

At least once during the 6-week intervention period, each teacher was observed implementing the lesson. One of the OWLLS researchers observed and followed along with the lesson plan to assure the instructional script was followed and the lesson done according to protocol. If there were elements that were not being implemented correctly, the researcher modeled the lesson, provided feedback and suggestions to the teacher, and followed up with another visit to monitor the implementation. In all cases, teachers were implementing the lessons as prescribed, although the researcher did on occasion model parts of the lesson if the teacher had questions or was unsure of how to best use materials.

Materials.

All materials for both conditions were prepared in advance by the project OWLLS researchers. Materials and equipment for treatment sessions consisted of a projector, transparency markers, transparencies, binders with researcher-prepared worksheets for the ELL and DLL groups, and visual mnemonics depicting parts of speech or other target skills.

Embedded Language Lesson Binders.

Lessons included six expository text passages that were divided into 24 lessons. Each passage was covered over a one-week time period, with one to two paragraphs explored during each daily lesson. Reading passage topics included low-fat diets, Walt Disney, Susan B. Anthony, Groundhog Day, the Pony Express, and Blues music. Under each paragraph, the researcher provided a script that taught the six target language arts skills, including a) vocabulary, b) subjects and predicates, c) punctuation and sentence types, d) parts of speech, e) sentence structure (i.e., conjunction, relative clause), and f) summarization and visualization of sentences. For each skill, the researcher provided questions for the teachers to ask and transparencies where questions were displayed and answers were to be recorded.

Visual Mnemonic Pictures.

Each teacher in the Embedded Language condition received transparencies of Visualized Grammar words (Norris, 2005). During Embedded Language Lessons, students were provided with six Visualized Grammar words depicting parts of speech and four Visualized Grammar words depicting punctuation marks. The teacher used the pictures to define these concepts and displayed them as parts of speech and/or punctuation were explored during the language lessons. For example, the meaning of the word "noun" was depicted on the letters, so that a smiling face

drawn inside of the "o" corresponded to the element of person, a door drawn inside of the "n" corresponded to place, a person thinking inside of the "u" corresponded to the element of concept, and a bow on top of the final "n" corresponded to the element of thing. During instruction, if the students were unable to identify the grammatical part of speech for a word such as "ball," the teacher would use the "n" of "noun" with the bow on top to cue that the object was a "thing" that could be in the gift box with the bow.

Discrete Language Lesson Binders.

Worksheets comprised of 24 lessons were divided into six weeks (one worksheet per day Monday through Thursday for 6 weeks). Lessons included grammatical parts of speech or punctuation skills, and were taught each day in the order indicated by the researcher. For students in grades 5 through 7, lessons included:

Day 1 Noun Function (Direct Objects)

Day 2 Noun Function (Indirect Objects)

Day 3 Noun Function (Appositive)

Day 4 (Interrogative and Relative Pronouns)

Projector or Document Camera.

A projector or document camera was used for each classroom group lesson for both treatment conditions. Teachers would place the lesson on the projector or document camera and follow the script or worksheet instructions accordingly.

<u>Transparency and Markers</u>.

Each lesson was presented on either a paper or a transparency for use with an overhead projector if a document camera was not available. Teachers in the Embedded Language Lesson condition would use the marker to write the correct responses to each question or draw pictures of actions occurring in the paragraph as indicated in the scripts that followed the reading of the paragraphs. Teachers in the Explicit Teaching condition would use the marker to fill in model responses as they were presenting the lesson or recording student responses.

Pretest-Posttest Procedures

Participants selected for this study completed group testing of the Test of Written Language, Third Edition (Hammill & Larsen, 1988) at pretest and posttest. The testing was conducted during the students' regular classroom time at their schools. The subtests were administered by the classroom teacher over several days. Eight items on the sentence combining subtest were examined for the current study. Participants were instructed to form a single sentence from the kernel sentences, or brief sentences including one idea, given on each test item. Participants were given two sample sentences in their response booklet to combine into a single sentence. The sentences were read aloud to them by their teachers, as well. The classroom teacher explained how to best combine these sentences so that one grammatically correct sentence was formed that did not include redundant information. The classroom teacher also gave an example of a poorly formed sentence that included redundant information and explained that this was not a well formed sentence.

Dependent Measures

Eight items on the sentence combining subtest of the TOWL-3 were selected for analysis: items 8, 11, 13, and 14 of form A were examined at pretest and items 7, 9, 11, and 15 of Form B were examined at posttest. These items were selected because they represented the following types of coherence on both forms of the test: cause-effect (item 13, form A, item 9, Form B), contiguity (item 14, Form A, item 15, Form B), sentence formulation in which copula BE and auxiliary BE are not treated as parallel (item 8, Form A, item 11, Form B), and sentence formulation in which stage-level and individual-level predicates are not treated as parallel (item 11, Form A, item 7, Form B). The test did not prompt students to write sentences involving the other forms of coherence discussed previously in both the pretest and posttest forms, so they were not examined in this current study.

Coherence was analyzed using the procedures described in the following sections. These procedures were adapted for this study by the researcher and were not procedures used for scoring the standardized test (TOWL-3). It was a requirement that the sentences created in each of the dependent measures be reasonably correct in grammar. Sentences containing errors such as minor spelling errors or lack of punctuation were counted as reasonably correct as long as these errors did not signal a change in the meaning of the sentence. Participants were also required to produce sentences which were complete and contained all of the information present in the kernel sentences. Responses that introduced extraneous information not present in the kernel sentences were counted as incorrect.

