**Good and Poor Elementary Readers' Use of Cohesion in Writing**

Beverly E. Cox; Timothy Shanahan; Elizabeth Sulzby

*Reading Research Quarterly*, Vol. 25, No. 1. (Winter, 1990), pp. 47-65.

Stable URL:
http://links.jstor.org/sici?sici=0034-0553%28199024%2925%3A1%3C47%3AGAPERU%3E2.0.CO%3B2-0

*Reading Research Quarterly* is currently published by International Reading Association.

---



---

Beverly E. Cox
*Purdue University*

Timothy Shanahan
*University of Illinois at Chicago*

Elizabeth Sulzby
*University of Michigan*

# Good and poor elementary readers' use of cohesion in writing

PREVIOUS RESEARCH has suggested that good adult readers use a text's cohesion to help comprehend it (Kintsch, 1974), that good writers use cohesion to explicate meaning within and across clauses in a text (Halliday, 1985), and that readers use reading knowledge in their writing (Eckhoff, 1983). The study reported here was designed to examine the relation between children's reading performance and their use of cohesion in writing. The authors asked 48 third- and fifth-grade students from a school district northwest of Chicago to write stories and reports for other children of the same age. The subjects were randomly selected from among students in each grade who scored either high or low on a standardized reading achievement test (percentile scores). The children's narrative stories and expository reports were examined for appropriate or inappropriate use of cohesive devices and for overall cohesive harmony. Good readers achieved significantly more complex cohesive harmony than did poor readers, regardless of grade or genre. In addition, poor readers made inappropriate use of cohesive devices significantly more often than did good readers. Significant correlations between reading ability and holistic rankings of writing quality indicated that good readers tended to be good writers who achieved more cohesive harmony. These results suggest that knowledge of cohesion is related to children's developing reading skills.

## *Utilisation de la cohésion en production de textes par des bons et des mauvais lecteurs*

DES RECHERCHES antérieures ont montré que les adultes utilisent la cohésion textuelle pour comprendre un texte (Kintsch, 1974), que les bons auteurs utilisent la cohésion textuelle pour construire la signification à l'intérieur des phrases et entre les phrases (Halliday, 1985) et que les lecteurs utilisent leurs connaissances en lecture pour écrire (Eckhoff, 1983). La présente étude vise à évaluer l'influence de la performance en lecture d'enfants du primaire sur

l'utilisation qu'ils font de la cohésion en production de textes. Quarante-huit enfants de troisième et cinquième année du district nord-ouest de Chicago, ont eu à produire des récits et des textes informatifs pour des enfants du même âge. Les enfants ont été choisis au hazard à chacun des niveaux scolaires et ont été répartis en deux groupes selon que leurs scores en percentiles, à un test standardisé de lecture, se situaient au dessus ou en dessous de la médiane. Les textes narratifs et informatifs ont été analysés au niveau de l'utilisation des liens cohésives et de l'harmonie cohésive (Hasan, 1984). Les bons lecteurs employaient davantage l'harmonie cohésive dans leurs textes et corrigeaient plus efficacement les erreurs de l'emploi de liens cohésives que les mauvais lecteurs quel que soit le niveau scolaire et le type de texte. Des corrélations significatives entre les scores en lecture et des rangs attibués pour la qualité globale des textes produits confirmèrent que les bons lecteurs sont de meilleurs auteurs et qu'ils emploient davantage l'harmonie cohésive dans les textes qu'ils produisent. Ces résultats semblent indiquer que les connaissances sur les règles de cohésion sont liées au niveau d'habileté en lecture des enfants.

## *El uso de la cohesión en la escritura por lectores expertos y débiles en la escuela elemental*

LA INVESTIGACIÓN previa ha sugerido que los lectores adultos avanzados utilizan la cohesión del texto para ayudarse a comprenderlo (Kintsch, 1974), que los escritores expertos usan la cohesión para explicar significado dentro y a través de la cláusula en un texto (Halliday, 1985), y que los lectores usan su conocimiento de lectura en su escritura (Eckhoff, 1983). El estudio reportado aquí fue diseñado para examinar la relación entre el desempeño en lectura de los niños y su uso de la cohesión en la escritura. Los autores pidieron a 48 niños de tercero y quinto grado en un distrito escolar en el nordeste de Chicago que escribieran historias y reportes para otros niños de su misma edad. Los sujetos fueron escogidos al azar de entre los estudiantes de cada grado que calificaron ya fuera en la parte alta o baja de una prueba estandarizada de logro en la lectura (percentiles). Las historias narrativas de los niños y sus reportes fueron examinados para ver el uso apropiado o inapropiado de los enlaces de cohesión y para ver la armonía cohesiva (Hasan, 1984) en general. Los lectores avanzados lograron significativamente más armonía cohesiva compleja y editaron los enlaces inapropiados de forma más eficiente que los lectores débiles, sin importar el grado o el sexo. Las correlaciones significativas encontradas entre la habilidad de lectura y su rango total en la calidad de escritura indicaron que los buenos lectores tendían a ser buenos escritores que lograron más armonia cohesiva. Estos resultados sugieren que el conocimiento de la cohesion está relacionado con el desarrollo de la habilidad de la lectura de los niños.

## *Die Verwendung von Kohäsion während des Schreibens bei guten und schlechten Hauptschulkindern*

IN FRÜHEREN Forschungen wurde vorgeschlagen, daß gute erwachsene Leser die Textkohäsion dazu verwenden, um den Text zu verstehen (Kintsch 1974), daß gute Autoren und Verfasser Kohäsion dazu verwenden, um Bedeutungen innerhalb von Sätzen und über mehrere Sätze eines Textes hinweg zu entfalten (Halliday 1985), und daß Leser ihre Lesekenntnisse beim Schreiben benutzen (Eckhoff 1983). Die vorliegende Studie wurde aufgestellt, um die Beziehung zwischen der Leseleistung von Kindern und dem Gebrauch der Kohäsion beim Schreiben zu untersuchen. Die Verfasser baten 48 Schüler der 3. und 5. Klasse einer Schule in einem Schulbezirk nordwestlich von Chicago, Geschichten und Berichte für gleichaltrige Kinder zu schreiben. Die Teilnehmer wurden willkürlich aus einer Gruppe von Schülern der jeweiligen Klasse, die bei einem vereinheitlichten Test über Leseleistungen entweder gut oder schlecht abgeschnitten hatten (prozentual gewertet),

ausgewählt. Die Geschichten und Berichte der Kinder wurden in bezug auf angemessene und unangemessene Kohäsionsmittel und Gesamtkohäsionsgleichmaß untersucht. Gute Leser erreichten ein wesentlich vielschichtigeres Kohäsionsgleichmaß und strichen unangemessene Kohäsionsmittel wesentlich effektiver aus, als es bei schlechten Lesern der Fall war – ungeachtet der Schulklasse und der Textart. Bedeutende Korrelationen zwischen der Lesefähigkeit und der Gesamteinstufung der Qualität des Schreibens deuten an, daß gute Leser dazu neigten, gute Verfasser zu sein, die ein höheres Kohäsionsgleichmaß erreichten. Diese Ergebnisse lassen vermuten, daß Kenntnisse der Kohäsion mit der sich entwickelnden Lesefähigkeit der Kinder in Verbindung stehen.

Reading ability and writing ability are closely related. A number of studies have shown that children's writing can accurately reveal information about their reading knowledge and processes (see reviews by Shanahan, 1988; Stotsky, 1982, 1983). For both reading and writing, one must have knowledge both of the subject matter (prior knowledge or "world knowledge") and of linguistic structure and conventions (linguistic knowledge). The linguistic knowledge shared between reading and writing occurs at all levels, including phonemic, orthographic, semantic, syntactic, and discourse structure knowledge (Shanahan, 1984). For example, good readers tend to write with more complex syntax (Hunt, 1965) and more elaborated story grammar categories (Shanahan, 1984), and they focus more on meaning than on mechanics (Langer, 1986). In this study, we examined the writing of good and poor readers to gain insight into another aspect of linguistic knowledge: their knowledge of cohesion.

*Cohesion* is the linking of elements of the text through repetition (or redundancy) of information at the semantic, syntactic, and discourse structure levels. Both common sense and considerable research and linguistic theory suggest that cohesion plays a critical role in language use and communication (Halliday & Hasan, 1976). Cohesion is important both to the reader in constructing the meaning from a text and to the writer in creating a text that can be easily comprehended.

