GRADE SIX STUDENTS' UNDERSTANDING OF METAPHOR IN INFORMATIONAL TEXT

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ABSTRACT

Metaphor research has become widespread. However, students' understanding of metaphor in informational text has received little study. With increased use of informational trade books in the classroom, research in this area is needed. Fifty-five grade six students with Canadian English as their first language participated in the study. Their understanding of metaphors in excerpts from three recently published informational trade books was examined by the use of the reading think aloud technique and multiple choice activities. One think aloud was completed by each student in both individual and dyadic conditions. Multiple choice activities were completed individually after reading, but with the text available. The think-aloud protocols were examined using specific-trait analysis, holistic scoring, and miscue analysis. The multiple choice activities were scored against anticipated adult-like understanding and the results were subjected to standard statistical tests. Level of understanding of metaphors varied widely among students, with the overall average being about 65%. Contrary to prediction, understanding was significantly higher in the individual condition compared to the dyadic condition. Although part of this difference could be attributed to differences in passage difficulty, the anticipated scaffolding effect of reading with a partner was not found. The reading think aloud was a rich source of information about both the meaning students constructed and the meaning-construction process. The study suggested that the think aloud could be used in the classroom as an effective learning device, particularly in that it allowed less-capable readers to participate as equal partners in what might otherwise have been a frustrating reading task. Overall, there emerged a picture of students at various points along the path to full adult mastery of metaphor, with some students already demonstrating an adult level of understanding. Level of text understanding was consistent with level of metaphor understanding. The only metaphor-type effect identified was for metaphors with copula-verb syntactic-frame structure. Abstractness of the words in the metaphors did not affect meaning construction; however, conventionality of the metaphorical expressions did influence understanding.

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CHAPTER ONE: OVERVIEW

I. Statement of the Problem and Introduction

A growing body of research literature (e.g., Vosniadou, Ortony, Reynolds, and Wilson, 1984; Keil, 1986; Winner, 1988; Siltanen, 1989, 1990) focuses on children's ability to understand metaphor and on factors affecting understanding. The importance of this research is emphasized by the key contentions of Lakoff and Johnson (1980), Lakoff and Turner (1989), and Lakoff (1993) that metaphor is based on experience and is central to what we think and the way we think.

From an educational perspective, there are bothersome gaps in the research. One such gap--attention to ecological validity--is identified by Broderick (1992). In an examination of the metaphor types used as stimuli in tests of fifteen major studies with children, he challenges the ecological validity of the studies on the ground that the metaphor types are different from the metaphorical language children normally encounter in printed stories. Broderick finds that the most frequently used stimulus types--the substitution and equation (copula-verb) types of metaphors--appear infrequently in children's books. He gives no information about the types of metaphors children normally encounter in other types of text, such as informational text.

A second gap in the literature is created by a general lack of attention to informational text. Studies of the importance of context in supporting metaphor interpretation have, for example, used specially created stories of differing lengths (e.g., Siltanen, 1989). This raises the question of whether the text structure generally associated with fiction (see, for example, Stein & Glenn, 1979)

might be influencing children's responses, as indicated by Waggoner, Meese, and Palermo (1985). From their examination of the effect of story structure on children's understanding of metaphor, they conclude that even young children's interpretation of metaphor may be affected by their understanding of typical story structure. Their study sheds no light, however, on understanding of metaphor in informational text that, while perhaps exhibiting a strong narrative voice and certain story elements such as, for example, conflict, may lack the "overarching framework that a reader can use to organize and relate the information in the text" (Beck & McKeown, 1992, p. 135).

As language arts programs broaden to include more trade books, both fiction and nonfiction, students are being exposed to much richer natural language than occurs in the traditional basal reading programs. While some of the newer reading series, such as the Impressions (1988) program, do contain authentic text (i.e., text not specifically written for classroom use), some of the series still in use contain mainly specially written selections and/or selections that have been rewritten to such criteria that the language is flat and unnatural, lacking to a large degree the metaphorical structures typical of natural language. (For a discussion of this in relation to one early reading series, see Luke, 1988.)

Although studies have looked at children's comprehension of metaphor in fiction and in specially constructed test-like text, children's understanding of the metaphorical language they encounter in nonfiction text, particularly informational text, remains largely unexamined. Additionally, it is not known in what way children's level of understanding of metaphor is related to their level of understanding of the text itself. This study proposes to investigate these two problems.

II. Need for the Study

Broderick's (1992) reminder of the importance of ecological validity is a helpful starting point when considering children's understanding of metaphor in informational text of the sort widely available for use in the classroom. Without some awareness of children's understanding of metaphor occurring naturally in informational text, one is left with uncertainty as to whether specifically chosen

materials are within the reading ability of the students. On the other hand, once an awareness is reached, a basis for decision making can be established and informed adjustment of both curriculum and classroom practice can be made to ensure that children thoroughly understand the informational text they read and benefit from the increased richness of meaning provided by metaphor.

This study proposes to address the problem of ecological validity identified by Broderick (1992) to the extent that it will use text that students might well encounter in their school program. By using coherent excerpts of such authentic text, the problem of adequacy of context will be addressed at the same time.

An additional measure of ecological validity will be provided by having students complete part of the work in pairs (dyads), thus drawing on current cooperative-learning practice, as influenced by Vygotsky (1962, 1978) (see, for example, Johnson & Johnson, 1994). This will provide an opportunity to compare student understandings in the dyadic and individual conditions.

Informational trade books are being used widely in both language arts and content areas of the curriculum. An examination of such trade books reveals that much of the language is rich in metaphor. The use of analogy (a type of metaphoric language) as an advance organizer has been found to stimulate recall of text information under experimental conditions (Mayer and Bromage, 1980; Anderson and Pearson, 1984). Mayer and Bromage (1980) suggest that analogy works at the time of original encoding of the information in memory as well as during recall by structuring the information in a coherent form. Given these crucial functions of metaphorical language, it becomes a pertinent question how children's understanding of the metaphorical language is contributing to their understanding of the informational text.

There is, at present, no clear idea of how children's understanding of metaphor relates to their understanding of informational text. This study will attempt to determine whether such a relationship exists and, if it does, something of its nature.

An examination of the metaphor content of informational text was carried out as part of this study. Selections of informational text appearing in authorized language arts anthologies and project

books of the <u>Impressions</u> program and basal readers were examined and were found to vary widely in the amount of metaphor content, with the <u>Impressions</u> program material containing a higher proportion of metaphors than selections from the other basal reading programs. Randomly selected informational trade books also showed a high density of metaphor, much higher than the basal readers. While these more-or-less informal findings raise questions about the appropriateness of different materials and whether students using a particular program are being provided with reading experiences that will support successful reading beyond the specific program materials, these concerns will be left to others to investigate. Of particular interest so far as this study is concerned is that students are likely to encounter natural, metaphor-rich language when they read informational trade books.

Should a clear relationship between understanding of metaphor and understanding of text be identified, this study will have served the purpose of drawing attention to the need for teachers to give careful consideration to the metaphor content of informational text. It is hoped that the results of this study would then provide teachers with an incentive and a means to examine this rich area of language experience and student understanding.

III. Theoretical Framework and Assumptions

The view of metaphor which informs this study is that put forward by Lakoff and Johnson (1980), Lakoff and Turner (1989), and Lakoff (1993). According to this view, metaphors are conceptual in nature and are a natural, inescapable part of our way of thinking. Their primary purpose is to extend understanding of one conceptual entity (target) by drawing upon knowledge of a second conceptual entity (source) by means of a mapping process. Drawing on schema theory, as put forth by Rumelhart (1980), according to which schemata are process-structures in which knowledge is held in an organized manner and is rendered accessible in usable form, the metaphor process is held to consist of any or all of the following types of mapping from the source-domain schema to the target-domain schema: (a) slots, (b) relations, (c) properties, and (d) knowledge. These will be discussed in Chapter

Two. According to Lakoff, Johnson, and Turner, metaphors are based on solitary and culturally grounded experience and have meaning because they are grounded in experience. This grounding is so powerful that metaphors govern both how and what we think.

Schema theory and this view of metaphor are consistent with the further concept that knowledge is constructed by the cognizing individual. The radical form of constructivism (so-called by its proponents) has been put forward by Ernst von Glasersfeld (1984, 1989). The more moderate form espoused by Jerome Bruner (1986, 1990) is more generally accepted. L. S. Vygotsky (1962, 1978) sets forth the necessary conditions for knowledge construction to occur. He suggests that all individual learning and development result from social interaction, a process in which language plays a critical mediational role. Constructivism and social interactionism can be seen as mutually informing concepts that are helpful in describing how the individual comes to know.

The radical form of constructivism, as informed by Vygotsky's theory, has been adopted in the current study; thus, this study will examine the meaning that children construct from their own knowledge in the presence of both text and talk and will depart from the theoretical stance of those studies that conceptualize the process as one of comprehension of a meaning residing in the text. The focus, then, is children's constructed understanding, not their comprehension in the conventional sense.

Three particular factors have been found to influence outcomes of studies of children's understanding of metaphor: (1) the context in which the metaphor is presented (Vosniadou, Ortony, Reynolds, & Wilson, 1984); (2) knowledge of story structure (Waggoner, Meese, & Palermo, 1985); and (3) types of metaphor (Broderick, 1992). Specifically, Vosniadou et al. found that when adequate context is provided, children's understanding of metaphor increases. Waggoner et al., examining children's recall of metaphor in fiction, found that metaphor is more memorable if embedded at the outcome node, according to story-grammar analysis, than if embedded at another location; and Broderick found that many studies of children's understanding of metaphor used metaphor types not commonly found in children's books and likely to be of questionable familiarity to the children.

The current study addresses these three problematic areas in the following ways: first, all text samples used are self-contained units of authentic text, from three to thirteen pages in length, preserving to a major extent the original context, including illustrations, photographs, and graphics; second, because informational text is used, possible influence of story structure is avoided; and, third, text samples have been drawn from authentic text, thus ensuring that the study's metaphor types are consistent with metaphor types children are exposed to in the course of reading readily available informational trade books.

The use of the think aloud as a data collection device, together with analysis of the resulting think-aloud protocols, is supported by a growing literature (e.g., Dias, 1987; Baumann, Jones, & Seifert-Kessell, 1992; Ericsson & Simon, 1993). Dias contends that the think-aloud verbalization, while not necessarily "identical with" the thought process from which it arises, is "close to being concurrent" and is a useful reflection of the thought process (p. 9). Baumann et al. show that think-aloud instruction can improve student performance on metacognitive activities involved in reading, thereby indicating that thinking aloud can be linked in some non-trivial way to the reading process and can be taken to reveal something about the process itself and the meanings constructed during reading. Ericsson and Simon provide a powerful theoretical rationale for the use of think-aloud procedures in a variety of research situations.

This study makes use of the think aloud to gather data. By using the concurrent think aloud, it is hoped that both the meaning-construction process and the meanings constructed during reading will be uninfluenced by memory or recall processes or by possible effects of probes used to encourage retrospection.

Based on the literature reviewed in Chapter Two and the methodology described in Chapter Three, seven key assumptions have been made about metaphor, constructivism, think alouds, social interaction, and the stability of specific traits. It is assumed:

1. That metaphor is a cognitive structure rather than simply a linguistic one;
2. That meaning making is a constructive process;

3. That what we already know determines the possible meanings we can construct when we read;

4. That thinking aloud while reading reveals something about the reading process and the meaning that is constructed;

5. That grade six students are capable of doing think alouds successfully while reading;

6. That working with another person will alter the meaning constructed during the reading experience; and

7. That the operation of the specific traits identified during the pilot study remains the same in the main study.

IV. Research Questions

Three major questions underlie this study: (a) How well do grade six students understand metaphor in the informational text they read? (b) How well do the same children understand the metaphor-bearing informational text itself? (c) How are understanding of text and understanding of metaphor related?

For the purpose of this study, these three major questions are restated as seven specific questions. The relationship between the major and specific questions is as follows:

(a) How well do grade six students understand metaphor in the informational text they read?

1. What is student level of understanding of metaphor as determined by performance on a multiple choice meaning clarification activity?

2. What are the differences in understanding of metaphor by the same student in the individual and dyadic think-aloud conditions as determined by performance on multiple choice meaning clarification activities?

3. What are the differences in understanding of metaphor in the same text for the individual and dyadic think-aloud conditions as determined by performance on a multiple choice meaning clarification activity?

4. What are the differences in understanding of different types of metaphor as determined by performance on multiple choice meaning clarification activities?

(b) How well do the same children understand the metaphor-bearing informational text itself?

5. What proportion of students achieve high and low scores on think-aloud tasks as determined by holistic and specific-trait scoring and miscue analysis?

(c) How are understanding of text and understanding of metaphor related?

6. What are the features of the think alouds of students whose performance on a multiple choice meaning clarification activity placed them in the first and fourth quartiles?

7. What is the relationship between the level of students' understanding of metaphor and their understanding of text?

V. Limitations of the Study

This study was undertaken to examine how well grade six students understand metaphor in the informational text they read, how well the same children understand the informational text itself, and how understanding of text and understanding of metaphor are related.

To make this study manageable in terms of time and cost, other potentially interesting questions were not examined. It was not possible to investigate children's understanding of metaphor in fiction or poetry. Research in these areas would need to take into account some of the special features of the two, such as the particular structure of story or poetry's often very high density of metaphor, where meaning may be influenced by interactions among metaphors.

This study did not set out to explore psychological aspects of metaphor or text understanding. While such processes are under debate and are of considerable interest, the purpose of this study was to investigate the meaning students construct. Although the meaning-construction processes discussed in this study must surely have a psychological foundation, examination of the nature of that foundation was not the purpose here.

Although student understanding of metaphor at all grade levels is of interest, it was necessary

to limit the study to one grade level only for the reasons mentioned above. Grade six students were selected, in part because they are more skilled in metacognitive strategies than very young children and they have a rapidly growing world knowledge. When absent or weak, these two factors have been found to have a negative effect on reading understanding (Baker & Brown, 1984). It was hoped that by using grade six students, the potentially negative influence of these two factors would be less than with younger children. Also, grade six students are unlikely to have fully developed metacognitive processes. It has been found that, as readers mature, the metacognitive processes become automatic and drop below the level of consciousness, often going unreported during think-aloud tasks (Afflerbach & Johnston, 1984). Clearly, this study's results can be taken as only possible suggestions of metaphor and text understanding of younger and older children.

It was necessary to develop instruments and methods for this study. No adequate measures were available for use under the conditions and for the purposes identified. Most studies have created texts and have structured metaphors in particular ways. Many studies have depended on the ability of students to paraphrase metaphors. Some have taken for granted student ability to recall. Student understanding of text has generally been ignored. Most studies have been highly intrusive in that they have required students to use text in ways other than those with which they are familiar and in ways that emphasize the test-like nature of the activity. This study used methods and materials as much as possible like those students would be familiar with from their classroom experience. The specific traits used to describe the think alouds, for example, emerged from the protocols themselves and were not imposed upon them as would have been the case with previously developed instruments. By adopting this approach, it was hoped to maintain the ecological validity of the material and activity and to maintain a closer contact with the curriculum than would be possible if instruments and methods were borrowed from previous studies. The ecological validity was weakened to the extent that it was necessary for the students to work in small groups outside their classroom with a stranger who clearly had a purpose beyond simply having them read and talk about passages of text. The test-like situation was not entirely avoided.

The issue of adequate context in the presentation of metaphors was addressed by using high-quality colour photocopies of the front cover and initial pages of text of each book. In this way, it was hoped to ensure that the metaphors were contextualized in a manner similar to the original. However, because the complete books were not available to the students and numbered fluorescent dots were affixed at points in each text for reference during the multiple choice activity, the original context was somewhat altered.

Researchers generally have gone to considerable effort to ensure that, where multiple passages are used, they are equivalent. This study used passages that are different from each other in subject matter and reading level. The books are representative of material classroom teachers might well use in their programmes. The differences in the reading levels of the passages have provided data for additional comparative analysis.

This study, approaching metaphor as a conceptual phenomenon rather than simply a linguistic one, assumes that the cultural contribution to one's understanding of metaphor will pose special problems for non-native English speakers. Drawing subjects as it has from a native English-speaking population, this study makes no attempt to examine the particular problems of English-as-a-second-language (ESL) learners, although such an examination is needed.

VI. Definition of Terms

In this study, the key terms were operationally defined as follows:

Metaphor: A metaphor is a conceptual entity, identifiable linguistically as a conjunction of terms, stated or implied, such that one term (the target) is understood in terms of some feature(s) of the other (the source). The purpose of metaphor is to create and/or enrich understanding.

Individual think aloud: A process of speaking aloud what one is thinking. A reading think aloud combines this with the oral reading of text in such a way that the text reading is interrupted by the speaking aloud of the accompanying thoughts. It may also include either or both a speaking aloud of thoughts as they occur during the reading and/or a retelling after the reading has been completed.

Dyadic think aloud: A think aloud produced by two participants.

Think-aloud protocol: The verbatim transcription of the think aloud.

Understanding: The meaning created by an individual as the result of an experience, such as,

for example, reading. In this study, it is taken to mean performance on a multiple choice meaning

clarification activity, performance as determined by holistic and specific trait scoring of a think aloud,

and performance as determined by miscue analysis.

Specific trait: One of various characteristics of student utterances produced during a think

aloud, representing features of meaning construction, orientation toward task, or lack of

understanding.

Specific-trait analysis: Identification of the specific traits in a think-aloud protocol.

Specific-trait scoring: A profile of a think-aloud protocol, consisting of numbers and/or

percentages of specific traits identified during analysis.

Holistic score: A numerical value assigned to a think-aloud protocol using a multi-item, six-point,

Likert-type scale of descriptors.

Informational text: Nonfiction whose main purpose is to provide factual information in a literary

way.

Trade book: A book intended for sale to the general public. Such books find their way into the

classroom and school library, where they supplement the authorized and recommended texts.

High score: A high comparative standing, as determined by rankings of scores obtained by

both holistic and specific-trait analysis of a think-aloud protocol, as well as by analysis of serious

miscues made during reading. Serious miscues are defined as those that change the meaning of the

text. The miscue analysis is consistent with recommended practice for determination of level of

student comprehension of text, with a high score representing an independent, or easy, reading level

of less than 2% serious miscues (May, 1990, p. 388).

Low score: A low comparative standing, as determined by rankings of scores obtained by both

holistic and specific-trait analysis of a think-aloud protocol, as well as by analysis of serious miscues

made during reading. Serious miscues are defined as those that change the meaning of the text. The miscue analysis is consistent with recommended practice for determination of level of student comprehension of text, with a low score representing a frustrational reading level of more than 5% serious miscues (May, 1990, p. 388).

In preparation for the study of the specific questions identified above, a broad range of research literature and philosophical works was examined. The most pertinent pieces have been selected for discussion in Chapter Two.

CHAPTER TWO: LITERATURE REVIEW

I. Introduction

Lythcott and Duschl (1990) identify the need for research conclusions to be based on a coherent worldview. They maintain that the worldview justifies the warrants upon which the research conclusions must be based, the warrants being the assumptions that directly support the conclusions. Lythcott and Duschl suggest that the constructivist psychological worldview is capable of providing the necessary grounding.

This study accepts the position of Lythcott and Duschl. This chapter will outline the constructivist psychological worldview (hereafter called, simply, constructivism) and certain other concepts that interlock with it.

The chapter will examine the following concepts from the perspectives indicated:

1. Social interactionism, as a concept describing the general conditions under which knowledge construction takes place;

2. Constructivism, as a concept describing the specific manner in which the individual constructs knowledge from experience;

3. Schema theory, as a description of the manner in which knowledge is organized;

4. Parallel distributed processing, as a concept describing how knowledge is processed;

5. Metaphor, as a concept describing how knowledge, once constructed, feeds itself.

This survey will attempt to show that the above concepts together form a simple, coherent heuristic device. A section reviewing metaphor research will follow the examination of the concepts. The chapter will conclude with a summary of the central ideas.

II. Social Interactionism

The concept of social interactionism is derived in large part from the work of L. S. Vygotsky. While the concept embraces all human learning, Vygotsky and those building on his work have focused on language, in part because it provides a model case of the human developmental process, but also because, as Bruner (1986) says, language is "an agent for altering the powers of

thought--giving thought a new means for explicating the world. In turn, language became the repository for new thoughts once achieved" (p. 143). This examination of the concept will also focus on language, but for the additional reason that understanding of text is a central concern of this study.

According to Vygotsky (1962, 1978), an individual's mental processes are social in origin--the result of interactions of the individual with others or with cultural artifacts, such as language. Bruner (1986), a strong advocate of Vygotsky's theories, says, "I agree with Vygotsky that there is at least one deep parallel in all forms of knowledge acquisition--precisely the existence of a zone of proximal development and the procedures for aiding the learner to enter and progress across it" (p. 78). He notes that Vygotsky focuses on thought and language as two central aspects of knowledge construction, with inner speech acting as a "regulatory process that, in Dewey's famous words, provided a means for sorting one's thoughts about the world" (p. 143). In Vygotsky's terms, language has the power to shape thought and, in so doing, shape the individual's construction of reality, while, at the same time, functioning as the "repository for new thoughts once achieved" (p. 143).

Wells (1990a) also focuses on children's relationships with text, which, in broad terms, he defined elsewhere as

> any artifact that is constructed as a representation of meaning using a conventional symbolic system since, by virtue of its permanence and the symbolic mode in which it is created, such an artifact performs the essential function of allowing us to create an external, fixed representation of the sense we make of our experience so that we may reflect upon and manipulate it. (Wells,1990b, p. 378)

This process of reflection and manipulation has the potential to be varied and rich. Wells (1990a) suggests that the written text can function as "an aid to the construction and interpretation of meaning," a role served by "any form of symbolic representation that enables thought to be revisited and revised" (p. 12). This "engagement with texts" is central to children's developing literacy, which, in keeping with Vygotskian theory, "involves the orchestration of thinking, talking and doing, as well as reading and writing, in the construction and interpretation of meaning" (p. 13).

The interpretation of meaning from text, according to Wells (1990b), involves five modes: performative, functional, informational, re-creational, and epistemic (p. 374). While each has its place,

it is the epistemic mode whereby the writer's "tentative and provisional attempt...to capture his or her current understanding...may provoke further attempts at understanding as the writer or some other reader interrogates the text in order to interpret its meaning" (p. 373). The "empowerment" resulting from the "transaction between the representation on the page and the representation in the head" contributes to levels of understanding--intellectual, moral, affective--"that would otherwise be difficult or impossible to achieve" (p. 374).

Vygotsky's concept of the zone of proximal development (ZPD) is a key part of the concept of social interactionism. In Vygotsky's words,

> [T]he zone of proximal development...is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers. (1978, p. 86)

This ability to do more with assistance than is possible alone reveals what capacities are in the process of developing and provides an idea of what the child's development picture will look like in the near future (p. 87).

The ZPD has become the focus of intense scrutiny and speculation by cognitive theorists, as has the concept of cognitive scaffolding by means of language use. According to the latter concept, language can act as a support mechanism (scaffold) for performance within the ZPD, when provided by a more accomplished other--that is, one can do more with help than without help. The demand placed upon the child by the need to learn to use language to establish its own context, for example, provides a clear opportunity for the process of scaffolding, which Bruner (1986) sees as "the procedures for aiding the learner to enter and progress across" the zone of proximal development (p. 78). By this process, the more proficient language user in effect provides an organizing framework of action or thought, within which the learner can fit the less-than-complete information that has been learned but which falls short of the full understanding or mastery that would mark an independent development level.

The twin concepts of zone of proximal development and scaffolding (particularly language scaffolding) are at the hub of social interactionism. Together they describe the conditions under

which individual learning and, thence, development, can occur. As will be seen later, this gives support to the ideas that metaphor itself is experientially and culturally influenced and that metaphor meaning is not merely a linguistic given, but a cognitive construction of the individual, with an element of commonality accounted for by social context.

This study provided opportunity for each student to read a passage with a partner (dyadic condition), then to complete a multiple choice activity individually. In this way it was hoped to gather data on the effect of cooperative reading on metaphor and passage understanding.

III. Constructivism

Constructivism holds that all individuals are actively and continuously engaged in the construction of meaning from the flow of experience. This constructed meaning becomes knowledge for the individual. The constructive process involves prior knowledge and current experience, linguistic and otherwise.

The term constructivism encompasses a wide range of theoretical positions. At a simple level--as often used in education--it refers to either the undefined process a child goes through in learning from an experience or the fact that what a child learns is, in some way, unique. At this level, there is no challenge to the existence of objective reality or to the capacity of humans to know something verifiable about it. At this level, education functions on the premise that reality is waiting to be discovered, but that individual extent of learning will vary.

At the other extreme, so-called radical constructivism maintains that knowledge is simply that which the individual has found to work. Radical constructivism considers knowledge to be unverifiable; rather, what matters is that it be viable within the framework of the experience out of which it arose (von Glasersfeld,1984, 1989) and that it possess a degree of stability, thus providing the basis for choice of action within future experience. Knowledge, then, is the construction of a body of viable experience, that is, experience that fits one's pursuit of goals, making the goals attainable. This knowledge is built up "bit by bit in a succession of steps," repeated often enough that

the "given experiential item has some kind of permanence" (1989, p. 442). Language provides part

of the permanence, but "not even language enables a cognizing subject to get beyond the

boundaries of subjectively constructed experiential reality" (p. 444).

The roots of constructivism reach back at least to Giambattista Vico, whose major work, <u>Scienza</u>

<u>Nuova</u> (1725), is currently undergoing enthusiastic critical examination (see, for example, Danesi,

1993). Not only does Vico provide a constructivist explanation of human knowledge, he

hypothesizes a significant role for metaphor in creating the surface level of mind, that part capable of

forming, holding, and manipulating concepts.

A particularly lucid statement of the challenges to, and implications of, the constructivist position

is given by Jerome Bruner (1986), who suggests that the cognizing individual applies preselected

symbol systems, thus limiting the possible outcomes--the "possible worlds." Of the challenge

confronting any theory of development, "its central technical concern," he says, "will be to create in

the young an appreciation of the fact that many worlds are possible, that meaning and reality are

created and not discovered, that negotiation is the art of constructing new meanings by which

individuals can regulate their relations with each other" (p. 149). The cultivation of awareness of

possibility--or, more exactly, awareness of multiple possibilities--is one of the values of metaphor. In

this respect, metaphor can be seen to be a support for the type of theory of development favoured by

Bruner.

Although not addressed by Louise Rosenblatt in such terms (see, for example, Rosenblatt,

1978), the awareness of multiple possibilities fostered by metaphor would seem to be consistent with

the idea of an individually constructed aesthetic experience and may contribute to it. In this study,

one facet of aesthetic experience--affective response--was identified as one of the specific traits of

the think-aloud protocols and was considered to play a part in the meaning-construction process.

Constructivism is consistent with the idea that metaphor is an active cognitive device, one

capable of further construction of knowledge from an individual's prior knowledge and information

provided by text. The relationship between meaning constructed for a text passage and metaphor

understanding is one focus of this study.

The constructivist viewpoint entails an interest in the process of meaning making as well as in the outcome. In a situation where the process is of interest, the role of memory may be a complicating factor. To avoid such a possibility, this study used the unprompted think aloud concurrent with the reading to gather data about the processes students employed and the meanings they constructed. To avoid the effect of reliance on recall of text during the multiple choice activity, students were instructed to refer to specific portions of the passage.

Spivey (1987, 1990) identifies three specific constructive processes active during reading: organizing, selecting, and connecting information. In this study, these processes were evident in specific traits identified in the think-aloud protocols. Specific traits revealed such strategies for organizing information as paraphrasing, predicting, and evaluation of text as text, such selecting strategies as inferencing and truth assessment, and such connecting strategies as comparing, contrasting, and linking information within the text and from the text with prior knowledge.

IV. Schema Theory

Schema theory relates in useful ways to both constructivism and metaphor. Anderson and Pearson (1984) call a schema "an abstract knowledge structure...abstract in the sense that it summarizes what is known about a variety of cases that differ in many particulars" (p. 259). The schema is, then, a cognitive structure, to be identified in some measure, as noted by Rumelhart (1980), with the beta structures, frames, scripts, and plans suggested by other writers (p. 33). The use of the term schema itself, Rumelhart credits to F. C. Bartlett, whose 1932 work, Remembering: A Study in Experimental and Social Psychology, has influenced much that has occurred since in the field of cognitive enquiry. To Bartlett,

> 'Schema' refers to an active organisation of past reactions, or of past experiences, which must always be supposed to be operating in any well-adapted organic response. That is, whenever there is any order or regularity of behaviour, a particular response is possible only because it is related to other similar responses which have been serially organised, yet which operate, not simply as individual members coming one after another, but as a unitary mass. (p. 201)

Rumelhart is clear that schemata represent knowledge at all levels of abstraction and are not to be thought of as definitions. He considers them to be "recognition devices whose processing is aimed at the evaluation of their goodness of fit to the data being processed" (p. 41). He comments that "the fundamental processes of comprehension are taken to be analogous to hypothesis testing, goodness to fit, and parameter estimation" (p. 38), processes in which schemata play the central role, a role that he calls their "primary activity" (p. 39).

Rumelhart suggests that schemata have variables related to different instantiations, that the variables have certain constraints--knowledge about typical values of the variables and their interrelationships--and that they serve two purposes. These are, first, to "help in the identification of various aspects of the situation with the variables of the schema," and, second, to serve as default values that aid in the making of "initial 'guesses' for variables whose values have not yet been observed" (pp. 34-36). In other words, if only enough data are available to suggest a schema, and it seems to work to explain the given situation, then the knowledge held within the schema will come into play to fill in the slots for which new data have not been provided. Thus, a portion of the picture is sufficient to suggest the whole picture, with the whole picture, in fact, being assumed on the basis of the incomplete information.

Rumelhart also discusses accretion, tuning, and restructuring as different modes of learning possible under schema theory (modes similar to Piaget's processes of assimilation, accommodation, and disequilibration and equilibration, respectively). They are activated either conceptually--from whole to part--or by data action--from part to whole (pp. 41-42)--and result in new information being added to an existing schema (accretion), the schema being altered to take into account new information (tuning), or the creation of entirely new schemata (restructuring) (p. 52).

There is a sense in which schemata are procedural. Rumelhart notes that they are "active computational devices capable of evaluating the quality of their own fit to the available data," each with its own "network (or possibly a tree) of subschemata, each of which carries out its assigned task of evaluating its goodness of fit whenever activated" (p. 39). He likens the structure of a schema and its

subschemata to a computer program, the intention of which is to carry out a set of procedures for a purpose (p. 40). Interestingly, Mac Cormac (1985) compares the brain to a computer, with the mind functioning as the software. It is but a short distance from this stage of mental model building to envisage schemata as subprograms.

With regard to reading, an important facet of schema handling is the capacity to draw inferences. To Spiro (1980), the past--that is, prior knowledge held in the form of schemata--is inferentially reconstructed, and it is the reader's capacity to draw inferences when new material is encountered that makes text useful as a meaning-making device. Anderson and Pearson (1984) suggest four kinds of inferences that can be identified in the reading process: first, those that have to do with the decision to choose a specific schema in a particular situation; second, those that lead to the instantiation of slots in the schema; third, those that have to do with choosing default values in the absence of information; and, fourth, those involved in drawing conclusions in the face of missing information. Anderson and Pearson record that skill in drawing inferences seems to be age related and suggest that "growth in inference ability is really a difference in the growth of knowledge available for drawing inferences" (p. 271). This has clear significance for success in reading. It may also have significance for constructing meaning from metaphor, since metaphors must sometimes be thought over by connecting the immediate textual clues with prior knowledge in order to reach a conclusion representing the most likely meaning, given the particular context.

A key point is that schemata are cognitive structures, holding the knowledge one has constructed from previous experience, serving as models of knowledge against which new experience is measured and classified and assigned significance. Further, schemata can be seen to provide the raw material upon which the metaphor process works to produce its effects (Lakoff & Turner, 1989). Additionally, in this study, schema theory provided a useful way of thinking about construction of inferences and about relationships among elements of prior knowledge, both of which were revealed by students during their think alouds.

V. Parallel Distributed Processing

Parallel distributed processing (PDP), also termed connectionism, gives one possible

explanation of how the brain processes knowledge. It provides a link between observable

phenomena (such as human performance during experimentation) and their interpretation (in the form

of experimental data and analyses), on the one side, and, on the other, examination of brain structure

and function at the neurological level. In language reminiscent of schema theory, Chandler (1991)

explains,

> Connectionist schemes...store information as patterns of excitory and inhibitory connections
> among vast arrays of very simple, low-level processing units. The information content in the
> system exists not in isolatable segments of...memory but in the patterns and strengths of the
> activated units....Based on experience (i.e., learning), a connectionist system will self-organize
> into patterns of associations among input features. (p. 240)

A link between PDP and schema theory was at first only intuited, since schemata and PDP are

hypothesized to operate at different levels of the cognitive structure--schemata at the macrolevel and

PDP at the microlevel. Effort has been made to bring the two together (Rumelhart, Smolensky,

McClelland, & Hinton, 1986).