Cause-effect Coherence Relation

Item 13 on Form A of the TOWL-3 consists of the kernel sentences *Sherry's foot is sore* and *She had dropped a book on it.* For a response to have been counted as correct, the student

was required to combine the kernel sentences into a single sentence that expressed that Sherry first dropped a book on her foot and then, as a consequence, her foot was sore. The sentence had to express causation. Causation could be directly expressed semantically through the use of the conjunction *because*. Causation could also be indirectly expressed so that an inference of causation would be triggered, either through the use of the conjunction *and now* or by indicating which foot is currently sore by identifying it as the one Sherry dropped a book on in the past using a relative clause. Students were not given credit if they combined the sentences without indicating a cause-and-effect relationship between the two events or if the antecedent and consequent events were transposed. Tables 7 and 8 show examples of both acceptable and unacceptable responses.

Table 7

Acceptable responses for item 13 on Form A of the TOWL-3

Acceptable Responses	Examples
Cause and effect represented by combining sentences with *because*	Sherry's foot is sore because she dropped a book on it.
Cause and effect represented by combining sentences with *and now*	Sherry dropped a book on her foot and now it's sore.
Cause and effect represented by combining sentences with a relative clause	The foot that Sherry dropped her book on is sore

Item 9 on Form B of the TOWL-3 consists of the kernel sentences *The bell rang* and *Class was over*. For a response to have been counted as correct, the student was required to combine the kernel sentences into a single sentence that expressed that the bell ringing was the antecedent event and the ending of class was the consequent event. The subject was required to produce a

40

Table 8

Unacceptable responses for item 13 on Form A of the TOWL-3

Unacceptable Responses	Examples
The cause and effect were not represented	Sherry dropped a book on her sore foot.
The kernel sentences were not altered; only terminal punctuation was removed or replaced with a comma	Sherry's foot is sore she had dropped a book on it.
Response was incomplete or ungrammatical	Sherry's foot is sore cause a book on it

sentence from which causation could be inferred. Causation could be represented by combining

the antecedent event and then the consequent event with the conjunctions *when, and,* or *and then*.

Causation could also be represented by combining the consequent event and then the antecedent

event using the conjunction *after*. Students were not given credit if they combined the sentences

in which a cause-and-effect relationship could not be inferred between the two events or if the

antecedent and consequent events were transposed. Tables 9 and 10 show examples of both

acceptable and unacceptable responses.

Table 9

Acceptable responses for item 9 on Form B of the TOWL-3

Acceptable Responses	Examples
Cause and effect represented by combining sentences with *when*	Class was over when the bell rang. When the bell rang, class was over.
Cause and effect represented by combining sentences with *and* or *and then*	The bell rang, and class was over. The bell rang, and then class was over.
Cause and effect represented by combining sentences with *after*	Class was over after the bell rang.

Table 10

Unacceptable responses for item 9 on Form B of the TOWL-3

Unacceptable Responses	Examples
Antecedent event and consequent events were out of sequence	The bell rang when class was over. The bell rang because class was over. Class was over, so the bell rang.
The kernel sentences were not altered; only terminal punctuation was removed or replaced with a comma	The bell rang class was over. The bell rang, class was over.
Response was incomplete or ungrammatical	The bell r and cause class was.

Contiguity Coherence Relation

Item 14 on Form A of the TOWL-3 consists of the kernel sentences *The rocket was in the air* and *It exploded* and *It disintegrated*. To receive credit for combining these kernel sentences into a single sentence, the student was required to indicate that the rocket exploded before it disintegrated, and that these events occurred while the rocket was in the air. Students were not given credit for sentences in which the antecedent and consequent events were out of sequence. Tables 11 and 12 show examples of both acceptable and unacceptable responses.

Item 15 on Form B of the TOWL-3 consists of the kernel sentences *Ann bought a book* and *She read it quickly*. To receive credit for combining these kernel sentences into a single sentence, the student was required to indicate that the sequence of events involved Ann buying the book first and then reading the book quickly second. The adverb *quickly* should only modify *read*. Tables 13 and 14 show examples of both acceptable and unacceptable responses.

Table 11

Acceptable responses for item 14 on Form A of the TOWL-3

Acceptable Responses	Examples
Sentences combined using *when* and appropriately sequenced phrases to indicate temporal order	When the rocket was in the air, it exploded and disintegrated.
Sentences combined using *then* and appropriately sequenced phrases to indicate temporal order	The rocket exploded in the air, then disintegrated. The rocket was in the air, then it exploded and disintegrated.
Sentences combined using appropriately sequenced phrases to indicate temporal order	The rocket exploded and disintegrated in the air.
Sentences combined using *before* and appropriately sequenced phrases to indicate temporal order	The rocket exploded in the air before it disintegrated.

Table 12

Unacceptable responses for item 14 on Form A of the TOWL-3

Unacceptable Responses	Examples
Antecedent event and consequent event out of sequence	The disintegrated rocket exploded in the air. The rocket that was in the air exploded because it disintegrated.
Information from kernel sentences was omitted	The rocket exploded and disintegrated. The disintegrated rocket exploded.
Response was incomplete or ungrammatical	The rocket was in the air and exploded in the disintegrated.

Table 13

Acceptable responses for item 15 on Form B of the TOWL-3

Acceptable Responses	Examples
Sequence of events indicated by combining sentences with temporal *and*	Ann bought a book and read it quickly. Ann bought a book, and she read it quickly.
Sequence of events demonstrated through use of relative clause	Ann quickly read a book she bought. Ann quickly read a book that she bought.

Table 14

Unacceptable responses for item 15 on Form B of the TOWL-3

Unacceptable Responses	Examples
The kernel sentences were not altered; only terminal punctuation was removed or replaced with a comma	Ann bought a book she read it quickly. Ann bought a book, she read it quickly.
Structurally ambiguous sentences	Ann read the book that she bought quickly. Ann bought a book that she read quickly.
Adverb does not clearly modify *read* alone	Ann bought and read a book quickly.
Information from kernel sentences was omitted	Ann read her book quickly.