## Cohesive devices

In early studies of cohesion, researchers examined writers' use of various *cohesive devices*, or types of cohesive ties. The cohesive device most often identified is pronominal reference – the use of a pronoun in place of a previously mentioned noun (John *doesn't like dogs. A dog bit* him *once.).* However, Halliday and Hasan (1976) include a variety of other cohesive devices in their taxonomy of cohesive devices. In addition to pronominal reference, they list as cohesive devices the use of the specific determiner *the* to refer to information previously presented in the text *(A man and* a boy *are standing on the corner.* The boy *has no hat.);* ellipsis, or the omission of words previously noted in the text *(The man has two* apples. *The boy has three* [apples].); comparative reference (John can run fast. *His brother can run* faster [than John can run].); and lexical links, such as the use of repetition, synonyms, and superordinates *(John doesn't like* dogs. A German Shepherd *bit John once.).* Hasan (1984, pp. 185-187) has categorized this taxonomy according to three types of semantic bonds: (a) *coreferential,* in which one term is simply replaced with another which has identical meaning in this context (e.g., the use of a pronoun and its referent); (b) *coclassificatory,* in which a word or idea already mentioned is repeated with a slightly different use or meaning (and thus has a different identity), but both terms belong to the same class (e.g., comparison, ellipsis); and (c) *coextensive,* in which a term is used that is related to a word or idea already mentioned by either a semantic relation (e.g., synonym, antonym) or a categorical relation (e.g., superordinate term). These semantic bonds tie parts of individual messages together and differ distinctively from conjunctive cohesive ties, which overtly relate together whole messages (Hasan, 1984).

Thus, in a cohesive text, the author's thoughts are related to each other through a series of cohesive ties between words in the text. In order to construct meaning from the text, readers use these cohesive ties to reconnect or reintegrate the author's ideas. Without the cohesive ties, the text would appear to be a series of disconnected propositions. Cohesive ties are generally used differently in common oral language, such as conversation, because the referent can often be inferred from the situation or from external aids to interpretation (e.g., gestures). Thus, one member of the linked pair of terms—the referent—often appears to be missing. In written language, on the other hand, because external aids are generally not available, the referent is usually explicit. However, although less common in oral than in written language, cohesive ties are essential to both forms of communication. Thus, the use of cohesive ties represents a continuum rather than a dichotomy between oral and written language; appropriate use depends on the situation (Tannen, 1982).

Studies of reading comprehension have suggested that cohesive ties provide focal points for the reader in integrating meaning from the text (e.g., Garrod & Sanford, 1977; Kintsch, 1974; Lesgold, 1972, 1973, 1974). Research on writing has suggested that cohesive ties contribute heavily to writing quality (e.g., Cox, 1987; Hasan, 1984; Pappas, 1981, 1985), and that the use of cohesive devices varies according to genre (Cox & Tinzmann, 1987; Crowhurst, 1987; Martin & Peters, 1985), style (Gutwinski, 1976), content domain (Binkley, 1983), and voice (Cox & Tinzmann, 1986; Neuner, 1987). Thus, cohesive devices appear to be critical in determining the clarity, appropriateness, and comprehensibility—that is, the quality—of an author's writing (Halliday, 1985; Halliday & Hasan, 1976).

However, many of these studies have been criticized for oversimplifying the concept of cohesion by using a simple count of cohesive ties as an index of text quality (Mosenthal & Tierney, 1984). Unfortunately, reading researchers have tended to base their efforts on the earliest, and least complete, theory of cohesion advanced by Halliday and Hasan in their (1976) taxonomy. Contributions by both authors have expanded and developed the concept of cohesion in several ways since that publication; however, their more complex formulations have received minimal attention from reading and writing researchers.

### Cohesive harmony

Hasan (1984) argues that the way cohesion works to create meaning is inadequately represented by simply counting the number of repetitions in coreferential, coclassificatory, or coextensive pairs of terms. Hasan has developed a more comprehensive concept of cohesion, called *cohesive harmony*. This concept is based on work by both Halliday (1985) and Hasan (1984) extending their earlier (1976) taxonomy of cohesive devices to include not only repetition of semantic information—via nouns, pronouns, verbs, and ellipses—but also repetition of functional information—via words having the same grammatic or syntactic function.

Halliday (1985) has identified seven types of verbs or processes that can carry (and, thus, repeat) information about "doing" (action verbs) or "being" (state verbs). The seven categories are verbs of material action (the action may effect a goal or take a range), verbs of mental action, verbs of verbal action, verbs of behavior, verbs of existence, verbs of identity, and attributive verbs (for complete discussion, see Halliday, 1985). A writer's use of two or more verbs from the same semantic category (e.g., two attributive verbs) also creates a cohesive tie between sentences (Hasan, 1984; Halliday, 1985).

Furthermore, Halliday (1985) has suggested that the semantic category of the verb implicitly determines the functions, or case grammar roles, of nouns that fill certain syntactical slots, such as the subject or object in an English sentence. Thus, depending on the verb, a subject noun may have the case grammar role of actor, agent, sayer, or existent; an object noun may have the case grammar role of range or goal. For instance, in the sentence *Carpenter ants dig holes in wood,* the verb *dig* is classified as a goal-oriented material action. Therefore,

the subject noun *Carpenter ants* is implicitly and automatically assigned the case grammar role of actor, and the object noun *holes* is automatically assigned the case grammar role of the goal, which is achieved by the action and is a lasting effect. Cohesive ties also exist between words (or phrases) with the same case grammar roles. For example, if the sentence following the sentence given above is *Termites build columns to reach wood,* then there is a cohesive tie between *dig* and *build,* which are both goal-oriented actions. There are also cohesive ties between *Carpenter ants* and *Termites,* because both have the case grammar role of actor, and between *holes* and *columns,* which are both goals with lasting effects.

According to Hasan (1984), as the author develops a theme, idea, or event, the cohesive bonds form more than just simple pairs of linked terms. Each type of repetition of information forms a *chain*; the ideas within each chain together develop a topic. For example, Table 1 shows part of a text written by a fifth-grade child of high reading ability. The text has been divided into modified T-units, or independent clauses with all dependent clauses attached; these units are numbered (in parentheses). In the analysis shown below the text, the first two columns are members of two *participant chains,* comprising semantically related nouns and pronouns: the insects chain and the homes chain. Each sentence linked by a cohesive tie in the insects chain develops the topic of insects; each sentence in the homes chain develops the topic of insect homes. In the remaining columns are members of *process chains,* comprising verbs or processes from four semantic categories: goal-directed material action verbs, existential verbs, attributive verbs, and behavioral verbs. Sentences linked by each of these chains develop functional or role information. All of these chains of repetitions wend through the text and support, refer back to, and elaborate on earlier ideas or roles.

As conceived by Hasan (1984), cohesive harmony is based on the *interactions* between these chains and a third type of chain, comprising repetitions of functions (case grammar roles). In Table 1, the case grammar roles are shown in parentheses below each chain member; the asterisks identify the chain interactions. For example, the subject nouns in T-units 1 and 2 are both members of the insects chain. In addition, the verbs in both units are members of a chain because in each sentence the verb *are* is used as a verb of existence. Finally, because of this verb classification, both nouns are assigned the case grammar role of an existent. Thus, information imparting the existence of ants – from the nouns, the verbs, and the case grammar roles – is repeated across these two T-units to form a chain interaction. A chain interaction in a text is maximally cohesive because it involves both semantic repetition (of both nouns and verbs, whether explicit or implicit) and syntactic repetition (of implicit case grammar roles).

Similarly, the subject nouns in T-units 3 and 14 (*carpenter ant* and *larva*), although not identical as in the preceding example, are semantically related members of the insects chain. In addition, the object nouns (*holes* and *cocoon*) are semantically related members of the homes chain. Finally, the verbs are both material action verbs that effect a goal, forming part of a process chain. Thus, both subject nouns are assigned the case grammar role of actor, and both object nouns are assigned the case grammar role of goal. The subject nouns, object nouns, and verbs are all involved in chain interactions – that is, units 3 and 14 add to the idea that ants exist by repeating that they are also actors that can perform actions affecting things. The proportion (or index) of cohesive harmony in a text is the number of interactive chain members divided by the total number of members of all chains in the text.