PDP suggests that in any event, such as the viewing and identification of an object, immediate

neural input, stimulating numerous neurons, is processed according to certain criteria established by

previous experience and passed along by each to each of the next level neurons for further

processing. This level will most likely be a so-called hidden level--one of possibly several between the

more-observable input and output levels (McClelland & Rumelhart, 1986). At the level at which the

transformed neural input encounters the matching prototype, identification takes place. The number

of hidden levels of neurons may vary according to the complexity of the object or event, but the final

stage is always processing by the output-level neurons.

The PDP model accounts for the speed of mental processing. According to earlier

information-processing theory based on the operation of the digital computer, time-consuming

extended sequential processing was required to accomplish complex tasks. On the other hand, the

distribution of processing of multiple stimuli across a neural network at each processing level allows

each neuron to contribute to the accumulated refined stimuli sent on to the next level, thus collapsing a multiple-stage process into one stage, with an attendant time saving (Norman, 1986).

Chandler (1991) proposes a connectionist explanation of metaphor processing. Nouns and verbs, the key elements in many metaphors, he suggests, "are associated with conceptual prototypes embodied within a connectionist network," with the patterns for nouns established between "microfeatures" and those for verbs among "temporal sequences of microrelations" (p. 253). He contends that both metaphorical and literal sentences "lead us to construct mental images considerably different from what most of us would consider the prototypical exemplars for the key word" (p. 233). As a result, "there are no differences between on-line processing of metaphoric and literal expressions" (p. 232). Similarly, Waggoner, Meese, and Palermo (1985) conclude from their experiment "that the process of comprehending metaphor is the same in kind as the process of comprehending literal language" (p. 1164), although their conclusion is based on the absence of differences in performance on recall tasks involving metaphor and literal language.

If PDP is, indeed, found to work in conjunction with schemata, it may provide an important perspective from which to reexamine the cognitive function of metaphor, which, in turn, is hypothesized to be related to schemata (see, for example, Ortony, 1980, and Lakoff & Turner, 1989).

VI. Views of Metaphor

In the twentieth century, metaphor has become a subject of considerable interest, an interest Mark Johnson has called "metaphormania" (1981, ix). Views of the nature of metaphor have undergone revision and new views have been developed.

The language used to describe the structural elements of metaphor has varied somewhat over time. For the standard form, A is B, A has been termed topic or tenor and B, vehicle. Lakoff and Johnson (1980) and Lakoff and Turner (1989) use target and source for the two parts, A and B, respectively. This thesis, drawing on the inspiration and ideas of Lakoff, Johnson, and Turner in a number of ways, adopts their terminology.

The following sections present four views of metaphor. The first three--substitution, comparison, and interaction--provide a backdrop against which to examine the fourth--metaphor as mapping--the view that informs this study.

i. <u>Substitution View</u>

For over two millennia, from the time of Plato and Aristotle to the present, metaphor has been regarded with varying degrees of curiosity and misgiving by many who have given it close scrutiny. The curiosity and misgiving have been linked to the seemingly anomalous nature of metaphor, for, according to the substitution view, metaphor appears to be, at best, a verbal embellishment or, at worst, a misleading deviation from the sought-for clear expression presumed to reside in literal language (see, for example, Winner, 1988).

The perceived deviance of metaphor results from the underlying belief that language is, at its base, literal, and that it is in literal expression that meaning resides. Where metaphor is involved, clarity of expression is considered to depend on the translation of the figurative language into literal language. According to this view, metaphor is an inexact substitute for literal language, and the exact meaning is determined only by identifying the appropriate literal language to replace the metaphorical language.

The substitution view is linguistically based and depends on a two-value logic in which propositions are either literally true or false. Further, propositions are considered to be about an objective reality that is independent of any observer; that is, the propositions and the objective reality upon which they rest are said to be mind-free--to have meaning in and of themselves. The propositions are to be considered true insofar as they accord with that objective reality. Metaphors must, then, be false because they make statements that cannot be verified by reference to objective reality. They can be considered true only in the non-reality of the imagination.

Considered according to the substitution view, a metaphor such as, for example, LIFE IS A JOURNEY is a rhetorical embellishment. In and of itself, it has no truth value--since it must be treated

as a literal statement--and therefore no meaning. A speaker or author of such a metaphor might be judged to want merely to draw attention to life for the possible purpose of suggesting that the listener or reader should pause and think about it. On the other hand, the speaker or author might be judged to have meant to say something else entirely.

ii. Comparison View

The original form of the comparison view of metaphor, traceable to Aristotle, holds that the metaphor process involves comparison of characteristics of the referents of the words that compose the two parts of the metaphor (Winner, 1988). The referents must have common characteristics, often taking the form of perceptual attributes. A true literal paraphrase must be possible for the metaphor. For the LIFE IS A JOURNEY metaphor, the paraphrase could be, for example, "Life is like a journey because they both have a beginning and an end and a limited number of other shared characteristics." This view treats metaphor as a form of simile, although not as explicit as the form using like or as.

I. A. Richards (1936) offers a refinement of the comparison view of metaphor. According to Richards, metaphor is a means of comparing "thoughts," and the "ground" of the comparison is the "common characteristics" of the metaphor's two parts--the "tenor" and the "vehicle" (terms he introduced). By focusing on thought, Richards moves the consideration of metaphor beyond the narrow rhetorical base of the substitution view and the older form of the comparison view. What he proposes is an analogical model, though with awareness of the potential contribution of the differences, as well as the similarities, between tenor and vehicle in shaping the meaning of the metaphor.

According to Richards' comparison view, a metaphor involves a comparison between the common characteristics, which may be features or attributes of the entities, themselves, or semantic features activated by the names of the entities. When a metaphor is analyzed, attributes and features common to both vehicle and tenor are sought. These can form the basis for a meaningful

metaphorical comparison if there is sufficient difference in salience, that is, if one or more features or attributes are more dominant characteristics of the vehicle than of the tenor. Where there is sufficient salience imbalance, the comparison will cause a distortion of the pertinent characteristics of the tenor, causing it to be viewed in a new way.

Richards' comparison view, like the old comparison view and the substitution view, is based on the literal meaning view of language and the acceptance of an objective reality. To form a true metaphor, the tenor and vehicle must have features or attributes in common and their existence must be verifiable through reference to objective reality. A literal paraphrase must be possible. For the LIFE IS A JOURNEY metaphor, a paraphrase might be, for example, "Life is a journey because they have a number of common characteristics that allow me to think about life in a novel way."

iii. Interaction View

The interaction view is a recent attempt to avoid problems posed by the substitution and comparison views. As the name suggests, the interaction view sees the meaning of metaphor as the outcome of an interaction between the two parts of the metaphor, rather than resulting from a substitution of literal language or a simple comparison of features or attributes. Of central importance is the idea that metaphor involves the interaction of concepts.

Max Black (1962) starts with Richards' idea that the metaphor process involves the mind holding two thoughts simultaneously, both thoughts being represented by a single word or phrase. Black proposes that the interaction of the two parts of the metaphor results in a meaning that cannot be reduced to mere literal paraphrase of the expression or a simple statement of the shared characteristics. He suggests that metaphor is a kind of filter that controls which of the culturally based, associated commonplaces of the two ideas enter the metaphorical interaction.

The functions of source and target are different from their functions according to the substitution and comparison views. In the interaction view, the target imposes a filter that screens and limits the characteristics and meaning that can be carried over from the source. This imposes a kind of

bidirectionality that is quite different from the unidirectionality of the substitution and comparison views. Accordingly, the source concept, as well as the target concept, is deemed to undergo restructuring. In the LIFE IS A JOURNEY metaphor, for example, the life concept sets up a filter that permits only certain characteristics of the journey concept to reach and act upon its characteristics, thereby altering them. The interaction produces a meaning for the metaphor that is too complex to be reduced to literal paraphrase.

The nature of the filter has been given considerable attention by proponents of the interaction view. Way (1991) offers one description. She suggests a "dynamic type hierarchy" in which the source and target are reclassified as types within a higher type (category). The characteristics of the target determine the nature of its membership in the higher type, and these parameters of membership become the filter through which the source's characteristics, themselves having undergone a similar process, are limited prior to transfer to the target.

Apart from any descriptive and explicative value it may have, Way's description, drawing, as it does, from information processing theory, is interesting as an example of the contributions to metaphor study being made by people from many academic disciplines and philosophical positions.

Glucksberg and his associates (Gildea & Glucksberg, 1983; Glucksberg & Keysar, 1990; Glucksberg, 1991) have put forward a strong class-inclusion model to explain the function of metaphor. According to this view, a metaphor is a true statement, not a false literal statement, since the truth of the metaphor is apparent in the inclusion of both the target and source terms within a new (perhaps newly created) superordinate class initiated by the source term. In this view, no special psychological mechanisms are required to understand metaphor, and the meaning of a familiar metaphor will be activated automatically as quickly as a literal meaning for a literal expression.

Winner (1988) proposes that pragmatic elements need to be considered in any attempt to explain how metaphor works. She accepts the interaction view; however, she rejects a semantic approach to explaining metaphor, preferring, instead, a pragmatic approach that places "metaphoricity outside the sentence--in the speaker's use of the sentence, and hence in the speaker's intentions"

(p. 23).

An appealing feature of the interaction theory is that it leaves room for some kinds of metaphors to function according to the comparison view. The interaction view (or some elaboration of it) seems to be the currently dominant theory, with metaphor research generally using it as a starting point, although the comparison view provides a convenient and often-used platform from which to launch description of the metaphors themselves (Broderick, 1991; Evans & Gamble, 1988). Ortony (1980) contends that comparison, "the ability to perceive similarities and differences" (p. 363), is a central cognitive process involved in much of the mind's activity and is inescapable when metaphor is understood, whether according to the comparison or the interaction view. Such a position seems to entail the primacy of comparison, with metaphor the observable outcome of the process.

iv. Metaphor as Mapping

Lakoff and Johnson (1980), Lakoff and Turner (1989), and Lakoff (1993) put forward a view of metaphor that, while rejecting the idea of interaction between the two parts of the metaphor, does share certain features with Black's view. Agreeing with Black, Lakoff, Johnson, and Turner hold metaphor to be a conceptual entity firmly grounded in human experience, having the power to produce meaning inexpressible by literal paraphrase. They maintain, however, that the metaphor-making process involves a one-way mapping from the source to the target--a process of "understanding and experiencing one kind of thing in terms of another" (Lakoff & Johnson, p. 5). The mapping may be of schema slots, relations, properties, or knowledge in the source domain (Lakoff & Turner, pp. 63-64). These mappings have the power to create new understanding (Lakoff & Johnson, p. 139) and to create similarities between conceptual domains where similarities did not previously exist (pp. 148, 150-153). These specific knowledge elements of the shared experience on which the metaphor is grounded and the structural features of the source domain, as well as the relationships among those structural features, including the affective and orientational, together define experience--humans' way of being in relation to the world. Further, against a cultural backdrop,

Lakoff, Johnson, and Turner portray metaphor as the fundamental way of interpreting experience and structuring thinking and as a device to aid understanding--one without which our ways of thinking and our conceptions of reality would necessarily change (Lakoff & Johnson, pp. 3, 145; Lakoff & Turner, p. 51).

Lakoff and Turner give these ideas a literary connection. They focus beyond the basic metaphors in everyday life to the expression of these metaphors in our poetic existence. According to Lakoff and Turner, these metaphors, except for certain idiosyncratic and image metaphors, are grounded in a shared human experience that gives them immediacy of meaning, general recognizability, the power to connect us with each other through our language, and the power to generate new meaning. They note the power of poetic metaphor to extend conventional metaphor meaning, to elaborate schemata in nonconventional ways, to question the limits of understanding expressed via conventional metaphor, and the formation of composite metaphors whose power far exceeds that of ordinary metaphors (pp. 67-72). Conceptualized in this way, metaphors, because of their experiential basis within a particular cultural environment, can provide an understanding of both how and why we think as we do.

Lakoff and Johnson identify three main types of metaphor: structural, orientational, and ontological. Structural metaphors are those in which "one concept is metaphorically structured in terms of another" (p. 14). The example used throughout this introduction to metaphors--LIFE IS A JOURNEY--is a structural metaphor. It functions by mapping elements of the knowledge structure of the conceptual domain journey onto the conceptual domain life, restructuring it so as to highlight certain features and to hide others. Mappings may include, for example, the following: traveler from the source domain onto person in the target domain; destinations onto purposes; routes onto means of achieving purposes; distance traveled onto progress in life; crossroads onto choices; and provisions onto material resources (Lakoff & Turner, pp. 3-4).

Orientational metaphors originate from our awareness of spatial relationships, such as "up–down, in-out, front-back, on-off, deep-shallow, central-peripheral" (Lakoff & Johnson, p. 14).

Examples of orientational metaphors include HAPPY IS UP and SAD IS DOWN, as in the common

metaphorical expressions "My spirits <u>rose</u>" and "I'm feeling <u>down</u>" (p. 15).

The third type of metaphor--ontological metaphor--takes two forms: entity and substance

metaphors and container metaphors. The entity and substance metaphors are "ways of viewing

events, activities, emotions, ideas, etc., as entities and substances" (p. 25). THE MIND IS A MACHINE

and THE MIND IS A BRITTLE OBJECT, as illustrated by the common metaphorical expressions,

"We're still trying to <u>grind out</u> the solution to this equation" and "The experience <u>shattered</u> him" (pp.

27-28), respectively, are two such ontological metaphors. Container metaphors, on the other hand,

originate in our experiences of land areas and visual perception. Common metaphorical expressions

such as "There's a lot of land <u>in</u> Kansas" and "That's <u>in</u> the <u>center of</u> my <u>field</u> of vision" (p. 30) are

examples. Ontological metaphors of these two types--entity and substance metaphors and container

metaphors--provide a powerful way of structuring our awareness of our social, emotional, and

intellectual experience. Specifically, according to Lakoff and Johnson, "events and actions are

conceptualized metaphorically as objects, activities as substances, states as containers" (p. 30).

Lakoff and Turner distinguish between generic-level metaphors and specific-level metaphors.

The former, such as PURPOSES ARE DESTINATIONS, EVENTS ARE ACTIONS, and STATES ARE

LOCATIONS (p. 52), lack "fixed source and target domains" and have no "fixed list of entities

specified in the mapping" (p. 81). The latter, such as LIFE IS A JOURNEY, on the other hand, have

fixed domains and lists of entities to be mapped (pp. 80-83), as indicated above.

Lakoff and Johnson's idea of the grounding of metaphor places emphasis on the cultural

context in which the experiencing individual operates. They state,

> Cultural assumptions, values, and attitudes are not a conceptual overlay which we may or may
> not place upon experience as we choose. It would be more correct to say that all experience is
> cultural through and through, that we experience our "world" in such a way that our culture is
> already present in the very experience itself. (p. 57)

One effect of culture is to provide coherence to the system of metaphors; that is, there will be a limited

number of major conceptual metaphors, such as LIFE IS A JOURNEY, but a larger

number--sometimes a very large number--of metaphorical expressions of them, all consistent with

them and all mapping smaller features of the source conceptual domain onto the target conceptual domain (see, for example, pp. 17-19, 52-55, and Lakoff & Turner, p. 51). For LIFE IS A JOURNEY, this coherence can be seen in such metaphorical expressions as "passing away," referring to death, and "getting sidetracked," referring to diversion from goals (Lakoff & Turner, pp. 2-3). For this reason, while there is variation in the way different cultures systematize their metaphors, there is a high degree of coherence within each culture (Lakoff & Johnson, pp. 24, 118, 146). In this study, an attempt was made to avoid effects produced by diverse cultural backgrounds by choosing students from a long-established, relatively stable, primarily unilingual cultural subgroup.

The view of metaphor as mapping has been adopted in numerous research studies and has been examined by philosophers of language. While not every aspect of this view is accepted by all writers, three main ideas do seem to be accepted: first, that restructuring of knowledge in the target conceptual domain takes place in line with knowledge in the source domain; second, that much (perhaps most) metaphor has a cultural basis; third, that metaphor strongly influences how we think. Some writers see a view of metaphor such as this to be a variation of the interaction view and, as such, subsumed under it (see, for example, Winner, 1988, and Way, 1991). While this point is not significant for this study, this position is specifically rejected by Lakoff and Turner (1989), who maintain that the mapping is unidirectional from source to target.

The ideas of Lakoff and Johnson (1980), Lakoff and Turner (1989), and Lakoff (1993) provide the theoretical orientation toward metaphor adopted in this study, with the single exception that taxonomies developed by Broderick (1992) for the purpose of categorizing metaphor according to the type of comparison and syntactic frame have been used to provide additional description of student performance on the multiple choice activities.

VII. Metaphor Research

The study of children's understanding of metaphorical language is a relatively new area within the broader research field bringing together education and psychology. A key question that has

emerged is: How well do children understand the metaphors they read?

This review considers the literature on metaphor research from three perspectives: Methodology, Child Focus, and Text Focus. This organization reflects three main concerns evident in the literature and pertinent to this study. The divisions are, of course, not discrete and certain studies have contributed in more than one area. Child Focus is reviewed under the following subheadings: Development of Understanding, Experience and Prior Knowledge, and Culture; and Text Focus is reviewed under the subheadings: Context, Explicitness and Similarities, Ecological Validity, and Metaphor in Informational Text.

i. Methodology

Several methodological problems have affected metaphor research. Vosniadou, Ortony, Reynolds, and Wilson (1984) identify three specific problems: that researchers have sometimes confused children's lack of background knowledge with failure to understand metaphors; that metaphors have often been presented to children with insufficient attention to context; and that there has been an over-reliance on paraphrase as a measure of children's understanding of metaphor (p. 1589).

Winner (1988) notes that some studies have used verbal measures, such as "asking children to paraphrase metaphors...to select the appropriate verbal paraphrase...or to judge whether sentences make sense or are anomalous," while others have used nonverbal measures, such as having children point to pictures to indicate choice of meaning, having the children match words and visual stimuli, according to metaphoric similarity, having the children act out the metaphors using toys, and having children match only nonverbal stimuli (p. 45). Based on her examination of studies using the above means of testing children's understanding, Winner observes that "[t]he measure used dramatically affects the level of comprehension revealed. The greater the reliance on linguistic and metalinguistic abilities, the more likely is the measure to reveal a low level of understanding" (p. 45). Ortony (1980) agrees. He says, "It is well known that the skill to verbally explain one's comprehension of something

develops later than the ability to actually comprehend" (p. 356).

Vosniadou (1987) makes the same point, and she notes that "paraphrase and explanation are poor measures of metaphor comprehension because they impose linguistic or metacognitive demands well in excess of those required for metaphor comprehension alone" (p. 877). She goes on to suggest that multiple choice and enactment tasks are preferable to paraphrase tasks, "presumably because the former impose fewer linguistic and metacognitive demands than the latter" (p. 877). The challenge to researchers, she says,

> is the development of better tasks to assess metaphor comprehension, tasks that do not confound metaphor comprehension with lack of background knowledge, metalinguistic skill, ability to comprehend language out of context, and other variables that do not have much to do with metaphoric competence per se. (p. 878)

In a relatively early study examining children's understanding of metaphor in narrative text, Cunningham (1976) presented grade six students with two cloze passages, similar except that one was non-metaphorical and the other heavily metaphorical. He found a significant difference in student performance on the cloze tasks ($\underline{t}$ test, $\underline{p}<.001$), from which he concluded that the presence of metaphor increased the reading difficulty of the passage compared to the no-metaphor passage.

Cunningham's methodology raises three specific concerns: First, the deletions were not parallel in the two texts for parts of speech; second, the scoring of the cloze tests was done "against a key of exact deletions" (p. 367); third, the metalinguistic demands of the cloze test were not taken into account. Of the 25 blanks, only 11 required the same part of speech in both texts. The second blank in the no-metaphor passage, for example, required the possessive pronoun his and the second blank in the metaphor passage required the noun mother. Both of these were strongly indicated by context, although the second required reading ahead to the next sentence for confirmation. The sixteenth blank in the no-metaphor passage, on the other hand, required the verb got, while the same blank in the metaphor passage required danced. Common usage made the former a likely choice, whereas the latter was highly arbitrary.

The specific examples of metaphorical language chosen by Cunningham also raise questions. There is a mix of slang expressions, such as "a peach of a thing," replacing "a great thing," and

idiosyncratic expressions, such as "I got ivory faced," replacing "I got real excited." Such slang expressions are likely to have a high degree of familiarity, perhaps on a level with the literal substitute, while the idiosyncratic expressions are entirely arbitrary and without contextual support.

Results are further complicated in that each student had both forms of the cloze test, varied only to the extent that the order in which the passages were stapled together was reversed in half the cases. Since a set time (30 minutes) was given, it is possible that students could have compared the two passages, thus arriving at an explanation of otherwise obscure phrases or even precise words, a situation that may well have favoured completion of the no-metaphor test. There is no indication, however, of the extent to which students referred back and forth between the passages.

Vosniadou, Ortony, Reynolds, and Wilson (1984) undertook to examine factors affecting children's understanding of metaphor in three experiments designed to avoid the methodological problems mentioned above. Rather than depend on children's ability to paraphrase, the experimenters had the children enact their interpretation of the target statements, which consisted of both probable and improbable literal and metaphoric endings to specially constructed narratives, read to them by the experimenters. The three experiments indicated that close attention to the factors identified as confounding variables can result in a somewhat different picture of children's understanding of metaphor, one that has the children able to understand metaphor at a younger age than had hitherto been indicated by experimentation. A major finding of these experiments was that "complexity of the linguistic input is...an important variable in metaphor comprehension" (p. 1603). This serves as an important caution to those undertaking metaphor research.

A possibly significant feature of the experiments unaccounted for by Vosniadou et al. is that the metaphors and literal targets were all placed at the ends of the narratives. Although this standardizes the task in one respect, it may introduce a complicating factor, one identified by Waggoner, Meese, and Palermo (1985), who investigated children's recall of metaphor within a story grammar structure. They contend that placement of the metaphors at the outcome position, according to story grammar, provides children with a structure they can "use not only to aid recall" but "to succeed in the more

difficult task of verbalizing the meaning of the metaphors" (p. 1163). They conclude that a statement in a story is easy or difficult to understand "in the context of that story and not as a function of whether it [is] expressed in a literal or a metaphorical form" (p. 1164). Since Vosniadou et al. placed all the targets at the outcome position, they may inadvertently have introduced an effect to be accounted for by story grammar.

In her study of children's production of metaphor--a branch of research that has paralleled studies of metaphor understanding--Vosniadou (1987) adopts two necessary criteria for children's utterances to be classified as metaphors: first, "the utterance must... be based on some perceptible similarity between the two juxtaposed objects," and, second, "the child must be aware that the two objects belong to different conventional categories" (p. 874). These criteria are based on the comparison view of metaphor. Although they are useful for examining many metaphors, perhaps especially those of young children, they fail to take into account that metaphors can create conceptual similarities where none hitherto existed (Lakoff & Johnson, 1980, p. 147). Interestingly, Vosniadou, herself, makes a similar point when she remarks that metaphor provides a way for children "to understand new phenomena, phenomena that are not quite similar to anything they have experienced before" (p. 822). She does not, however, reexamine the first of the two criteria mentioned above in light of this understanding of this special power of metaphor, nor does she reexamine her view of metaphor itself.

Vosniadou has carried out research on occasion with Andrew Ortony (see for example, Vosniadou et al., 1984), and her view of metaphor is similar to his. Ortony (1980) claims what might be termed a pragmatic view of metaphor. He describes metaphor as any intentionally anomalous utterance for which the tension (the incompatibility between the two parts) "is, in principle, eliminable" (p. 352), thus embracing both the comparison and interaction views of metaphor. Ortony suggests a "context-sensitive activation mechanism" (p. 360) to link schemata and their subschemata in a search for "salient aspects" (similarities) between the two parts of the metaphor (p. 359). He suggests that "there do exist more probable and preferred values" for the variables of the schemata and that

"staying within reasonable limits" would be an important control factor in establishing links between the schemata representing the two parts of the metaphor (p. 361). The idea of salience imbalance between salient features linking the two parts of the metaphor has been adopted by researchers (see, for example, Evans & Gamble, 1988, and Mate & Malicky, 1988). From the point of view adopted in this study, such a position is seen as limiting in that it focuses on those metaphors whose source and target have identifiable preexisting similarities.

Winner (1988) adopts the interaction view of metaphor (p. 23), although she elaborates upon it by proposing that metaphor understanding proceeds according to pragmatic principles, whereby the listener must first detect nonliteral intent, then detect the relationship between sentence meaning and speaker meaning, and, finally, detect the speaker meaning itself (pp. 10-11). Such a process would lead to a longer processing time for metaphors than for literal language, since the steps would have to be performed sequentially. Research has attempted to detect time differences for understanding of literal and metaphoric language (see, for example, Gregory & Mergler, 1990). Findings have not been consistent, but the bulk of the evidence seems to suggest that there is no significant difference in processing time (Winner, p. 125). Winner reports this tentative conclusion as a refutation of a stage theory of metaphor-understanding development in children. In the current study, differences in processing time are not investigated, since no attempt is made to address questions of psychological process.

The literature reviewed above identified the following seven factors as having methodological implications:

1. Children's lack of background knowledge;

2. Effect of insufficient context;

3. Over-reliance on paraphrase;

4. Inappropriate stimulus sets and passages;

5. Over-complexity of linguistic input;

6. Effect of story grammar; and

7. Operational definition of metaphor.

In the present study, children's background knowledge is of interest insofar as it influences understanding of the metaphors, where that can be determined. Since the research interest is in the extent of understanding and such processes as are evident in the think alouds, no attempt is made to determine level of background knowledge, to compensate for its lack, or to make fine judgments about complex psychological processes. Numbers 2, 3, 4, and 6 are all taken into account by, respectively, providing lengthy passages, by having students complete multiple choice activities, by providing authentic texts, and by using expository text. Number 5 is of interest as a factor influencing metaphor and passage understanding, and the three passages used are of different reading levels. Number 7 is taken into account by defining metaphor broadly, as explained above.

ii. Child Focus

a) Development of Metaphor Understanding

A considerable amount of research has been undertaken in an attempt to determine the age or ages at which children begin to demonstrate the ability to produce and to understand metaphor. Within this general area, one aspect has attracted particular interest, that is, whether there are developmental stages in metaphor understanding. Part of the interest is related to the predictions of Piagetian psychology that certain stages of cognitive development must be reached before a child is capable of the complex recategorization hypothesized to take place when metaphors are produced or understood, according to comparison and interaction views of metaphor.

In a study of poor and good readers in grades three and five, Seidenberg and Bernstein (1988) examined their data for effects of grade on interpretation of absurdities and ability to name critical semantic attributes, two elements they held to be similar in some respects to metaphor interpretation (p. 41). They found a grade effect for absurdities among the good readers and for ability to name critical semantic attributes among poor readers, suggesting that these two elements follow a developmental pattern, at least for the groups studied. Correlations were also significant between

metaphor scores and scores on absurdities for the high-ability group and between scores on metaphors and scores on synonyms for the low-ability group, which is taken to suggest "that factors implicated in the high and low group's [sic] interpretation of metaphor may differ" (p. 43), suggesting either a different developmental rate or route.

Seidenberg and Bernstein conclude that "ability to name a critical corresponding attribute is not a sufficient condition for metaphor interpretation" (p. 44). Drawing on extensive literature in the area of metacognition in relation to interpretation of literal statements, they suggest that the same metacognitive strategies are necessary for children to "resolve comprehension failure for metaphoric language" (p. 44). This conclusion may turn out to be supported by future research, but it raises other issues, not least of which is the question of whether the processes for understanding literal and metaphoric language are the same, a question to which there is not at present a clear answer.

Seidenberg and Bernstein's view that metaphor understanding is not a simple one-step process is also held by Gregory and Mergler (1990). In a study of adults' response time to the task of classifying true or false statements for literal truth, possible sense, or metaphoricity, they conclude that readers "make use of a variety of processing strategies" (p. 170) and that familiarity or unfamiliarity with metaphors may, in itself, be a significant factor (p. 171). The linguistic demands of the task were high in that participants were required, among other things, to identify when metaphor-type statements were false. This would suggest that at least some of the processing strategies are metacognitive and, as such, developmental (see, for example, Brown, 1980). On the other hand, the stimulus sentences were presented in random order with no contextual support, raising a question as to whether the generally longer time required "to deny metaphoricity or possible sense than to affirm it" (p. 167) would hold in a more typical reading situation.

Siltanen (1989) details a four-stage developmental model of metaphor understanding based on the types of conceptual categories six- to twelve-year olds create during a metaphor-understanding task (p. 201), and she refers to a "developmental pattern through which children progress in acquiring adult metaphor comprehension" (p. 208). Consistent with this, Siltanen (1990) observes that "as

children [again, six- to twelve-year olds] develop cognitively and linguistically, they provide more elaborate metaphor comprehension" (p. 15).

Siltanen bases her work on Piagetian theory, according to which, she says, the metaphor-understanding process involves resolving cognitive disequilibrium set up by the incongruence between the two parts of the metaphor by "constructing a new joint category based on perceptual or conceptual grounds" (1989, p. 200). The view of metaphor understanding as a reclassification process by which a superordinate category is found or created to subsume the two conceptual categories represented by the two parts of the metaphor has been explored; however, it has a serious weakness in that it fails to account for those metaphors in which no attributes are held in common by the source and target. (For a possible way around part of this problem, see Glucksberg & Keysar, 1990.)

A methodological weakness of Siltanen's studies is that she required verbal interpretation of the metaphors. She defends this as being "an ecologically valid task," that is, one similar to a real-life task (1990, p. 11). As was indicated above, however, this approach favours older children and fails to reveal the full extent of younger children's knowledge.

Using a very different research approach, Pearson (1990) asked three- and four-year-olds to repeat metaphorical, literal, and anomalous sentences, then compared the number of errors produced during the repetitions. According to Pearson, studies have shown this approach to differentiate between what is meaningful and non-meaningful to adults and children alike, while reducing the linguistic demands of such methods as paraphrase. Pearson found that the 52 children in her study produced very similar levels of error in the repetitions for the metaphorical and literal sentences but a significantly higher level for the anomalous sentences. From this, she concludes that "children are not strangers to metaphor. They are here seen processing the figurative sentences on a par with the literal" (p. 197). Also, she found no evidence for "a development with age in the capacity to repeat metaphors" (p. 197).

In a study of recall of metaphor and literal statements by seven-, nine-, and eleven-year-olds,

Waggoner, Meese, and Palermo (1985) report a grade effect for recall of both metaphor and literal

statements embedded at the outcome node of a story schema and for the subsequent sentences.

They conclude that "children as young as 7 years of age can and do correctly interpret metaphors"

that are embedded in a story schema, suggesting that the story schema provides a structure that

reduces the "difficulty of the comprehension task so that it is within the child's difficulty limit both to

recall and to verbalize the meanings of the metaphors" (p. 1163). If Waggoner, Meese, and Palermo

are correct, then predictable text structure, such as the so-called story grammar common to fiction

(see, for example, Stein & Glenn, 1979), can become an aid to understanding metaphors under

certain conditions. This introduces a factor that must be taken into account in metaphor research

involving a recognizable story structure. In the present study, the effect of story structure is avoided

by using informational text.

Kincade (1991) examined grade two and grade five children's ability to recall explicit, implicit,

and metaphor information in short narratives. She reports a grade level effect for recall of all three

types of information. Of particular interest, however, is the finding that the performance of the

children at both grade levels improved when probed recall was used, rather than free recall,

suggesting "that the structured questions provided external organizational strategies and cues that

elicited information from the children's memory" (p. 93). This finding is to be expected, given that

"external organizational strategies" remove a considerable burden, especially from young children

who, as mentioned above, have been shown to know more than they can explain. Thus, while

developmental differences are evident, they are not differences in kind, only in degree.

Research findings are not consistent in the matter of the order of development of

understanding of abstract and concrete similarities involved in different types of metaphors. Based on

their study, Silberstein, Gardner, Phelps, and Winner (1982), for example, contend that "children

understand and produce perceptually based metaphors before conceptually grounded ones" (p.

148). On the other hand, Broderick (1991), on the basis of a study in which he asked preschoolers to

match stimulus pairs presented in physical or verbal form by the experimenter, reports that "children

are able to relate concepts in both concrete and abstract fashions from the earliest period of language development" (p. 79). In a comment on the effect of methodology, Broderick observes, "When extraneous processing demands are eliminated, psychological/physical metaphor does not appear to be a late development" (p. 77). The procedures of Silberstein et al., unlike those of Broderick, would, indeed, make linguistic demands (for example, choosing one of five possible endings to complete a metaphor) that may cause younger readers (as young as age eight in the study) difficulties that are unrelated to the metaphors themselves.