Copula BE and Auxiliary BE not Treated as Parallel

Item 8 on Form A of the TOWL-3 consists of the kernel sentences *The boys are older* and *The boys are playing*. These sentences appear nearly identical in structure, but the student was required to recognize that *are* in the first sentence is the third-person plural form of copula BE, and that *are* in the second sentence is an auxiliary verb used with *playing*. Because of the different functions of *are* in these two sentences, *are older* and *are playing* could not be treated

as parallel forms. To receive credit for combining these kernel sentences into a single sentence, the student was required to adhere to parallel structure. Violation of parallel structure could be avoided by repositioning the adjective to the prenominal position of the sentence or representing either the adjective or the verb phrase in a relative clause. Tables 15 and 16 show examples of both acceptable and unacceptable responses.

Table 15

Acceptable responses for item 8 on Form A of the TOWL-3

Acceptable Responses	Examples
The adjective is moved to the prenominal position and is subsumed within the noun phrase	The older boys are playing.
Either the adjective or the present progressive verb is represented in a relative clause	The boys that are playing are older. The boys who are older are playing

Table 16

Unacceptable responses for item 8 on Form A of the TOWL-3

Unacceptable Responses	Examples
The kernel sentences were not altered; only terminal punctuation was removed or replaced with a comma	The boys are older, the boys are playing. The boys are older the boys are playing.
Extraneous information added	The boys are older and they like playing. The boys are now older and playing. The boys are playing with older kids.
Parallel structure is violated	The boys are older and playing.
Sentence was incomplete or ungrammatical	The boys older are playing.

Item 11 on Form B of the TOWL-3 consists of the kernel sentences *The baby was happy* and *The baby was laughing.* These sentences appear nearly identical in structure, but the student was required to recognize that *was* in the first sentence is the past tense form of copula BE, and that *was* in the second sentence is an auxiliary verb used with *laughing*. Because of the different functions of *was* in these two sentences, *was happy* and *was laughing* could not be treated as parallel forms. To receive credit for combining these kernel sentences into a single sentence, the student was required to adhere to parallel structure. Violation of parallel structure could be avoided by repositioning the adjective to the prenominal position of the sentence, transforming the present progressive verb into a participle and moving it to the prenominal position, or representing either the adjective or the verb phrase in a relative clause. Subjects were not permitted to change the verb tense of the verb phrase as this may have been a maladaptive strategy for dealing with the two BE forms. Because of the lexical association between *happy* and *laughing*, a judgment was made to accept sentences indicating a causative relationship between the two. A judgment was also made to accept the sentence, *The baby was laughing because the baby was happy*, in which there is a reiteration of *the baby*. This decision was made based on the fact that individual babies are typically referred to using the personal pronouns *he* or *she* rather than *it.* Since the gender of the baby is not explicitly stated, the subjects may have used the phrase *the baby* a second time to avoid a possible penalty for using an incorrect pronoun. Tables 17 and 18 show examples of both acceptable and unacceptable responses.

Table 17

Acceptable responses for item 11 on Form B of the TOWL-3

Acceptable Responses	Examples
The adjective is moved to the prenominal position and is subsumed within the noun phrase	The happy baby was laughing.
Either the adjective or the present progressive verb is represented in a relative clause	The baby that was happy was laughing. The baby that was laughing was happy.
The present progressive verb is moved to the prenominal position and becomes a present participle functioning as an adjective	The laughing baby was happy.
Logical association of *laughing* and being *happy* represented through causation	The baby was laughing because he was happy. The baby was laughing because the baby was happy.

Table 18

Unacceptable responses for item 11 on Form B of the TOWL-3

Unacceptable Responses	Examples
Parallel structure is violated	The baby was happy and laughing. The baby was laughing and happy.
Kernel sentences conjoined with *and*, but no ellipsis of redundant information	The baby was happy and the baby was laughing.
Verb tense was altered	The happy baby laughed.
Redundant information was not omitted	The baby was happy and was laughing.

Stage-Level and Individual-Level Predicates not Treated as Parallel

Item 11 of Form A of the TOWL-3 consists of the kernel sentences *The girls are tall* and *The girls play ball*. These sentences appear similar in structure, but the student was required to

recognize that *are tall* (copula BE + adjective) and *play ball* (verb + object) should not be treated as parallel forms. To receive credit for combining these kernel sentences into a single sentence, the student was required to adhere to parallel structure. Violation of parallel structure could be avoided by repositioning the adjective to the prenominal position of the sentence or by representing either the adjective or the verb phrase in a relative clause. The subjects were required to indicate that being tall was an individual-level rather than a stage-level property of the girls. Sentences such as, *The girls are tall playing ball*, implies that the girls are only tall at times when they are playing ball and were counted as incorrect. Tables 19 and 20 show examples of both acceptable and unacceptable responses.

Table 19

Acceptable responses for item 11 on Form A of the TOWL-3

Acceptable Responses	Examples
The adjective is moved to the prenominal position and is subsumed within the noun phrase	The tall girls play ball.
Either the adjective or the verb phrase is represented in a relative clause	The girls who are tall play ball. The girls that are tall play ball.

Item 7 of Form B of the TOWL-3 consists of the kernel sentences *The dog is hungry* and *The dog is brown.* These sentences appear similar in structure, but the student was required to recognize that *is hungry* is a stage-level property of the dog and *is brown* is an individual-level property of the dog. Because of these differences, *is hungry* and *is brown* could not be treated as parallel forms. To receive credit for combining these kernel sentences into a single sentence, the student was required to adhere to parallel structure.