The concept of cohesive harmony, with its chain interactions, represents much more than the operational definition of repeated case grammar roles might suggest. Cohesive harmony analysis addresses how a text's cohesive noun and verb chains are also related to each other through "the echoing of functional relations" (Hasan, 1984). Because interactive T-units must also employ nouns from the same participant or noun chain and verbs from the same process chain, cohesive harmony interactions represent a convergence of semantic, syn-

**Table 1** Sample cohesive harmony analysis of part of a student expository text (good reader, fifth-grade)

Student text

(1) What kinds of ants are there? (2) There are about 15,000 different kinds of ants. (3) An example, the carpenter ant, makes holes in wood for their nests.... (13) After the eggs are laid they turn into larva. (14) Sometimes the larva will build a cocoon.

| T-unit | Participant chains | | Process chains | | | |
|---|---|---|---|---|---|---|
| | Insects chain | Homes chain | MA | X | AT | B |
| (1) | kinds of ants* *(existent)* | | | are* | | |
| (2) | kinds of ants* *(existent)* | | | are* | | |
| (3) | carpenter ant* *(actor)* | holes* *(goal)* nests *(cause)* | make* | | | |
| (13) | the eggs *(behavior [range])* they *(token)* larva *(value)* | | | | turn (i.e., become) | lays |
| (14) | larva* *(actor)* | cocoon* *(goal)* | build* | | | |

*Note.* T-units 4–13 are not shown. Numbers in parentheses denote T-units; words in italics and parentheses denote case grammar roles. MA = material action verbs with a goal; X = existential verbs; AT = attributive verbs; B = behavioral verbs. An asterisk denotes a cohesive harmony interaction.

tactic, and grammatical information in a text. A chain interaction binds a text together into a cohesive and coherent message by saying "similar 'things' about similar/same 'entities,' 'events,' etc." (Hasan, 1984). In contrast to a simple count of cohesive ties, an index of cohesive harmony can account for much of the complex linking that writers use and that readers must interpret.

Despite its power, cohesive harmony analysis is not without limitations and pitfalls (Friedman & Sulzby, 1987). If shared membership in the same class of items is treated as a text-independent relationship, it can result in an overly liberal categorizing scheme for chains. For example, it is possible to include people, fish, and pine trees in a chain as members of the set of living things. Cohesion analysis, unless constrained to text-dependent, pragmatic relations that depend upon the purpose of the text, will not accurately describe the coherence of a text.

Two other cautions must be raised relative to the use of cohesive harmony analysis. First, such an analysis does not by itself attend to clausal order. That is, a text's clauses could be randomly ordered and still receive the same cohesive harmony index as would a well-organized text. Second, cohesive harmony analysis does not by itself consider the content of a text's redundancies (e.g., if a text were comprised of a single sentence repeated over and over, it would

result in a maximum cohesive harmony score). Both these problems can readily be attended to by supplementing cohesive harmony analysis with organizational analyses and holistic readings for meaningfulness. However, it is important to realize that simplistic, mindless application of cohesive harmony procedures without regard for meaning can result in inappropriate and inaccurate conclusions. As Halliday (1985) has emphasized, cohesive ties are only one part of a discourse system; they do not operate independently of other aspects of this system, such as given/new functions or voice.

## Current study

Although studies (e.g., Kintsch, 1977) have shown that cohesive devices are importantly related to proficient reading, researchers have yet to provide an adequate elaboration of whether developing readers actually know and employ cohesion, especially the complex form of cohesion captured by the measure of cohesive harmony. It seems likely that cohesion may be one of the text-based conventions of written language that effective readers have internalized from reading and can employ with a fair degree of automaticity as they write. However, differences in cohesion knowledge have not been directly related to potential sources of development, such as maturation or reading knowledge. Some research (Hasan, 1984) suggests children do use differing degrees of cohesive harmony in their writing, but there is as yet no evidence that such knowledge is related to children's level of reading performance.

We chose to include children in the third and fifth grades in order to allow comparison with previous studies examining the use of cohesive ties in elementary children's writing attempts (stories that were told or dictated as well as written stories). For example, in earlier studies, we (Cox, 1983; Cox & Sulzby, 1984) related increased use of coreferential cohesive ties by children in kindergarten, first, and second grade to a more advanced emergent or independent reading level. Pettegrew (1984) studied first graders' use of coclassificatory and coextensive as well as coreferential ties and found a relation between greater use of such ties and more fluent reading. However, other researchers who have examined coreferential, coclassificatory, and coextensive ties as well as cohesive harmony in children's writing attempts from first grade through the end of fourth grade have not related differences in use of cohesion to differences in reading level. We conducted the current study with third- and fifth-grade subjects in order to extend our knowledge of how children use cohesion in their writing beyond fourth grade, and to investigate how the use of cohesion is related to reading achievement beyond first or second grade. In addition, earlier studies have shown that it is possible to identify differences in the use of cohesion by children who are at least 6 months apart in age or grade (Rentel & King, 1983).

We were also interested in children's knowledge and use of cohesion in writing both narrative and expository text. Narration is more familiar to children than exposition because they have many opportunities to read and listen to stories, both at home and at school. Narration occurs with greater frequency than exposition in read-aloud sessions (Sulzby & Teale, 1987) and in elementary reading instruction materials (Durkin, 1978-1979; Venezky, 1987). In contrast, expository text is more difficult for elementary children (e.g., Chall & Jacobs, 1983; Kameenui & Carnine, 1982; Prater & Padia, 1983). However, the greater difficulty of exposition is most likely due to its unfamiliarity rather than to differences in the level of abstract intelligence required or to the inappropriateness of the genre for children. Researchers have shown that children use non-narrative text in their oral and written language even at preschool and kindergarten ages (e.g., Bissex, 1980; Clem & Feathers, 1986; Collerson, 1983; Dyson, 1988; Temple, Nathan, & Burris, 1982).

Although expository writing is more difficult for children than narrative writing, the two tasks do not differ in the amount of cohesion required. The major difference between narration and exposition in use of cohesion is in the types of cohesive devices that predominate (Martin &

Peters, 1985). Such differences in the specific cohesive devices used do not affect the interactions that lead to cohesive harmony (Hasan, 1984). Moreover, despite its difficulty, the expository writing task should allow both good and poor readers to use their knowledge of simple anaphoric relations because these conventions are usually learned early (e.g., Maratsos, 1974).

As a task which is difficult due to its low familiarity, expository writing should help reveal specific differences in the knowledge base of young readers/writers. In particular, differences in reading ability that relate to automaticity and expertise with various aspects of written language can often be discerned by making the task more difficult (e.g., Just & Carpenter, 1987; LaBerge & Samuels, 1974). Less familiar or developing—and therefore less automatic—knowledge is often not used, or it may be used inconsistently or poorly. Within-subject differences between genres (exposition and narration), therefore, can be taken as representing real differences in knowledge or automaticity. Such discrepancies are especially important if they align with knowledge differences that distinguish good from poor developing readers.

In the current study, therefore, we asked third- and fifth-grade children to write both stories and expository reports for other children of the same age. These stories and reports were examined to see whether there were any differences in their use of cohesion, based both on simple measures of their use of cohesive devices (number of appropriate and inappropriate cohesive ties) and a more complex measure of overall cohesive harmony. We were also interested in whether differences in use of cohesion would be related to the children's grade or reading comprehension ability, to the genre of the writing, or to the quality of their writing (judged holistically). We were particularly interested in the following research questions:

1. Does children's writing evidence individual differences in understanding the use of cohesion (simple cohesive devices and cohesive harmony) and its function in written text?
2. If differences in knowledge of cohesive devices or cohesive harmony are evidenced in children's writing, are these differences related to their grade level or reading achievement?
3. Are the use of cohesive devices and cohesive harmony related to writing quality in children's writing for others?