Dent and Rosenberg (1990) also used physical objects to investigate children's development of ability to understand visual metaphors and metaphoric similarity and to compare with adult performance. They report that children "improve from ages 5 to 7 in comprehension of visual metaphors, in which topic-vehicle interaction is explicit, and gradually from 5 to 10 in comprehending metaphoric similarity" (pp. 993-994). They report no stage-like development.

In discussing their results, however, Dent and Rosenberg note that the types of questions they asked may have directed the participants to provide certain kinds of responses, rather than others. They admit that their results "indicate complex relations between perceptual and discourse context" and that they "do not yet know in detail how discourse requests direct attention to objects, layouts, etc. that can be perceived" (p. 992).

In a study comparing the metaphor understanding of verbal and picture stimuli of grade two and grade five children, Kogan and Chadrow (1986) report a "large performance difference" in favour of the older children (p. 292). Additionally, they consider that there is no "generalized advantage for either pictures or words" (p. 294), suggesting that metaphor understanding is not a function of one modality more than another, although performance using pictures was enhanced when the pictures had descriptive labels. While such a finding may be confusing if one looks only at perceptual, affective, and conceptual similarities between entities when explaining the metaphor process, it is consistent with the metaphor as mapping of information view, according to which preexisting similarities are not required for the formation of a metaphor, but may instead result when the metaphor

is created. In the present study, the latter, broader view of metaphor avoids the limitations of an existing-similarities-only approach.

Vosniadou, Ortony, Reynolds, and Wilson (1984) examined the sources of difficulty young children experience in understanding metaphor. By having preschool, grade one, and grade three children enact endings of stories, they were able to determine that understanding of concluding metaphors was affected by the probability of the ending and the overall complexity of the linguistic input. They contrast their findings with those of investigations based on Piagetian theory and take their own results as a refutation of those others. They take the fact that preschoolers understand metaphor to some level under some conditions as a clear indication that, to understand metaphor, children do not have to reach "formal, or at least late concrete operational, thinking," a prerequisite in Piagetian theory (p. 1603). They state that while "metaphor comprehension is a progressive development that starts quite early" (p. 1601), "findings are inconsistent with the position that the development of metaphor understanding follows a clearly identified sequence of stages, which starts with literal responses first, and only later follows with more mature types of metaphoric understanding" (p. 1604).

Vosniadou (1987) provides a useful picture of the metaphor-development question. From her interpretation of the literature, she says that

> in the most recent psychological literature, metaphor comprehension is conceptualized as a continuous process that starts very early and develops gradually to encompass a greater variety of metaphorical linguistic inputs....The development of metaphor comprehension is constrained primarily by limitations in children's conceptual knowledge, linguistic skill, and information-processing ability....What develops, according to this view, is the ability to understand more complex metaphorical inputs in a variety of linguistic and situational contexts. (p. 880)

Implicit in much of the above research is the view that the processes for understanding literal and metaphorical language are essentially different, and further, that, of the two, literal language is basic and metaphor is an add-on. This relative status of the two modes of language is denied by the view of metaphor proposed by Lakoff, Johnson, and Turner and by Vico, as described above; indeed, Vico's descriptions of the development of mind and language clearly portray metaphor as the basic

mode of thought, as well as of language. As yet, major research into the development of metaphor ability has not been undertaken within a metaphor-first paradigm.

Perhaps a major shift in the research paradigm is underway under the influence of the connectionist (PDP) view of cognition. Such a shift would approach the two modes of language (literal and metaphorical) as essentially the same, a position described by Chandler (1991) in his explanation of a unified-process model, according to which literal and metaphorical language are processed in the same way (p. 232). Chandler admits that "connectionism is still very limited in what cognitive processes researchers can model well with it" (p. 239), but his reinterpretation of metaphors that others had interpreted in such a way as to support the literal-language-first view suggests that connectionism has the potential to inform research in significant ways.

Vosniadou et al. (1984) provide significant incidental support for Chandler's model. They note that "children's metaphoric thinking seems to be more flexible than generally believed" (p. 1604). This would be consistent with a model based on interconnections and interactions within and among conceptual domains. Vosniadou et al. found, as well, that the children in their experiments had more difficulty enacting metaphors involving nonliteral verbs than they did those involving nouns. This would be consistent with a connectionist model in which the processing of verbs, as Chandler points out, introduces a temporal element not present with the processing of nouns (1991, p. 253).

Keil (1986) studied the metaphor understanding of kindergarten, grade two, and grade four children. The metaphors were constructed from paired semantic domains, such as animate-inanimate and idea-plant. From the children's explanations of the metaphors, Keil determined that older children produced more adult-like meanings, indicating a developmental aspect. The use of paraphrase may have biased the results, for reasons already mentioned; however, Keil found a bimodal distribution of responses for all grade levels, indicating that on a four-point ranking of responses (with 1 being low), children tended either to not understand or to understand at a high level.

Keil sees his results as evidence that children's metaphor understanding develops on a domain-by-domain basis. He says,

The results accord with recent research demonstrating that metaphor ability does not emerge as general competence at a certain point in development. Children in the kindergarten age group were clearly proficient with certain groups of metaphors and not others. It is also evident that the development of metaphorical understanding is strongly influenced by structured conceptual domains. Children's comprehension of metaphors tends to emerge in a unified, all-or-none, manner within each of the conceptual domains considered; and metaphorical abilities among terms within each domain are more closely related than those across domains. This pattern also supports other arguments that metaphors involve interactions between entire domains, not just isolated concepts. (p. 91)

Keil's interpretation that once children understand one metaphor linking two particular conceptual domains, then their likelihood of understanding other metaphors linking the two domains is increased, is consistent with a connectionist explanation of the organization and processing of information, according to which neural links to and in the proximity of prototypes become stronger with use.

The present study examines the understanding of metaphor and text by grade six students. The decision to use children of this age level was based in part on the literature reviewed here, indicating that while grade six students have achieved a high degree of independence in the developmental aspects just outlined, they have not yet reached full adult ability for handling language.

b) <u>Experience and Prior Knowledge</u>

Winner (1988) sees the development of children's metaphor ability to be closely related to their "knowledge of the world" (pp. 62-63), a view shared by Vosniadou (1987; see, for example, p. 877). As mentioned above, Keil (1986) looked at prior knowledge as a factor in children's metaphor understanding. He concludes that, although it is not possible to tell with certainty

which of the two [knowledge] domains juxtaposed in a metaphor is more likely to contribute to the younger children's difficulties in comprehension...much of the development of metaphor ability is a consequence of broader developments in the conceptual domains that are juxtaposed. (p. 94)

Keil's discussion of children's prior knowledge in terms of domain knowledge, rather than single concept knowledge, is important in that it emphasizes the interrelatedness of knowledge. Keil concludes that there is evidence "that the development of metaphorical understanding is strongly influenced by structured conceptual domains" (p. 91), which he took as "support for the domain

interaction view of metaphor" (p. 94).

Winner, Levy, Kaplan, and Rosenblatt (1988) provide support for Keil's conclusion. They suggest that when metaphor is not understood, "the problem for children is not that they lack the ability to discover the similitude between the two halves of the comparison, but rather that they often lack full enough knowledge of one of the halves of the comparison" (p. 58). They believe, with Keil, that "understanding metaphor is primarily a logical-analytical task" (p. 54), but they introduce a new aspect when they describe this task as involving a "match between two divergent aspects of experience" (p. 54). If the ground of metaphor can indeed be experience, in a broad sense, then the definition of knowledge must be equally broad and metaphor is seen clearly to be much more than a mere linguistic device.

Some studies have, however, focused on word-level knowledge. Seidenberg and Bernstein (1988) look specifically at word meanings. They report that for good and poor readers encountering metaphor understanding tasks, "there are significant group differences in performance...even when the metaphoric statements are context embedded," findings that led the authors to the further conclusion that poor readers "have less sufficient knowledge of similar word meanings and multiple meanings of words, and they pay less attention to the semantic content of sentences than high ability readers" (p. 43). For poor readers, knowledge of word meanings, as determined by the ability to name the critical attribute linking the parts of the metaphor, is not enough in itself to ensure understanding of the metaphor. The authors note that their "findings suggest that abilities other than word knowledge are implicated in metaphor comprehension. It appears that some poor readers may have the knowledge but lack the ability to match the critical attributes even when the metaphor is context embedded" (p. 44).

Ortony (1980), referring to his earlier work (Ortony, 1975), suggests that "the comprehension of metaphor involves predicating of the topic [target] those salient aspects of the vehicle [source] that are not incompatible with it" (p. 359). Although Ortony describes the process in terms of the schema theory of knowledge and the activation of subschemata during metaphor understanding, his ideas

have often been applied more to semantic features of the target and source than to general knowledge about their referents. From this has developed a salience imbalance model. This model, focusing on the comparison of semantic features, has shaped a considerable number of studies. Working from this perspective, for example, Evans and Gamble (1988) conclude that the "ground and the individual's knowledge about the topic and vehicle which forms it, and ability to access and integrate the relevant knowledge, appear to be key factors" (p. 446) affecting metaphor interpretation. Similarly, Mate and Malicky (1988) looked at children's existing knowledge by examining the semantic features identified for the two parts of metaphors and establishing their salience imbalance, that is, the degree to which a specific feature is more important to one part of the metaphor than to the other. From their study, Mate and Malicky suggest that "although salience imbalance is a significant feature of the metaphor comprehension process, subjects used a variety of strategies to obtain meaning for metaphorical statements" (p. 113).

Extending the model, Kincade (1991) refers not only to "word knowledge of the topic and vehicle terms" but also to "familiarity with the subject-matter of the text" as factors in children's comprehension of metaphors (p. 85). Winner (1988) adds the elements of pragmatic knowledge and knowledge about text function. She takes the position that the metaphor-understanding process involves the understanding of "both halves of [a] comparison" (p. 53), according to a three-step model in which the reader must first detect nonliteral intent, then detect the relation between what has been said and what is meant, and finally detect unstated meaning (p. 54). To Broderick (1992), on the other hand, prior knowledge includes conventionality (the commonness of the phrase). He concludes that "conventionality is a perplexing complication in theories of comprehension and continues to pose challenges to researchers constructing stimulus lists" (p. 187).

Conventionality is a topic of central importance to Lakoff and Johnson (1980), Lakoff and Turner (1989), and Lakoff (1993). Lakoff and Turner observe, "Conventional metaphor...depends on conventional knowledge. In order to understand a target domain in terms of a source domain, one must have appropriate knowledge of the source domain" (p. 60). They state, "In actuality we feel that

no metaphor can ever be comprehended or even adequately represented independently of its experiential basis" (p. 19). In their example LIFE IS A JOURNEY, they point out that the metaphorical meaning derived for life depends on the knowledge held about journeys. To understand the metaphor "is to have in mind, consciously or more likely unconsciously, a correspondence between a traveler and a person living the life, the road traveled and the 'course' of a lifetime, a starting point and the time of birth, and so on" (p. 61). This process of bringing to bear conventional prior knowledge of journeys produces a "rich and varied" conceptualization of life (p. 61), not a simple one-to-one correspondence between semantic features of the source and target. The metaphorical mapping consists of four types of knowledge: Slots, relations, properties, and specific knowledge in the source domain are all available for mapping onto the target domain (pp. 63-64).

The conventional knowledge--or domains of experience--is organized as "gestalts...natural kinds of experience...[that] are a product of [o]ur bodies...[o]ur interactions with our physical environment...[o]ur interactions with other people within our culture...products of human nature" (pp. 117-118). In other words, our conceptual system is "a product of the kind of beings we are and the way we interact with our physical and cultural environments" (p. 119). The knowledge resulting from the interactions may be personal and private--the result of individual experience--or public and commonplace--the result of knowledge sharing (Lakoff & Turner, p. 84). In the metaphor process, entire gestalts are activated, with each gestalt providing "a background for understanding the sentence in terms that make sense to us, that is, in terms of an experiential category of our culture" (p. 168).

Lakoff and Johnson maintain that metaphors "influence our experience and our actions" (p. 68). "Reason," they state, "involves categorization, entailment, and inference. Imagination...involves seeing one kind of thing in terms of another kind of thing," and metaphor brings these together as "imaginative rationality" (p. 193). Accordingly, we can understand our experience directly when we conceive of it as structured in coherent fashion by the gestalts that have emerged from our natural interactions, whereas experience is understood metaphorically "when we use a gestalt from one

domain of experience to structure experience in another domain" (p. 230).

In the present study, students' experience and background knowledge, be it of metaphors, of language in general, or of the world, are understood to contribute in significant ways to the construction of meaning.

c) Culture

Pritchard (1990) examined the reading strategies of grade eleven students in a cross-cultural study with culturally familiar and unfamiliar text. He reports that "the cultural background of the reader and the cultural perspective of the text" are two of the most important factors affecting the reading process and the understanding the reader constructs (p. 291). While Pritchard's study did not look at metaphor per se, his conclusion concerning the importance of culture in the reading process may relate to the idea expressed by others (e.g., Lakoff & Johnston, 1980; Lakoff & Turner, 1989; Lakoff, 1993) that the particularities of a culture have an effect on the metaphors that are created and shared by members of the cultural group--a situation that would account in part for Pritchard's results.

In their discussion of the origin of orientational metaphors (those that depend on spatial orientation, such as "I'm feeling up" to indicate happiness [p. 58]) and ontological metaphors (such as "He did it in ten minutes" [p. 59], suggesting that time is a container), Lakoff and Johnson (1980) remark,

> Our physical and cultural experience provides many possible bases for spatialization metaphors. Which ones are chosen, and which ones are major, may vary from culture to culture. It is hard to distinguish the physical from the cultural basis of a metaphor, since the choice of the physical basis from among many possible ones has to do with cultural coherence. (p. 19)

Similarly, structural metaphors, the third major group of metaphors, give rise to a large number of metaphorical expressions that reveal a mapping of the organizational structure of the source domain onto the target domain--the structural metaphor ARGUMENT IS WAR, for example, gives rise to expressions that speak of verbally attacking, defending, counterattacking positions (p. 62).

Lakoff and Johnson contend that "[c]ultural assumptions, values, and attitudes" (p. 57) determine how it is possible to conceptualize experience and that the conceptualization itself

depends on the metaphorical process in that the nonphysical is conceptualized in terms of the physical, "that is, we conceptualize the less clearly delineated in terms of the more clearly delineated" (p. 59).

Lakoff and Johnson maintain that ways of conceptualizing experience vary from culture to culture, partly because of the physical environment in which a culture develops and functions and partly because of the way social relationships are defined. They state, "Since much of our social reality is understood in metaphorical terms, and since our conception of the physical world is partly metaphorical, metaphor plays a very significant role in determining what is real for us" (p. 146). This position is strongly supported by Lakoff and Turner (1989), who see our cognitive models being acquired through direct experience and through culture (p. 66), and by Lakoff (1993), who says, "Metaphorical mappings vary in universality; some seem to be universal, others are widespread, and some seem to be culture specific" (p. 245).

What emerges, then, is a complex interaction of metaphor, experience, and conceptualization, with each shaping and being shaped by the others. This complex interaction may account for the cross-cultural differences Pritchard identifies in the reading behaviours of students. The potential for cultural influence on children's understanding of metaphor was taken into account in the present study by drawing participants from an identifiable, seemingly stable cultural subgroup.

iii. Text Focus

a) Context

Winner (1988) notes that studies that take context into account reach different conclusions from those that do not. Metaphors presented in context, she says, "reveal the kinds of similarities that children recognize" (p. 44). She cautions, however, that paraphrases out of context cannot be used "to conclude that children cannot generate relational interpretations of metaphors when called for" (p. 44).

In his review of the literature, Ortony (1980) identifies a "context-length by context-type

interaction" (p. 359) in metaphor experiments done by Ortony, Schallert, Reynolds, and Antos

(1978). He suggests that the context may cue the reader that an utterance is anomalous and requires

a nonliteral interpretation (p. 352), thus initiating a meaning search involving a "context-sensitive

spreading activation mechanism" that begins with the main input schemata, then, under the influence

of the concepts active in the context at the time, activates related subschemata until a satisfactory

intersection of the schemata is arrived at, thus providing a set of features upon which to base a

metaphorical comparison (pp. 360-361).

Investigating the effects of context on children's metaphor comprehension, Siltanen (1989)

finds an age-context relationship. She says "that younger children...need different amounts of

context for easy, moderately difficult, and difficult metaphors than...older children" (p. 211). Support

for Siltanen's conclusion is provided by Chandler (1991), who maintains that "all metaphor usage

seems to be highly sensitive to context effects for both linguistic and nonlinguistic contexts" (p. 237).

From three experiments on children's understanding of metaphor, Vosniadou, Ortony,

Reynolds, and Wilson (1984) conclude that children must confront several sources of difficulty, one of

which is "the context in which the metaphorical language occurs" (p. 1595). They suggest "that

children use the linguistic and situational context to draw inferences" about the meaning of the text

(p. 1603) and, where the context is insufficient and inferences turn out to be unsupportable, that

readers must engage in inference revision, thus complicating the meaning-making process (p. 1603).

Vosniadou (1987) concurs. She says that "it may be the case that metaphor comprehension is

originally achieved only in situations where the already established context strongly leads to

inferences that are inconsistent with a literal interpretation and consistent with the metaphor's implied

meaning" (p. 878). Kincade (1991) also agrees, identifying "adequate context support" as one of the

conditions necessary for grade two and grade five children to understand abstract comparisons of the

type underlying certain metaphors (p. 94).

Examining college students' comprehension of metaphors, Inhoff, Lima, and Carroll (1984)

found that metaphors were understood as fast as literal statements when contexts were long, but

more slowly when contexts were short (p. 563). From this, they conclude, "Conceptually supportive context is an important factor in the comprehension of metaphoric language" (p. 563). Also working with college students, Reynolds and Schwartz (1983) examined understanding of context-dependent metaphors, those that depend on surrounding information to determine how they will be understood (p. 451). They report "increased memorability for passages when the concluding statement is expressed metaphorically rather than literally" (p. 455) and "greater recall of the metaphors than the literally equivalent statements" (p. 455), suggesting a mutually reinforcing interaction between metaphor and context.

Vosniadou (1987) claims that inaccurate results have been achieved in some studies because "the metaphorical sentences were often presented to children in the absence of a meaningful linguistic or situational context" (p. 877). Related to this, Siltanen (1989) warns that "researchers cannot ignore metaphor difficulty as a critical factor in children's metaphor comprehension" (p. 208). And, a basic question for the researcher, Ortony (1980) says, is "whether, given every opportunity, a child can show ability to comprehend metaphors" (p. 357).

The present study attempts to address concerns for adequacy of context by using passages of unedited, authentic text.

b) Explicitness and Similarities

When a metaphorical statement is phrased in the simile form, that is, using like (or an equivalent phrase) to force the comparison, the resulting explicitness is considered by some researchers to make the detection of similarities between the source and target easier. Placing her comments within the context of her three-step, pragmatic comprehension model (see Methodology section, above), Winner (1988) suggests that the presentation of metaphorical comparisons in simile form changes the understanding task for children, making it easier by reducing the reader's processing requirements by at least one step--that is, by avoiding the need for the listener to first detect nonliteral intent (see, for example, pp. 10-11 & 49).

Siltanen (1990) investigated relations among three factors: age, metaphor difficulty, and explicitness. Her results are inconclusive and leave open the question of the degree to which explicitness contributes to metaphor understanding. She suggests that her results can be accounted for by the children at a certain age making no distinction between the simile and metaphor forms of an expression or focusing on "content words (nouns and verbs)" rather "than on function words (conjunctions and determiners)" (p. 17).

Vosniadou, Ortony, Reynolds, and Wilson (1984) also investigated the effects of explicitness, with results somewhat different from those achieved by Siltanen. They report that "the insertion of 'like' clearly helped the children enact the meaning of the metaphorical sentences" (p. 1600). They suggest two possible reasons for this: first, that the word like focuses attention on "perceptual similarity between the objects compared, or on the similarity of the actions in which the agents engage," and, second, like focuses attention on "relational similarity," that is, things behaving in similar ways (p. 1600). The ability to enact does not mean, however, that children can necessarily give verbal paraphrases of the metaphorical sentences, as required by Siltanen; this may account in part for the differences in the results of the two studies.

The question of the effect of explicitness, with the attendant questions of similarity of source and target and saliency of semantic features, arises from the comparison view of metaphor. While this is not central to conceptualizing metaphor understanding according to the mapping view elaborated by Lakoff and Johnson (1980), Lakoff and Turner (1989), and Lakoff (1993), it need not be excluded, since clearly some metaphors do involve comparison of existing features of the two parts of the metaphor. For this reason, although the question of the effect of explicitness on metaphor understanding is largely unanswered by the studies undertaken so far, it seems appropriate that the question should remain open.

In the present study, no attempt is made to balance metaphors and similes. All metaphors are those occurring naturally in the selected text passages.

c) Ecological Validity

As has been pointed out throughout this review of the literature, the examination of children's metaphor understanding has proceeded according to a variety of experimental paradigms and with the use of a variety of metaphorical material. Broderick (1992) compares the metaphors occurring in 53 popular children's books and those used as stimuli in 15 major metaphor studies with children. He says, "In the study of children's comprehension of figurative language to date...stimulus sets have been constructed largely without reference to what children are actually exposed to in everyday life" (p. 183). He notes that metaphoric equation (i.e., the use of a copula verb and noun phrases--e.g., "that fellow was a bad apple" [p. 184]) and metaphoric substitution (i.e., "referring to an old referent in a new way"--e.g., "their father, the wretch" [p. 184]) have been favoured in research but "are among the rarest forms in children's literature" (p. 191).

Broderick provides taxonomies for examining the ecological validity of stimulus sets of metaphorical expressions used in research. These are based on both syntactic frame (describing the form of the comparison) and similarity type (describing similarity relationships between the source and target) (pp. 184-187). As is readily evident, Broderick's review focuses on studies based on the comparison view of metaphor, and his taxonomies reflect his own attachment to the view, particularly in his identification of the major taxonomies based on syntactic frames and comparison types. That notwithstanding, his taxonomies provide a useful tool for analyzing aspects of the task faced by children when they make meaning of metaphors. Additionally, Broderick has made a significant contribution to the field by drawing attention to the need for ecological validity in metaphor studies.

The present study uses Broderick's taxonomies to describe the metaphors occurring in the target passages and as one basis for comparing student understanding of the metaphors. This study also considers the ecological validity of the metaphors by using passages excerpted from authentic texts of the sort students are likely to encounter in their classrooms.

d) <u>Metaphor in Informational Text</u>

Most studies of metaphor have used specially prepared sets of metaphors, specially prepared sets of sentences with metaphors embedded, or specially prepared stories. Very few studies have used informational text, and of those that have, none could be found which used authentic text drawn from trade books. Consequently, very little is known about children's understanding of metaphor in informational text.

In three studies, Pearson, Raphael, TePaske, and Hyser (1981) examined children's recall of metaphor in expository text and the way metaphor affected recall of textual information. In the first study, two passages were adapted from an informational text, one as the literal form and the other as the metaphorical form. Grade six and university students were tested for recall. The grade six students recalled more of the metaphor structures than of the corresponding literal structures. In the second study, high- and low-reading ability grade three students performed the same type of test procedure, but with inconclusive results. A followup investigation suggested that passage familiarity might be a factor, that is, that the less familiar the passage, the more likely a metaphor was to be memorable within the passage. The third study, this time involving high- and low-reading ability grade three and grade six students, produced ambiguous results, although there was evidence that metaphors were more memorable in the unfamiliar text.

To examine the relationship between topic familiarity and metaphor understanding, Mercer (1985) gave grade seven students either a metaphor or literal text version of specially prepared familiar- and unfamiliar-topic expository passages. On oral free recall of target ideas, students recalled significantly more information conveyed by the metaphor targets of the unfamiliar topic text than of the familiar topic text. Also, interpretation of metaphor targets was significantly greater for the unfamiliar topic text (pp. 78-79). As Mercer acknowledges, the target metaphors were entirely of the similarity type (comparison view), that is, based on some preexisting similarity between the source and target. Because other types of metaphors were not included, she cautions that generalizations may be inappropriate. Her text passages, although specially prepared for the study, were close to being

authentic informational text in that they were adaptations of trade books available at the time. The metaphor target density was eight per passage, or one per 50 words or less--a density that may be higher than in most non-experimental texts. Each metaphor version had one metaphor target that was more properly a literal comparison (i.e., "weigh as much as a ten year old child" and "weigh as much as a large refrigerator"). It is unclear the extent to which this would alter the findings. It does, however, underscore the importance of a scheme, such as that offered by Broderick's (1992) taxonomies of literal and metaphoric comparisons for establishing the metaphoricity of expressions.

From a study of the effect of analogy (which makes use of the metaphorical process in an extended way--see, for example, Lakoff, 1993, p. 235) on children's understanding of expository text, Vosniadou and Schommer (1988) report that explicit analogies assist five- and seven-year-old children to "build representations of new concepts that are richer than the ones obtained from information contained in expository texts without analogies" (p. 535). The effect is age-related, which is taken to indicate that expanding "world knowledge" permits the older children to "build the constraints needed for more selective transfer" (pp. 534-535).

Drawing on earlier work on advance organizers, Mayer and Bromage (1980) examined the effects of concrete analogies on the recall of information. Participants were university students who scored either high or low on the Scholastic Aptitude Test--Mathematics. None had had prior experience with computers or computer programming. The target texts were simplified versions of certain commands in the BASIC computer language, one presented in a text-only format and the other in a text plus organizing-model format. Participants received both texts, but in different order. Subsequent tests indicated that the concrete analogies aided recall when presented before reading took place. The effect was stronger for low-ability students. A second study looked at the effect of test delay on recall, finding that the before group had a higher rate of recall than the after group. One conclusion reached by Mayer and Bromage is that analogical models should be more useful for unfamiliar information (p. 224), a conclusion consistent with Pearson, Raphael, TePaske, and Hyser's (1981) study reported above.

Reynolds and Schwartz (1983) carried out a study comparing the effects of literal and metaphorical concluding summarizing statements on passage recall. Results indicate that "under certain circumstances and constraints, metaphors, like adjunct questions or advance organizers, can enhance learning from written text" (p. 455). Reynolds and Schwartz suggest that metaphors may act as "summary statements" that "serve to clarify some details of the text or to draw an analogy between an unknown event or procedure and a more familiar idea" (p. 458). The eight text passages created for the study were "short stories" of about 50 words in length (p. 452). Examination of the sample passage provided by the authors shows it to have more in common with expository text than with fiction in that there is no structure typical of stories. On this basis, Reynolds and Schwartz's comments can be taken to apply to expository text and to relate to other studies reported in this section, at least tentatively.

The study reported here uses authentic informational text passages, each being the initial portion of a trade book readily available for use in school. By choosing such material, it is hoped that the issue of ecological validity will be addressed to some degree and that findings, as preliminary as they may be, will tell something about children's reading of naturally occurring informational texts in naturally occurring situations.

VIII. Summary

In this chapter, five theories were examined to suggest ways in which they interlock to form a simple, coherent worldview capable of supplying the warrants upon which research into metaphor can rest. The following contentions were put forward and evidence offered in their support:

1. That social interactionism sets general conditions under which knowledge construction can take place--that is, <u>when</u> knowledge can be constructed;

2. That constructivism describes a specific manner in which the individual can construct knowledge from experience--that is, <u>how</u> knowledge can be constructed from experience;

3. That schema theory describes a model according to which knowledge can be organized--that

is, how knowledge can be stored;

    4. That parallel distributed processing describes how knowledge can be processed--that is, how knowledge can be systematized; and

    5. That views of metaphor describe how knowledge, once constructed, can feed itself--that is, how knowledge can become synergistic.

    In this chapter four major views of metaphor were examined:

    1. The substitution view, according to which metaphor is held to be a linguistic device by means of which one word is substituted for another and according to which any metaphor is necessarily logically false;

    2. The comparison view, according to which attention is drawn to dominant features of one part of the metaphor in such a way that the other part is endowed with the features;

    3. The interaction view, according to which the two parts of the metaphor are seen to influence each other; and

    4. The mapping view, according to which the meaning and/or structure of one domain of experience maps onto another, reshaping it.

    Metaphor research indicates that children, particularly the young, may comprehend metaphor but be unable to explain its meaning. Research indicates that literal language is not necessarily acquired by children prior to metaphorical language. Research into how the brain processes metaphor is inconclusive. Recent enquiry into parallel distributed processing (PDP), however, suggests that broad segments of the neural network are engaged during concept formation, refinement, and activation and during comparison and/or mapping from one conceptual domain to another.

    To avoid limitations and restrictions arising from a narrow conceptualization of metaphor--limitations and restrictions such as those imposed by the comparison view, for

example--this study defines metaphor broadly as a mapping process, as described in this chapter. Children's background knowledge is of interest in this study insofar as it influences understanding of the metaphors, where that can be determined. Ensuring adequate context, use of methods other than paraphrase, use of authentic metaphorical passages, and avoidance of the effects of story structure are all taken into account. These things are accomplished, respectively, by providing lengthy passages, by having students complete multiple choice activities, by providing authentic texts, and by using informational text passages. Complexity of linguistic input is of interest as a factor influencing metaphor and passage understanding; to this end the three passages used are of different degrees of reading difficulty.

The present study examines the understanding of metaphor and text by grade six students, who, as a group, are generally acknowledged as having achieved a fairly high degree of independence in the developmental aspects of reading and metaphor understanding, although not the full adult range and expertise.

In the present study, students' experience and background knowledge, be it of metaphors, of language in general, or of the world, are considered to contribute in significant ways to the construction of meaning. No attempt is made to control for explicitness, according to the comparison view. All metaphors are those occurring naturally in the selected text passages. Lastly, this study considers the ecological validity of the metaphors by using passages excerpted from authentic texts of the sort students are likely to encounter in their classrooms.

This study attempts to provide tentative suggestions about children's understanding of metaphor in authentic informational text, an area that has not been examined. Further, it undertakes to use the ideas of Lakoff, Johnson, and Turner to inform a study to a degree not hitherto attempted, insofar as can be determined from the literature.

CHAPTER THREE: RESEARCH DIALECTIC AND METHODOLOGY

I. Introduction

This study arose from my long-standing interest in metaphor. As a student of English literature, studying and reading widely across genres and literary movements, I developed a strong sense of the power of metaphor to capture the essence of the idea being represented and to raise it to a higher level of significance than possible with literal language alone, thus making the idea both more meaningful and more memorable--something to be savoured, often to be shared with others, to be carried with me and used in my own life.

As a poet, I had--and have--a very personal interest in how metaphor is constructed, how it functions on what might be considered the technical level, and how and why readers and listeners

respond to it affectively. In my own poetry, I found myself giving particular attention to the images I created, often through metaphor, and came to think of the most striking of these as power centres around which meaning was organized and which, one might say, provided the gravity that gave the poem weight.

As a teacher, I became interested in the challenges and opportunities that metaphor presented to my students. Although I was aware of how powerful metaphor could be to heighten meaning for some of my students, to surprise, often to delight, I was also aware that not all students could appreciate the power of metaphor or make it their own. For these students, metaphor was a challenge, not an opportunity.

At the academic level, my first attempt to delineate the problem to my own satisfaction was, as it turned out, quite unsatisfactory. Although I knew there was a problem, I was not clear whether the problem was one of the process of metaphor production, one of pure linguistic comprehension, one of reading comprehension, or a problem of knowledge of metaphor. To compound my problem, the researchers were not clear, either, as to the origin of the children's problems; indeed, researchers often did not even agree on just what a metaphor was! The advantage was that there was much interest in metaphor at the experimental and philosophical levels of enquiry. The disadvantage was that one new to the field had to sort through diverse, persuasive theories and often contradictory research findings, trying to make significant judgments with less than finely honed critical tools.

I read widely, hoping to find a convincing philosophical perspective, a convincing explanation of the psychological processes of metaphor making and comprehension, and a convincing explanation of how and when these psychological processes developed in children.

One of the books I read was George Lakoff and Mark Turner's (1989) More Than Cool Reason: A Field Guide to Poetic Metaphor. Their ideas were strongly appealing, perhaps because they harmonized with my own, hitherto poorly conceptualized and poorly articulated, ideas--ideas that had, nonetheless, been forming for at least twenty years. Lakoff and Turner confirmed for me that metaphor was much more than a simple linguistic embellishment. Metaphor was, as I had sensed, a

cognitive device. It was, they maintained, fundamental to our way of thinking, as well as to our way of talking. It was ubiquitous. It was capable of creating new meaning, not just passing along existing meaning. It had a cultural basis. It was, in a sense, a form of cultural shorthand.