48

Table 20

Unacceptable responses for item 11 on Form A of the TOWL-3

Unacceptable Responses	Examples
The kernel sentences were not altered; only terminal punctuation was removed or replaced with a comma	The girls are tall, the girls play ball.
Extraneous information added	The girls are tall and they like to play ball.
Kernel sentences conjoined with *and*, but no ellipsis of redundant information	The girls are tall and the girls play ball. The girls are tall and they play ball.
Inappropriate implicature	The girls are tall playing ball.
Sentence was incomplete or ungrammatical	The girls are tall, play ball. The girls that are play ball are tall. The girls tall are playing ball.
Parallel structure is violated	The girls are tall and play ball. The girls play ball and are tall.

Violation of parallel structure could be avoided by repositioning one of the adjectives to the prenominal position of the sentence or by representing either of the adjectives in a relative clause. Tables 21 and 22 show examples of both acceptable and unacceptable responses.

Table 21

Acceptable responses for item 7 on Form B of the TOWL-3

Acceptable Responses	Examples
One of the adjectives is moved to the prenominal position and is subsumed within the noun phrase	The brown dog is hungry. The hungry dog is brown.
Either of the adjectives is represented in a relative clause	The dog that is brown is hungry. The dog that is hungry is brown.

49

Table 22

Unacceptable responses for item 7 on Form B of the TOWL-3

Unacceptable Responses	Examples
The kernel sentences were not altered; only terminal punctuation was removed or replaced with a comma	The dog is hungry, the dog is brown.
Kernel sentences conjoined with *and*, but no ellipsis of redundant information	The dog is hungry and the dog is brown. The dog is brown and the dog is hungry.
Extraneous information added	The dog is hungry because it is brown.
Parallel structure is violated	The dog is brown and hungry. The dog is hungry and brown.
Sentence was incomplete or ungrammatical	The brown dog.

Pretest Performance

Since participants in the fifth and seventh grades were selected based on classroom placement and teacher, they were not randomly assigned to groups. To determine whether or not the control and experimental groups were similar at pretest, paired independent samples t-tests were conducted for each of the four dependent measures to compare the two groups' pretest scores. There were no significant differences at the p<.05 level between the control and experimental groups on any of the four dependent measures at pretest. Table 23 profiles means at pretest for the DLL and ELL groups.

Table 23

Independent Samples t-tests Comparing Mean Scores on Dependent Measures at Pretest for Grades 5 and 7

	Control Group		Experimental Group				
Variable	Mean	SD	Mean	SD	t	df	Sig.
Cause and effect	.65	.480	.58	.498	.780	108	.437
Contiguity	.56	.501	.55	.503	.190	108	.850
Parallel structure/ BE	.47	.504	.64	.485	-1.734	108	.086
Parallel structure/stage	.44	.501	.62	.490	-1.925	108	.057

Scoring Reliability

Data set 1 was comprised of 110 test protocols which were collected from the students in grades 5 and 7, 55 at pretest and 55 at posttest. There were four items on each protocol which were selected for analysis, resulting in a total of 440 items. For the first data set, 12 test protocols from grade 5, three at pretest and three at posttest from each group, as well as 12 test protocols from grade 7, three at pretest and three at posttest from each group, a total of 24 (22%) of the 110 protocols analyzed, were randomly selected and independently analyzed by a second examiner. The second examiner, who was a faculty member in the department of Communicative Sciences and Disorders at the University of Montana, also independently analyzed four randomly selected pretest protocols from each of the additional grade levels in data set 2, a total of 8 (20%) of the 40 test protocols collected from grades 4, and 6. Percent interrater agreement was calculated by dividing the number of interrater agreements by the total number of items (128) in the 32 test protocols. The results of the reliability check indicated that interrater agreement was 96% (123 agreements/128 opportunities).

RESULTS

The purpose of this study was to determine a) the ability of students to produce sentences that maintain coherence across the continuum of grade levels, and b) whether or not adolescents would produce fewer errors of coherence on sentence combining exercises following six weeks of Embedded Language Lessons (ELL) instruction as compared to Discrete Language Lessons (DLL) instruction.

Frequency of Errors of Coherence across Grade Levels

To examine the ability of students to produce sentences that maintain coherence in written sentence combining, the four items on the sentence combining subtest selected for analysis were examined for subjects in grades 4, 5, 6, and 7. To determine if there were statistically significant grade effects in the distribution of scores for the four dependent variables, the Pearson Chi-square test was conducted to measure differences between grade levels. Chi-square was used because the scoring system was established in a non-ordinate manner; thus, the method of scoring subjects' responses inhibited other parametric statistical methods from being used.

A chi-square test of independence was performed to examine the relation between adherence to the coherence relations and grade level. The relation between these was significant for the cause-effect coherence relation, χ^2 (3, $N = 95$) = 14.9, $p=.002$, for the contiguity relation, χ^2 (3, $N = 95$) = 8.50, $p=.037$, for parallel/BE, $\chi2$ (3, $N = 95$) = 17.9, $p= .0001$, and for parallel/stage, $\chi2$ (3, $N = 95$) = 16.2, $p= .001$. Thus, grade level differences were found for each of the coherence relations. Table 24 shows the percentage of students whose responses adhered to the coherence relations under examination.

Table 24

Percent of Student Responses Representing Adherence to the Coherence Relations across Grade Levels

	Coherence Relation			
Grade Level	Cause-Effect	Contiguity	Parallel/BE	Parallel/Stage
4	45%	30%	25%	30%
5	30%	20%	45%	35%
6	70%	40%	30%	35%
7	85%	55%	85%	85%

Students' adherence to coherence relations was then examined by age rather than grade level. The Pearson product-moment correlation test revealed a moderate positive correlation between age and adherence to coherence relations, $r\,(150) = 0.327$, $p < 0.05$. This suggests that students' adherence to coherence relations increases with age and maturation.