## *Method*

### Subjects

The 48 subjects were middle-income students from regular third- and fifth-grade classes in four elementary schools in a district northwest of Chicago. This school district encompasses parts of three growing suburban communities and represents a population diverse in socioeconomic status and ethnic background. The 48 subjects were randomly selected from a subject pool of 96 third- and fifth-grade students chosen to represent high and low reading comprehension. Reading comprehension level was determined on the basis of each child's normal curve equivalent score on the Iowa Test of Basic Skills (Hieronymous, Lindquist, & Hoover, 1989) administered in the fall by the school district. Students whose scores fell between the 68th and 92nd percentiles were assigned to the high comprehension subject pool; students with scores between the 8th and 32nd percentiles were assigned to the low comprehension pool. Of all the students in each grade, approximately 17 percent were above and 17 percent were below the mean of the national distribution. This procedure assured the existence of real differences between the groups of good and poor readers, and reduced the potentially biasing impact of regression to the mean by omitting subjects whose scores were at the extremes of the distribution.

### Materials

Each child was asked to complete four writing tasks: two narrative (writing stories) and two expository (writing reports). For each task, the children were exposed to some stimulus materials and were asked to write about those materials for an audience of other chil-

dren of the same age. For the narrative tasks, each set of materials consisted of three large pictures showing fantasy situations and suggesting a beginning, middle, and end for a problem/solution story (Stein, 1979). One picture set illustrated two boys fishing in a magic pond despite warning signs. The other picture set showed two girls at home alone, one of whom received a magic birthday present that allowed her to walk on the wall, and the parents arriving as one girl walked up the wall, leaving dark footprints behind. Both picture sets were examined and judged appropriate for story writing by elementary teachers.

For the expository tasks, we used articles rather than pictures. Both of the articles were written for the study (by the first author) because we could not find expository texts on suitable topics at the third-grade level that appropriately incorporated cohesive devices. One article was about ants; the other was about cities. Both used a theme and elaboration organization (Applebee, 1984). This structure can also be categorized as a hypotactically organized rhetorical predicate (Grimes, 1972; Meyer, 1975), that is, a structure that gives prominence to one superordinate (i.e., main) idea which serves as a hierarchical organizer for supporting ideas (Horowitz, 1987).

Both articles had been used by elementary teachers in other classrooms prior to use in the study. Specifically, the teachers had read the articles aloud and had then used them as a basis for discussion. The teachers judged the articles to be interesting and appropriate as information sources for report writing in the third and fifth grades. In the current study, we noted that both the expository and narrative tasks were greeted with enthusiasm by most children, who expressed a desire to write more stories and reports for "the others" (the students for whom they were asked to write).

## Procedure

Subjects met with one of us (either the first author or a recent PhD graduate in educational psychology) in groups of 12 for four sessions. The first three sessions were on consecutive days; the fourth session was the following week. Each group included good and poor readers from the same grade level. Subjects worked on one task each session; the order of the tasks and order of the genres (story vs. report) was counterbalanced across groups. Groups were seen by the same examiner at all four sessions. We used standard directions and procedures.

For all tasks, sessions were divided into two phases: discussion and writing. In the first phase, we presented and led a discussion about the materials for that session (the picture set or expository article). For the narrative tasks, we displayed the picture set, discussed their experiences with the topic (either birthdays or fishing), and elicited story ideas about the pictures from the students. We focused the discussion on common story grammar categories, such as setting, event, and reaction (Stein, 1979), and we concluded the discussion with a summary in terms of these categories. The pictures were left in view as a mnemonic for the ideas generated during the discussion. For the expository tasks, we first discussed what the children already knew about the topic. Then, to avoid immediate effects of differences in reading ability, we read the articles aloud as the students followed silently on their own copies. We focused the discussion on the organizational structure of the articles, and we recorded notes from the discussion, in the children's own words, in rough outline form on a chalkboard. The expository articles were then collected from the students, but the notes were left in view on the chalkboard as students began the writing task. All of these procedures were designed to reduce the influence of vocabulary knowledge, topic knowledge, and memory on students' writing.

In the second phase of each session, we asked each child to write a report or a story for children of their own age at another school. For the narrative tasks, we explained that some other children would like to receive stories to read, and asked the subjects to write a story for the other children. For the expository tasks, we explained that the other children were interested in the topic, did not have access to the article that had been read aloud, and therefore were ea-

ger to receive the information. The children were free to examine further either the pictures or the notes on the blackboard as they wrote, and many did, but each was required to write independently. We gave no directions for rereading or editing; we simply told them to do the "best you can." However, we assured the children that we would read their work, obtain clarification of any unclear items, and make corrections during retyping before we shared their writing with others. This assurance was designed to relieve any pressure students may have felt due to skill deficiencies, such as in spelling, which might otherwise have constrained their writing efforts. Recent evidence shows that such directions do not constrain children's word choices and in fact may allow a better indication of lexical competence (Clarke, 1988).

### Scoring

Two trained scorers analyzed the student compositions for use of cohesion. First, each text was parsed into modified T-units (the smallest terminal unit in a sentence: Hunt, 1965), consisting of independent clauses with all dependent clauses attached (Cox, 1987; Pappas, 1981). Consistent with the principles of Halliday's (1985) functional grammar, dependent clauses were parsed with the independent clause because of their dependency on the idea expressed in the major clause. In addition, compound verb structures were parsed as separate T-units because each verb represents different "goings on" or processes in the representation of experience in language. In contrast, compound noun structures were considered a single T-unit because such nouns represent participants simultaneously related in an experience through the same process (verb). (For additional information on all scoring procedures, see scoring manual in Cox, 1987.)

Next, the texts were examined for appropriate and inappropriate use of simple coreferential and coclassificatory cohesive ties (i.e., pronoun reference, use of *the* as a specific determiner, comparatives, demonstratives, and ellipsis). All coreferential and coclassificatory cohesive ties were counted and rated as appropriate or inappropriate. In an appropriate cohesive tie, both members were clearly referenced within the text so that an adult reader had no trouble retrieving the meaning; in an inappropriate cohesive tie, one member was ambiguous, was so distant from the other member that retrieval of meaning was a conscious task, or existed only in the situation of composition or the writer's own private knowledge rather than being stated explicitly in the text. These raw counts were then divided by the total number of T-units in each text to give two proportional scores: appropriate cohesive ties and inappropriate cohesive ties.

Following the analysis of simple cohesive devices, the texts were analyzed for cohesive harmony. First, all texts were lexically rendered (Pappas, 1981). To accomplish this, each coreferential or coclassificatory device was replaced with its referent (i.e., the word or phrase which served as its interpretive source), verbs were translated into their root forms, and function words (e.g., propositions) were eliminated. Once lexically rendered, a text consists totally of nouns, verbs, adjectives, and adverbs, which are all considered lexical *tokens*. Second, scorers identified all appropriately used cohesive ties (coreferential, coclassificatory, and coextensive) and the chains formed by these ties (including both identity chains, based on actual repetition, and semantic chains, based on semantic redundancy). Third, the case grammar roles assigned to the nouns and verbs in each T-unit by the semantic verb category were mapped. Fourth, the scorers counted all chain members that were included in interactions via repeated case grammar roles. Finally, a proportional score for cohesive harmony was computed by dividing the number of interactive chain members by the total number of lexical tokens that were members of chains.

Proportional scores were used in all three measures to correct for differences in length of student texts; such differences are significantly related to advancing grade level, higher reading achievement, and fluency. Interscorer agreement for cohesive device and cohesive harmony analyses involving 2,850 T-units, 13,060 to-

kens, and 5,282 cohesive ties was .85 to .95. Disagreements between raters were resolved through discussion.

In addition, the compositions were rated for quality according to the holistic ranking procedures recommended by Myers (1980). The narrative and expository compositions were ranked separately. Two experienced teachers rated each composition independently. A 4-point holistic scale was used for this purpose, with 4 indicating best written. Raters considered the following criteria in their evaluation:

1. Did the piece seem true to its assigned genre (i.e., was it clearly recognizable as a story or a report)?
2. Was the piece clearly and appropriately organized for its genre (i.e., was there an introduction of either the topic or the setting, a middle part that gave information or a sequence of events, and a conclusion)?
3. Did the information or events seem to "flow" smoothly?
4. Were connectives used appropriately?

Interscorer agreement for this procedure was .91. A third reader resolved all disagreements. (Sample scoring of two student texts on all three cohesive measures plus writing quality is shown in the Appendix.)