Ernst von Glasersfeld's (1984) "An Introduction to Radical Constructivism" was also strongly appealing. Again, it accorded with elements of my own thinking, elements expressed in some measure in my poetry. While many researchers were working from the constructivist perspective, few adopted the extreme position put forward by von Glasersfeld. For him, constructivism did not simply describe the manipulation of information, although that was important; rather, it was a theory of how knowledge came to be and how the individual made meaning of the flow of imposing sensation. It was a theory of being.

Under the influence of socio-cultural theorist and researcher Gordon Wells, I came to L. S. Vygotsky's (1962, 1978) socio-cultural theory of language. At first, it seemed to conflict with constructivism. However, in time I discovered a workable balance between the internalness of constructivism and the externalness of social interactionism. I found that the two theories provided powerful double lenses through which to examine the issues laid out so boldly by Lakoff and Johnson (1980), Lakoff and Turner (1989), and Lakoff (1993).

I found that Jerome Bruner had adopted a constructivist-social interactionist stance in <u>Actual Minds, Possible Worlds</u> (1986) and <u>Acts of Meaning</u> (1990). For Bruner's purposes, the extreme stance of von Glasersfeld was unnecessary, and he maintained at least a tacit acknowledgement of objective reality. One of the powers of Bruner's two books is the manner in which he makes accessible Vygotsky's ideas, especially the zone of proximal development and the social construction of individual identity.

My reading continued during all phases of my studies. I discovered articles and books that expanded my thinking. The book by Marcel Danesi (1993), <u>Vico, Metaphor and the Origin of Language</u>, stands out, as does George Lakoff and Mark Johnson's <u>Metaphors We Live By</u> (1980). A second article by Ernst von Glasersfeld (1989), "Facts and the Self From a Constructivist Point of

View," gave texture to the striking outline of radical constructivism sketched in the 1984 book

chapter, "An Introduction to Radical Constructivism." Indeed, I found the entire book, The Invented

Reality (1984), edited by Paul Watzlawick, a fascinating exploration of the application of constructivist

philosophy across many academic disciplines and social contexts.

Perhaps because of my background, I thought of the question of metaphor as a question of

poetry and narrative. This stance was encouraged by the research literature. With this orientation, I

culled nine samples of metaphor from poetry and fiction in four grades two and three language arts

anthologies and asked six grade three students to tell me what the text samples meant.

I analyzed the metaphors to determine what critical knowledge (semantic features) would be

required to transfer from source to target to constitute understanding. I used this critical knowledge in

my analysis of the think-aloud protocols.

On the premise that extreme cases might provide contrasting pictures of prior knowledge and

metacognitive processes, I identified five samples, two that had been understood by all students, one

that had been understood by five before probing and all six after probing, and two that had not been

understood by any of the students. In the case of the understood samples, two features were

revealing--that is, that the children had the prior knowledge of a cultural expression and that the

metaphorical aspect could be ignored while still understanding the meaning of the text sample. One

example, "pitch black," illustrates both features: It is a common cultural expression that the students

reported hearing previously, and they understood it to mean "very, very dark" or "dark black" without

knowing the meaning of the word pitch itself.

The two samples not understood by any of the students revealed three common

characteristics: a limited context, the presence of one extremely abstract term, and students' lack of

prior knowledge.

Again looking at extreme cases, I compared the think-aloud characteristics of the two students

who understood the most text samples (6 of 9) with those of the two students who understood the

fewest (3 of 9 and 2 of 9). The protocols of the first pair had a greater variety and complexity of

features considered indicative of understanding of the text (8), compared to the protocols of the second pair (4 and 3, respectively).

From these analyses, I discovered that the students understood the text samples (not necessarily the metaphors contained in the samples) without probing about 46% of the time. I discovered also that these children might well have the prior information necessary to compare the two parts of the metaphor (using the feature-comparison model), yet be unable, even under probing, to make the semantic connections that would constitute paraphrase of the metaphor (Ortony, 1980; Evans & Gamble, 1988), a condition noted among poor readers by Seidenberg and Bernstein (1988). This was entirely consistent with the ideas that a certain level of metacognitive capacity is needed when the meaning of text is not immediately clear and, further, that metacognitive capacity is something unlikely to be fully developed by grade three. It was also consistent with the idea of conventionality of metaphors--that some of them are learned because they are part of the ordinary, everyday way of talking about things (Lakoff & Johnson, 1980). I was forced to consider the question of what constituted sufficient context for presentation of metaphors (Inhoff, Lima, & Carroll,1984; Vosniadou, Ortony, Reynolds, & Wilson, 1984; Winner, 1988).

Methodologically, I discovered that the think aloud could be a useful device for getting at the sort of information that interested me but that it required some pre-teaching and familiarization, since talking in the presence of others usually entails talking to the other, rather than to oneself. On a very sobering, practical side, I discovered that analysis of think-aloud protocols could be time-consuming and difficult.

I felt it would be helpful to have a clearer idea of how proficient adult readers read text containing metaphors. To this end, I selected a piece of fiction from a grade six language arts anthology, identifying in it six metaphor samples. I intended that the potential problem of insufficient context would be avoided by using the single text, rather than portions of several. I asked five students from a doctoral seminar, working individually, to read the passage aloud as if reading to a friend--a procedure reported by Ericsson and Simon (1993, p. xviii) to improve subject performance when compared to

control group subjects--and to stop at indicated points to explain the underlined portions of text, each containing a metaphor. I audio-taped the think alouds, transcribed, and analyzed them.

Expanding on the idea of critical knowledge used with the text samples for the grade three children, I constructed schematic webs (semantic-feature or salient-attribute charts) for the six metaphors. For example, for the metaphorical expression, "the herd was galloping away like the wind," I identified the following shared features for "herd" and "wind": movement, speed, force, uncontrollable. Reference to any of these features by the participants was taken to indicate the sort of linkage underlying metaphor comprehension, according to the attribute-saliency form of the comparison theory (see, for example, Ortony, 1980).

The adult participants made numerous semantic connections. For the metaphorical expression (simile), "they swept like a brown flood" (referring to a herd of horses), participants mentioned six of the seven features I had identified as being major conceptual links, providing a total of eleven mentions.

Results for four of the six samples showed one feature to be favoured above the others. In the expression, "the herd was galloping away like the wind," for example, speed was mentioned by all participants. This could be taken to suggest that the expression itself provided the clues necessary to make this connection; on the other hand, it may be that a form of the expression was sufficiently familiar to cause the participants to judge that speed is the important feature of the situation described by the expression.

Understanding of the metaphors was, as expected, 100%. There was little evidence of metacognitive activity, but this could be accounted for by the ease with which the adults read the text--that is, the metacognitive processes were so automatic as to be invisible to the reader and so did not occasion comment of the sort that could be taken as evidence of their presence and function. Context seemed sufficient for ease of reading and there was no evidence of focusing on key words to the exclusion of other portions of text, as had occurred with the children when they created meaning around puzzling portions of text. A major difference between the children and the adults was the

amount of unprompted elaboration provided in addition to the basic responses necessary to indicate understanding of the target samples, with the adults producing a much higher percentage.

These two activities suggested that the think aloud could reveal considerable, potentially significant information about the level of text understanding and the reading and thought processes engaged in by the reader. They also suggested that grade three students' metaphor understanding might be affected by their limited metacognitive abilities. The literature suggested that young children might also lack the power to verbalize metaphor meaning, even when a meaning had been constructed from the reading (Vosniadou, Ortony, Reynolds, & Wilson, 1984).

On the other hand, based on experience and my reading of the research literature, I felt that grade six students would form a more appropriate research group; specifically, they should possess higher metacognitive and verbal abilities than grade three students, yet they should not be able to read with full adult proficiency, making it more natural for them "to report on processes which have [not] become 'automatized'" (Afflerbach & Johnston,1984, p 314). This position is also supported by Brown (1980).

Other factors imposed themselves at this point. The literature shows that children's familiarity with story structure (Bruner, 1990, p. 80, for example, says that humans have "an 'innate' and primitive predisposition to narrative organization") can influence memorability of metaphor, depending on where in the text the metaphor occurs (Waggoner, Meese, & Palermo, 1985). Other studies show that vividness of metaphor can influence memorability of text for some readers (Pearson, Raphael, TePaske, & Hyser, 1981; Reynolds & Schwartz, 1983). As well, there seemed to be a certain dichotomy in asking children to read a story, something for which they would usually assume an aesthetic stance (Rosenblatt, 1978, 1991), then having them give paraphrases of portions of the text, treating it in an efferent manner.

I found that the literature had very little to say about the problems and opportunities presented to young readers by metaphor in informational text. It seemed that the topic should be of considerable importance, especially since informational trade books are available in large numbers for

use in support of the curriculum. Once I decided that metaphor in informational text should be the focus of the study, two of the potentially confounding factors mentioned above were eliminated--that is, effects of story structure and effects of changing reader stance. The third factor (effect of metaphor on memory) could be controlled by making the text passage available throughout the entire activity.

As well, to address the potential problem that some children might be unable to verbalize meaning, while actually understanding the metaphors, I decided to use a multiple choice activity following the think aloud, a method Vosniadou (1987) identifies as a stronger method than requiring paraphrase. To increase the richness of information provided by the think alouds, I decided to ask the children to do a retell after completing the initial reading. This would be an extension of the think aloud and would require the students to give what they considered to be the main points, so as to reveal more of the meaning they had constructed during their reading.

A factor that seems to influence understanding of metaphor is intimacy with culture. One of the grade three children had English as her second language. She experienced difficulty with one of the more idiomatic expressions, although probing showed she had the requisite knowledge to make a semantic-feature comparison adequate to explain the two parts of the metaphor (see Ortony, 1980, and Winner, 1988). One of the adults also had English as her second language. After the think aloud, she commented that some of the expressions were difficult because she was not a native English speaker and had not internalized all the expressions from childhood.

These observations are consistent with the contentions of Lakoff and Johnson (1980), Lakoff and Turner (1989), and Lakoff (1993) that metaphor is strongly influenced by culture (see above, Chapter Two). On this basis, I decided that the meaning I would expect for any particular metaphor in the study would be the anticipated meaning an adult, Canadian English speaker would be likely to make.

According to Vygotsky's idea of the zone of proximal development, students should perform at a higher level when working "in collaboration with more capable peers" (1978, p. 86) [emphasis in

original]. Wells (1990b) expresses this idea in the form of an apprenticeship model, whereby

"collaborative talk about texts of varying kinds in the context of meaningful joint activities, undertaken

with the assistance of a more skilled co-participant," can increase learning (p. 402). Wells (1990a)

suggests that without

> opportunities for this sort of talk about texts, students may learn to perform the more observable
> aspects of reading and writing and still fail to understand how these behaviors may empower
> action, thinking and feeling in their personal lives as well as in the tasks they are required to
> perform in the classroom. (p. 12)

Moffett and Wagner (1991) carry the idea further. They describe partner reading, the process

whereby students take "turns sight-reading aloud to each other in a group of two to four" (p. 71).

Although weaker readers are aided by the process, the benefits extend to enrichment of the

comprehension of all participants and increased awareness of their own response to the text (p. 71).

Forman and Cazden (1985), studying the problem-solving interactions of pairs of fourth- and

fifth-grade students, report that "by assuming complementary problem-solving roles, peers could

perform tasks together before they could perform them alone" (p. 343) [quoted in Cazden, 1988, p.

130].

Out of the foregoing, there arose the idea to examine whether two readers working together

(i.e., in dyads) would produce more talk about the text than a lone reader. It seemed interesting to

ask, as well, whether students who read in the dyadic condition would show increased understanding

of the metaphors on the planned multiple choice activity.

II. Research Proposal

I prepared a proposal entitled "Grade Six Students' Understanding of Metaphor in Informational

Text." In this, I noted that despite the increasing number of studies of children's understanding of

metaphor, informational text had received very little attention. Consequently, the problem remained

that it was not known how well children understood the metaphorical language in informational text,

nor was it known whether children's level of understanding of metaphor was related to their level of

understanding of the text itself. One concern was central: The study should have ecological validity

by drawing material from actual informational books of the sort students were likely to encounter in the classroom or choose to read on their own.

The proposal set out three major questions around which the study was to be organized: (a) How well do grade six students understand metaphor in the informational text they read? (b) How well do the same children understand the metaphor-bearing informational text itself? (c) How are understanding of text and understanding of metaphor related? These three major questions were restated as seven specific questions. The relationship between the major and specific questions was as follows:

(a) How well do grade six students understand metaphor in the informational text they read?

1. What is student level of understanding of metaphor as determined by performance on a multiple choice meaning clarification activity?

2. What are the differences in understanding of metaphor by the same student in the individual and dyadic think-aloud conditions as determined by performance on multiple choice meaning clarification activities?

3. What are the differences in understanding of metaphor in the same text for the individual and dyadic think-aloud conditions as determined by performance on a multiple choice meaning clarification activity?

4. What are the differences in understanding of different types of metaphor as determined by performance on multiple choice meaning clarification activities?

(b) How well do the same children understand the metaphor-bearing informational text itself?

5. What proportion of students achieve high and low scores on think-aloud tasks as determined by holistic and specific-trait scoring?

(c) How are understanding of text and understanding of metaphor related?

6. What are the features of the think alouds of students whose performance on a multiple choice meaning clarification activity placed them in the first and fourth quartiles?

7. What is the relationship between the level of students' understanding of metaphor and their understanding of text?

These questions were subsequently approved by my academic committee.

I proposed to use authentic text from informational trade books, rather than either artificially contrived metaphor sets or text written for the purpose of the study.

I examined the metaphor content of informational text in various language arts series that had been authorized for use in British Columbia schools, copies of which are held by the Language Education Research Centre of the Department of Language Education of The University of British Columbia. Specifically, I looked at all the informational text in the following:

1. Spin Among the Stars, Grade 6, Network series (Nelson, 1991);

2. Star Flights, Grade 6_1, Network series (Nelson, 1984);

3. Handshakings, Grade 6_{12}, Expressways series (Gage, 1988);

4. Lobstick, Grade 6_{13}, Expressways series (Gage, 1988);

5. Nineteenth Moon, Grade 6_1, Unicorn series (McGraw-Hill Ryerson, 1985);

6. All in Good Time, Grade 6_2, Unicorn series (McGraw-Hill Ryerson, 1985);

7. Ride the Wave, Grade 6, Journeys series (Ginn, 1988);

8. Wherever You Are, anthology and project book, Grade 6_1, Impressions series (Holt, Rinehart & Winston, 1987); and

9. All Over the World, anthology and project book, Grade 6_2, Impressions series (Holt, Rinehart & Winston, 1987).

I found that the amount of metaphor varied considerably, not only across series, but within them as well. Noticeable, however, was that informational text from Impressions generally showed a higher occurrence of metaphor than the informational text of the other series.

I examined five recently published informational trade books, randomly selected by a teacher-librarian from among publisher submissions to the National Council of Teachers of English

bibliographic project, <u>Adventuring with Books</u>. The five books were as follows:

1. <u>Monarch,</u> by Kathryn Lasky, Harcourt Brace & Co., San Diego, 1993;

2. <u>The Search for the Right Whale</u>, by Scott Kraus and Kenneth Mallory, Crown, New York, 1993;

3. <u>Playful Slider</u>, by Barbara Juster Esbensen, Little, Brown & Co., Toronto, 1993;

4. <u>Arctic Summer</u>, by Downs Matthews, Simon & Schuster, New York, 1993; and

5. <u>Power Machines</u>, by Ken Robbins, Henry Holt & Co., New York, 1993.

The first three books all begin with metaphor-rich language. After the first few pages, the language becomes less metaphoric. The fourth book begins and ends with an extended personification of winter and, apart from this, has only occasional metaphors. The fifth book has occasional similes and strong comparisons constructed like similes, but metaphors are rare.

In considering these observations, I felt that they raised questions about the appropriateness of different materials. I wondered, for example, whether students confined to a single language arts series were being provided with reading experiences to support reading beyond the program material. It seemed that students were increasingly likely to encounter metaphor when they read informational trade books. Since there is a trend to use more such trade books in school, I felt this made my central interest even more pertinent--that is, how well metaphorical language is being understood and how its understanding relates to understanding of the text.

In the proposal, the key terms were operationally defined as given in Chapter One, with the following three exceptions:

<u>Understanding</u>: The meaning created by an individual as the result of an experience, such as, for example, reading. In this study, it is taken to mean both performance on a multiple choice meaning clarification activity and performance as determined by holistic and specific-trait scoring of a think aloud.

<u>High score</u>: A score, as determined by holistic and specific trait analysis of a think aloud, equivalent to a comprehension score of at least 90%. This is consistent with recommended practice

for determination of level of student comprehension of text using an Informal Reading Inventory and represents an independent reading level (May, 1990, p. 384).

Low score: A score, as determined by holistic and specific trait analysis of a think aloud, equivalent to a comprehension score of less than 50%. This is consistent with recommended practice for determination of level of student comprehension of text using an Informal Reading Inventory and represents a frustrational reading level (May, 1990, p. 385).

III. Pilot Study

I sought and received approval from the University Behavioural Sciences Screening Committee for Research Involving Human Subjects to carry out a pilot study. The pilot study was done to test procedures and materials prior to undertaking the main study and to develop a set of descriptors for the understanding processes revealed by the students during their reading. It involved six grade six students (three girls and three boys) from two combined grades six/seven classes in an urban elementary school in the British Columbia lower mainland. The students were among the younger members of their classes, yet, because of promotion by age, which is standard in the elementary school system, these students were typical of the age of British Columbia grade six students, generally. At my request, students were chosen by their teachers to reflect a range of reading abilities. Corroborative data from school records were not sought, but subsequent performance by the students supported the teachers' choices. The students and their parents agreed to the participation.

The school had a high English-as-a-second-language (ESL) population, although all students who participated in the pilot had English as their first language. The school had been operating for a number of years and appeared to the visitor to provide a stable, yet vigorous educational environment. At the time of the pilot, the school community was involved in intense self-examination and long-range planning, as part of the school accreditation process. There was a blend of younger and older teachers, led by an able administrative team of principal and vice-principal.

i. Research on Think Aloud

My earlier experience using the think-aloud procedure with grade three students and adults suggested it was a potentially rich source of information about readers' understanding of text. The literature supports this. Waern (1980), while stating that "the think aloud comments cannot be seen as a direct reflection of all thought processes going on during reading...are incomplete...and reflect some editing" (p. 128), does maintain that they reveal "the content of short-term [memory] store" (p. 124).

Afflerbach and Johnston (1984) give five advantages of think-aloud type procedures. Specifically, they say, oral reports have "one major advantage" in that "their validity relies on a different set of assumptions from those of most other methods of investigating cognitive processes," thus performing "a valuable role in the collection of converging data sources"; they can "provide veridicial descriptions of cognitive processes which otherwise could only be investigated indirectly"; they give access to underlying "reasoning processes"; they may be the only available source of information permitting the "historical or genetic analysis of mental processes"; and they "allow an analysis of the affective components of reading processes" (p. 308).

Baumann, Seifert-Kessell, and Jones (1992) used the think aloud to examine students' monitoring of their own understanding while reading and found that they could increase the amount of comprehension monitoring students used by teaching the students think-aloud procedures. Baumann, Jones, and Seifert-Kessell (1993) specifically suggest that the think aloud "can be used to promote understanding of informational trade books or content area textbooks" (p. 192). They also recommend that "students participate in the social construction of think alouds" (p. 192), a suggestion in line with social-interaction theory. This agrees with my own position and serves to inform research questions two, three, five, and six, above.

I decided also to have the students end each reading think aloud with a retell of the selection in their own words. This is consistent with Afflerbach and Johnston (1984), who note that "to the extent that concurrent and retrospective reports represent different data sources, they may be used as

multiple indicators" (p. 319).

ii. Materials

The materials used for the pilot study were as follows:

1. Two demonstration selections of informational text: "The Land of the Inuit" (Expressways program, Level 6_{12}, Handshakings student anthology) and "Hawaii" (Impressions program, Level 5_2, Knock at the Door student anthology); one copy of each per student and one for myself;

2. Two practice selections of informational text: "Getting to Know Lake Ontario" (Impressions program, Level 6_2, All Over the World student project book) and "The Invention of Levi's" (Impressions program, Level 5_2, Knock at the Door student project book); one copy of each per student and one for myself;

3. Informational text "Sharks" (Impressions program, Level 6_1, Wherever You Are); one copy per student and one for myself;

4. Multiple Choice Meaning Clarification Activity forms "Sharks"; one copy per student; and

5. Audio recorders, blank cassettes, and lapel microphones; one of each per student, except a second cassette per individual for Session Three.

The Multiple Choice Meaning Clarification Activity (MCMCA) consisted of fourteen multiple choice items, each with one answer conforming to the meaning anticipated of an adult reader and two distractors, as well as the option to write in a meaning if none of the presented choices agreed with the meaning constructed by the student while reading.

iii. Procedures

I met with the students four times. The first meeting, held in the principal's office, was informal and was intended to establish rapport with the students and to answer any questions they might have. Two of the pilot sessions were held in the ESL room and one in the multi-purpose/activity room.

In the second meeting, Session 1, I followed a prepared script. I gave the students my reasons

for doing this study; shared with them some pertinent ideas about thinking, reading, and think aloud; demonstrated the individual think aloud procedure with the text "The Land of the Inuit"; provided the students with a sheet of simplified directions for doing the think aloud, explained the directions, and asked the students to refer to the directions as necessary throughout the following activity. The students then completed a practice think aloud with the text "Getting to Know Lake Ontario." All portions of the session were audio taped and were later examined to determine the clarity of my own presentation and the quality of student talk, as well as to ensure that the students had handled the tape recorders without undue difficulty.

Although I had intended the retell portion of the think aloud to follow an immediate playback of the tape, time restrictions prevented this procedure and the retell was not done. It was clear that I had to revise my plan by eliminating the think-aloud replay. This was taken to be a simpler procedure. It seemed to offer no disadvantage, since the students were urged to refer to the text throughout the retell.

I concluded also that my think-aloud demonstration had been longer than necessary to demonstrate the procedure adequately. It was clear that this part of the plan needed revision.

In Session 2, I gave feedback on the previous day's practice think alouds, stressing such things as telling all thinking, not going too fast, and telling how something was known. I complimented the students for providing quite a lot of information--that it was a good first try. I confined my demonstration of the dyadic think aloud, done with one of the students, to one page of the text "Hawaii." My student partner worked easily with me, following my lead, taking her turn, and adding significantly to the talk.

I changed the retell to immediately after the think aloud itself. As well, to my original script, I added two hints for working together: Listen to your partner and respect your partner's ideas.

I provided the students with a sheet of simplified directions for doing the think aloud in the dyadic condition, explained it, and asked them to refer to it as necessary during the practice activity. They completed a practice dyadic think aloud using the text "The Invention of Levi's." Dyads were

randomly assigned.

The students indicated that they preferred working with a partner to working alone and that understanding the think aloud would have been even easier if the dyadic part had been done first. I took this into consideration when planning the main study.

In Session 3, students were randomly assigned to complete either a dyadic or individual think aloud using the text "Sharks." Four students worked in dyads and the remaining two worked individually. Upon completion of the reading think aloud, all students completed the MCMCA individually as a combination think-aloud and paper task. The text was referred to so the task would not be memory-dependent.

Because of an undetected problem with the tape recorder, one of the dyads failed to record their think aloud. This necessitated my return to the school to have them redo the activity--a not altogether successful solution, since the repeated think aloud lacked the richness of language I had anticipated, based on the practice sessions.

Analysis of the pilot data consisted of three parts: analysis of the meanings constructed for the metaphors, according to the MCMCAs; analysis of the think-aloud protocols to determine the specific traits exhibited (i.e., such features, inter alia, as paraphrase, restatement, inferencing, affective response, procedural); and holistic scoring, according to a scale devised for the purpose.

The MCMCAs were scored against the anticipated meanings of adult native speakers. Each item had one anticipated adult-like response, one literal interpretation, and one tangential explanation focusing on one part of the expression. Space was given for students to write in a meaning if none of the given choices agreed with the meaning they had constructed. If this option was chosen, the write-in explanation was analyzed to determine whether it could be restated as one of the given meanings or whether it could be considered an acceptable substitute for the anticipated adult-like response. The students provided the anticipated adult-like responses 62 of a possible 84 times, or 74% of the time. Individual scores ranged from 43% to 86%, with three of the six students scoring 86%.

The 13 think-aloud protocols were examined (i.e., all target and practice protocols). Student utterances apart from renderings of the text passage were analyzed to determine the thinking processes involved. I took no advance categories to the task, allowing the categories to emerge from the protocols themselves. The specific traits identified gave one of potentially numerous possible profiles of the thinking processes used and meaning constructed during the reading. Individual and dyadic profiles based on these specific traits provided a means to compare the ways different students completed the task. I noted that think alouds completed in the dyadic condition were generally longer and showed a wider range of specific traits than those completed in the individual condition.

Once I had analyzed the 13 protocols, I developed definitions for the specific traits and identified examples. Two independent raters, using my definitions and examples, rated the four protocols for the target text "Sharks." The three sets of ratings (from the two independent raters and myself) were compared to establish inter-rater agreement. Two particular specific traits--Restatement and Paraphrase--were so similar as to make differentiation difficult. These were subsequently collapsed into a single specific trait--Restatement/Paraphrase. Two other specific traits--Affirmation of Understanding and Identifies Information not Previously Known--were also collapsed because of confusion during rating. Two-rater agreement--that is, agreement between at least two of the three raters on every item--was calculated. Two-rater agreement between any two raters was 96.4%. Two-rater agreement between myself and at least one other rater was 94.8%.

A six-point, Likert-type holistic rating scale was devised, using polar descriptors of qualities observed in the protocols. Three students of a doctoral seminar, together with the instructor and myself, used the scale to rate the four protocols produced during the reading of the target text "Sharks." For each protocol, the five holistic ratings for each polar set were averaged, providing a composite rating. The composite ratings were, in turn, averaged to provide an average rating for the entire protocol.

The protocol that produced the greatest number of specific traits (117 on the initial think aloud

and 21 on the retell) and variety (12 of a possible 13 different traits on the initial think aloud and 3

different traits on the retell) was given the highest average rating (5.1 of a possible 6) on the holistic

rating scale by a wide margin. The protocol that produced the least variety of specific traits (4 of a

possible 13) on the initial think aloud also received the lowest average rating (3.2 of a possible 6).

With the other two protocols, the one that showed the greater number of specific traits (40 compared

to 30) and variety (8 compared to 5) also received a higher average ranking (4.0 compared to 3.6).

The 14 metaphors used in the MCMCA were analyzed following Broderick's (1992) scheme of

syntactic frames and similarity types. No particular form of metaphor seemed to be more troublesome

for the students than another. One metaphor ("Pterodactyls glided the skies on huge, leathery

wings") of the two that were most difficult (anticipated adult response given by only one student) had a

structure (Syntactic Frame: Descriptive Adjective phrase; Similarity Type: Disparate-kind) exactly the

same as one ("We see the imprints of their bat-type bodies...") of the two that were understood by all

six students. The other metaphor ("In the wonderful cycle of the underwater world, everything floats

in its own balance") understood by only one student had a structure (Syntactic Frame: Descriptive

Verb phrase; Similarity Type: Incompatible-kind) the same as a metaphor ("They weed out the

weak...") understood by five of the six students.

Lakoff and Johnson (1980), Lakoff and Turner (1989), and Lakoff (1993) identify the

conventionality of metaphor as central to its power, wide-spread use, and ease of understanding. At a

certain point, the specific expressions of the underlying conventional metaphors become so familiar

to speakers of the language that they are both produced and understood automatically. This process

results in numerous so-called dead metaphors (e.g., "'He's almost gone,' used for a dying person,"

[Lakoff & Turner, 1989, p. 129]) and idioms (e.g., "That's still up in the air," said of something that has

yet to be decided [Lakoff & Johnson, 1980, p. 137]). The confounding issue with such expressions

is that, although they may be entirely familiar to mature speakers, they may retain a degree of novelty

for the less mature. Additionally, some children may well be exposed to and learn certain conventional

metaphors and their common expressions earlier than other children in the same culture.

This commonness of particular metaphorical expressions complicates efforts to determine children's proficiency in making meaning for metaphors, since it is difficult to ascertain without doubt whether meaning is constructed on the occasion or is already held. In this pilot study, it was possible to deduce that the metaphorical phrase "armour plating," for example, was already known, since the anticipated adult meaning was identified by all students, although the text provided no contextual clues. Where context clues are sufficient to permit construction of meaning, provided adequate prior knowledge of metaphor source and target is also held, identification of actual source of meaning is likely to be complicated. To avoid the problem, I chose to focus on the constructed meaning itself and not the source of meaning.

The pilot study established that the think-aloud procedure would provide useful information about the thinking processes the readers engaged in and the meaning they constructed during reading. It showed that specific-trait profiles of the protocols could be created, permitting comparison. Further, it revealed the extent of adult-like understanding of metaphors within authentic text.

Difficulty was encountered in applying the concepts <u>high score</u> and <u>low score</u> as operationalized. The decision was made to add miscue analysis as an additional means of analyzing the think-aloud protocols. The operationalized definitions for <u>understanding</u>, <u>high score</u>, and <u>low score</u> were changed to the forms given in Chapter One, and Question 5 (see Research Proposal section, above) was changed to the form given in the Research Questions section of Chapter One, to take into account the addition of miscue analysis.

Based on the pilot results, I sought and received permission from my academic committee to undertake the main study.

IV. Main Study

i. Research Approach

The research approach was quasi-experimental. The study used three text passages of different levels of reading difficulty. Each reading think aloud was done in either individual or dyadic

condition. Each student completed two think alouds, one in each condition. Text passage, condition, and dyadic partner were randomly determined. No control group was used.

ii. Research Design and Instrumentation

Three target passages were used. These were of differing reading difficulty, as measured by an established readability formula. Each passage consisted of approximately six hundred words, comprising the first portion of a recently published informational trade book. Each text provided ten target metaphors.

The passages were selected from the National Council of Teachers of English (NCTE) project, Adventuring with Books--a major bibliographic undertaking currently housed at The University of British Columbia (UBC), under the editorship of Dr. Wendy Sutton of the Department of Language Education. An initial ranking by a project member had identified 66 books as being of the highest quality. I sorted these 66 books according to three criteria: probable interest to grade six students, reading difficulty judged appropriate for grade six students, and sufficient density of metaphor to permit a selection of ten metaphor samples for specific study in a passage consisting of approximately the first six hundred words of the book. This screening resulted in the selection of four books, one of which I eliminated because it was a second title in a particular series of books by one publisher, and I judged it likely to be of less interest to students than its companion. The final selections were:

1. Shadows of Night, by Barbara Bash, published by Sierra Club Publications, San Francisco,1993;

2. Frontier Home, by Raymond Bial, published by Houghton Mifflin, New York, 1993; and

3. The Middle Ages, by Sarah Howarth, published by Viking, New York, 1993.

The selected parts of the books were randomly designated Passage X, Passage Y, and Passage Z, respectively, for ease of reference.

The three text samples were analyzed using the Flesch-Kincaid readability formula. Results were as follows:

1. Passage X (Shadows of Night)--approximate grade level, 6;

2. Passage Y (Frontier home)--approximate grade level, 11; and

3. Passage Z (The Middle Ages)--approximate grade level, 8.

I analyzed the thirty metaphors from the three selections according to Broderick's (1992) taxonomic scheme of syntactic frames and similarity types, as I had done in the pilot study. Additionally, I analyzed the metaphors according to Lakoff and Johnson's (1980) and Lakoff and Turner's (1989) description of type and features--whether, for example, the metaphor was a basic ontological, a structural, or an orientational metaphor or was based on a basic conceptual metaphor, such as AN EVENT IS AN ACTION or the CONTAINER metaphor.

I designed a ten-item Multiple Choice Meaning Clarification Activity (MCMCA) for each text passage. Design was similar to the MCMCA used in the pilot study, that is, each item provided three possible choices and the option to write in a meaning. The three item choices consisted of one anticipated adult-like response and two distractors.

Four pilot study text samples were chosen for demonstration and practice purposes (see above). "Hawaii" and "The land of the Inuit" were again used for demonstration, and "The Invention of Levi's" and "Getting to Know Lake Ontario" were used for dyadic and individual practice, respectively.

All publishers were contacted for approval to make copies of the selections. In the case of the three target passages, permission was sought to make high quality colour photocopies. A sample letter is included in Appendix A.

The holistic rating scale developed in the pilot study was adopted unchanged for use in the main study.