Changes in Coherence Following Intervention

The second question of this study asked whether the ELL group made greater changes in the ability to maintain coherence in sentence combining than the DLL (control) condition. Because visual inspection of the developmental data of question 1 showed that fifth graders and seventh graders performed differently on all cohesion relations, the effect of intervention type was measured separately for the two grades. Tables 25 and 26 profile the data separately for the two grade levels.

53

A chi-square test of independence was performed to examine the relation between the fifth-grade experimental and control groups' adherence to the coherence relations at pretest and posttest. The relation between these was significant for the contiguity coherence relation, χ^2 (1, N = 20) = 7.20, p=.007, but not for the cause-effect relation, χ^2 (3, N = 20) = .563, p=.453, for parallel/BE, χ^2 (1, N = 20) = 0.09, p= .763, and for parallel/stage χ^2 (1, N = 20) = .90, p= .740. Table 25 profiles the percentage of fifth-graders who combined sentences adhering to each of the coherence relations.

Table 25

Percentage of Fifth-Graders who Combined Sentences Adhering to the Coherence Relations

	Control Group		Experimental Group	
	Pretest	Posttest	Pretest	Posttest
Cause-Effect	35%	60%	30%	85%
Contiguity	50%	25%	20%	75%
Parallel/BE	20%	30%	45%	85%
Parallel/Stage	20%	40%	35%	90%

These results show an expected greater increase for the experimental group on all measures of coherence compared to the control group.

A chi-square test of independence was performed to examine the relation between the seventh-grade experimental and control groups' adherence to the coherence relations at pretest and posttest. The relation between these was not significant for the contiguity coherence relation, χ^2 (1, N = 20) = 7.20, p=.007, the cause-effect relation, χ^2 (3, N = 20) = .422, p=.516, for parallel/BE, $\chi2$ (1, N = 20) = 0.001, p= .990, or for parallel/stage $\chi2$ (1, N = 20) = .011, p= .918. Table 26 profiles the percentage of seventh-graders who combined sentences adhering to each of the coherence relations.

Table 26

Percentage of Seventh-Graders who Combined Sentences Adhering to the Coherence Relations

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	Control Group		Experimental Group	
	Pretest	Posttest	Pretest	Posttest
Cause-Effect	83%	80%	74%	91%
Contiguity	57%	51%	74%	46%
Parallel/BE	66%	69%	74%	77%
Parallel/Stage	63%	77%	74%	77%

These tables reveal an expected greater increase for the experimental group only for Cause-Effect relations. This suggests that cohesive relations reflect complex abilities that are not all age related and that knowledge of some relations are language dependent.

DISCUSSION

With initiatives such as Response to Intervention (RtI) and ASHA's position statement on literacy, the SLP is becoming increasingly involved with writing, especially with adolescents. While the focus of researchers has largely been directed toward increasing the syntactic complexity of the writing of adolescents, a common finding is that it is often at the expense of coherence (e.g., Connor & Johns, 1990; McQuade, 1980). One reason for the lack of emphasis on coherence it that it is difficult and time consuming to measure. This study identified sentences from the Sentence Combining subtest of the Test of Written Language, Third Edition, (TOWL-3) (Hammill & Larsen, 1996) that required adherence to three different coherence relations using Kehler's (2002) classifications (cause-effect, contiguity, and parallel structure). The analysis of the target sentences provides an examination of written sentences that simultaneously addresses syntax and coherence, or the semantic-pragmatic knowledge needed to correctly combine the information from two sentences. The coherence analysis provides insights into how and why students incorrectly generate complex sentences.

In addition, the effects of a meaning-based intervention designed by the SLP but implemented by the classroom teacher, was examined for changes in coherence. Consistent with the RtI model, the intervention was designed to meet the classroom teacher's language arts goals (i.e., learning grammar), but implemented in a manner that addressed the SLP's objectives for increasing students' meta-awareness of the semantic-pragmatic effects of word and clause order. It was proposed that the emphasis on meaning concomitant with the examination of grammatical structures would result in better maintenance of coherence in the sentence combining task.

Analysis of Coherence across Grade Levels

The first question of this study asked whether differences in the ability to maintain coherence for the four types of coherence relations would be found across grade levels. This question combined subjects from both treatment groups since the analysis used pretest data that was not influenced by treatment. In addition, pretest data from other grade levels that did not participate in the intervention study were included to provide a developmental overview.

The examination of the four sentences at pretest showed that the task could be used to identify students who had difficulty with coherence relations. A subset of students at all grade levels could produce sentences that accurately combined information from two or more sentences and maintained coherence. This finding was true for all four coherence relations. However, students at all grade levels also produced unacceptable responses that failed to maintain each of the coherence relations.

Developmental Trend

A developmental trend also was shown with a significant difference between younger (i.e., grades 4 through 6) and older (i.e., grade 7) subjects. For grades 4 and 5, the percentage of student responses that adhered to coherence relations ranged from 20% to 45% for the four measures. This indicates that the sentence combining task was difficult and the majority of the students at these ages were unable to produce a coherent sentence that contained all of the information from component sentences. For grade 7, the percentage of student responses that adhered to coherence relations ranged from 55% to 85% for the four measures, indicating that the majority of the older students were successful at this task. Cause-effect, parallel/BE, and parallel/stage relations were mastered by nearly all of the seventh-grade students at pretest. The

57

sixth-graders fell in between these groups, with scores closer to the older group for cause-effect relations but closer to the younger group for parallel/BE and parallel/stage relations.

Comparison of the four types of cohesion suggests that cause-effect is a relatively early emerging relation. Of the four coherence relations, cause-effect was the category on which students in the fourth grade exhibited the highest scores, and it was the only coherence relation on which students in grade 6 responded with greater than 40% accuracy (i.e., 70%).