## *Results*

### Children's knowledge of cohesion

We will examine first students' performance on the three cohesion measures: appropriate cohesive ties, inappropriate cohesive ties, and cohesive harmony. The means and standard deviations for all three measures are listed in Table 2 (for narrative text) and Table 3 (for expository text). These data were examined using 2 × 2 repeated-measures analyses of variance (ANOVAs) with grade (third, fifth) and reading comprehension ability (high, low) as independent variables. Separate analyses were performed for each genre. The Neuman-Keuls test for multiple comparisons was used to determine significant post hoc effects for reading level within each grade.

*Appropriate cohesive ties.* As shown in Table 2, in narrative text the fifth-grade children used appropriate cohesive ties significantly more frequently than the third-grade children, $F(1, 44) = 13.208, p < .001$, and good readers used appropriate cohesive ties significantly more frequently than poor readers, $F(1, 44) = 11.670, p < .001$. Similarly, for expository text (Table 3), statistically significant main effects were found for both grade level, $F(1, 44) = 17.178, p < .001$, and reading level, $F(1, 44) = 25.438, p < .001$. Older and more proficient readers thus demonstrated in both genres of writing significantly more knowledge than poorer and younger readers about how to repeat and develop meaning unambiguously through coreferential ties. There were no significant effects due to interactions of grade and reading level.

*Cohesive harmony.* In their narrative writing, fifth-grade students used significantly more harmonic cohesion than did the third-grade students, $F(1, 44) = 10.156, p < .002$. Similarly, the good readers employed significantly more cohesive harmony than did the poor readers, $F(1, 44) = 25.587, p < .001$. Again, there were no significant interactions. Both older and better readers effectively knew how to repeat lexical, coclassificatory, and coreferential ties as well as verb categories and case grammar roles to elaborate on and develop their stories.

Expository writing, however, exposed some differences in effects of reading level on use of cohesive harmony. As expected, the more proficient readers employed more cohesive harmony than the poor readers, $F(1, 44) = 4.006, p < .05$. However, contrary to developmental expectations, fifth-grade readers employed only slightly more cohesive harmony than third-grade students, and the difference was not significant. No significant interactions were found. Thus, when the writing task was more difficult and unfamiliar, the proficient readers, irrespective of grade, employed significantly more cohesive harmony by more frequently repeating nouns, verbs, and case grammar roles.

**Table 2** Means by grade and reading level for proportion of appropriate and inappropriate cohesive ties and cohesive harmony: Narrative text

| | Cohesive ties | | | | Cohesive harmony | |
|---|---|---|---|---|---|---|
| | Appropriate | | Inappropriate | | | |
| | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| Grade | | | | | | |
| Third ($n$ = 12) | 1.16 | 0.20 | 0.50 | 0.21 | 0.53 | 0.15 |
| Fifth ($n$ = 12) | 1.38 | 0.26 | 0.35 | 0.24 | 0.64 | 0.12 |
| Reading ability | | | | | | |
| Third ($n$ = 12) | 1.17 | 0.27 | 0.55 | 0.20 | 0.51 | 0.14 |
| Fifth ($n$ = 12) | 1.37 | 0.19 | 0.30 | 0.20 | 0.66 | 0.11 |

**Table 3** Means by grade and reading level for proportion of appropriate and inappropriate cohesive ties and cohesive harmony: Expository text

| | Cohesive ties | | | | Cohesive harmony | |
|---|---|---|---|---|---|---|
| | Appropriate | | Inappropriate | | | |
| | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| *Grade* | | | | | | |
| *Third* ($n$ = 12) | 0.58 | 0.34 | 0.29 | 0.18 | 0.67 | 0.17 |
| Fifth ($n$ = 12) | 0.91 | 0.33 | 0.32 | 0.26 | 0.68 | 0.16 |
| Reading ability | | | | | | |
| Third ($n$ = 12) | 0.55 | 0.33 | 0.37 | 0.25 | 0.63 | 0.19 |
| Fifth ($n$ = 12) | 0.94 | 0.29 | 0.24 | 0.17 | 0.72 | 0.13 |

*Inappropriate cohesive ties.* In narrative writing, the poor readers used inappropriate cohesive ties significantly more often than did the good readers, $F(1, 44) = 22.235$, $p < .001$, and third-grade readers used inappropriate cohesive ties significantly more often than did fifth-grade readers, $F(1, 44) = 8.329$, $p < .05$. Interaction effects were not significant.

In expository writing, however, a different picture emerged. Only the main effect of reading level was statistically significant: The poor readers used inappropriate cohesive ties more often than did the good readers, $F(1, 44) = 4.500$, $p < .05$. However, as for cohesive harmony, there was no significant main effect of grade level, $F(1, 44) = .185$. On the other hand, there was a significant interaction between grade and reading level, $F(1, 44) = 6.793$, $p < .05$. A post hoc Neuman-Keuls analysis of this interaction showed that the poor readers in the fifth grade used inappropriate cohesive ties significantly more often than any other group, including the poor readers in third grade. The good readers, regardless of grade, were significantly less likely to use cohesive ties inappropriately in their writing for others. It is especially interesting to note that, as early as third grade, knowledge regarding cohesion

in written text separates good from poor developing readers.

### Cohesion and writing quality

Next, we examine whether texts high in use of cohesive ties or cohesive harmony were considered better written and more comprehensible by adult readers than those with fewer cohesive ties or less cohesive harmony. Pearson product-moment correlation coefficients were calculated between the three cohesion measures and holistic writing quality scores. Steiger's (1980) test was used to test for the significance of differences between correlations from the same sample. The correlation between frequency of appropriate cohesive ties and rank score for writing quality was not significant for narrative text ($r = .18, p > .05$), but was significant for expository text ($r = .345, p < .05$). The correlation between cohesive harmony and quality of writing was significant for both narrative ($r = .50, p < .05$) and expository text ($r = .39, p < .05$). Thus, cohesive harmony appeared to be a more consistent index of writing quality for both genres than frequency of appropriate cohesive ties. (See Appendix for an example of a text that received a high score for appropriate cohesive ties, but low scores for cohesive harmony and quality rating).

Although it is evident from the above correlations that factors other than cohesion also contribute considerably to judgments of writing quality, cohesive harmony was significantly related to the quality ratings for both genres. One other factor that appeared to contribute to quality ratings was length; as in previous research (e.g., Shanahan, 1984), the texts that received lower quality ratings were shorter than most of the texts given higher ratings. This expected result had already been accounted for in the cohesion measures by calculating proportional scores.

## *Discussion*

Previous studies have identified the use of cohesive devices as critically related to proficient adult readers' comprehension of text (Garrod & Sanford, 1977; Kintsch, 1977; Lesgold, 1972). Research and theory have also related cohesion, especially cohesive harmony, to more expert writing (Halliday & Hasan, 1976; Hasan, 1984). These studies imply the possibility of a causal or interactive relation between cohesion knowledge and proficient reading and writing. Although the present study does not address causality, it does tell us something about the nature of that relationship with some children.

The present study strongly suggests that knowledge about cohesion, especially as evidenced in use of cohesive harmony, is related to children's developing reading and writing ability. As in previous research (e.g., Loban, 1963, 1976), the writers of texts judged superior in the holistic evaluation were generally better readers as well. Importantly, they also tended to use more cohesive harmony in both their narrative and expository texts. This is consistent with the idea that knowledge of cohesive harmony is part of general literacy knowledge, and that this cohesion knowledge is implicated in both reading comprehension and writing quality regardless of the grade level of the child or differences in genre.

Furthermore, the better readers used cohesion more effectively (using cohesive harmony and avoiding inappropriate cohesion) even in the more difficult expository task. Thus, knowledge of the complex uses and appropriate monitoring of cohesion for written language appears to be fairly well-developed in good readers as early as third grade. Even at this level, their developing cohesion knowledge already separates good from poor readers.

### Relation of cohesion knowledge to grade and reading achievement

Important differences between good and poor readers/writers in their use of cohesion emerged due to differences in the familiarity of the two tasks. In the more familiar narrative task, increases in both children's reading ability and their grade level were reflected in a stronger grasp of the simple and complex functions of cohesion in writing. This finding is consistent with extensive research on cohesion and chil-

dren's reading level (Chapman, 1980, 1981, 1983) suggesting that knowledge of cohesion is the result of both learning to read and maturation. However, in the less familiar expository writing task, only greater reading ability was associated with more thoroughness in the use of cohesion. In particular, the better readers, regardless of grade level, employed significantly more cohesive harmony in developing their expository texts than did the poor readers. In addition, the better readers, again regardless of grade level, avoided the inappropriate use of coreferential and coclassificatory cohesive ties in their expository texts much more consistently than did the poor readers. Though a causal relation was not tested, it is clear that with these children, increased reading achievement rather than grade-related development was associated with more proficient use of complex cohesive harmony and less inappropriate use of cohesive ties in the more difficult expository task.