For the main study, the key terms were operationally defined as for the pilot study, with the exception of changes to understanding, high score, and low score, as noted in the Research Proposal section above.

iii. Selection of Participants

I sought and received approval from the University Behavioural Sciences Screening Committee

for Research Involving Human Subjects to carry out the main study. Fifty-six grade six students from one class in each of three public schools under the jurisdiction of a single school board in rural Nova Scotia participated in the study. The 56 students (out of a potential 71) were those who agreed to take part and had parent/guardian permission to do so. One student was unable to complete the four sessions. Only data from the remaining 55 were used in the analysis. Anonymity of students and schools was maintained by coding all data.

I chose to carry out the study in Nova Scotia because of my familiarity with the school system, with this particular school district, and with many of its teachers and administrators, and because of the cultural and linguistic stability of the area, a factor I considered to be of potential significance because of the culturally sensitive nature of metaphor understanding, according to Lakoff, Johnson, and Turner (see Chapter Two above).

Initial contact was made with the superintendent of schools, who gave his approval for the study. The supervisor of curriculum took my request to the elementary principals, three of whom immediately agreed to assist.

The students who participated in the study were all native Canadian-English speakers. The schools they attended and communities in which they lived were long-established and linguistically stable. The traditional economic base of one of the communities had been fishing. This had been jeopardized, however, by the decline of the Atlantic groundfishery. The community was struggling to adjust to a significant drop in standard of living for a large part of the population. The school was affected in that special measures had to be taken by teachers and principal to ensure that school activities, whether co-curricular or extra-curricular, did not discriminate against children whose families were suffering financial hardship.

The other communities were less dependent on the fishery. Theirs was a multi-faceted economy, influenced by agriculture, forestry, various service industries, and manufacturing, anchored by one of Nova Scotia's three tire manufacturing plants nearby. This plant provided a measure of economic stability rare in the province.

The schools in all three communities were long-established. They provided a community focus, and school events and activities were generally well supported by students' families. Communication between the schools and their communities was supported by trust and a shared sense of purpose.

The board's policy of rotation of principals resulted in an infusion of new ideas and administrative style every few years. To implement their vision before the next rotation, principals had to capitalize on the goodwill of the teachers and communities. This goodwill seemed to be forthcoming in the three schools.

Two of the schools were elementary, with grades primary to six. The third school had an elementary section and a junior-senior high school in the same complex. In the first two schools, the study participants were among the oldest group of students, while in the third they were among the oldest group in the elementary, but approximately mid-age in the school complex.

iv. Site Procedures

In all schools, I met with groups of no more than six students at a time in a room separate from the regular classroom, such as the school library or resource room. In all cases the space provided adequate separation of students during their think alouds such that, during Sessions Three and Four, no student could hear another reading the same text passage.

A script was prepared for each of the four sessions. The scripts for Sessions One and Two were similar to those prepared for Sessions Two and One, respectively, of the pilot study. The first contained information about my reason for doing the study and my ideas about thinking, reading, and think aloud. The second reviewed the information shared during Session One. In each session, the question "Is this making sense to me?" was emphasized as a key question to ask oneself frequently during reading, to answer, and to tell why or why not (adapted from Baumann, Jones, & Seifert-Kessell, 1993).

In Session One, randomly assigned groups were introduced to the dyadic think aloud. They were given a demonstration, involving myself and a volunteer student, including demonstration of the

use of the recording equipment. The demonstration text "Hawaii" was used. The practice text was

"The Invention of Levi's." The students were reminded to do a cooperative retell after completing the

initial think aloud. They were given individual copies of short, explicit directions to refer to while

completing the think aloud.

In Session Two, randomly assigned, small groups were introduced to the individual think aloud.

Proper use of the recording equipment was again demonstrated. The demonstration text "The Land

of the Inuit" was used. The practice text was "Getting to Know Lake Ontario." The students were

reminded to do a retell after completing the initial think aloud. They were given individual copies of

short, explicit directions to refer to while completing the think aloud.

Session Three began with an overview of the session, followed by a review discussion of

thinking aloud and dyadic think aloud procedures. The students completed a dyadic think aloud with

a randomly assigned target text (that is, Passage X, Y, or Z) and a randomly assigned partner. Again,

the students were given individual copies of short, explicit directions to refer to while completing the

think aloud. An individual MCMCA was completed as a combined paper task and think-aloud activity,

with each student working on a separate tape recorder.

Session Four was conducted in the same manner as Session Three, except that the think

alouds were done individually. The random draw was constructed to ensure that each student read a

different passage from that read in Session Three.

To avoid memory-dependence during the MCMCAs, subjects kept the text and were instructed

to reread the specific portion of passage containing the metaphor related to each MCMCA item. The

lines of text containing the metaphors were identified with fluorescent yellow, adhesive dots, each

numbered to correspond with the appropriate MCMCA item number. Copies of the three MCMCAs

are included in Appendix B.

v. Data Collection and Recording

For the purpose of assuring anonymity of students, each was assigned a five part code such as,

for example, Z2F4K. The first part could be X, Y, or Z, to indicate passage. The second part could be

either 1 or 2, to indicate individual or dyadic condition, respectively. The third part indicated subject gender and could be either F or M, to indicate female or male, respectively. The fourth part could be 3, 4, or 5, to indicate one of the three schools, to which the numbers had been randomly assigned. The fifth part, a letter of the alphabet, was used to indicate randomly assigned position on a list of participants by school. Thus, the example given above, Z2F4K, indicates that a female from school 4, the eleventh student on the randomized class list, completed a think aloud for Passage Z in the dyadic condition.

Data of two types were collected. One hundred ten MCMCAs (two produced by each student) provided information on the meanings students constructed for the metaphors within the context of authentic text. Responses were recorded on a spreadsheet, with the numeral 1 representing an anticipated adult-like response and the numeral 0 representing any other response.

The audio tapes of the think alouds were transcribed. An excerpt from a think-aloud protocol is included in Appendix C. In all, 55 individual and 28 dyadic protocols were produced (one of each per student). A fifty-sixth student contributed to a dyadic think aloud but, because of the start of a family vacation, did not complete an individual think aloud. Data gathering had been scheduled to conclude before the student left, but a one-day school cancellation due to weather forced an extension into a second week. The student's partner was counted.

The protocols were analyzed using a modified version of the specific-traits inventory developed in the pilot study. The list of specific traits and definitions is included in Appendix D. This modified version added three specific traits--[Evaluation of] Discussion, Procedural, and Other/Miscellaneous-- to the original thirteen. Sub-traits were added to account for those cases in which a speaker simply agreed with an utterance of the previous speaker. Eight of the specific traits identified were similar to categories and elements identified by Purves and Rippere (1968). (The specific traits were also similar in several respects to general comprehension strategies and local linguistic strategies developed by Block, 1986, who had followed the ideas of extensive and reflexive modes used by Emig, 1971, and Perl, 1978 [cited in Block, 1986].) The specific traits were combined to form three overarching

categories--Meaning-Construction Processes (M/C), Neutral States (N/S), and Pre-Meaning

Conditions (P/M). The first, Meaning-Construction Processes, encompassed all those specific traits

that revealed the students to be actively seeking to construct meaning and doing so successfully.

Pre-Meaning Conditions were the opposite. Neutral States revealed the students to be orienting

themselves toward the task itself. This is consistent with the suggestions made by Afflerbach and

Johnston (1984) that this process reduces the effect of inferencing and increases the accuracy of the

ratings. Because of the high two-rater agreement achieved in the pilot study, I felt justified in

completing the specific-trait analysis myself. Combining the specific traits into the three overarching

categories produced 100% inter-rater agreement. Samples of analysis are included in Appendix E.

Following Purves and Rippere (1968, p. 49), the specific traits were used to construct profiles of

typical think alouds for students, in this case for those whose performance on the MCMCAs placed

them in extreme groups roughly equivalent to the first or fourth quartiles (see Chapter Four, Question

Six, for an explanation of the composition of the extreme groups). Appendix F gives average profile

graphs of the think alouds of students scoring in the extreme groups in both individual and dyadic

conditions.

The information resulting from the specific-trait analysis was further quantified by expressing the

number of occurrences of each trait as a percentage of the total number of traits identified in the

protocol.

All protocols were rated holistically by myself and three other adults who had been instructed in

the process. The resulting four scores for each pair of descriptors were averaged and used in

calculating an overall average for the protocol. A sample holistic rating form is included in Appendix G.

A miscue analysis was performed for each of the 55 protocols produced in the individual

condition. Dyadic protocols were not analyzed, since the interaction of readers made it unlikely that a

single student's contribution could be ascertained with accuracy. While miscue analysis has

generated disagreement among researchers as to what miscues should be counted (see, for

example, McKenna, 1983), how the level of each type of miscue relates to understanding of text

(Englert & Semmel, 1981), and how to assign independent, instructional, and frustrational reading levels (Lowell, 1970), the procedure has enough research support and currency of use to make it acceptable as one means among several for assessing student understanding of text.

The opening three to five paragraphs of each passage were selected for miscue analysis, consisting of 269 words for Passage X, 280 words for Passage Y, and 256 words for Passage Z. Each miscue noted during the transcription from audio tape was analyzed. If the miscue was corrected by the student or was of such a nature as to maintain the meaning of the text, it was not counted. If, however, the miscue altered the meaning of the text, it was considered as serious and was counted. Reading levels were assigned as follows: less than 2% serious miscues, easy reading level; 2% to 5% serious miscues, instructional reading level; over 5% serious miscues, frustrational reading level (following a scheme field tested in the Portland, Oregon, Public Schools, mentioned in May, 1990, p. 388, and subsequently reported in Dean's [1991] study, cited in May, 1994, p. 410).

The specific traits and holistic ratings, together with results of the miscue analysis, were used to suggest possible high and low levels of text understanding.

Student performances on MCMCAs after completing individual and dyadic think alouds were compared. Overall performances on MCMCAs by same-text groups in the dyadic and individual conditions were compared.

Performances on different types of metaphors were compared using Broderick's (1992) taxonomy and Lakoff and Johnson's (1980) and Lakoff and Turner's (1989) types.

vi. Methodological Assumptions

Inter-rater agreement for the specific traits, as established in the pilot study, was 96.4% between any two of three raters. Two-rater agreement between myself and at least one other rater was 94.8%. It was assumed that the specific traits had sufficient validity to be used in analyzing the think-aloud protocols of the main study. Additionally, the combining of specific traits into three more general categories reduced the amount of inferencing required during the rating process, thus

increasing overall agreement to 100%.

The following methodological assumptions underlie this study:

1. That ecological validity is enhanced by using maximally authentic text (Broderick, 1992);

2. That the think aloud can provide information about meaning constructed during reading (Waern, 1980; Ericsson and Simon, 1993);

3. That specific-trait analysis of think-aloud protocols can provide information about meaning constructed during reading (Purves and Rippere, 1968; Dias, 1987);

4. That miscue analysis has been established as a useful procedure for the rough determination of reader understanding of text (May, 1990, 1994);

5. That the multiple choice has been established as a reliable form of testing for meaning; and

6. That the text passages used in this study, in that they have been drawn from trade books published by major North American publishers, are similar to informational texts being used in many classrooms.

vii. Limitations

This study was undertaken to examine how well grade six students understand metaphor in the informational text they read, how well the same children understand the informational text itself, and how understanding of text and understanding of metaphor are related.

As stated in Chapter One, in order to make this study manageable in terms of time and cost, other potentially interesting questions were not examined. It was not possible to investigate children's understanding of metaphor in fiction or poetry or to explore psychological aspects of metaphor or text understanding. The study was limited to grade six students, although a comparison of students at different grade levels should be informative. This study's results can be taken as only possible indications of metaphor and text understanding of younger and older children.

It was necessary to develop instruments and methods for this study since no measures were available for use under the conditions and for the purposes identified. This study used methods and

materials as much as possible like those familiar to students from their classroom experience. I hoped to maintain the ecological validity of the material and activity and to maintain a closer contact with the curriculum than would be possible if instruments and methods were borrowed from previous studies. The test-like situation was not entirely avoided, however, and the ecological validity was weakened to the extent that students worked in small groups outside their classroom for a purpose established by a stranger.

The contexts in which metaphors were presented were similar to the original texts; however, the complete books were not given to the students and numbered fluorescent dots were affixed at specific points in each text, thus altering the appearance of the passages. The target passages were of different levels of reading difficulty, according to a standard reading formula; consequently, certain analyses involved a somewhat lower n than would have been the case had all passages been at the same reading level.

Although such an examination is needed, this study did not attempt to examine the potential problems metaphor presents to English-as-a-second-language (ESL) learners.

V. Summary

The three major and seven specific questions around which the study was organized are as follows:

(a) How well do grade six students understand metaphor in the informational text they read?

1. What is student level of understanding of metaphor as determined by performance on a multiple choice meaning clarification activity?

2. What are the differences in understanding of metaphor by the same student in the individual and dyadic think aloud conditions as determined by performance on multiple choice meaning clarification activities?

3. What are the differences in understanding of metaphor in the same text for the individual and dyadic think aloud conditions as determined by performance on a multiple choice meaning clarification

activity?

4. What are the differences in understanding of different types of metaphor as determined by performance on multiple choice meaning clarification activities?

(b) How well do the same children understand the metaphor-bearing informational text itself?

5. What proportion of students achieve high and low scores on think-aloud tasks as determined by holistic and specific-trait scoring and miscue analysis?

(c) How are understanding of text and understanding of metaphor related?

6. What are the features of the think alouds of students whose performance on a multiple choice meaning clarification activity placed them in the first and fourth quartiles?

7. What is the relationship between the level of students' understanding of metaphor and their understanding of text?

The pilot study showed that the selected methods and procedures could provide potentially useful information about grade six students' understanding of metaphors and the text in which they are embedded. Specific traits identified in the think-aloud protocols provided a way of describing the students' meaning constructed during the reading. The multiple choice activities provided a means of comparing student understanding of metaphor with anticipated adult understanding.

The study drew from a population of grade six students for whom Canadian English was their first language. The target passages were drawn from recently published informational trade books. Reading think alouds were performed and recorded, and students completed multiple choice activities on the metaphors. Students completed both dyadic and individual think alouds.

Scoring of the multiple choice activities gave numerical data on student understanding of metaphors. These were used in conjunction with type analysis of the metaphors to provide information on performance by type. Specific-trait analysis of the think-aloud protocols provided numerical data concerning understanding of text. From this information, think-aloud profiles were constructed. Holistic ratings provided numerical data on the protocols, as did miscue analysis. The

holistic ratings and miscue-analysis scores were used along with specific-trait analyses to suggest possible high and low levels of text understanding.

Assumptions were made about specific-trait analysis of think-aloud protocols, the appropriateness of miscue analysis as a device for determining understanding of text, the usefulness of multiple choice activities in determining constructed meaning for metaphor, and the similarity of the target passages to texts being used today in classrooms.

Limitations of generalizability because of the nature of the sample population and validity because of the originality of the instruments have been noted.

CHAPTER FOUR: FINDINGS

I. Introduction

The examination of data involved both qualitative and quantitative analysis. In the case of the multiple choice activities, numerical data were gathered, permitting statistical examination according to standard practices. Analysis of the think-aloud protocols, on the other hand, provided specific traits descriptive of aspects of the reading process as engaged in by these particular students. The quantification of the occurrences of the specific traits provided data for standard statistical tests and descriptions of the protocols, including percentage profiles. Holistic rating of the protocols was carried out by myself and three other adults who had been instructed in the process. This Likert-type holistic scale provided additional numerical data. Miscue analysis was performed on the 55 individual think-aloud protocols.

II. Findings

i. Major Question (a)

How well do grade six students understand metaphor in the informational text they read?

a. Question One

What is student level of understanding of metaphor as determined by performance on a multiple choice meaning clarification activity?

Students completed a ten-item multiple choice meaning clarification activity (MCMCA) individually after each think aloud, whether individual or dyadic. The 110 MCMCAs so produced yielded 1100 item responses. The item responses were scored against anticipated adult-like response, operationalized as the selection of the single non-distractor meaning provided for each multiple choice item (see Research Design and Instrumentation, Chapter Three, and Appendix B). From the raw scores, performance means, standard deviations, and percentages were calculated for the whole set, as well as for each passage in both individual and dyadic conditions (six subgroups). Results are summarized in Table 1.

According to these data, overall student understanding of metaphor matched anticipated adult-like understanding for an average of 65% of the items. In the dyadic condition, average understanding ranged from a low of 50% (Passage Y) to a high of 69% (Passage X). In the individual condition, average understanding ranged from a low of 57% (Passage Y) to a high of 77% (Passage X).

Student scores varied widely (see Appendix H). Single scores ranged from 1 to 10 (see Figure 1) and combined scores (2 tests) ranged from 5 to 20 (see Figure 2). Thus, understanding of metaphor, as measured by these multiple choice activities, varied widely among these particular students. This finding may reflect a difference in ability, but it is also consistent with the view that there is a developmental aspect to metaphor understanding, although it says nothing about the nature of that development.

Table 1

Multiple Choice Meaning Clarification Activities--Performance Statistics

Passage	Condition	No. Students	Mean[a]	Standard Deviation	Percent[b]
X	Dyadic	18	6.944	2.100	69.4
	Individual	19	7.684	1.416	76.8
	Total	37	7.324	1.796	73.2
Y	Dyadic	18	5.000	2.223	50.0
	Individual	19	5.737	1.939	57.4
	Total	37	5.378	2.086	53.8
Z	Dyadic	19	6.421	1.677	64.2
	Individual	17	7.353	1.967	73.5
	Total	36	6.861	1.854	68.6
All Passages		110	6.518	2.075	65.2

[a]Out of 10.
[b]Rounded to nearest tenth.

The distribution of all multiple choice (MCMCA) scores showed the general configuration of a normal distribution (see Figure 1). To test the degree to which the distribution conformed to the normal distribution, the w/s test for normality of a population was performed. For a range of 9 and standard deviation of 2.075, the studentized range statistic was $q=4.337$. By interpolation from tabled values, for $n=110$, the critical values were 4.366 and 5.956, $\alpha=.05$. Since the calculated value fell below the lower critical value, a significant difference between the sample frequency distribution and the normal frequency distribution was indicated.
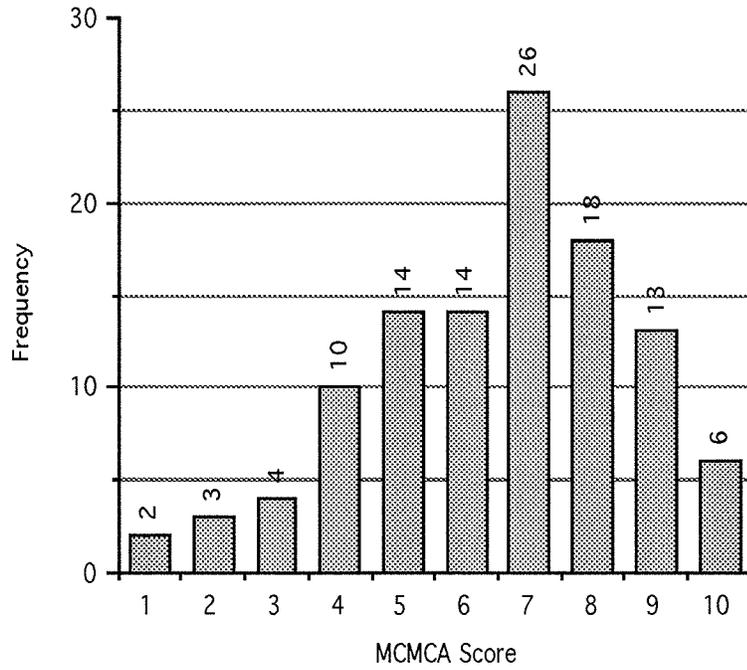
Figure 1   Distribution of MCMCA Scores
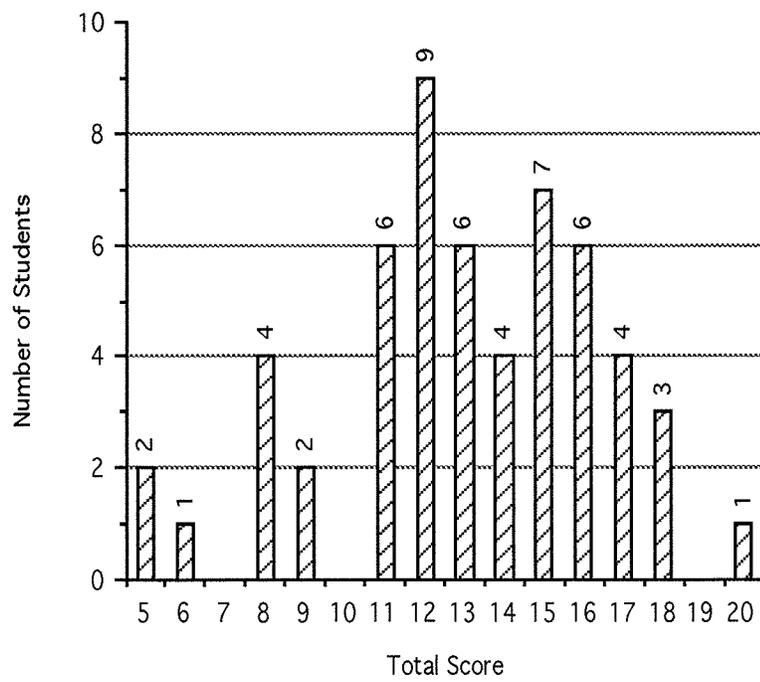
Figure 2   MCMCA Scores--Student Totals

This test compared the number of standard deviations encompassed by the range of scores with the number expected in a normal distribution for a given n. For an n of 100, for example, the expected number of standard deviations was 5.0 (Downie & Heath, 1983, p. 50), although, as the critical values of the w/s test indicated, the number could vary from 4.31 to 5.90 (Kanji, 1993, p. 183).

Because the distribution of MCMCA scores was neither bimodal nor seriously skewed, it was felt that usual statistical procedures did not have to be abandoned.

The w/s test for normality of a population was also performed for all three passages in both individual and dyadic conditions (3 passages x 2 conditions). All values of q fell between the respective critical values, indicating no significant differences between the samples and a normal frequency distribution. Results are summarized in Table 2.

Since the samples were normally distributed, the Hartley test for equality of variances was performed for the six subgroups, with ns ranging from 17 to 19, as shown in Table 1. This test is usually performed on same-size samples; however, it may be used for samples of approximately the same size (Kanji, 1993, p. 64). The critical value of F_{max} (α=.05) for n - 1=15 and 6 groups was 4.68. When n - 1=20, the critical value was 3.76. The calculation produced an F value of 2.463, well below the critical value for either n. From this, it was indicated that there were no significant differences among the variances of the six samples.

Findings. Pertaining to Question One, the findings were:

    1. Overall, students exhibited a 65% level of understanding of the metaphors; and

    2. There were wide variations in the scores for the three passages, with averages of 54% on Passage Y, 69% on Passage Z, and 73% on Passage X.

Table 2

Summary of w/s Test for Normality of a Population--Passage x Condition

Passage	Condition	$\underline{n}$	$\underline{q}$	Critical Values[a]
X	Individual	19	3.531	3.14 and 4.43
	Dyadic	18	3.810	3.10 and 4.37
Y	Individual	19	3.610	3.14 and 4.43
	Dyadic	18	3.149	3.10 and 4.37
Z	Individual	17	3.559	3.06 and 4.31
	Dyadic	19	3.578	3.14 and 4.43

[a]α=.05.

b. Question Two

What are the differences in understanding of metaphor by the same student in the individual and dyadic think-aloud conditions as determined by performance on multiple choice meaning clarification activities?

A Pearson product-moment (Pearson $\underline{r}$) correlation coefficient was calculated for the individual and dyadic scores (see Appendix H), producing a value, $\underline{r}$=.362. For α=.05 and $\underline{n}$=55, the critical value was 0.2616 (by interpolation). From this, it was concluded that there was a moderate positive correlation between the individual and dyadic scores.

A $\underline{t}$-test for dependent samples was also performed to compare the individual and dyadic scores (means of 6.909 and 6.127, respectively), with a result, $\underline{t}$=2.51. With α=.05 and $\underline{df}$=54, the critical value was $\underline{t}$=2.006 (by interpolation). Since the $\underline{t}$ score exceeded the critical value, it was concluded that there was a significant difference between the two sets of scores at the .05 level, with the individual scores being significantly higher than the dyadic scores.

The student scores are presented in Table 3 in the order in which they were achieved and according to passage read--that is, dyadic score first, followed by individual score. When the scores in Table 3 for each student were summed and graphed, the resulting distribution showed some characteristics of a normal distribution (Figure 2).

For the combined scores, the mean was 13.036, the variance was 11.199, and the standard deviation was 3.346. 69.09% of the combined scores fell within $\pm$ one standard deviation of the mean, with the first standard deviation below the mean contributing 38.18%. 92.73% of the combined scores fell within $\pm$ two standard deviations of the mean. The w/s test for normality of a population produced a studentized value of q=4.48. For n=55, the critical values were 3.90 and 5.43 (α =.05), indicating no significant difference between the sample set and a normal distribution.

When the individual and dyadic scores were graphed separately, their relative contribution could be compared. Figure 3 presents the two sets of scores for the purpose of comparison. The difference revealed by the t-test for dependent samples is suggested by the distribution of the two sets relative to each other.
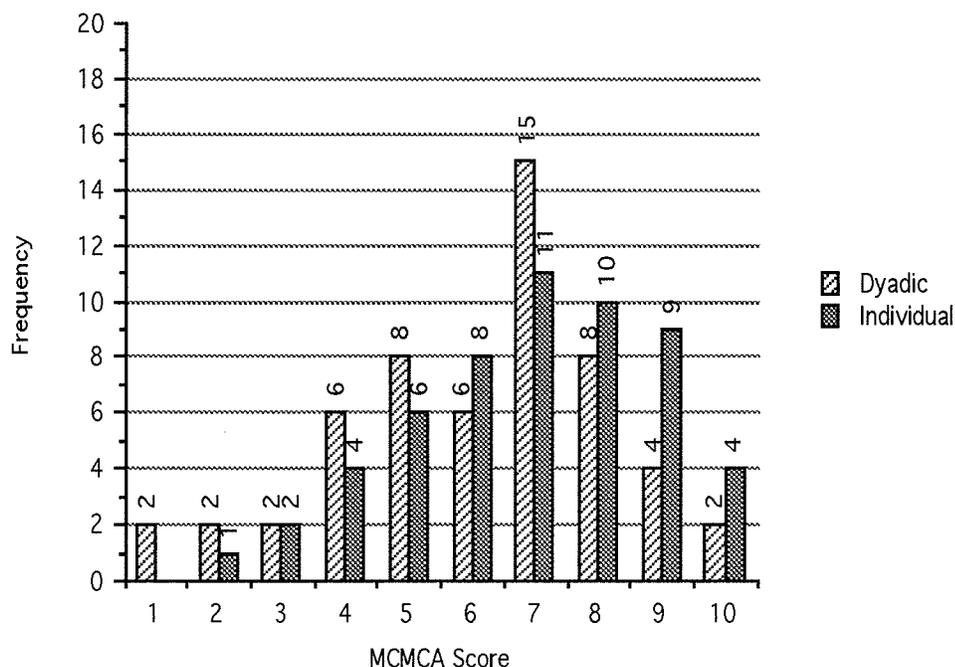
Figure 3   Frequency of MCMCA Scores--Dyadic and Individual

Table 3

Changes in MCMCA Scores According to Level of Passage Difficulty

X to Y	X to Z	Y to X	Y to Z	Z to X	Z to Y
F3D 6,5	M3K 10,10[b]	F3L 4,7	M3G 7,9	F3B 4,7	F3A 7,5
F3H 9,8	M4E 5,7[a]	F4Q 7,9	F3I 6,9	F3C 4,9	M3F 3,2
M3N 7,6	M4M 8,7	F4X 4,5	F3J 7,10	M3E 8,7[a]	M4G 8,4
F4A 9,7	M5C 7,6	M5E 5,6	F4B 1,7	F3M 8,8[b]	F4S 7,6
F4C 10,8	F5D 7,8[a]	M5J 6,8	F4D 7,8	F4J 5,6	M5A 5,9[a]
M4L 5,7[a]		M5N 8,10	F4F 3,5	F4K 5,10	M5K 8,3
M4O 7,5			M4H 5,7	M4N 8,9	
M4T 7,5			F4I 2,3	M4P 7,8	
F4V 2,4[a]			F4R 4,4[b]	M4U 9,8[a]	
F5H 7,6			M5B 5,9	M4W 7,9	
F5I 9,9[b]			F5F 1,8	M5G 6,7	
F5M 6,6[b]			M5Q 8,8[b]	M5L 6,6[b]	
F5P 4,4[b]				F5O 7,7[b]	

Note. Level of text difficulty is judged according to the Flesch-Kincaid Readability Formula: Passage X, least difficult; Passage Z, more difficult; Passage Y, most difficult. Each entry consists of student code and scores in the order they were achieved.
[a]Opposite to the order predicted by passage difficulty.
[b]Identical scores on both passages.

Findings. Pertaining to Question Two, the findings were:

　　　3. There was a significant positive correlation between students' individual and dyadic scores;

and

　　　4. Student understanding of metaphor was significantly higher after completing the think aloud

in the individual, as opposed to the dyadic, condition.

c. Question Three

What are the differences in understanding of metaphor in the same text for the individual and dyadic think-aloud conditions as determined by performance on a multiple choice meaning clarification activity?

The three passages (X, Y, and Z) and the two conditions (individual and dyadic) provided six different sets of MCMCA scores (see Appendix I). Harmonic means were calculated for all groups and these were used in performing the Tukey procedure (also known as the HSD--honestly significant difference--test). This procedure revealed significant differences between subgroups involving different passages but did not reveal any significant differences between individual and dyadic scores for the same text passage.

Finding. Pertaining to Question Three, the finding was:

5. There was no significant difference in understanding of metaphor for the same passage between the dyadic and individual conditions.

d. Question Four

What are the differences in understanding of different types of metaphor as determined by performance on multiple choice meaning clarification activities?

The Kuder-Richardson Formula 20 test was performed on the multiple choice meaning clarification activities to determine the degree of convergence of the items--that is, the degree to which the items appeared to measure a single psychological construct. (Neither this test nor any other test of internal consistency was reported in any of the studies examined for the present study.) Results for all three MCMCAs were in the range of 0.50.

For certain test situations and purposes, this level would be considered seriously low. For a test

specially constructed for research, for example, a high degree of internal consistency is sought. However, the metaphor samples used in this study were not specially constructed, but occurred naturally in the target texts. As well, the MCMCAs were short--consisting of 10 items each-- and tests of internal consistency normally return lower scores for short tests than for lengthier ones.

In the construction of the MCMCAs, certain factors played a decisive role. For example, both the choice of metaphor and the order were determined by the passages themselves. This was intended to make it easier for the students to locate the metaphors in the text and to provide an additional measure of ecological validity by keeping the task as similar as possible to an actual classroom reading task.

There is also the question of whether understanding of metaphor is a simple or a complex psychological construct. If it is the former, then the low level of internal consistency would be a concern; on the other hand, if metaphor understanding is not a simple psychological construct, one could expect a low level of internal consistency, as evidenced by the results of these MCMCAs. This is consistent with the ideas of Broderick (1992), Lakoff and Johnson (1980), Lakoff and Turner (1989), and Lakoff (1993), as described above. It is the contention here that metaphor understanding is not a simple psychological construct, but rather a cluster of psychological elements and processes; thus, the low internal consistency of the multiple choice activities is to be expected.

The 30 MCMCA metaphor samples were analyzed within the context of the text passages according to the two ideas of metaphor described in Chapter Three: first, the syntactic-frame/ comparison-type taxonomy put forward by Broderick (1992); second, the classification scheme used by Lakoff and Johnson (1980), Lakoff and Turner (1989), and Lakoff (1993).

The types of metaphors, as classified according to Broderick, are given in Appendix J. Using this information and that from Appendix K (MCMCA Results by Item), the percentages of adult-like responses to the individual items were calculated and are summarized in Table 4.

Table 4

MCMCA Percentage Scores According to Metaphor Type (After Broderick, 1992)

| | Passage | | | | | | | | | |
| | X | | | Y | | | Z | | | Total |
	Incomp.[a]	Disp.[b]	Tot.	Incomp.	Disp.	Tot.	Incomp.	Disp.	Tot.	Total
IS(Implied)[c]	56.8		56.8	45.9		45.9	69.4		69.4	55.5
IS[d]	81.1		81.1		32.4	32.4				56.8
DS(VP)[e]	80.2		80.2	64.9		64.9	69.9		69.9	71.2
DS(Adj)[f]	60.8	73.0	66.9				80.6	47.2	63.9	65.9
DS(NP)[g]		86.5	86.5							86.5
DS(PP)[h]				51.4	51.4					51.4
Total	71.4	77.5	73.2	55.4	41.9	53.8[i]	71.0	47.2	68.6	65.2[j]

Note. Combined metaphors(not included above):
1 x [DS(Adj)/Incomp. + DS(VP)/Disp.]--Passage Y, 48.6%
1 x [DS(VP)/Disp. + IS(Implied)/Incomp.]--Passage Y, 73.0%
All percents rounded to nearest tenth.
[a]Incompatible-kind similarity type. [b]Disparate-kind similarity type. [c]Copula verb (implied) syntactic frame. [d]Copula verb syntactic frame. [e]Descriptive (verb) phrase syntactic frame. [f]Descriptive (adjective) phrase syntactic frame. [g]Descriptive (noun) phrase syntactic frame. [h]Descriptive (present participle) phrase syntactic frame. [i]Includes combined metaphors. [j]All scores.