Contiguity was difficult for students at each grade level, ranging from 30% accurate responses at fourth grade to 55% at seventh grade. The greatest number of errors occurred for this relation by fifth-graders; only 20% produced grammatically correct sentences that demonstrated causation.

The parallel/BE and parallel/stage relations showed the greatest differences across age. At fourth grade the percentage of accurate responses were 25% and 30%, respectively. Both jumped to 85% at seventh grade. In addition, when posttest data were examined, both showed increases between pretest and posttest, regardless of the intervention group.

Quality of Errors

The quality of the errors also changed across time. At grade 4, simply conjoining the kernel sentences using "and" was a common strategy (e.g., *The girls are tall and the girls play ball*), but by grade 8, students combined sentences using a variety of strategies, such as representing some of the information in relative clauses (e.g., *The girls who are tall play ball*) and using unambiguous conjunctions (e.g., *Sherry's foot is sore **because** she dropped a book on it* rather than *Sherry dropped a book on her foot **and** it is sore*).

A hierarchy of difficulty also emerged from the data. Cause-effect coherence relations showed the highest level of accuracy at pretest and also showed high gains at posttest for both groups, with no advantage for the ELL instruction. The cause-effect relationship in this sentence was temporal: the bell rang, causing class to be over. Conjunctions such as "when" or "and then" are needed to maintain the cause-effect coherence in this sentence. These are forms that emerge early in development and maintain a temporal causality which is simpler than psychological causality and so it is not surprising that many students could produce the sentence at pretest. The use of a variety of conjunctions was a focus in the DLL instruction and is reflected in the gains. These conjunctions were also a focus in the ELL instruction and this group also showed high gains at posttest.

The only significant difference between the two instructional groups was observed for contiguity coherence relations in grade 5. Contiguity relations require background knowledge to make an inference regarding how the information in the sentences is related and thus how they should be combined. Students who do not have a schema for the events described in the sentences will naturally have difficulty combining sentences based on that information. The two sets of sentences to be combined at pre- and posttest presented the students with interesting challenges. At pretest, the students were required to possess a *rocket-explosion-disintegration* schema to accurately combine the sentences representing the events in the proper sequence. Vocabulary knowledge was also important. Students with a weak understanding of the word *disintegrate* may not recognize, for example, that a rocket cannot first disintegrate and then explode. In this way, poor vocabulary knowledge can result in poor representation of the contiguity relation. The set of sentences at posttest required the students to possess a *purchase-book-read-book-quickly* schema. This set of sentences contained no vocabulary that should be

59

unfamiliar to an elementary school student, and the schema is one that would likely be familiar to most children. There was one aspect of the syntax that appeared difficult for the students; the adverb *quickly* was present in one of the kernel sentences and modified the verb *read*. A frequent error produced by many of the students involved adverb placement after the two kernel sentences were combined. Students were observed to use *quickly* to modify *bought* (e.g., *Ann quickly bought a book and read it*), or modify both *bought* and *read* (e.g., *Ann quickly bought and read a book*). These types of errors were exemplary of students' attention to grammar, but inattention to coherence. Although adverbs can be moved to different positions in the sentence rather flexibly, students at these grade levels exhibited difficulty doing so without changing the meaning of the intended message.

Intervention Outcomes

It was anticipated that students receiving the Embedded Language Lessons would show greater gains in forming cohesion relations than students in traditional Discrete Language Lessons. The interactions in the ELL instruction were designed to increase meta-awareness of how forms in language communicate meaning and function. Discussions focused on the shifts in meaning that occur with grammatical transformations including breaking complex sentences into constituents and examining key words used to integrate the ideas meaningfully.

Age effects were seen in the posttest outcomes. The majority of the seventh-graders were able to generate sentences that maintained parallel/BE and parallel/stage relations at pretest. While a greater number of seventh-graders in the ELL group were successful at posttest, students in the DLL group also made improvements. In addition, the number of students who correctly

generated contiguity and cause-effect relations decreased resulting in no significant change for time.

At fifth grade the ELL group showed a greater change at posttest compared to the DLL group. When the individual relations were considered, contiguity showed a significant change. The mean scores for the fifth-graders in the ELL group increased by 27% while the mean scores for the fifth-graders in the DLL group decreased by 50%. The majority of the sentences produced by the DLL group at posttest were grammatically correct but the clauses were out of temporal sequence, while the majority of the sentences produced by the ELL group were both grammatically correct and adhered to the contiguity relation.

Conclusions and Implications

Using structured sentence combining tasks appears to be a viable method for quickly screening a student's ability to establish coherence relations. The type of incorrect response generated by the student can also provide qualitative information regarding what the student understands about the semantic-pragmatic relationships and how they are expressed using word and clause order. The greater changes shown by the ELL fifth-graders for contiguity may be preliminary evidence supporting the hypothesis that instructional methods that place an emphasis on meaning in the teaching of grammar may result in improvements in both syntax and coherence.

This study provides evidence that transactional instruction methods, such as Embedded Language Lessons, can result in improvements in grammar (Dinkins, 2006) as well as in overall coherence of adolescents' sentence combining. The improvements made by the experimental group contradict the tenants of the transmission model, that instruction must target individual

skills in isolation and in a linear sequence, followed by frequent practice drills before introducing the next skill. The Discrete Language Lessons group received instruction under the transmission model and did not outperform the Embedded Language Lessons group on any of the four measures of coherence. These results show that an instruction method that places an emphasis on the text as a whole and provides quick, incidental lessons regarding the parts (e.g., grammar, morphology, punctuation) has a positive impact on the coherence of adolescent's written sentence combining.