Findings from several earlier studies (Cox, 1983; Cox & Sulzby, 1984) suggest that the relations between grade or maturation, reading level, and developing cohesion knowledge are complex. In a cross-sectional comparative study of kindergarten and second-grade children, we (Cox & Sulzby) found that knowledge of coreferential cohesion in narration is significantly related to emergent and independent reading level, rather than to grade. Because the kindergarten children in that study had received no formal instruction in reading, this finding suggested that a child's learning about coreferential cohesion in written language can take place prior to formal instruction and may be related to differences in either experience or maturation/development.

However, when we (Cox & Sulzby, 1984) examined longitudinal data from the kindergarten children when they reached first grade, we found a decrease in appropriately used coreferential cohesion for the good readers – in fact, a decrement to levels far below those of the average and poor readers. This finding ran counter to our expectations of growth in development or reading level. Therefore, we suspected that the children's experiences with written language may have been altered in an important way in first grade. Formal reading instruction with basal materials began earliest and was most pervasive for the more advanced emergent readers. Upon entering first grade, these high-level emergent readers were grouped together for reading instruction and were placed in basal preprimers and readers earlier than the others.

Elementary school basal reading materials (at least through 1985-1986) have generally used texts especially written for the purpose of reading instruction. (We hope the current movement toward use of good literature and authentic text in basal readers will thrive and extend to content area texts.) Especially in the earliest materials, artificial controls on vocabulary and syntax resulted in contrived language, poor representation of diverse genres, and inappropriate use of cohesion for written text (Anderson & Armbruster, 1984; Anderson, Hiebert, Scott, & Wilkinson, 1985; Beck, McKeown, McCaslin, & Burkes, 1979; Cox, 1987). Attempts to simplify other elementary texts (e.g., content textbooks) have resulted in similarly inauthentic, contrived text and particularly an inappropriate use of cohesion (Beck, et al., 1979; Cox, 1987). In short, elementary textbooks for the earliest grades generally have not provided authentic models of cohesion in written language, either narrative or expository. However, as the grade level of such texts increases, the perceived need for artificial controls diminishes and the texts become noticeably less contrived. Specifically, the basal readers and content area texts for older grade levels have tended to use somewhat more extended, more authentic texts with more appropriate use of cohesion.

In our earlier study (Cox & Sulzby, 1984), the basal series used by the children was one of those that had been cited for its contrived text and inappropriately used cohesion (Beck et al., 1979). Thus, the diminishment in appropriate use of coreferential cohesion by the better readers in first grade could be related to their experience with the basal text during that year. As they advanced through this basal program, the high-level emergent readers would move more rapidly through the basal materials than their less advanced peers. Thus, although they were

exposed to more of the primary basal texts earlier in first grade than the other readers, by second grade they would have moved sooner into more advanced basals, which contained somewhat less contrived text. This fact may explain our cross-sectional data showing that good readers in second grade, like high-level emergent readers in kindergarten, used more coreferential cohesion appropriately in their stories than their peers.

Other research suggests that not only the materials but also the instructional practices used with better readers differ from the instructional practices for poor readers (Allington, 1984; Anderson et al., 1985; Eder & Felmlee, 1984). In the traditional good readers' group, the children read more, engage in more silent reading, read more extended text, attend to the reading lesson better, and spend much more time discussing the meaning of passages than do children in low reading groups. In addition, the good readers probably engage in more independent or recreational reading with self-selected, authentic texts (Fielding, Wilson, & Anderson, 1984). Such texts tend to use cohesion in ways more appropriate for written language than do instructional texts, which often have a contrived design because of greater attention to more quantitative aspects of prose, such as readability formulas for word and sentence length. In contrast, readers in low groups spend more time reading short, simple text and working in structured environments on skills. Good readers have greater opportunity to learn about cohesion because their instruction is more meaning-oriented, they read less contrived texts, and they do more independent reading. Future research should consider directly the influence of text materials and instructional practices on children's developing knowledge of cohesion.

## Limitations

Like all studies, this one has its limitations. However, these limitations provide direction for future research and suggest metrics to accomplish that research. One limitation is that the existing empirical evidence for the validity of the cohesive harmony measure is still small. This study adds to that evidence by showing that cohesive harmony is a much more sensitive measure of a text's cohesion than are simple counts of cohesive ties. This study also suggests that cohesive harmony is part of what proficient readers respond to when they evaluate the quality and coherence of a text. The accumulating evidence of validity is particularly important because of the potential power and flexibility of cohesive harmony analysis to unlock important knowledge about the textual functions of language, literacy development, and cognitive relations. For example, cohesive harmony analysis not only can expose much of a text's meaning-making microstructure, but also can be integrated with macrostructure analyses (Cox, Shanahan, & Tinzmann, 1989; Cox & Stewart, 1989). Moreover, cohesive harmony analysis can examine differences in genres across oral and written modes, and suggests a way to examine cognitive development that may be related to literacy.

A second limitation is that the subjects for this study were mainstream, middle-income, suburban children. The growing evidence for the validity of cohesive harmony, including the findings reported here, suggest that the research should be extended to other populations such as non-mainstream children and adolescents, and adults with literacy problems. A third limitation is that the study addresses only how good and poor readers use cohesive harmony in their own writing. It does not examine directly the role of cohesive harmony in the reading process, nor in good and poor readers' construction of meaning from text.

## Implications

Future research should address the possible early emergence of cohesion knowledge (i.e., prior to formal schooling). It is especially important to consider whether or not knowledge of cohesive harmony is already well under way before school entry for some children (as is knowledge of coreferential cohesion: Cox & Sulzby, 1984). It is also important to determine whether such knowledge aligns with more advanced levels of emergent reading ability, and whether absence of cohesion knowledge characterizes children "at risk." This area of research

is important because the forms and sources of learning about cohesive harmony need to be identified in order to develop instructional programs to facilitate such learning.

Research attention should be directed also to school instruction and materials. Given that poor readers appear to know so much less about cohesive harmony, is a study of cohesion in reading and writing programs warranted? Given the emergent literacy research about language learning, including behaviors that appear regressive but actually signify overall growth, how should such an intervention proceed? Such research should consider the growth of cohesion knowledge that results from a variety of instructional approaches, including the uses of "natural" versus "contrived" texts and the nature of effective teacher/student and peer interactions about text.

## REFERENCES


ALLINGTON, R. (1984). Content coverage and contextual reading in reading groups. *Journal of Reading Behavior, 16,* 85-96.

ANDERSON, T.H., & ARMBRUSTER, B.B. (1984). Content area textbooks. In R.C. Anderson, J. Osborn, & R.J. Tierney (Eds.), *Learning to read in American schools: Basal readers and content texts* (pp. 193-226). Hillsdale, NJ: Erlbaum.

ANDERSON, R.C., HIEBERT, E.H., SCOTT, J.A., & WILKINSON, I.A.G. (1985). *Becoming a nation of readers: The report of the commission on reading.* Washington, DC: National Institute of Education.

APPLEBEE, A.N. (1984). *Contexts for learning to write.* Norwood, NJ: Ablex.

BECK, I.L., MCKEOWN, M.G., MCCASLIN, E.S., & BURKES, A.M. (1979). *Instructional dimensions that may affect reading comprehension: Examples from two commercial reading programs.* Pittsburgh, PA: University of Pittsburgh, Learning Research and Development Center.

BINKLEY, M. (1983). *A descriptive and comparative study of cohesive structure in text materials from differing academic disciplines.* Unpublished doctoral dissertation, George Washington University, Washington, DC.

BISSEX, G.L. (1980). *Gnys at wrk: A child learns to read and write.* Cambridge, MA: Harvard University Press.

CHALL, J.S., & JACOBS, V.A. (1983). Writing and reading in the elementary grades: Developmental trends among low-SES children. *Language Arts, 60,* 617-626.