The extreme cases were identified at two levels--those with adult-like response below 50% and those 80% and above. Eight metaphors were identified in each group. Those below 50%, along with their percentages for the dyadic and individual conditions and metaphor type, are given in Table 5 and those 80% and above follow in Table 6.

An examination of the types of metaphors represented in Tables 5 and 6 revealed that three occurred on both lists--that is, DS(Adj)/Incompatible-kind; IS(Implied)/Incompatible-kind; and DS(VP)/Incompatible-kind. For these three types, the overall adult-like responses were 67% (on 3 items), 55% (on 6 items), and 71% (on 12 items), respectively, suggesting that there was nothing unique about the types themselves to account for the extreme scores on the individual items.

Table 5

MCMCA Scores--Sub-50% by Passage, Item, and Metaphor Type

Item	%(Dyad)	%(Indiv)	%(Total)	Type
X-4	44.4	47.4	46.0	DS(Adj)/Incompatible-kind
Y-1	38.9	57.9	48.6	Complex {[DS(Adj)/Incomp-Kind] + [DS(VP)/Disparate-kind]}
Y-5	38.9	42.1	40.5	IS(Implied)/Incompatible-kind
Y-7	38.9	31.6	35.1	IS(Implied)/Incompatible-kind
Y-9	38.9	26.3	32.4	IS/Disparate-kind
Y-10	44.4	52.6	48.6	DS(VP)/Incompatible-kind
Z-3	42.1	52.9	47.2	DS(Adj)/Disparate-kind
Z-4	31.6	58.8	44.4	DS(VP)/Incompatible-kind

Note. The type code used is that explained in Chapter Three and in the note to Table 4, above. All percents rounded to nearest tenth.

Three types were without examples in either table--that is, IS/Disparate-kind; DS(NP)/Disparate-kind; and IS/Incompatible-kind. All, however, were represented by only a single item out of the 30 items of the three MCMCAs. With such meager representation, it was not possible to draw meaningful conclusions.

A further reduction of extreme scores was done to identify only the bottom and top three--that is, those below 41% and above 86%. Two of those so identified were represented by single items, both the lowest (at 32%) and the highest (at 87%). The remaining two lowest-score items were both of the type, IS(Implied)/Incompatible-kind; for the highest-score items, the remaining two were both DS(VP)/Incompatible-kind. Again, since both of these types were represented in both lists, no conclusions as to their significance could be drawn.

Table 6

MCMCA Scores--80% and Above by Passage, Item, and Metaphor Type

Item	%(Dyad)	%(Indiv)	%(Total)	Type
X-2	77.8	84.2	81.1	DS(VP)/Incompatible-kind
X-5	83.3	89.5	86.5	DS(NP)/Disparate-kind
X-6	83.3	78.9	81.1	IS/Incompatible-kind
X-9	88.9	84.2	86.5	DS(VP)/Incompatible-kind
Z-1	73.7	94.1	83.3	DS(VP)/Incompatible-kind
Z-6	78.9	82.4	80.6	IS(Implied)/Incompatible-kind
Z-7	84.2	88.2	86.1	DS(VP)/Incompatible-kind
Z-9	73.7	88.2	80.6	DS(Adj)/Incompatible-kind

Note. The type code used is that explained in Chapter Three and in the note to Table 4, above. All percents rounded to nearest tenth.

When all metaphor types were grouped according to syntactic frame only (excluding the two combined metaphors identified above), IS (equation or copula-verb) types were shown to have had an adult-like response of 56% and DS (descriptive phrase) types, 69%. Grouping by similarity type produced the following results: Incompatible-kind, 66.8%; Disparate-kind, 60.6% (again, excluding the two combined metaphors). For details, see Appendix J.

A chi-square test for consistency was performed to examine the significance of the differences between the IS and DS raw scores for the values given above. With $df=1$ and $\alpha=.05$, the critical values were $98 \cdot 10^{-5}$ and 5.02. The calculated value was 17.209. The calculated value exceeded the right critical value, indicating that the difference between the two sets of scores was significant.

In his discussion of the ecological validity of the types of metaphors used in the stimulus sets of a number of studies, Broderick (1992) points out that studies have depended largely on metaphors

constructed according to the IS syntactic frame, yet metaphors of this type were uncommon in the authentic texts he examined. He maintains that some of the low rates of understanding shown by these studies could be accounted for by this lack of ecological validity--that is, that children were being asked to recognize types of metaphor with which they were largely unfamiliar.

In the current study, IS syntactic-frame metaphors account for only 8 of 28 metaphors on the three multiple choice activities (combined metaphors excluded). This low count, while higher than that reported by Broderick, does represent an imbalance between metaphors of the different syntactic-frame types. Additionally, the chi-square result seems to be further support for Broderick's contention that children find equation (copula-verb) type metaphors more difficult than metaphors of the descriptive-phrase type.

A chi-square test performed on the raw scores for Incompatible- and Disparate-type comparisons did not reveal significant differences, suggesting that students understood these two types equally well.

The 30 metaphors used in the MCMCAs were also analyzed using the categories described by Lakoff and Johnson (1980), Lakoff and Turner (1989), and Lakoff (1993). The results of this analysis are tabled in Appendix L.

The data from the analysis were examined for potential relationships between the structure of the metaphors and student performance on them in the MCMCAs. Again, the eight high- and low-extreme items were taken for the initial comparison. Figures 4 and 5 show the composition of the metaphors in each group.

By comparing the two sets, it was found that three types of metaphor--orientational, ontological, and event/action--made up 20 of the 22 elements in the high-extreme set and 21 of the 24 elements of the low-extreme set, with an actual overlap of 18 (ignoring any excess in one or the other set). Further, the average number of elements in each item of the high-extreme set was 2.75, while for the low-extreme set the average was three. No significant difference between the sets was apparent.
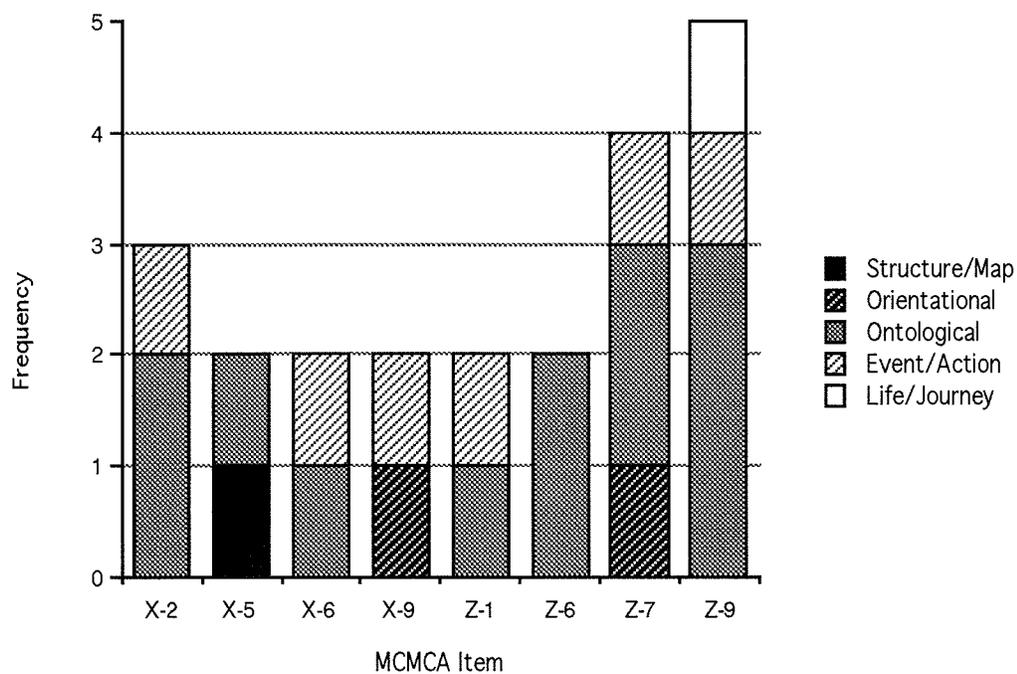
Figure 4   Metaphor Features--High-Extreme MCMCA Items (After Lakoff, Johnson and Turner)
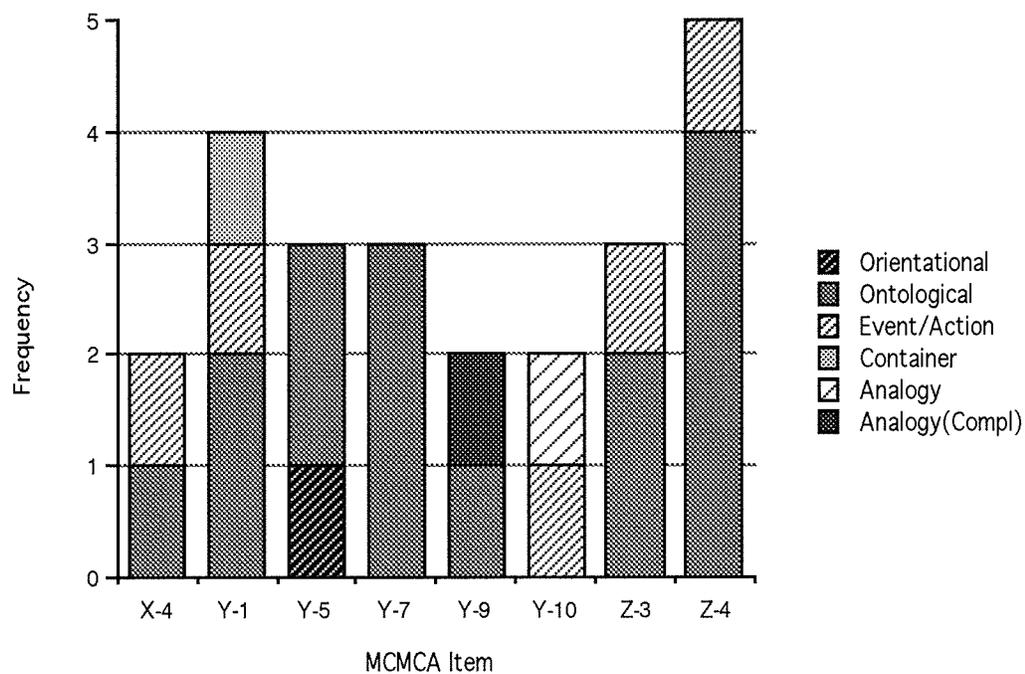
Figure 5   Metaphor Features--Low-Extreme MCMCA Items (After Lakoff, Johnson and Turner)

The three highest- and three lowest-percentage items were also examined. See Figures 6 and

7. Each set of three was composed of eight elements, averaging 2.67 per item, with an overlap of four

elements in two types of metaphor--orientational and ontological. The remaining four elements were

distributed among three types of metaphors, with only one--event/action--providing more than one

element. While the sets appeared different, it seemed unlikely that those differences were sufficient

to account for the wide range of scores.

Findings. Pertaining to Question Four, the findings were:

6. Student understanding of metaphors of the copula-verb (equation) syntactic-frame type was

significantly lower than of the descriptive-phrase syntactic-frame type; and

7. The Lakoff, Johnson, and Turner method of analyzing metaphors did not isolate differences

to account for the varying performance scores on the MCMCAs.
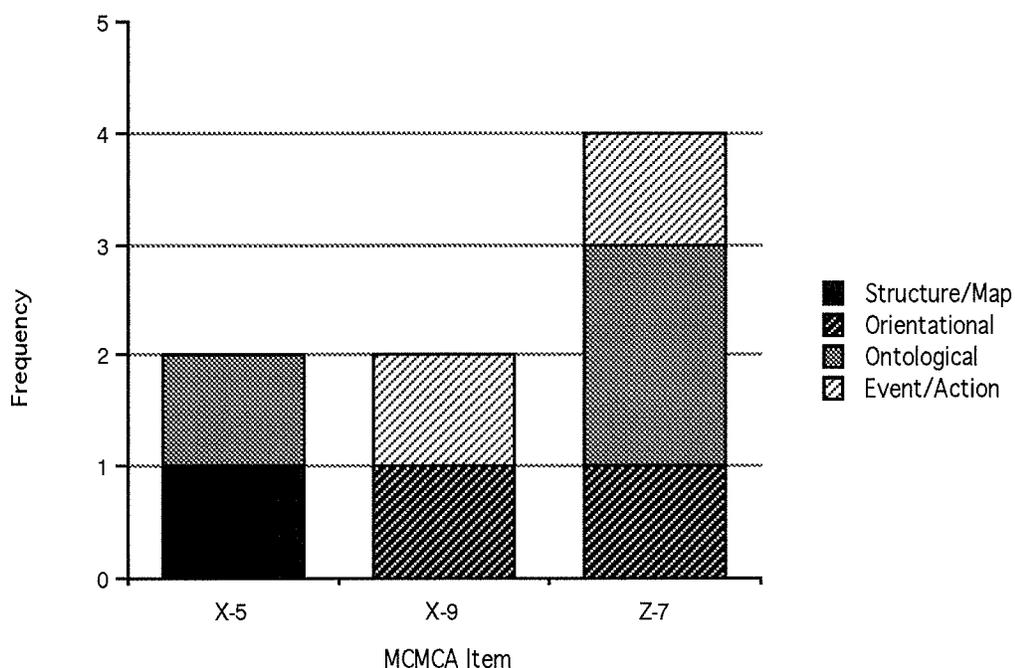
Figure 6   Metaphor Features--Highest Three MCMCA Items (After Lakoff, Johnson and Turner)
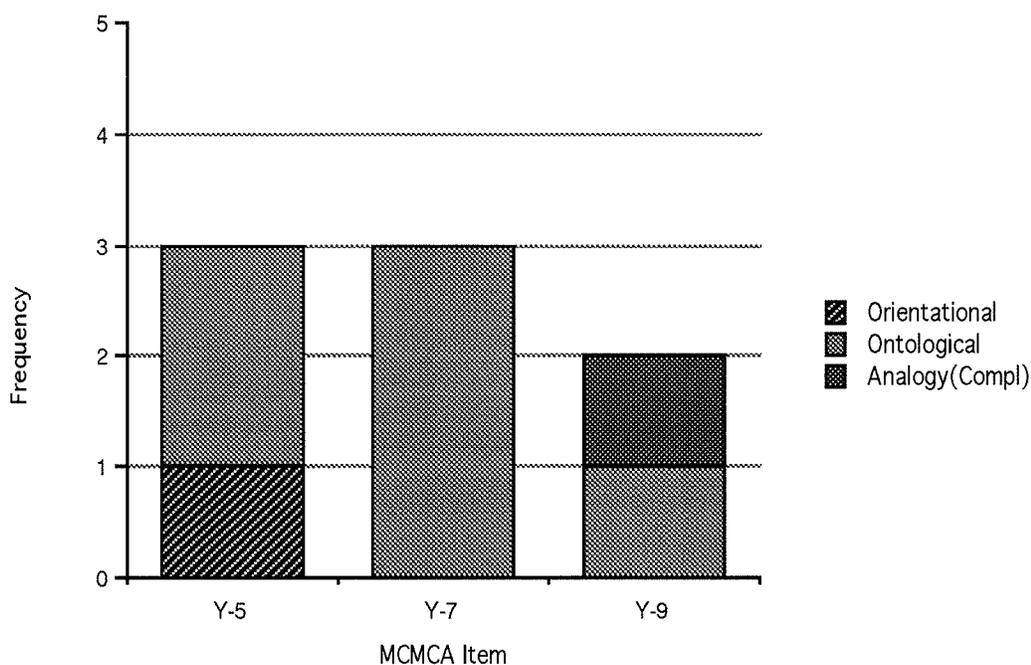
Figure 7   Metaphor Features--Lowest Three MCMCA Items (After Lakoff, Johnson and Turner)

ii. Major Question (b)

How well do the same children understand the metaphor-bearing informational text itself?

e. Question Five

What proportion of students achieve high and low scores on think-aloud tasks as determined by holistic and specific-trait scoring and miscue analysis?

All think alouds were transcribed from audio-tape. The resulting protocols (see sample, Appendix C) were printed and underwent specific-trait analysis using the specific traits developed in the pilot study and refined during the analysis of the main study protocols (see Appendix D for definitions of all specific traits). A sample specific-trait analysis from the main study is given in Appendix E.

As described in Chapter Three, the specific traits were combined to form three overarching categories: Meaning-Construction Processes (M/C), Neutral States (N/S), and Pre-Meaning Conditions(P/M). This procedure is consistent with the idea put forward by Afflerbach and Johnston

(1984) that the identification of easily inferred processes will result in higher inter-rater agreement than when identification of the processes requires a high degree of inferencing, as is necessary with the individual specific traits. The pilot data on inter-rater agreement are consistent with this position, with two-way agreement on the specific traits (mid-90%) rising to all-rater agreement of 100% when the specific traits are combined into the three overarching categories. These combined categories differentiate among the various stances-toward-task the students exhibit in their think alouds. The Meaning-Construction Processes, as the name suggests, encompass all those specific traits that reveal the students to be actively seeking to construct meaning and being successful in the endeavour. The Pre-Meaning Conditions are essentially the opposite, while Neutral States reveal the students to be orienting themselves toward the task itself.

From the data, profiles were created showing both average number and average percent of utterances for several sets of protocols. Presentation of the profiles by percent is advocated by Purves and Rippere (1968) as a useful way to detect patterns and make comparisons while avoiding the distortions produced by large differences in the number of utterances. Since each can provide useful information, however, both number and percent are used in this study.

The profile for all protocols is shown in Figure 8. The total number of protocols contributing data was 83, consisting of 55 individual and 28 dyadic. As can be seen from the figure, students produced many more utterances (70%) whose purpose was to make meaning (M/C) than for other purposes, although orientation toward the task accounted for approximately one-fifth of the utterances.

Figures 9 and 10 show similar information for the dyadic and individual protocols, respectively, as separate sets. Examination of Figures 9 and 10 reveals that students produced more utterances in each category in the dyadic condition than in the individual condition, with the average total dyadic utterances being slightly over 267% of the average total individual utterances. A chi-square test was performed to determine whether the difference between the total average number of specific traits in the dyadic and individual protocols was significant. With $df=1$ and $\alpha=.05$, the critical values were $98 \cdot 10^{-5}$ and 5.02. The calculated value, 43.521, exceeded the upper critical value, indicating that

the averages obtained under the two conditions were not consistent with each other.
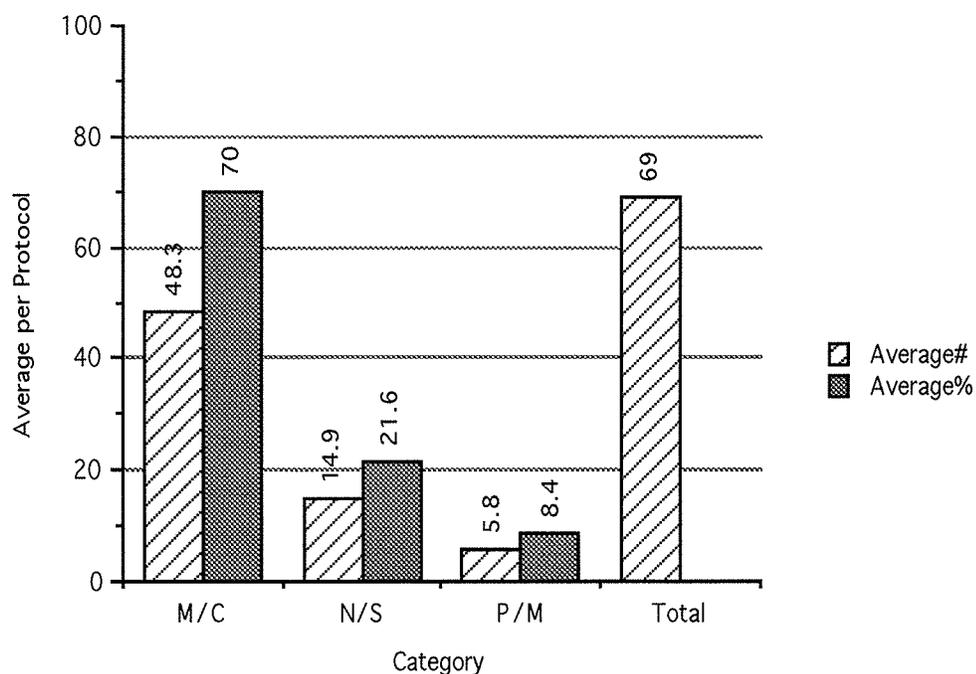
Figure 8 Specific Traits--Average Number and Average Percent--All Protocols
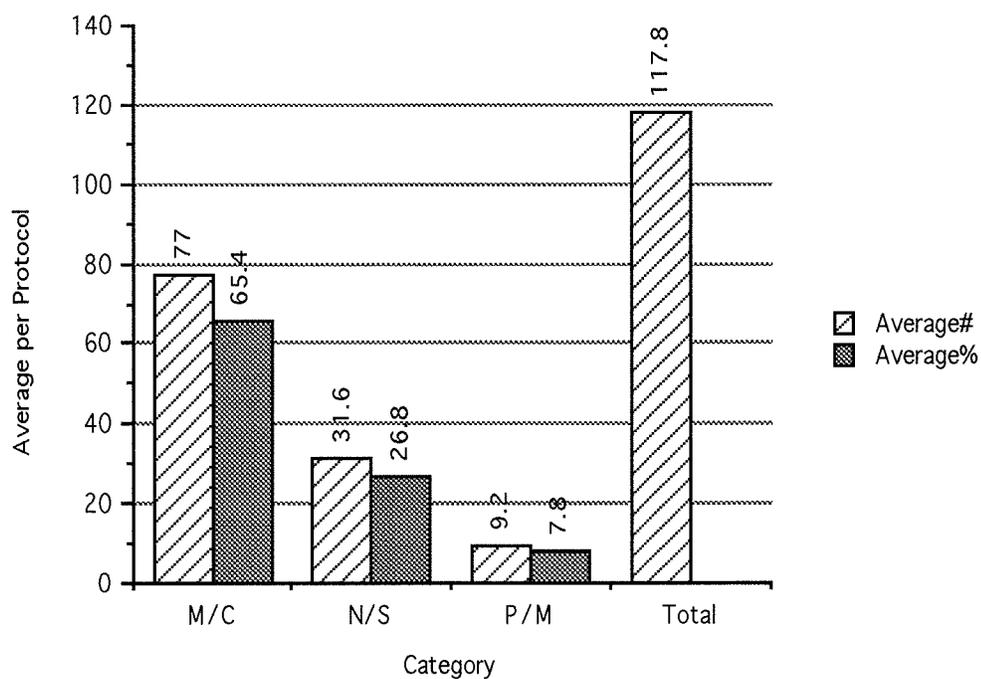
Figure 9 Specific Traits--Average Number and Average Percent--Dyadic Protocols
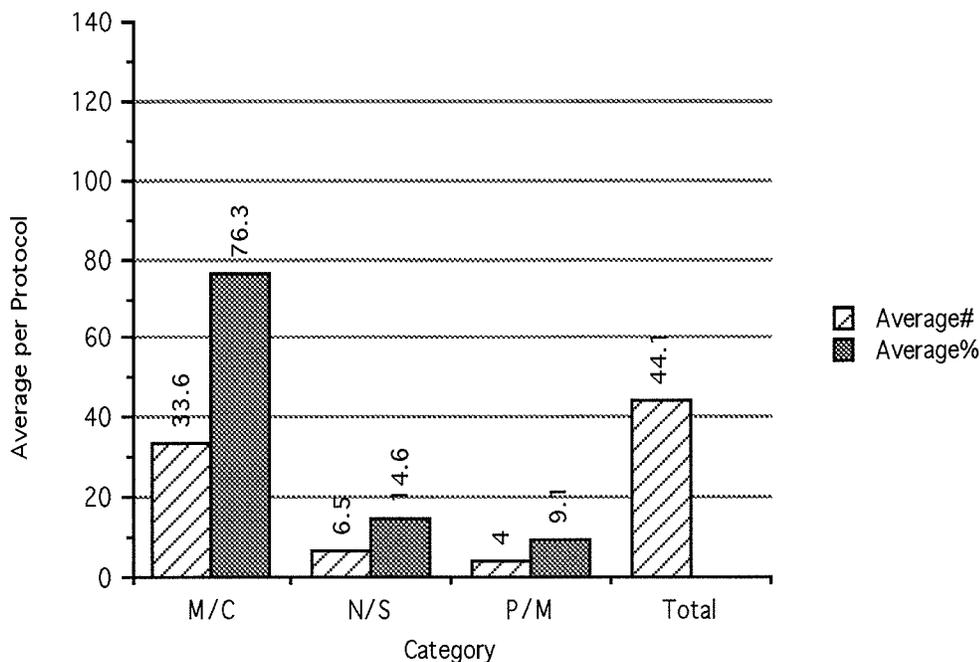
Figure 10 Specific Traits--Average Number and Average Percent--Individual Protocols

As can be seen from Figures 9 and 10, the relative changes in percentages for the separate

categories are noticeable between dyadic and individual protocols, with Meaning Construction (M/C)

contributing over 65% of the utterances in the dyadic protocols but over 76% in the individual

protocols. A second substantial shift is to be seen in the Neutral States (N/S) category, which makes

up almost 27% in the dyadic condition but under 15% in the individual condition. As major as these

shifts appear to be, chi-square tests did not reveal significant differences, from which one can assume

that students were relatively consistent in their think-aloud strategies whether working alone or with a

partner; in other words, the dyadic and individual think-aloud profiles were similar, apart from the

significant difference in the total number of utterances in the two conditions.

Percentages were also calculated for the combined categories of specific traits for the dyadic

and individual groups for each of the three text passages. A chi-square calculation for the category

percentages for the three dyadic sets revealed no significant differences ($\alpha=.05$). A similar

chi-square calculation for the three individual sets was significant ($\alpha=.05$). The percentage profile

graphs for the three sets of individual protocols are given in Figures 11, 12, and 13.
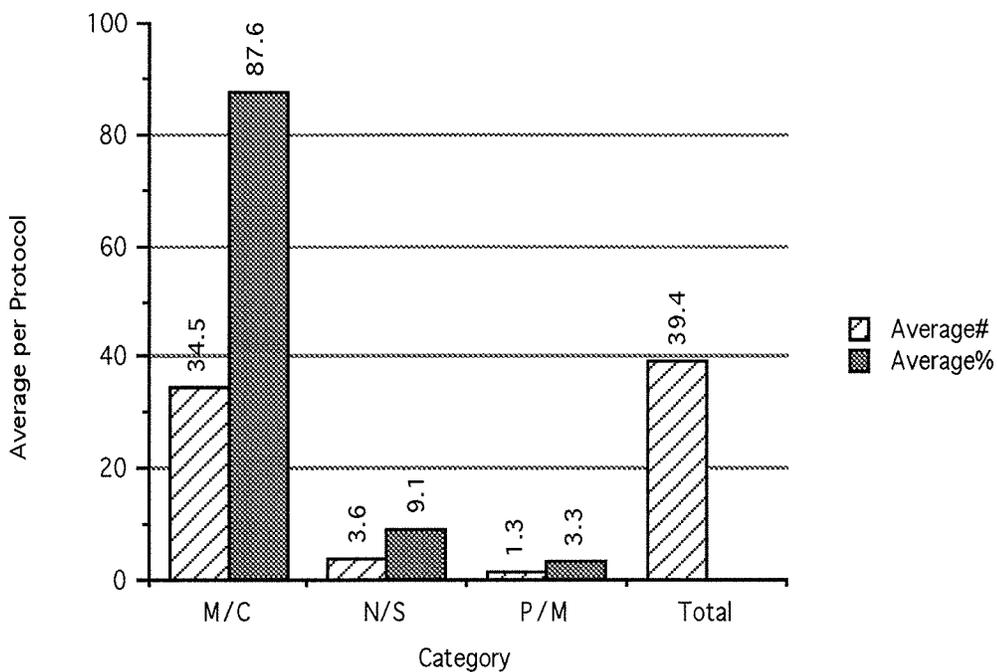
Figure 11 Specific Traits--Average Number and Average Percent--Passage X Individual
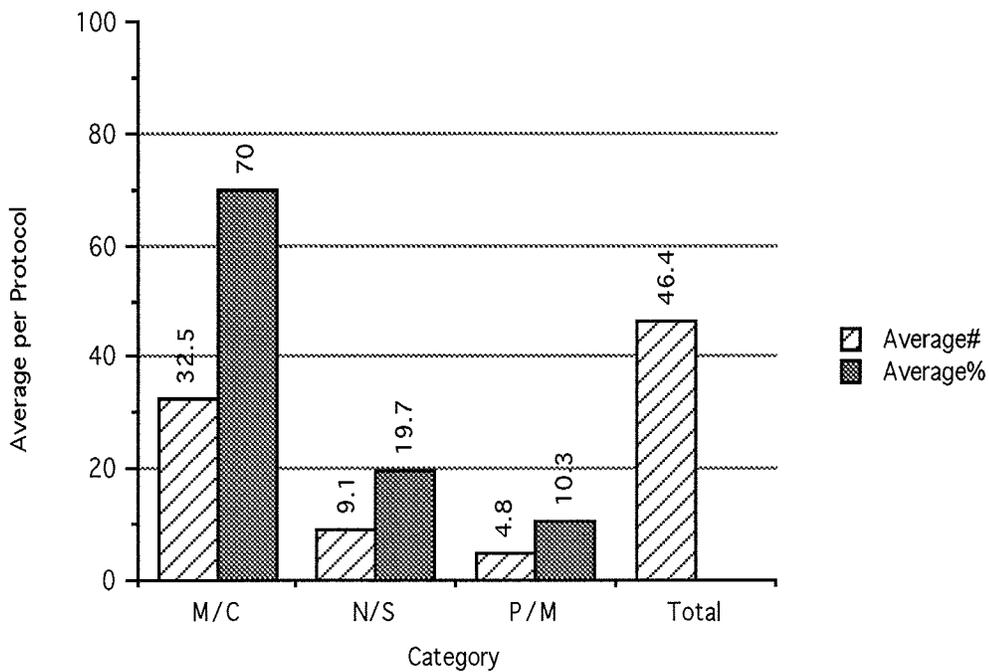
Figure 12 Specific Traits--Average Number and Average Percent--Passage Y Individual
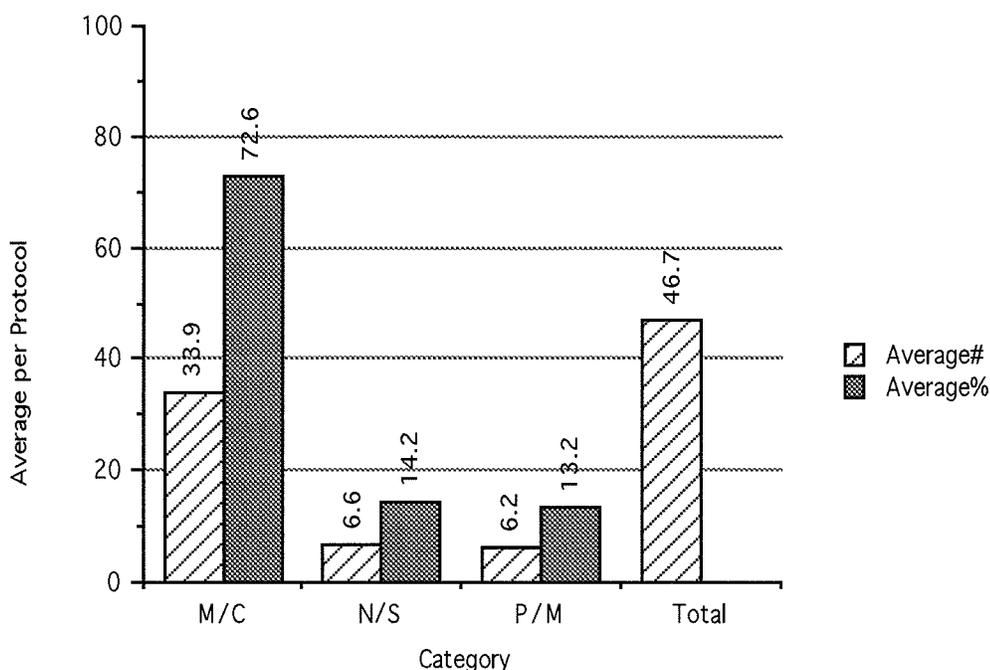
Figure 13 Specific Traits--Average Number and Average Percent--Passage Z Individual

The most noticeable difference in the passage profiles is between the percentage for M/C and

the percentages for the other two categories for Passage X in the individual condition (Figure 11).