The findings of this study are also important and relevant for planning clinical intervention. Referrals for intervention generated for adolescents struggling with written language are typically due to difficulties with form (e.g., grammar, spelling, punctuation). Referrals due to difficulty with written form generally result in intervention targeting written form. Even when classroom teachers recognize that student compositions are incoherent, coherence is difficult to quantify, and thus may be underreported. The form of written language is much easier to identify, quantify, and describe, which may be the reason that teachers hone in on errors of form. Sentence combining may provide an efficient method of examining cohesion and measuring change. This research suggests that an instrument measuring sentence combining specifically designed to elicit a variety of coherence relationships could become a language measure the SLP can add to analysis of t-units, clausal density, or other syntax-oriented measures.

This information also has implications for RtI. Students who do not perceive implicit relationships may require more explicit instruction, more intensive instruction, and increased exposures. Activities to improve coherence in writing can be easily incorporated into the writing process models currently being used in classrooms. The school-based SLP could collaborate

with the classroom teacher and intervene with students during the revising and editing phase of the writing process. Collaborative sentence editing with students could be used to identify points in the text where coherence is lost, and to propose strategies to improve coherence, such as using metadiscourse markers. It is important to note that interventions provided by the SLP to improve coherence can take place in the students' classroom. There is no need to remove the student from the general education classroom, thus decreasing his instructional time. Intervention can be conducted within the context of authentic writing practices already taking place within the curriculum.

The current study contributes to the current literature on adolescent written language in three ways. First, the findings of this study are consistent with previous studies examining coherence in school-aged children's writing in that they support a developmental process with regard to the production of coherent texts (e.g., Bamberg, 1984; Fitzgerald & Spiegel, 1986; Rentel, Pettigrew, & Pappas, 1983). Previous studies examining the developmental progression of coherence have examined overall text coherence, but no studies of were found that examined coherence relations individually. Second, it adds some information about a hierarchy of difficulty in representing coherence relations, with cause-effect coherence relations appearing to be mastered earlier than others. Further investigation is needed to substantiate this finding since several types of coherence relations were not examined in this study. Lastly, there was some preliminary evidence supporting Embedded Language Lessons as an effective service delivery model to improve students' representation of coherence relations in their compositions, while still providing quality instruction in other areas of the language arts curriculum.

Limitations of the Current Study

Although this study did show promising support for the use of ELL for English language arts instruction, it is not without limitations. It was found that improvements could have been made in the areas of elicitation probe design, subject selection, and project design.

Sentence Combining Task

One major limitation of this study was the small number of coherence relations examined. Because the sentences were selected from a standardized sentence combining task using an existing data set, only four sentences were found that were representative of coherence relations, and two of the four dealt with parallel structure, so several measures of coherence were not addressed in this study. This resulted in examining only four coherence relations, one for contiguity, one out of four possible types for the resemblance relations, and two out six for the cause-effect relations. Grade level distinctions could be made with respect to the four relations, suggesting that a sentence combining task could be a robust method for screening cohesion. However, a sentence combining task specifically developed to elicit coherence relations could have assessed a wider array of types of relations and provided a more comprehensive examination of development and use of coherence. In addition, the items on the test differed in the familiarity of the vocabulary. For example, it was suspected that many of the students did not know the meaning of the word "disintegrated." The degree to which the items in the kernel sentences were semantically related was also a concern. Some items were closely related (e.g., *happy* and *laughing*) while others were not related (e.g., *brown* and *hungry*). How closely related the lexical items to be combined were may have influenced how the items were combined, resulting in a more implied relationship versus a relationship which was directly

expressed. Further, some of the trials required the student to combine two sentences, while others required three.

The problems encountered in this analysis suggest that examining the sentences from the sentence combining subtest of the TOWL-3 would not provide a satisfactory screening of coherence as originally hoped. A specific test needs to be designed that has at least one example of each of the three types and 10 categories of coherence relations, with two exemplars of several categories for reliability. The test would need to be controlled for sentence length, sentence type, number of sentences to be combined and vocabulary.

A test eliciting all types and categories of coherence relations would also eliminate a second limitation of this study, that is, a small range of possible scores. The total score on the task ranged from zero to four points. Even with this limitation differences were found between age groups. However, when age and score were correlated, only a moderate positive linear relationship was found. The difference between the highest and the lowest scores did not allow for much discrimination and a ceiling effect occurred. A larger number of items would allow for a wider range of scores and better discrimination between groups. In addition, items were scored as either correct or incorrect. An attempt was made to make judgments regarding whether an error was semantic or pragmatic, but these areas overlap and the judge would need to infer the intention of the writer, so the scale was abandoned. However, the reliability of a four point grading scale could be examined, with 0 = did not combine the sentences, 1 = combined whole sentences using "and," 2 = combined sentences but with an error in coherence, and 3 = correctly combined sentences.

Finally, the sentences in a test would need to be carefully examined for potential ambiguity for interpreting the coherence relation. For example, the sentence "The baby is happy and laughing" may be more acceptable than "The dog is hungry and brown." In the first case, *happy* and *laughing* are both referring to the same proposition, with *laughing* representing an observable action and *happy* an inferred state derived from the act of laughing. The items maintain lexical cohesion. In contrast, *hungry* and *brown* are not lexically linked. Thus, the two sentences are not as comparable as they originally appeared. Items in a test designed to measure coherence would need to be carefully constructed and tested to assure that they are not lexically or semantically ambiguous.

The analysis was performed by selecting items from the TOWL-3 (Hammill & Larsen, 1996) sentence combining subtest in which coherence should be represented had the subject correctly combined the sentences. Only four measures of coherence were examined, and two of the four dealt with parallel structure, so several measures of coherence were not addressed in this study.