CHAPMAN, L.J. (1980). *The development of the perception of textual cohesion.* Paper presented at the 25th meeting of the International Reading Association, St. Louis. (ERIC Document Reproduction Service No. 192 260).

CHAPMAN, L.J. (1981). *The comprehension of anaphora.* London: The Open University. (ERIC Document Reproduction Service No. ED 205 897).

CHAPMAN, J. (1983). *Reading development and cohesion.* Exeter, NH: Heinemann.

CLARKE, L.K. (1988). Invented versus traditional spelling in first graders' writings: Effects on learning to spell and read. *Research in the Teaching of English, 22,* 281-309.

CLEM, C., & FEATHERS, K.M. (1986). I lic spidrs: What one child teaches us about content learning. *Language Arts, 63,* 143-147.

COLLERSON, J. (1983). One child and one genre: Developments in letter writing. In B. Kroll & G. Wells (Eds.), *Explorations in the development of writing* (pp. 71-94). London: Wiley.

COX, B.E. (1983). Tracking "it" through the woods and down the trail from emergent to independent reading. In J.A. Niles & L.A. Harris (Eds.), *Searches for meaning in reading/language processing and instruction. Thirty-second yearbook of the National Reading Conference* (pp. 243-250). Rochester, NY: National Reading Conference.

COX, B.E. (1987). *Cohesion and content organization in the narrative and expository writing of children* (Doctoral dissertation, Northwestern University, 1986). *Dissertation Abstracts International* (University Microfilm No. DAO 58785).

COX, B.E., SHANAHAN, T., & TINZMANN, M. (1989). *Children's knowledge of cohesion, voice, and organization.* Manuscript submitted for publication.

COX, B.E., & STEWART, R. (1989, March). *Young readers' use of cohesive cues in writing expository text structures.* Paper presented at the annual meeting of the American Educational Research Association, San Francisco.

COX, B.E., & SULZBY, E. (1984). Children's use of reference in told, dictated, and handwritten stories. *Research in the Teaching of English, 18,* 345-366.

COX, B.E., & TINZMANN, M. (1986, December). *What do elementary children know about differences in voice.* Paper presented at the annual meeting of the National Reading Conference, Austin, TX.

COX, B.E., & TINZMANN, M. (1987, December). *Elementary children's knowledge of exposition.* Paper presented at the annual meeting of the National Reading Conference, St. Petersburg, FL.

CROWHURST, M. (1987). Cohesion in argument and narration at three grade levels. *Research in the Teaching of English, 21,* 185-201.

DURKIN, D. (1978-1979). What classroom observations reveal about reading comprehension instruction. *Reading Research Quarterly, 14,* 481-533.

DYSON, A.H. (1988). Negotiating among multiple worlds: The space/time dimensions of young children's composing. *Research in the Teaching of English, 22,* 355-390.

ECKHOFF, B. (1983). How reading affects children's writing. *Language Arts, 60,* 607-616.

EDER, D., & FELMLEE, D. (1984). The development of atten-

tion norms in ability groups. In P. Peterson, L. Wilkinson, & M. Hallinan (Eds.), *The social context of instruction: Group organization and group processes* (pp. 189-208). New York: Academic Press.

FIELDING, L., WILSON, P., & ANDERSON, R.C. (1984). A new focus on free reading: The role of trade books in reading instruction. In T.E. Raphael & R.E. Reynolds (Eds.), *The contexts of school-based literacy* (pp. 149-162). New York: Random House.

FRIEDMAN, L., & SULZBY, E. (1987). Cohesive harmony analysis: Issues of text pragmatics and macrostructure. In J.E. Readence & R.S. Baldwin (Eds.), *Research in literacy: Merging perspectives. Thirty-sixth yearbook of the National Reading Conference* (297-317). Rochester, NY: National Reading Conference.

GARROD, S., & SANFORD, A. (1977). Interpreting anaphoric relations: The integration of semantic information while reading. *Journal of Verbal Learning and Verbal Behavior, 16,* 77-90.

GRIMES, J.E. (1972). *The thread of discourse.* Ithaca, NY: Cornell University.

GUTWINSKI, W. (1976). *Cohesion in literary texts* (Janua Linguarum Series Minor 204). The Hague: Mouton.

HALLIDAY, M.A.K. (1985). *An introduction to functional grammar.* Baltimore, MD: Edward Arnold.

HALLIDAY, M.A.K., & HASAN, R. (1976). *Cohesion in English.* London: Longman.

HASAN, R. (1984). Coherence and cohesive harmony. In J. Flood (Ed.), *Understanding reading comprehension* (pp. 181-219). Newark, DE: International Reading Association.

HIERONYMOUS, A.N., LINDQUIST, E.F., & HOOVER, H.D. (1979). *Iowa Test of Basic Skills* (Form 718, Levels 9-14). Iowa City, IA: Houghton Mifflin.

HOROWITZ, R. (1987). Rhetorical structure in discourse processing. In R. Horowitz & S.J. Samuels (Eds.), *Comprehending oral and written language* (pp. 117-160). New York: Academic Press.

HUNT, K. (1965). *Grammatical structures written at three grade levels* (Res. Rep. No. 3). Urbana, IL: National Council of Teachers of English.

JUST, M.A., & CARPENTER, P.A. (1987). *The psychology of reading and language comprehension.* Boston: Allyn & Bacon.

KAMEENUI, E.J., & CARNINE, D.W. (1982). An investigation of fourth graders' comprehension of pronoun constructions in ecologically valid texts. *Reading Research Quarterly, 17,* 556-580.

KING, M.L., & RENTEL, V.M. (1981). *How children learn to write: A longitudinal study* (Final Report, RF Project 761861/712383 and 761513/711748). Columbus, OH: The Ohio State University.

KINTSCH, W. (1974). *The representation of meaning in memory.* Hillsdale, NJ: Erlbaum.

KINTSCH, W. (1977). On comprehending stories. In M.A. Just & P.A. Carpenter (Eds.), *Cognitive processes in comprehension* (pp. 33-62). New York: Erlbaum.

LABERGE, D., & SAMUELS, S.J. (1974). Toward a theory of automatic information processing in reading. *Cognitive Psychology, 6,* 293-323.

LANGER, J. (1986). *Children reading and writing: Structures and strategies.* Norwood, NJ: Ablex.

LESGOLD, A.M. (1972). Pronominalization: A device for unifying sentences in memory. *Journal of Verbal Learning and Verbal Behavior, 11,* 316-323.

LESGOLD, A.M. (1973). *Variability in children's comprehension of syntactic structures.* Pittsburgh, PA: University of Pittsburgh, Learning Research and Development Center (ERIC Document Reproduction Service No. ED 086 986).

LESGOLD, A.M. (1974). *Effects of pronouns on children's memory for sentences.* Pittsburgh, PA: University of Pittsburgh, Learning Research and Development Center (ERIC Document Reproduction Service No. ED 068 974b).

LOBAN, W. (1963). *Language of elementary school children: A study of use and control of language and relations among speaking, reading, writing, and listening* (Res. Rep. No. 1). Urbana, IL: National Council of Teachers of English.

LOBAN, W. (1976). *Language development, kindergarten through grade twelve* (Res. Rep. No. 18). Urbana, IL: National Council of Teachers of English.

MARATSOS, P. (1974). Preschool children's use of definite and indefinite articles. *Child Development, 45,* 446-455.

MARTIN, J.R., & PETERS, P. (1985). On the analysis of exposition. In R. Hasan (Ed.), *Discourse on discourse: The Macquarie workshop on discourse analysis* (pp. 61-92). Wollongong, Australia: Applied Linguistics Association of Australia.

MEYER, B.J.F. (1975). *The organization of prose and its effects on memory.* Amsterdam: North-Holland.

MOSENTHAL, J.H., & TIERNEY, R.J. (1984). Commentary: Cohesion problems with talking about text. *Reading Research Quarterly, 19,* 240-244.

MYERS, M. (1980). *A procedure for writing assessment and holistic scoring.* Urbana, IL: National Council of Teachers of English.

NEUNER, J.L. (1987). Cohesive ties and chains in good and poor freshman essays. *Research in the Teaching of English, 21,* 92- 105.

PAPPAS, C. (1981). *The development of narrative capabilities within synergistic, variable perspective of language development: An examination of cohesive harmony of stories produced in three contexts – retelling, dictating, and writing.* Unpublished doctoral dissertation, Ohio State University, Columbus.