Although the total number of specific traits is lower than for the other two passages (cf. Figures 12 and

13), the traits are largely concentrated in the Meaning-Construction category. Since Passage X was

the least difficult, it may be that the students could give more of their attention to the construction of

meaning, rather than to other elements of the process. It may also be that when text is easy to read,

students read in a more mature manner (i.e., with more of the behaviours attributed to proficient

readers). If the metacognitive load drops in such a situation, the processes may become automatic to

the reader and go unnoticed and unreported (Afflerbach & Johnston, 1984).

Holistic scoring of the think-aloud protocols was carried out by four raters using the Likert-type

scale described in Chapter Three (see sample form, Appendix G). For each protocol, the four scores

for each pair of descriptors were averaged. Overall averages were calculated for the seven pairs of

descriptors common to both the dyadic and individual think alouds. A chi-square test performed on

these overall average scores for the two sets (dyadic and individual) revealed no significant difference.

Appendices M and N give data on the holistic rating of dyadic and individual protocols, respectively. For the dyadic protocols, the average rating for seven items was 3.3. As stated above, the scale was a six-point, Likert-type scale (values, 1 to 6). The actual range of scores could be 5--that is, 1 to 6. The average rating (3.3) was, therefore, slightly below the simple mean (3.5). Five of the 28 dyadic protocols (18%) were rated at least five out of six. Six (21%) were rated less than two on the six-point scale. For the 55 individual protocols, on the other hand, the average rating for the same seven items was 3.1, again below the simple mean. Four protocols (7%) were rated at least five out of six, while 16 (29%) were rated less than two on the six-point scale. From the foregoing, it is evident that dyadic protocols were rated higher on the seven common pairs of descriptors, both on average and at the extremes of the rating scale.

Holistic averages for students whose MCMCA scores placed them in the individual and dyadic extreme groups as described below (see Question Six) were tabled and graphed. Holistic averages of all eight pairs of descriptors for the low- and high-extreme dyadic groups were similar: for the low-extreme dyadic group, 3.46, and for the high-extreme dyadic group, 3.60. On the other hand, holistic averages of the seven pairs of descriptors for the low- and high-extreme individual groups appeared to differ considerably: for the low-extreme individual group, 1.88, and for the high extreme individual group, 3.56 (see Figures 14 and 15). However, a chi-square test did not reveal the difference to be significant (calculated value was 0.518; critical values were $98 \cdot 10^{-5}$ and 5.02; $\underline{df}$=1; α=.05). This lack of significance will be examined in Chapter Five.

Miscue analysis was carried out on the 55 protocols produced in the individual condition. As reported in Chapter Three, the opening portion of each passage was used for the analysis, in which only serious miscues that changed the meaning of the text were counted. Three reading levels were assigned: easy, where the serious miscues fell below 2%; instructional, where the miscues ranged from 2% and 5%; and frustrational level, where miscues exceeded 5% (see Chapter Three).
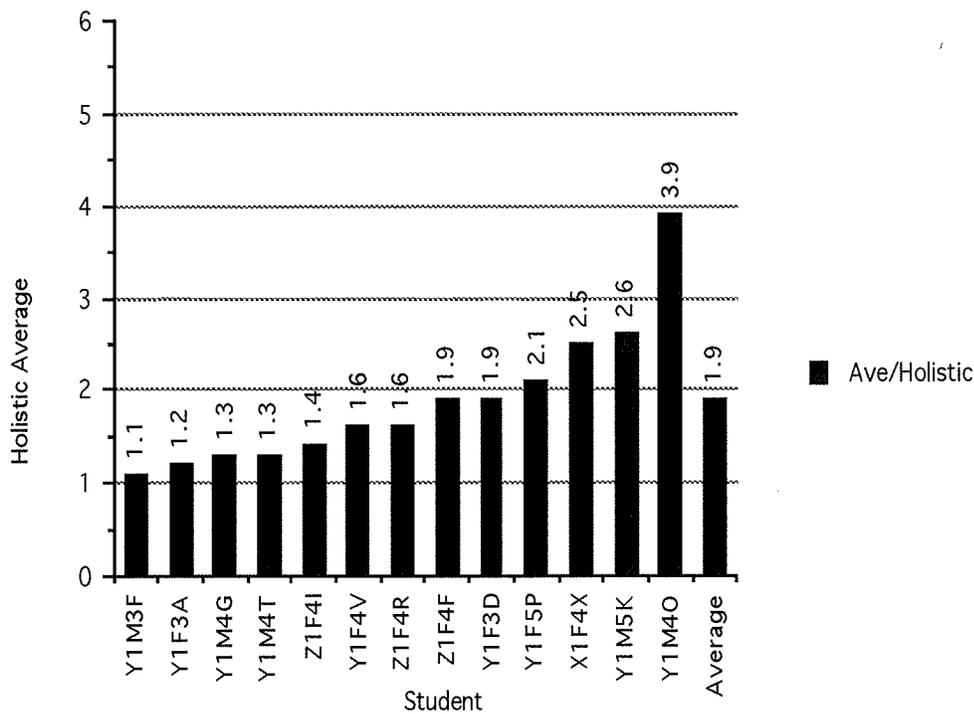
Figure 14 Holistic Averages--Extreme Group Individual 1st
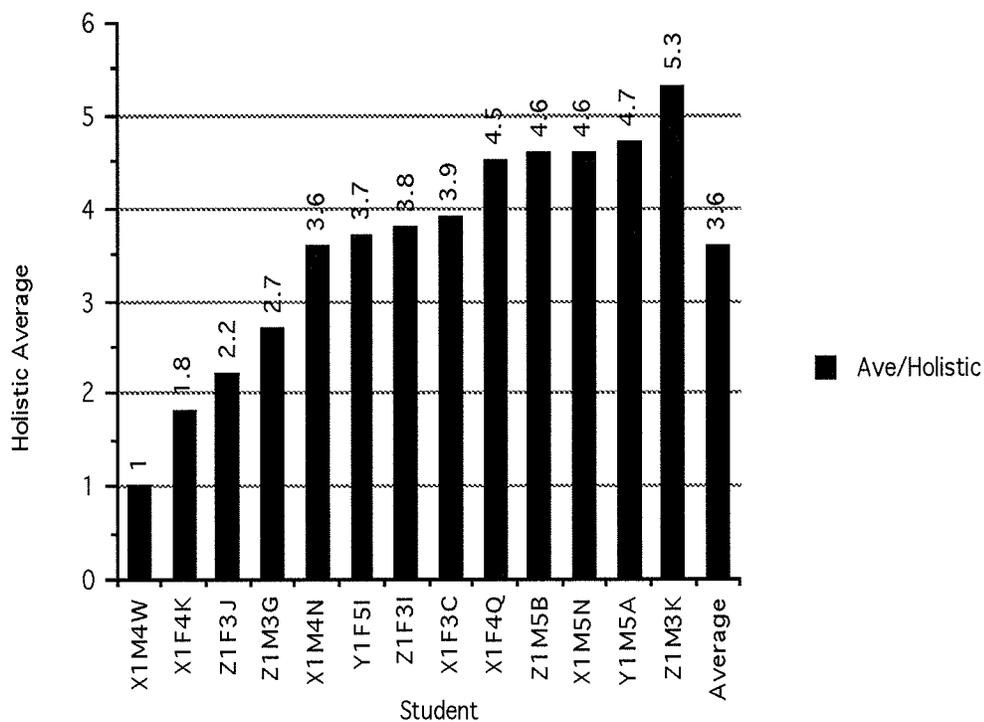
Figure 15 Holistic Averages--Extreme Group Individual 4th

For the 55 protocols produced in the individual condition, miscue analysis gave the following results: Passage X--15 easy reading level, 3 instructional level, and 1 frustrational level; Passage Y--5 easy, 5 instructional, and 9 frustrational level; Passage Z--4 easy, 5 instructional, and 8 frustrational level. Overall, students found the passages easy in 24 of the 55 cases; they found the passages to be at their level of instruction in 13 additional cases; and they found the passages to be at their frustrational level in the remaining 18 cases.

A Spearman rank correlation test was performed using the miscue percentages and the MCMCA scores obtained after reading in the individual condition. For $\alpha=.05$ (two-sided), the critical value was $\underline{Z}=1.96$. The calculated value was $\underline{Z}=- 4.21$, indicating that the two sets were correlated with each other; that is, there was a significant negative correlation between students' individual MCMCA scores and level of serious miscues made while reading the passages. The comparison of individual MCMCA scores and percent of reading miscues is given in Appendix O.

<u>Findings.</u>   Pertaining to Question Five, the findings were:

8. Students produced significantly more analyzable utterances when working in dyads than when working individually;

9. More utterances (70%) were for the purpose of constructing meaning than for other purposes;

10. Students were consistent in their approach to the think-aloud task whether working dyadically or individually;

11. When passage difficulty increased, the average percent of meaning-construction utterances in the individual condition dropped significantly ($\alpha=.05$);

12. Holistic scoring revealed large but non-significant differences between the think-aloud protocols of students who scored at the low and high extremes on the multiple choice meaning clarification activities in the individual condition; and

13. Students' scores on the individual MCMCAs showed a significant negative correlation with

the level of serious miscues made while reading the passages.

iii. Major Question (c)

How are understanding of text and understanding of metaphor related?

f. Question Six

What are the features of the think alouds of students whose performance on a multiple choice meaning clarification activity placed them in the first and fourth quartiles?

The dyadic and individual MCMCA scores were ranked for the purpose of determining the scores that fell within the first and fourth quartiles of each set. The identification of exact quartiles proved difficult because in certain cases the boundary fell within same-rank groups that could not be separated according to any meaningful criterion. As a result, clearly definable extreme groups were established instead of quartiles, with low scores being designated as Group 1 and high scores as Group 4. The extreme groups established by this method had the following numbers of members: Extreme Group Dyadic 1st (EGD1)--12; Extreme Group Dyadic 4th (EGD4)--14; Extreme Group Individual 1st (EGI1)--13; and Extreme Group Individual 4th (EGI4)--13.

Comparative data for the extreme groups are given in Table 7. Using the data from Table 7 and the grand mean (6.365) for all scores of the four extreme groups, the sum of squares between groups and the sum of squares within groups were calculated and used in the calculation of an F-test for the two population variances. Results are given in Table 8. The critical value of $F_{3,48}$ (.05) was 2.81 (by interpolation). Since the calculated value was F =160.607, the variance in MCMCA scores between the groups was taken to be significantly greater than the variance within the groups themselves, indicating that the individual groups had internal homogeneity but were significantly different from each other.

To identify which of the groups differed significantly from the others, the data from Table 7 were used in the calculation of the harmonic means for the pairs of groups, which in turn were used to perform the Tukey procedure (the HSD test--honestly significant difference test). Of the four relevant

Table 7

Extreme Groups--MCMCA Statistics

	EGD1	EGD4	EGI1	EGI4
$\underline{n}$	12	14	13	13
total score (MCMCA)	36	120	54	121
mean	3.00	8.571	4.154	9.308
$\underline{s}^2$	1.455	0.571	0.975	0.231
$\underline{s}$	1.206	0.756	0.987	0.481

Note. EGD1 -- Extreme Group Dyadic 1st; EGD4 -- Extreme Group Dyadic 4th; EGI1 -- Extreme Group Individual 1st; EGI4 -- Extreme Group Individual 4th.

pairs, three showed significant differences--namely, EGD1 and EGI1, EGD1 and EGD4, and EGI1 and EGI4. That is, both low-extreme groups differed from each other, and each differed from the high-extreme group in the same condition. The fourth pairing, EGD4 and EGI4, showed no significant difference--that is, there was no detectable significant difference between the students who scored highest in the dyadic condition and highest in the individual condition. This lack of difference between EGD4 and EGI4 is in contrast to the difference noted between students in the low-extreme groups and adds a new element to the finding of the $\underline{T}$-test described above (Question Two)--that is, that students' individual and dyadic scores differed significantly, indicating that it was the students who performed least well who also performed significantly differently in the two conditions. The similarities between EGD4 and EGI4 will be examined in more detail below.

The specific traits of the protocols of the four extreme groups were examined. Duplication was eliminated for those cases in which both dyadic partners had MCMCA scores in the same extreme group; that is, the protocol count was not repeated for these dyads. In EGD1, two dyads were represented by both members. In EGD4, three dyads were so represented. As a result of elimination of duplicates, these particular extreme groups contributed 10 and 11 sets of specific traits,

Table 8

<u>Summary of Results--F-test for Population Variances Between and Within Extreme Groups</u>

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>
Between	380.156	3	126.719	160.607*
Within	37.895	48	0.789	

*$p<.05$

respectively, rather than 12 and 14--the number of individual students who contributed MCMCA

scores. The average number of specific traits for the extreme groups, the mean number for the entire

set, and the median number are shown in Figure 16.
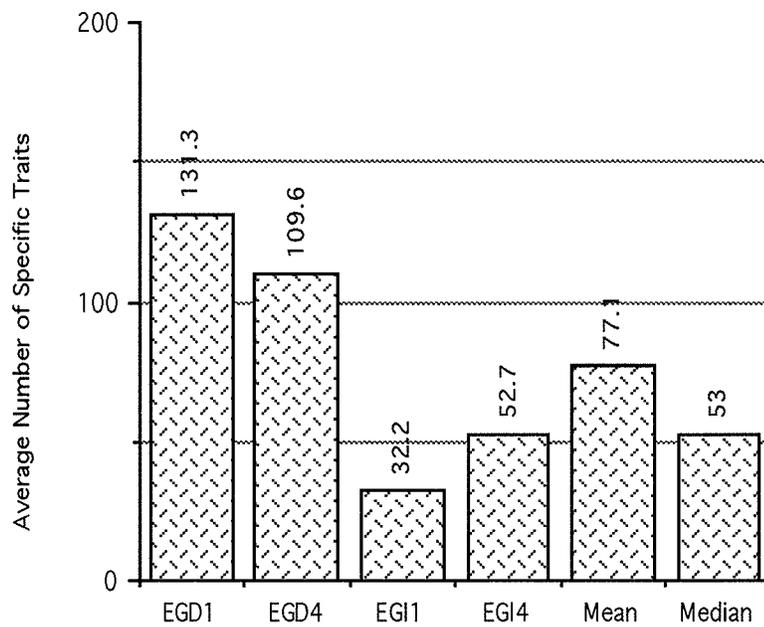
Figure 16 Specific Traits--Extreme Groups--Average, Mean, and Median

The combined categories of specific traits of the protocols for the students in the four extreme

groups were aggregated and profiled. The aggregate summaries of combined specific-trait counts by

category for the extreme groups are given in Appendix P. The aggregate summaries of percentages

of specific traits in combined categories for all extreme groups are given in Appendix Q. Figure 17

shows the average number of specific traits in each combined category and the average total for the

four extreme groups. Figure 18 presents the average percent of combined categories for the

extreme groups.
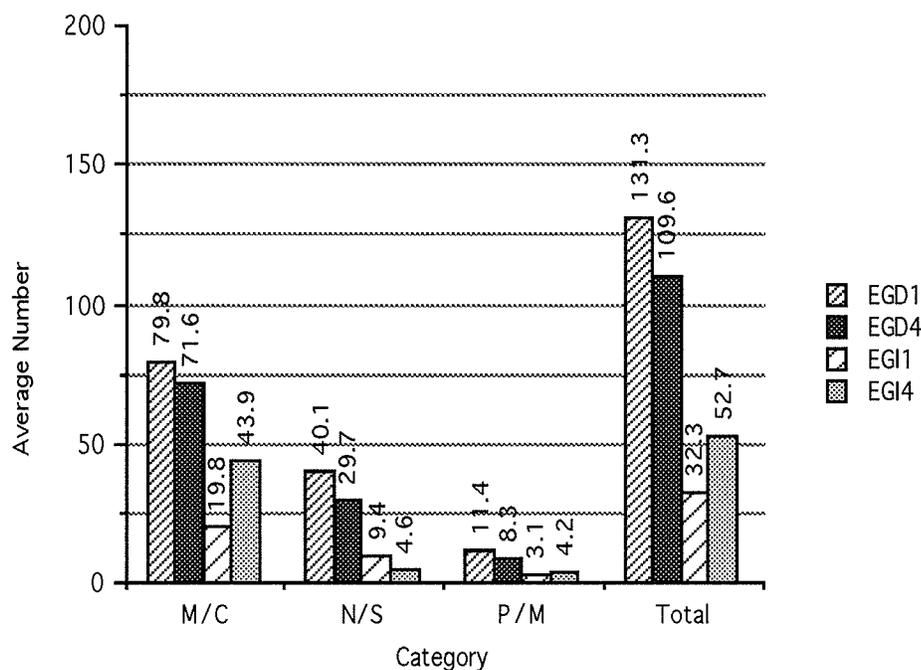
Figure 17 Specific Traits--Average Number--Extreme Groups

An examination of the specific traits constituting the combined categories for the four extreme

groups revealed considerable similarity across the groups. Table 9 provides the pertinent data. When

the specific traits that designate agreement with a previous statement were removed, the remaining

numbers of specific traits were almost identical. This indicated that students were consistent in their

basic approach to the task, in that they brought to bear the same repertoire of strategies even though,

as indicated above (Question Five), individual readers produced a lower percentage of

meaning-construction utterances when the passage difficulty increased. An interesting difference

was between the number of types of specific traits within meaning-construction for the two individual

extreme groups, with the lower group (EGI1) showing a wider range of basic specific traits--18--than

the higher group (EGI4)--15.
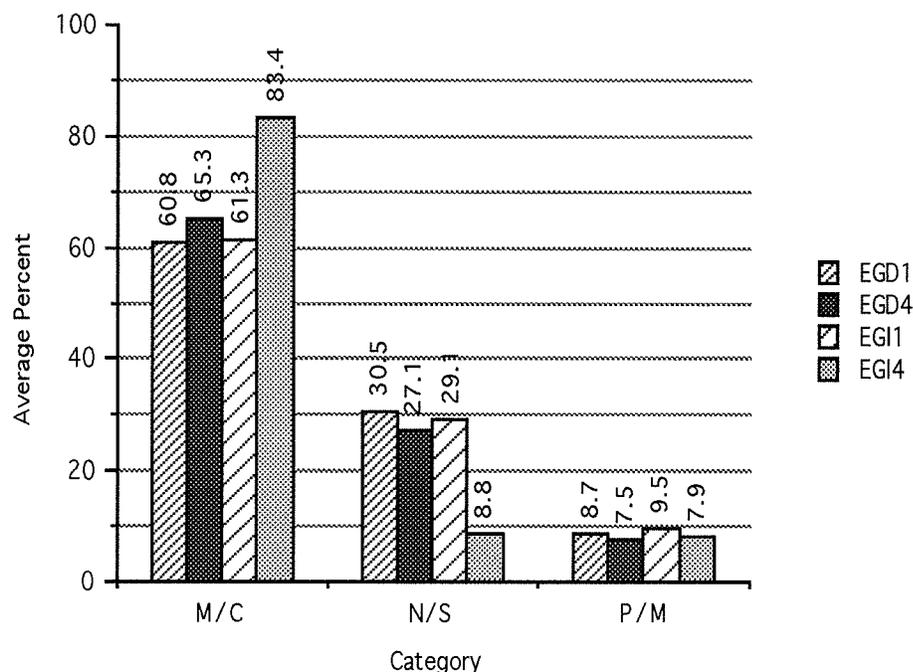
Figure 18 Specific Traits--Average Percent--Extreme Groups

As Figure 17 shows, the low-extreme individual group (EGI1) produced fewest analyzable

utterances. From this, one might surmise that, for students who performed lowest on tasks such as

this, there was a tendency to retreat from talk, possibly because of uncertainty about their own ability

to use talk effectively, or because it might reveal in them some inability to complete the task

successfully, or perhaps because they were not convinced that talk had utility in this situation.

The high-extreme individual group (EGI4), on the other hand, produced the highest

percentage of meaning-construction utterances (see Figure 18). This might be taken as an indication

of ability to focus on the task at hand, since the directions were to make meaning with the text passage

and to talk about the meaning that was being made. It is known that as certain reading strategies,

Table 9

Number of Types of Specific Traits by Combined Category and Extreme Group

Extreme Group	Meaning Construction	Neutral States	Pre-Meaning	Total
EGI4	18	4	6	28
	[15 +3(a)][a]		[5 +1(a)]	
EGI1	24	5	5	34
	[18 +6(a)]	[4 +1(a)]		
EGD4	33	6	10	49
	[18 +15(a)]	[4 +2(a)]	[5 +5(a)]	
EGD1	29	6	9	44
	[17 +12(a)]	[4 +2(a)]	[5 +4(a)]	

[a]Bracketed values consist of, first, the basic number of types of specific traits and, second, followed by (a), the number of types of specific traits showing agreement with a previous utterance made by self or dyadic partner.

including metacognitive strategies, are mastered by the reader, they drop below the threshold of consciousness and are performed automatically (Afflerbach & Johnston, 1984). In such a case, it would not be surprising that the range of specific traits narrowed toward those likely to be most effective in demonstrating understanding.

A closer examination of the protocols of these two extreme groups revealed that they varied in other ways than number and percent of meaning-construction specific traits. They differed also in the complexity of the meaning-construction process; specifically, EGI4 students were likely to use relatively sophisticated meaning-construction processes and to link specific traits in a chain of comment, whereas EGI1 students were more likely to use shorter, less complex utterances, frequently limited to a single specific trait.

With respect to these differences, EGI4 students might raise a question about meaning not yet

made clear by the text. In protocol X1F3C, for example, the student said, "I wonder how long?" after reading that the brown bat had a long life span. Such questions indicating active involvement with the text were rare in EGI1 protocols. The same student exhibited a combination of inferencing and the conscious use of a strategy to clarify meaning when, after reading that the female bat had entered an abandoned barn, she said, "So she goes to have her baby at the top of a barn, or maybe she's just sleeping. Let's find out." She then read on to verify one or the other of her inferences. The same student also showed an awareness of her own knowledge and change in that knowledge when she commented, "So, their mothers do leave them. I never thought they did." Awareness of one's own knowledge was also exhibited in protocol Z1M3K, where the student concluded the think aloud with the comment, "But I learned a few things, like what feudalism was and everything." The same student had made his prior knowledge explicit at the beginning of the protocol when, considering the title and cover of the text, he said, "Well, from the title, it looks like it would be sort of knights and everything in the story. It looks interesting. The Middle Ages is around the 1100s, I think. That's what...I think for sure it is. I'm not positive, but...." Such awareness of one's own knowledge and change in it was relatively rare in the protocols of EGI1.

Certain other features were exhibited fairly frequently by EGI4 protocols but rarely by those of EGI1. Protocol X1M4N demonstrated an evaluation of the significance of information given when, after reading that the bat had flown nearly a hundred miles in two nights, the student commented, "That is ver...obviously very fast animals for something their size." An evaluation of the logical implication of information given in text was shown in protocol X1M5N, where the student concluded, "So, in three weeks they...they're..they must have a big growth spurt," after reading about the changes in the baby bats. The process of evaluation extended to consideration of the text, its style, perhaps, or its effectiveness. In protocol X1F4Q, for example, the student, upon reading the meaning of the scientific name for the brown bat (translated as "mouse-eared" and "light-fleeing"), commented, "That's a good way to put it!" In protocol Z1M5B, the student evaluated the effectiveness of text when he commented, "Chieftains...right there's a pretty interesting word," then

went on to relate it to a more common word by suggesting, "I gather we get chief from [it]," a supposition that may well be correct since the word "chief" came into use in English a full century after "chieftain" (Webster's Ninth New Collegiate Dictionary, 1986). Such complex evaluations of text and meaning were lacking in the EGI1 protocols.

A difference between the extreme groups was noticeable in the amount of predicting and verifying that was exhibited. In protocol X1F4K (EGI4), for example, the student commented, "Okay, it's what I figured," having verified a prediction. In protocol Y1F5P (EGI1), the student made a strong opening set of predictions in response to the title. She said,

> Well, I think the Frontier Home will be about...uh...cabin maybe back in the woods...talking about the wilderness in the olden days, back when pioneers first came. Uh...it might be about...the...the woods...the way they survived. It may be...uh...it might be about Indians. No, I think it'll be about the cabins that they stayed in. Yeah! That's what I think it's about. Um...I'll read it now.

Despite the strong beginning, she failed either to verify the predictions or to use them to guide her reading. This student produced a lengthy protocol of 91 specific traits, of which 45% were Meaning Construction and 45% were Neutral States, indicating that as many of her think-aloud utterances were devoted to the demands of the task as to making meaning with the text. While this protocol was not typical of the low-extreme group protocols, the failure to make connections among various parts of the text was common.

A student in EGI1 might misread a word and persist with the incorrect word, as in protocol Y1F4V, where the student misread "villages" as "villas" and saw no incongruity with the resulting statement that pioneers established "villas" in the "thick woodlands of Ohio and Kentucky." In EGI4, on the other hand, a student was likely to check his or her understanding and prior knowledge, as in protocol X1M4N (EGI4), for example, where a complex evaluation of understanding took place when the reader, after encountering the scientific name for the brown bat, said, "'Light-fleeing'...that's...I can understand that. Obviously, it doesn't like light. Most bats don't. And the scientific definitions are all in Latin. I knew that. So I understand that."

In EGI4 the monitoring of understanding might lead to a suggestion of a specific reading

strategy. In protocol X1M5N, the student interrupted his reading in mid-sentence to rephrase what had just been read, "Okay...so...they use their wings to cradle the baby." He began to read again, only to discover that the meaning was not clear. As a result, he decided, "I'll read that again," thus choosing a reading strategy commonly employed when understanding has broken down. In like manner, in protocol Z1M3K (EGI4), the student suggested a specific reading strategy to clarify a point. In reference to the fall of the Roman Empire, he said, "Uh, I don't know when exactly that was, but it might tell if I read some more." This student also showed an expectation that the text would provide necessary information--that is, that it would be complete. In EGI4 protocols, such fix-up strategies were more common than in EGI1 protocols.

The importance of prior knowledge was demonstrated by the protocols of both extreme groups. In EGI4, students routinely connected text with prior knowledge, sometimes identifying the source of their knowledge. In protocol Z1F3J (EGI4), after reading that oaths were made in feudal society to a person granting land, the student stated, "I know what an oath is because we studied that in class...Oath of Allegiance. So it...it's a...an oath is kind of a promise." However, in a somewhat similar situation in protocol Z1F4F (EGI1), the student concluded, "And this here tells us that Rome is in America, I think," but failed to make use of the available maps to clarify the misconception.

The two extreme groups showed differences in the ways they accounted for context or failed to consider it. In protocol Z1M5B (EGI4), the student, when reading that Rome withdrew its troops from Britain in 442, contextualized the information first by identifying the numeral as a date and then recognizing that it was far in the past. He commented, "Hm...geez that's a long time ago." Students in EGI1 did not give context the same degree of attention. For example, in protocol Y1M4O (EGI1), after reading the phrase, "deep woods abounding in shadows and mystery" incorrectly as "deep woods above in shadows and mysteries," the student commented, "Mysteries! Hm! There's mysteries. They are stories by...stories about when they...when the mystery...somebody killed somebody and everything." In the same protocol, the student encountered the word "displaced" and, failing to consider the context in which the word was presented, concluded, "I don't know what 'displaced'

means. Kind of animals or something." Similarly, in protocol Y1M5K (EGI1), the student, unable to read the word "necessities," concluded that "it sounds like a disease."

Several protocols in both groups exhibited characteristic verbal patterns. In protocol Z1M5B (EGI4), for example, the student used specific patterns to initiate paraphrase of a section, generally (20 of 39 utterances) introducing his remarks with the phrases, "So, it seems like...," "So, it looks like...," "So, it sounds like...." The paraphrases were usually accurate representations of the text meaning (only six misinterpretations of text occurred). In protocol X1F4X (EGI1), on the other hand, although the think-aloud utterances generally began with the characteristic phrase, "So I know...," the completion often consisted of little more than repetition of words just read, as when, for example, after having read, "This is the story of the Little Brown Bat, one of the most common bats in North America," the student said, "So, I know it's one of the most common bats in North America." Similarly, in protocol Y1F3D (EGI1), the student, having read, "the sap could not flow into the branches," simply restated the same sequence of words with a single word changed, "Okay...so that means that the sap could not run into the branches."

Having an established purpose for reading is widely accepted as an important contributor to successful reading (Baker & Brown, 1984). In this study, the demonstrations of the think-aloud process, as well as the instructions to the students in the two practice sessions and the two target sessions, emphasized that the purpose was to make meaning with what was being read. In a sense, this purpose was external to the passage being read. Additionally, the passages were clearly informational, yet to varying degrees had a narrative voice. For some students, these factors may have caused difficulty. Some students produced a relatively high number of neutral-states specific traits, indicating orientation toward the task itself. This was often particularly noticeable with students for whom the reading was at their frustrational level.

An example of this is provided by protocol Y1F3D. It had 11.1% of serious miscues (frustrational level). Only 14 of its 36 specific traits were for meaning construction, 4 indicated pre-meaning conditions, and 18 were neutral-states utterances. In this protocol, there was a detectable sense of

confusion, and part of that seemed to be over purpose, as indicated by the student's uncertainty when she encountered the extended caption under one of the pictures. This caption consisted of an excerpt from a pioneer's diary and was written in the first person, as opposed to the third person of the main text, was in smaller size typeface, was entirely indented from the left margin, and its authorship was credited, yet the student included the entire six-sentence excerpt within the main-text sentence spanning the break. In transition from the unfinished sentence to the excerpt, she said, "Anything they could be...out...Father meant us...oops...Father met us...two yoke of oxens and our ox wagon." For this student, the purpose for reading seemed to be to say the words, although not necessarily all the words.

The retell of this protocol showed a similar lack of focus and a lack of attention to the significant messages provided by the text. The student said, "I think this is a very good story. I enjoyed it. And...um...how they used to travel and stuff. And...let's see! [inaudible portion]...the people lived their life. Okay. I'm done."

The low-extreme group protocols displayed certain features not evident in those of the high-extreme group. In protocol Y1F5P (EGI1), the student found the reading very difficult. This was evident in the number of failures to recognize and decode words. Also, the student showed frustration with the task. At one point she said, "Oh, man! I never want to read another book in my life!" The same student was disorganized in her approach to the task, often omitting large sections of text and experiencing difficulty in keeping her place in the text. At one point, she said, "Oh...I think I'm done that page. I don't know. Where's my place? I'll just start that page 'cause I don't know where I am."

Overall, the retells produced after the initial reading think aloud differed between the two extreme groups. In each group, two protocols were without retells. The remaining 11 protocols of EGI4 produced a total of 540 separate specific traits, 177 of which were for the purpose of retell. The remaining 11 protocols of EGI1 produced 385 separate specific traits, 93 of which were for the purpose of retell. The percent of specific traits devoted to retell varied between the two groups (33%

in EGI4 and 24% in EGI1), and the average number per protocol in EGI4 exceeded the average in EGI1 by a ratio of almost 2:1 (16.1 to 8.5). The retell was intended to provide an opportunity for the reexamination of the text, resulting perhaps in a statement of the gist of the passage. The strategies students demonstrated in their retells were generally similar to those used during their initial think alouds, thus providing additional data for inclusion in the combined categories (see Appendix D).

Interestingly, EGI1 protocols exhibited a broader range of specific traits than did EGI4 protocols--12 and 9, respectively. For those in EGI4, the average number of different specific traits was about two and one-half, while in EGI1 the average number of different specific traits was about three and one-half. The reason for this is not entirely clear, but it may be that the proficient readers in EGI4 were simply showing the tendency to leave the more or less automatic processes unreported (Afflerbach & Johnston, 1984).

The variety of specific traits used by students in EGI1 had the potential to contribute to meaning making; however, because the retells were generally quite short and often unfocused, the potential was not realized. For the retell of protocol Y1M4G (EGI1), for example, the student said,

> Um...Frontier Home. I don't know why they called it Frontier Home because...well, actually, they really talked about frontier life...and...um...uh...talked about what they did, and the tools, and the covered wagon, and how much...I guess...not much of the...the home, but more of the land.

While consisting of eight separate analyzable utterances of three different types (Evaluation of Text, Restatement/Paraphrase, and Other/Miscellaneous), the protocol did not capture the gist of the text passage.