Another limitation of the study is that coherence is widely recognized as a discourse level phenomenon that goes beyond the sentence level, yet the measurement task was limited to combined sentences. On the positive side, the finding that coherence relations could be identified and that a relatively few number of items did yield differences across age levels and intervention groups suggests that the task has excellent potential as a quick screening instrument. However, this study did not compare the scores from the sentence combining task with the coherence produced by the subjects in connected discourse. It is not clear whether students who failed to maintain coherence in sentence combining would also struggle with coherence in

composition. The validity of the task for actually discriminating between those who do and do not have difficulty maintaining coherence in writing is needed.

Subject Selection

The subjects of the study also yielded questions regarding the results. Students in the fifth and seventh grades were shown to be equivalent at pretest for variables such as racial composition, numbers receiving free lunch, and those repeating a grade or exhibiting learning disabilities. However, when the fourth and sixth graders were also compared, significant differences were found for race, with more Caucasians in fourth grade than other grade levels; free lunch, with more students in this category for sixth grade, and repeaters, with fewer in grades 4 and 6 than either 5 or 7. The groups were also small, with only approximately 20 students at each grade level. Therefore, the differences could have occurred because of factors other than grade level and thus the validity of the age differences needs to be replicated in future research. The subjects of this study were primarily African American children of economically disadvantaged families. Thus, results cannot be generalized to the total population, including other racial and ethnic groups or students from other socio-economic classes.

ELL Intervention through Project OWLLS

The treatment was short in duration (24 sessions, 15-20 minutes in duration), as compared to other studies that examined gains in language across a school year (Hillocks, 1986; Hudson, 2001) or in some cases longitudinally for several years (Elley et at., 1976). A longer period of intervention may have shown more substantial differences between the two instructional groups.

Project OWLLS was not designed to examine coherence relations. Researchers participating in Project OWLLS developed lesson plans with intent of targeting the expected grade-level language arts skills (e.g., grammar, print conventions) within the context of authentic literature while at the same time addressing the meaning expressed in that text; however, by discussing the meaning of the text and intent of the author, the coherence relations were therefore addressed. Had coherence been intentionally targeted, perhaps more explicit instruction, such as the teaching of metadiscourse markers, (Lee, 2002) could have been embedded in the lessons.

Future Research

Since little research has been conducted that examines coherence in the written language of adolescents, there are many routes with which to proceed with future research. The amount of research that has been documented that is specific to the field of speech-language pathology is even smaller. Since little is known about the ages at which children and adolescents acquire knowledge of the various coherence relations, future research should be conducted to investigate this area. Age-based normative data will help to guide the decisions of speech-language pathologists in determining whether intervention should be more focused on syntax, semantics, or pragmatics. SLPs need more information about the development of discourse structures, particularly in students in the upper elementary grades and beyond when other areas of language development, such as syntax and vocabulary, are not progressing at the rapid pace characteristic of early childhood. Research examining use and comprehension of coherence relations in verbal discourse is needed in typically developing as well as language disordered populations to establish age-based normative data.

Coherence in written language should be further explored, as well. Different genres of writing should be examined for various aspects of coherence. Just as different modes of verbal discourse are likely to reveal different forms of coherence, different modes of written discourse will likely be representative of different forms of coherence. For example, persuasive essays are more likely than personal narratives to contain metadiscourse markers, such as *for example, however,* or *nonetheless*, which signal the coherence relation of resemblance. These various forms of coherence obtained in authentic writing samples should be compared to sentences elicited in sentence combining tasks for reliability of responses. If individuals are shown to reliably produce the same form of coherence across tasks, sentence combining could be an effective tool for identifying students who have difficulty establishing coherence in their writing. Sentence combining could be used as a coherence elicitation task to identify which students readily perceive the implicit relationship between the kernel sentences presented.

Future research should address the limitations noted in this study. The first noted limitation involved the design of the elicitation probe. This study was a first attempt at assessing coherence by analyzing sentences which were selected from a standardized sentence combining task using an existing data set. The researcher did not create the elicitation probe, and, as a result, the sentence combining exercises used to elicit the responses were not designed for the purpose of examining coherence relations. This problem could be addressed in future work by first designing probes that addressed each of the 11 types of coherence relations (contiguity, four types of resemblance, and six types of cause-effect). Probes should also contain multiple items addressing each type of coherence relation, rather than one item to address each type. This would provide examinees with more than one opportunity to demonstrate the ability to adhere to each type of coherence relation and allow for a more sophisticated scoring method. Items should

69

also be carefully designed so that the implied coherence relation is not ambiguous. This may be accomplished by including more background information than can be represented in the kernel sentences alone. The examinee could be presented with a brief story prior to the writing exercises. The sentences given to the examinee to combine would be thematically related to the story, allowing for more control over the background knowledge that the examinee may or may not possess. This could be particularly useful if the examinee is unfamiliar with some of the vocabulary used in the kernel sentences, or if he or she does not have an internal schema or script for the implied relationship between the kernel sentences. The examinee would likely infer the basic meaning of unfamiliar words when presented in the context of a story. The story could explicitly state the character's intentions and beliefs and explain the canonical chain of events typically present in scenarios presented, eliminating the need for this type of background information to make an appropriate inference.

Another problem noted with the elicitation probes was that in some instances the examinees could combine the provided kernel sentences in ways that adhered to the implied coherence relations, but were somewhat ambiguous. One of the ways in which this was observed was the use of *and*. It was unclear to the examiner whether *and* was being used to conjoin propositions in a temporal sequence, to imply a causal relationship, or simply to add more information to the first proposition. This could be addressed in future work by imposing constraints on how the examinee combines sentences. The examinee could be instructed, for example, to combine the kernel sentences in a logical manner consistent with the accompanying story without using the word *and.*

This study represents a first step in the study of coherence relations using a sentence combining task. Further studies are needed to explore the efficacy of this approach.

70

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