PAPPAS, C. (1985). The cohesive harmony and cohesive density of children's oral and written stories. In J.D. Benson and W.S. Greaves (Eds.), *Systemic perspectives on discourse. Volume 2: Selected applied papers from the Ninth International Systemic Workshop* (pp. 169-186). Norwood, NJ: Ablex.

PETTEGREW, B.C. (1981). *Text formation: A comparative study of literate and preliterate first-grade children.* (pp.

181-219). Unpublished doctoral dissertation, Ohio State University, Columbus.

PRATER, D., & PADIA, W. (1983). Effects of modes of discourse on writing performance in grades four and six. *Research in Teaching of English, 17*, 127-134.

RENTEL, V., & KING, M. (1983). *A longitudinal study of coherence in children's written narratives* (Grant No. NIE-4-81-0063). Washington, DC: National Institute of Education.

SHANAHAN, T. (1984). Nature of the reading-writing relationship: An exploratory multivariate analysis. *Journal of Educational Psychology, 76*, 466-477.

SHANAHAN, T. (1988). The reading-writing relationship: Seven instructional principles. *The Reading Teacher, 41*, 636-647.

STEIGER, J.H. (1980). Tests for comparing elements of a correlational matrix. *Psychological Bulletin, 87*, 245-251.

STEIN, N. (1979). How children understand stories: A developmental analysis. In L. Katz (Ed.), *Current topics in early childhood education* (Vol. 2, pp. 261-290). Norwood, NJ: Ablex.

STOTSKY, S.L. (1982). The role of writing in developmental reading. *Journal of Reading, 25*, 330-340.

STOTSKY, S.L. (1983). Research on reading/writing relationships: A synthesis and suggested directions. *Language Arts, 60*, 627-642.

SULZBY, E., & TEALE, W. (1987). *Young children's storybook reading: Longitudinal study of parent-child interactions and children's independent functioning* (Final report to Spencer Foundation). Ann Arbor, MI: The University of Michigan.

TANNEN, D. (1982). The oral/literate continuum in discourse. In D. Tannen (Ed.), *Spoken and written language: Exploring orality and literacy* (pp. 1-16). Norwood, NJ: Ablex.

TEMPLE, C.A., NATHAN, R.G., & BURRIS, N.A. (1982). *The beginnings of writing*. Boston: Allyn & Bacon.

VENEZKY, R.L. (1987, December). *Literacy and the reading curriculum*. Paper presented at the annual meeting of the National Reading Conference, St. Petersburg, FL.

## Footnote

The first author gratefully acknowledges the assistance of Margaret Tinzmann, PhD, in helping to collect the data; of Lawrence Friedman, PhD, Margaret Tinzmann, and George Kamberellis in helping to score the data and develop the text analysis manual; and of Doris Caro, PhD, and Beverly Otto, PhD, in reading and holistically evaluating the children's texts.

Received June 17, 1988
Revision received December 12, 1988
Final revision accepted September 10, 1989

# APPENDIX

*Sample scoring on all three cohesion measures of student texts judged high and low in writing quality*

Numbers in parentheses indicate the T-unit parsings. Words or phrases in brackets were scored as clearly referenced (therefore, cohesive) instances of ellipsis, unless otherwise noted. A brief summary of the holistic quality rank, cohesive ties, and cohesive harmony scoring follows each text.

*Well-written text*
(Author: Good reader, fifth-grade)

*Text:* (1) Cities have thousands of people in them. (2) The people live very close together (3) and some next to tall buildings. (4) There is a lot of noise and people running around. (5) People live in big cities, because they are close to where they work (6) and they think they will have a better life [in big cities]. (7) There are also many choices about work, play, and housing [in big cities].

(8) There are usually three main parts in a city. (9) There is a downtown, which is busy. (10) It has many stores, skyscrapers, and apartments. (11) The industrial area has many factories, pollution, warehouses, and small houses. (12) The residential area has many homes and small businesses.

(13) Some cities grow by their natural resources like oil, trees, or gas. (14) Houston, Texas grew with those. (15) Chicago, Illinois grew with transportation crossroads – where roads, airways, and rivers meet. (16) These are some of the things that made small cities become big cities.

*Scores:* 1. This text was ranked 4 (highest) in quality.

2. In this text 14 clearly referenced coreferential or coclassificatory cohesive ties were identified (e.g., *the people* in T-unit 2, *they* in T-unit 6, *those* in T-units 14 and 16, and ellipses such as *in big cities* in T-units 6 and 7. When the 14 cohesive ties are divided by the texts' 16 T-units, the frequency of appropriate cohesive ties was 0.88.

3. In this text 89 tokens were scored as cohesive members of semantic or identity chains. Of these, 73 were interactive tokens that repeated noun, verb, and case grammar information across two or more T-units. The cohesive harmony for this text was 0.82 (73 interactive tokens divided by 89 chain members).

*Summary:* This text was rated high in quality and was rated high in number of cohesive ties (0.88) and in cohesive harmony (0.82).

*Poorly written text*
(Author: Poor reader, third-grade)

*Text:* (1) The Magic Spell (a title) (2) There was two boys. (3) They wanted to go fishing, so they went to the forest. (4) Tommy put a pole in the water (5) and [he] fell in [the water].

*Scores:* 1. This text was ranked 1 (lowest) in quality.

2. In this text, 5 clearly referenced coreferential or coclassificatory cohesive ties were identified ("they" twice in unit 3, ellipses such as "he" and "the water" in unit 5, and "the" in unit 4 but not in unit 3—which was agreed on as referring to the stimulus). When the 5 appropriately used cohesive ties are divided by the text's 5 T-units, the frequency of appropriate cohesive ties was 1.00.

3. In this text, 14 tokens were scored as cohesive members of semantic or identity chains. Of these, none were interactive tokens that repeated noun, verb, and case grammar information across two or more T-units. The cohesive harmony for this text as 0.00.

*Summary:* This text was rated low in quality; it was rated very high in frequency of cohesive ties (1.00), but quite low in cohesive harmony (0.00).

# In memoriam: Ronald W. Mitchell

The untimely death of IRA Executive Director Ronald W. Mitchell on November 17, 1989, came as a shock to all IRA members. Mitchell served IRA for more than 20 years, first as Assistant Executive Secretary, then as Director of Conferences, and finally as Executive Director since 1984. As IRA President Dale D. Johnson noted, Mitchell left "a lasting legacy—a proud and strong professional association working hard to improve literacy for all humans." A memorial fund has been established, and donations may be sent to: The Ronald W. Mitchell Memorial Fund, c/o International Reading Association, 800 Barksdale Road, PO Box 8139, Newark, DE 19714-8139, USA.

## References

**What Classroom Observations Reveal about Reading Comprehension Instruction**
Dolores Durkin
*Reading Research Quarterly*, Vol. 14, No. 4. (1978 - 1979), pp. 481-533.
Stable URL:
http://links.jstor.org/sici?sici=0034-0553%281978%2F1979%2914%3A4%3C481%3AWCORAR%3E2.0.CO%3B2-R

**An Investigation of Fourth-Graders' Comprehension of Pronoun Constructions in Ecologically Valid Texts**
Edward J. Kameenui; Douglas W. Carnine
*Reading Research Quarterly*, Vol. 17, No. 4. (1982), pp. 556-580.
Stable URL:
http://links.jstor.org/sici?sici=0034-0553%281982%2917%3A4%3C556%3AAIOFCO%3E2.0.CO%3B2-P

**Preschool Children's Use of Definite and Indefinite Articles**
Michael P. Maratsos
*Child Development*, Vol. 45, No. 2. (Jun., 1974), pp. 446-455.
Stable URL:
http://links.jstor.org/sici?sici=0009-3920%28197406%2945%3A2%3C446%3APCUODA%3E2.0.CO%3B2-%23

**Commentary: Cohesion: Problems with Talking about Text**
James H. Mosenthal; Robert J. Tierney
*Reading Research Quarterly*, Vol. 19, No. 2. (Winter, 1984), pp. 240-244.
Stable URL:
http://links.jstor.org/sici?sici=0034-0553%28198424%2919%3A2%3C240%3ACCPWTA%3E2.0.CO%3B2-6