> For the retell in protocol Z1M3K (EGI4), on the other hand, the student said,

> Well, this was interesting. It told about feudalism and how the Roman Empire was...and had most of Europe in its power at one time and how the...what was it?...the Germanic tribes started pressuring Rome and a new way of life started spreading, called feudalism. And the feudalists, they were usually poor and they...um...and were pov...they...lived in poverty and they protected...they...if they got...um...land or power from the king or queen, then they...that... they had to take an oath to protect the king or queen. And anybody who didn't would be a traitor. So, it was interesting. But I learned a few things like what feudalism was and everything, so....

This retell consisted of 10 separate analyzable utterances of three different types (Affective

Response, Restatement/Paraphrase, and Affirmation of Meaning). In contrast to the protocol from EGI1, this protocol captured the gist of the passage to a significant degree.

The exceptional cases in the two extreme groups provided interesting contrasts. In EGI4, for example, protocol X1M4W, produced by a student who scored 9 out of 10 on the MCMCA, had no commentary with the initial reading of text and provided a retell consisting of 14 Restatement/Paraphrase items that were entirely word-for-word excerpts from the original text. In EGI1, on the other hand, protocol Y1F5P, produced by a student who scored 4 out of 10 on the MCMCA, consisted of an 80-item commentary with the initial reading and a retell of 11 specific traits of five different types (Procedural, Restatement/Paraphrase, Other/Miscellaneous, Denial of Understanding, and Evaluation of Text).

For the two protocols under consideration (X1M4W and Y1F5P), it is helpful to examine the differences in the actual reading of text. Protocol X1M4W had a total of five miscues, only three of which could be taken to indicate failure to recognize a word--"light-fleeling" for "light-fleeing," "matternity" for "maternity," and "particle" for "particular." While the third is clearly a failure to recognize the word, the second may be the result of attempting to sound out a word that is unfamiliar in print, and the first may be merely a slip of the tongue. Since the text passage had over 600 words, the percentage of serious miscues fell below 1%, well within the range of easy reading for this student.

Protocol Y1F5P, as was indicated above, was produced by a student who experienced considerable frustration with the task. In the first paragraph, after skipping the first two sentences entirely, she made so many miscues in the remaining sentence that the portion was meaningless. Her think-aloud commentary following the first paragraph reflected this lack of meaning. She said,

> Well, it sounds like they're looking for...the people...are making [inaudible section]. They...
> they might...uh...be...uh....Oh, how do you say? They might be....Well, I know for sure that...
> the...for the cold winter....Well, I'll read some more.

The second and subsequent paragraphs were read with as much difficulty as the first, and the commentary reflected the growing frustration.

The same student, when completing the dyadic think aloud in the previous session, had left

most of the reading to her partner or had been coached through the reading of sections by the other student. She had, however, contributed to the discussion of the text as an equal participant and with considerable maturity, showing that she possessed the prior knowledge necessary to make meaning with the new text. As her opening inferences in the individual protocol indicated (see above), she also possessed considerable prior knowledge about this topic. However, because she could not decode enough words, she got little if anything from the text to link with her prior knowledge; thus, meaning construction was largely impossible. From the foregoing, one would judge that caution is in order when attempting to link protocol complexity with MCMCA scores on an individual basis. While the group differences may be strong, individual variation within the groups can be extreme.

As reported above, when the harmonic means of the MCMCA scores of the four extreme groups were compared, EGD4 and EGI4, showed no significant difference; that is, there was no detectable significant difference between the students who scored highest in the dyadic condition and highest in the individual condition. It is possible that this similarity of groups resulted from a ceiling effect, produced by either student reading ability or prior knowledge relating to the particular metaphors used in this study. If the passages had been even more difficult, then, the groups might have shown a significant difference.

An examination of these two groups revealed that 4 students appeared in both groups and 19 appeared in one only (see Appendix R). Of particular interest was that for these two extreme groups (27 cases), Passage X was read 12 times, Passage Y was read 4 times, and Passage Z was read 11 times. Passage X was one of the two passages read by each of the four students who appeared in both sets. These occurrences of the passages are in the reverse order of the passage difficulty (see Chapter Three), suggesting that there was a relationship between passage difficulty and performance by these students on the multiple choice activities, a relationship already noted for the whole group.

The data on the four students who appeared in both high-extreme groups were tabulated for examination (see Table 10). In the individual condition, student M4N produced an average number of specific traits (46 to the average of 44 for all individual protocols--see Figure 10). The other three

Table 10

Performance Summary of Students Appearing in Both High-Extreme Groups (EGI4 and EGD4)

	Student							
	M4N		M5N		F5I		M3K	
	Indiv	Dyad	Indiv	Dyad	Indiv	Dyad	Indiv	Dyad
Passage	X	Z	X	Y	Y	X	Z	X
MCMCA Score	9	8	10	8	9	9	10	10
Specific Traits #								
M/C	36	51	58	158	51	151	74	153
N/S	9	11	6	50	8	49	9	67
P/M	1	16	1	8	21	6	7	16
Total	46	78	65	216	80	206	90	236
Specific Traits %[a]								
M/C	78	65	89	73	64	73	82	65
N/S	20	14	9	23	10	24	10	28
P/M	2	21	2	4	26	3	8	7
Holistic Score[b]	3.6	3.4	4.6	5.1	3.7	5.1	5.3	4.9
Miscue %[c]	0.4		1.5		2.5		1.2	

Note. Code to Specific Traits: M/C--Meaning-Construction Processes, N/S--Neutral States, P/M--Pre-Meaning Conditions.
[a]Rounded to nearest whole number.
[b]Based on the seven pairs of descriptors common to both individual and dyadic scales. Rounded to the nearest tenth.
[c]Miscue analysis not performed on dyadic protocols. Rounded to the nearest tenth.

students (viz., M5N, F5I, and M3K) each produced a higher number of specific traits in the individual condition. In the dyadic condition, student M4N and partner produced 78 specific traits, compared to the average of 118 for all dyadic protocols (see Figure 9). Each of the dyadic protocols of the other three students had over 200 specific traits. The holistic scores were all above their respective group average--3.1 for all individual protocols; 3.3 on the same seven items for all dyadic protocols. Three of the four individual protocols had less than 2% of serious miscues, indicating easy reading, and the fourth had 2.5%, indicating an instructional reading level that was close to easy. The individual protocol of student F5I showed a much higher than average number of pre-meaning specific traits--21 (26%) compared to 4 (9%) for all individual protocols (again, see Figure 10). Generally, then, apart from having MCMCA scores that were higher than average, these students produced more specific traits than average, had higher holistic scores than average, and produced few serious miscues.

The protocols of the two individual extreme groups (EGI1 and EGI4), each consisting of 13 students, were compared for reading miscues. The results are summarized in Tables 11 (EGI1) and 12 (EGI4). In EGI1, 11 of the 13 students read at the frustrational level, one read at the instructional level , and one read at the easy level. Passage X, rated easiest (Grade 6, Flesch-Kincaid), appeared only once and was at the frustrational reading level for the student. Passage Y, rated hardest (Grade 11), appeared nine times, with seven of those being at the frustrational reading level. Passage Z, rated at the Grade 8 level, appeared three times, all at the frustrational level.

The results given in Table 12 are strikingly different. Passage X, rated easiest, appeared six times, Passage Y, rated hardest, appeared twice, and Passage Z appeared five times. Eight of the 13 readings were at the easy level and the remaining five were at the instructional level. Only one of the readings approached the frustrational level, with a miscue rate of 4.7%.

It is clear, then, that, as a group, students who scored lowest on the MCMCAs after reading individually (EGI1) produced a higher percentage of miscues on their protocols than did students who scored highest on the MCMCAs (EGI4).

Table 11

Low-Extreme Individual Group (EGI1) Miscue Analysis Percent and Reading Level

	Passage					
	X		Y		Z	
Protocol	%	Level	%	Level	%	Level
X1F4X	13.4	Frustrational				
Y1F3A			1.8	Easy		
Y1F3D			11.1	Frustrational		
Y1M3F			8.9	Frustrational		
Y1M4G			2.1	Instructional		
Y1M4O			14.3	Frustrational		
Y1M4T			6.1	Frustrational		
Y1F4V			10.7	Frustrational		
Y1M5K			10.7	Frustrational		
Y1F5P			x[a]	Frustrational		
Z1F4F					12.1	Frustrational
Z1F4I					24.6	Frustrational
Z1F4R					5.1	Frustrational

[a]Too many miscues to count.

Table 12

High-Extreme Individual Group (EGI4) Miscue Analysis Percent and Reading Level

			Passage				
	X			Y		Z	
Protocol	%	Level	%	Level	%	Level
X1F3C	3.0	Instructional				
X1F4K	1.9	Easy				
X1M4N	0.4	Easy				
X1F4Q	0.4	Easy				
X1M4W	0.7	Easy				
X1M5N	1.5	Easy				
Y1M5A			1.1	Easy		
Y1F5I			2.5	Instructional		
Z1M3G					1.2	Easy
Z1F3I					3.1	Instructional
Z1F3J					4.7	Instructional
Z1M3K					1.2	Easy
Z1M5B					2.0	Instructional

Findings. Pertaining to Question Six, the findings were:

14. With the exception of the two high-extreme groups (as determined by MCMCA scores), the understanding of metaphor by students in the extreme groups varied significantly;

15. Students in the low-extreme individual group produced fewest analyzable utterances;

16. Students in the high-extreme individual group produced the highest proportion of meaning-construction utterances; and

17. Students who scored highest on the MCMCAs in the individual condition made fewer miscues when reading than did students who scored lowest on the MCMCAs in the individual condition.

g. Question Seven

What is the relationship between the level of students' understanding of metaphor and their understanding of text?

Analysis of students' understanding of metaphor as measured by scores on the multiple choice meaning clarification activities revealed an overall adult-like understanding of the 30 metaphors of about 65%, with significantly higher understanding in the individual condition than in the dyadic condition (see Questions One and Two, above).

Analysis of specific traits revealed that students produced more total utterances in the dyadic condition than in the individual condition. Overall, more utterances (70%) were of the meaning-construction type than of other types (see Question Five, above).

Although the difference was not statistically significant, the average dyadic holistic score was higher than the individual holistic score, when compared on the same seven pairs of descriptors--3.3 and 3.1, respectively (see Question Five).

Dyadic holistic average scores (all eight pairs of descriptors) and MCMCA scores achieved after reading in the dyadic condition were graphed to show the average holistic score for students who scored at each MCMCA value. With the single exception that students who achieved a score of 10

had a holistic average score one full point higher on the six-point scale than students with any other

MCMCA score, no significant pattern could be observed. See Figure 19.
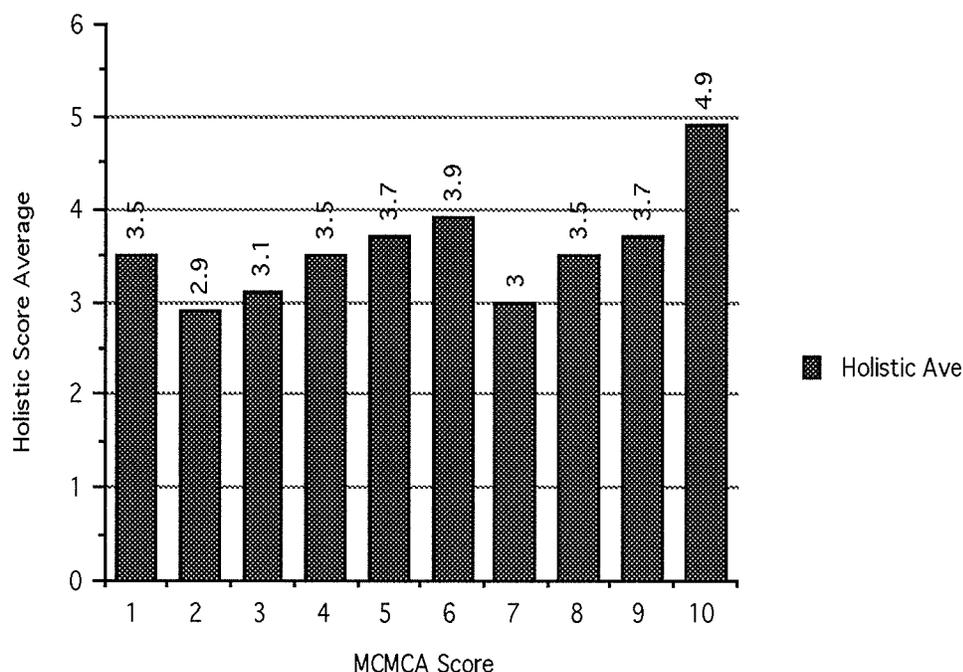
Figure 19 Holistic Score Average by Dyadic MCMCA Score

A similar graph was produced to show the relationship between MCMCA scores achieved after

reading in the dyadic condition and the average number of meaning-construction utterances

detected in the dyadic think-aloud protocols by specific-trait analysis. The results are given in Figure

20. Again, no significant overall pattern could be detected; however, as with the holistic scoring

average, students who achieved a score of 10 on the MCMCA also produced a higher average

number of meaning-construction utterances in their think alouds.

Individual holistic average scores (seven pairs of descriptors) and MCMCA scores achieved after

reading in the individual condition were graphed to show the average holistic score for students who

scored at each MCMCA value. There was a noticeable pattern, with students who scored from 6 to 10

on the MCMCA achieving average holistic scores at least a full point above those who scored below

six. See Figure 21.
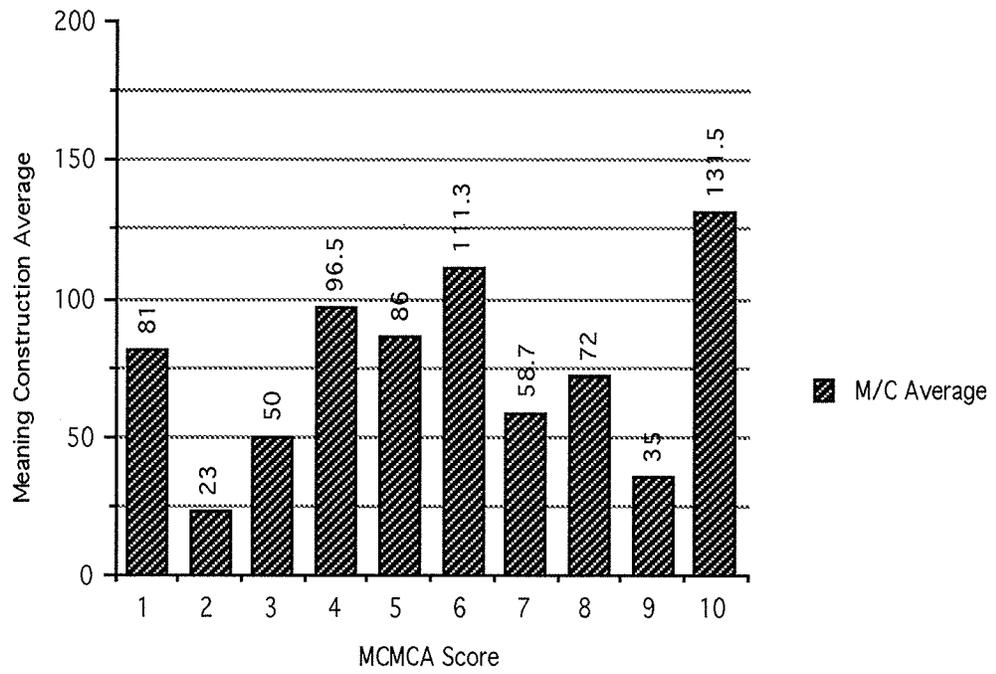
Figure 20 Meaning Construction Average by Dyadic MCMCA Score
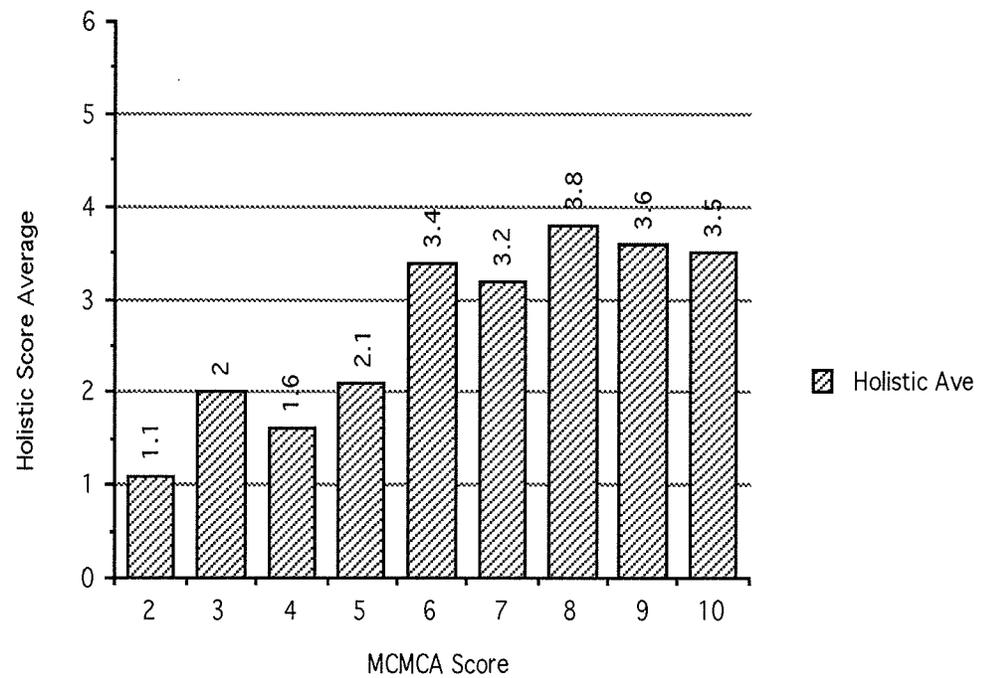
Figure 21 Holistic Score Average by Individual MCMCA Score

The relationship was examined between MCMCA scores achieved after reading in the individual condition and the average number of meaning-construction utterances in the individual think-aloud protocols. Results are given in Figure 22. As with the individual holistic averages, the individual averages of meaning-construction utterances were higher for students whose MCMCA scores were from 6 to 10. Again, students who scored 10 on the MCMCA had the highest average number of meaning-construction utterances, although only fractionally higher than students with a score of 9.
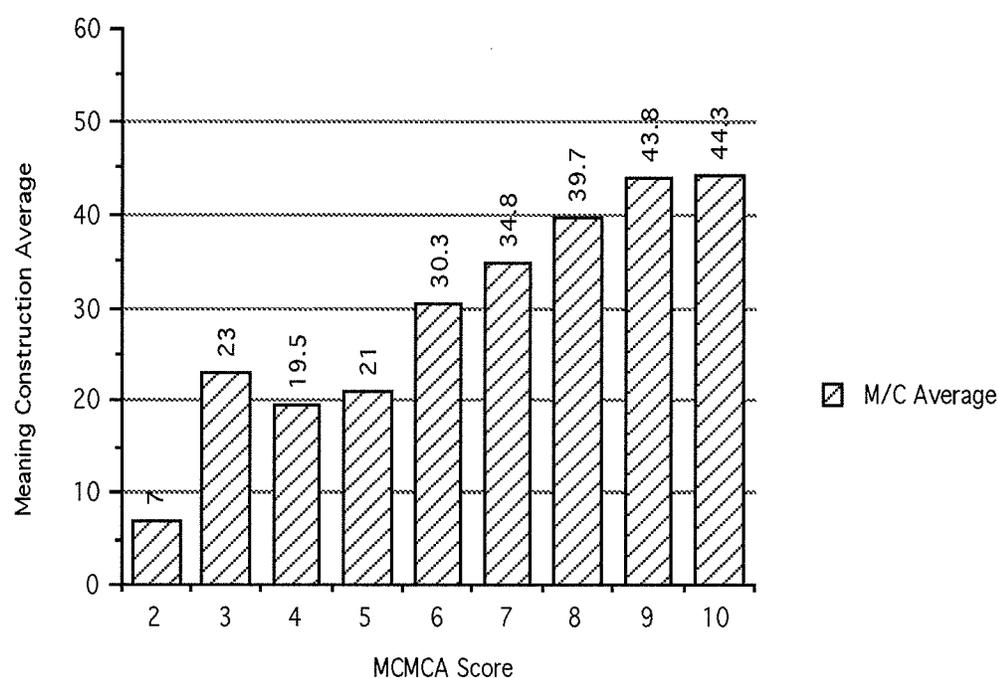
Figure 22 Meaning Construction Average by Individual MCMCA Score

As reported above, the dyadic protocols and MCMCA scores did not show the same patterns as the individual protocols and MCMCA scores. In a small number of cases both members of the dyad scored in the same extreme group (specifically, two dyads in EGD1 and three dyads in EGD4). Since most dyads, then, had members contributing MCMCA scores to different segments of the overall set, it is not surprising that their protocols tended to smooth out, rather than to separate into clearly defined groups, as was the case with individuals. It would appear that the sharing process at work in the dyadic think alouds masked individual differences, at least in those features measured by the

holistic rating scale and those identified by specific-trait analysis. This is supported by the average

scores for the eighth pair of descriptors on the holistic-rating scale, measuring the balance between

dyadic partners. As Figure 23 indicates, partners contributed relatively equally to the think alouds,

averaging 5.1 out of 6 on the balance item, a score that is considerably higher than the average scores

for the other pairs of descriptors.
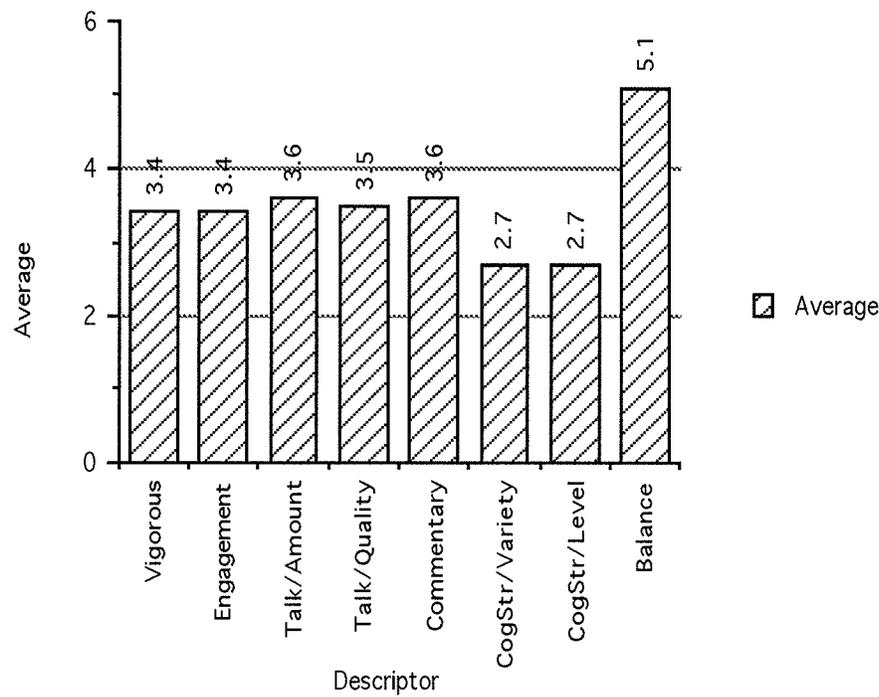
Figure 23 Holistic Average by Descriptor--Dyadic Protocols

Findings. Pertaining to Question Seven, the findings were:

18. It was difficult to identify links between MCMCA scores and holistic and specific-traits scores

for dyads;

19. Students working in the individual condition were more likely to separate into groups within

which MCMCA scores and holistic scoring, as well as number of meaning-construction utterances,

bore a positive relationship; and

20. According to the criteria established for this study, when working individually, students with

a higher understanding of the target metaphors demonstrated a higher level of understanding of the text passages in which the metaphors were presented.

III. Summary

In this chapter, the study data were examined in a variety of ways. Numerical data from the multiple choice activities were examined according to standard statistical practices. Specific-trait analysis of the think-aloud protocols provided descriptions of the reading processes engaged in by these students. The quantification of the occurrences of the specific traits provided data for standard statistical tests and for aggregate and percentage profiles of the protocols. The Likert-type holistic scale provided numerical data for description of the protocols. Miscue analysis was performed on the 55 individual think-aloud protocols.

The various analyses produced a total of 20 findings in answer to the study's seven questions. Taken together, these findings provide a picture of the understanding of the text passages and the understanding of the target metaphors by the study's 55 participants. The findings will be discussed in the following chapter.

CHAPTER FIVE: DISCUSSION, CONCLUSIONS, APPLICATION, LIMITATIONS,

AND RESEARCH IMPLICATIONS

I. Introduction

In this chapter, the findings from Chapter Four will be discussed. Connections with the research literature will be identified, and conclusions will be drawn. Application of the findings will be proposed, limitations will be noted, and implications for future research will be given. The chapter will end with brief concluding remarks.

II. Discussion

Findings Pertaining to Question One

Finding 1

Overall, students exhibited a 65% level of understanding of the metaphors.

One's initial response to the overall level of understanding of metaphor by these students may be one of surprise: Why do these students understand only about two-thirds of the metaphors?

I think it is instructive to turn the observation around--that is, by grade six these students have already reached two-thirds adult-level understanding of these metaphors when presented in these contexts. Looked at in a certain light, this can be considered a major accomplishment. For example, the texts used in this study were not written to conform to a formula determined beforehand as the

true indication of appropriate grade six level of understanding, whatever that might be. On the contrary, these texts were authentic--that is, presented as trade books and intended by the authors for use by a fairly broad range of readers. There is little textual evidence that the authors and publishers applied rigid criteria in marrying topic and text features. These were not written according to a formula, as is the case with some books, such as the so-called high-interest, low-vocabulary books and certain textbooks. All of this notwithstanding, these students, as a group, still managed to reach two-thirds of the anticipated understanding of adult members of the culture (Lakoff & Johnson, 1980; Lakoff & Turner, 1989; Lakoff, 1993).

Finding 2

There were wide variations in the scores for the three passages, with averages of 54% on Passage Y, 69% on Passage Z, and 73% on Passage X.

Factors other than the metaphors themselves may have influenced the scores. In classroom reading events, teachers routinely take into account such factors as student maturity, intelligence, prior knowledge, overall reading ability, and test-taking ability. The first three, for example, might well have a direct influence on the understanding of metaphor itself, while the last two might have a direct impact on task performance.

A point to be considered is that the text passages came from books written in other countries (USA and England). One would expect that the metaphors were representative of the stock readily available and familiar to the authors; certainly, the authors could not have chosen the metaphors with these particular students in mind. That notwithstanding, these students were able to identify the anticipated adult-like meaning a full 65% of the time over the three passages.

The question, then, is whether these students had prior knowledge of these particular metaphorical expressions, as predicted by Lakoff and Johnson (1980), Lakoff and Turner (1989), and Lakoff (1993), or whether they were able to apply their understanding of the metaphorical process to general conceptual-domain knowledge to construct a meaning on demand. This study was not

designed to examine these particular aspects of meaning making, and further research is needed.

This raises the further issue as to what extent an experimental task such as this actually activates the psychological mechanisms for making meaning via the metaphor process and to what extent explicit prior knowledge of the specific metaphors is being tapped. If meaning for the metaphor must be created on demand, then the question of context, as proposed by Ortony, Schallert, Reynolds, and Antos (1978) and Siltanen (1989), may well be significant, since the surrounding text may impose constraints and suggest possibilities. This may, at least in part, account for the clear inverse relationship between MCMCA scores and passage difficulty (as established by the Flesch-Kincaid readability formula). In other words, the surrounding text may have lacked the clear contextual features necessary to provide support in activating the domain knowledge critical to the successful completion of the mapping process.

Considering the results, one might be tempted to decry the incursion of U.S. or British books into Canadian classrooms. On the basis of the material examined here, such a response is not justified. The crucial issue, it seems, is not where the books are produced or the point of view from which they are written, but rather how they can be used with and by our students. In this regard, it must be noted that my use of the text passages in this study was narrow; in the classroom of a thoughtful teacher, the texts would be used in a more coherent way, a way more likely to seem purposeful to the students.

Findings Pertaining to Question Two

Finding 3

There was a significant positive correlation between students' individual and dyadic scores.

This is an interesting finding in that it indicates a significant degree of commonality between the individual and dyadic tasks, even though the passage difficulty changed from one task to the next, increasing for some students and decreasing for others. This suggests that metaphor understanding was, indeed, an important part of what was being measured. It suggests, also, that although metaphor

understanding may not be a single psychological construct, there is a certain core common to the various metaphors.

Finding 4

Student understanding of metaphor was significantly higher after completing the think aloud in the individual, as opposed to the dyadic, condition.

This finding was a surprise. The higher individual scores suggest that something having to do with the condition (individual or dyadic) influenced the outcomes. According to theories of social interactionism and cooperative learning, the students should have performed at a higher level in the dyadic condition. Below, I show that the direction of change in scores is generally consistent with expectations based on passage difficulty (see also the discussion of Finding 11, below). This has the effect, however, of suggesting that passage difficulty is a more powerful force than the sharing of a task, a conclusion that is hard to accept in light of the scaffolding effect associated with cooperative learning, regardless to the relative abilities of the participants (Johnson & Johnson, 1994).

One must ask whether something in the design of the study may have influenced the outcomes--for example, the effect of practice, the effect of order, the effect of past experience with dyadic procedures, or the effect of individual preference for a particular type of learning task.

Were the students perhaps unfamiliar with collaborative learning? It does not seem possible, since these students were from classrooms in which the whole-language, social-interactionist approach was commonly practiced. The students were, for the most part, aware of themselves and others as learners. They were accustomed to flexible grouping. With the exception of a very few students, they appeared to be sensitive to the feelings of each other and presented to each other in a supportive manner.

One possible explanation is that, in interacting with one another, students' attention was diverted from the text. This seems unsupported by the quality of the think-aloud protocols. While there are generally many more analyzable utterances in the dyadic protocols and a moderate shift in

focus toward specific traits within the combined category of Neutral States, there is no significant difference in the relative percentages of analyzable utterances in the three combined categories compared to the individual protocols.

Another possible explanation is that the shift of focus from working with a partner to working alone--that is, from dyadic reading to individual answering of the multiple choice activity--in some way presented a conflict that the students did not resolve in the time provided. There is nothing in the data to shed light on this.

Yet another possibility was examined. Since dyadic think alouds had been done before the individual think alouds (see Pilot Study, Procedures, Chapter Three), it was possible that the additional practice might have affected the outcome in the following session. However, the students had practiced dyadic and individual think-aloud procedures in the first two sessions and, for the most part, seemed comfortable with the process, especially working with a partner. As well, one might expect the additional practice to affect the think-aloud process itself, resulting in more ease with the process and more of those features that mark successful think alouds. As noted, students were highly consistent in their approach, whether working alone or with a partner, except for the amount of talk per protocol, which was lower in the individual condition. In other words, there was nothing in the individual think alouds, taken as a group, that would point to a higher level of understanding on the MCMCAs. Indeed, with regard to the think-aloud process, it was the opinion of a small number of students that talking to oneself--or to a tape recorder--was an unusual thing to do, but no student expressed any surprise at being asked to talk to another student about what was being read. On this basis, if an influence of condition were to be found, one would expect it to be in favour of the dyadic condition.

As indicated above, it is possible that the results were complicated by the differences in the reading levels of the three passages. To take a narrow example (and one limited by the limitations of readability formulas), the Flesch-Kincaid Grade Level Formula produced a grade level score for Passage X of 6, for Passage Y, 11, and for Passage Z, 8. If the data from Table 3 (see Chapter Four,

Question Two) is examined for direction of change of scores, relating the rise or fall in each case to the change in the grade levels of the passages, the results are largely predictable, as shown in Table 13.

As can be seen from this table, only 7 of the 46 non-tie pairs of scores did not match direction of change consistent with passage difficulty level. A chi-square calculation using the data of Table 13, with $\underline{df}$=1 and α=.05, gave a value of 0.249, within the critical values of $98 \cdot 10^{-5}$ and 5.02, indicating that the change in direction of scores is within the expected range; that is, it is indicated that the direction of change of scores in understanding of the metaphors is consistent with a difference in reading difficulty between each pair of passages compared.

Again, the reason for the effect is not clear--that is, understanding of metaphor may drop when passage difficulty increases, but why? Is it because the context is such a significant determining factor for the understanding of metaphor? The literature on context effect is not helpful here, focusing mainly on length of immediate context (see, for example, Ortony, Schallert, Reynolds, and Antos,1978, and Siltanen, 1989). Is it because, as the passage difficulty increases, reader attention is drawn to the difficult parts in an effort to decode them? If such is the case, is less attention given to those parts that do not immediately force themselves upon the reader's consciousness as requiring particular attention, as may be true of metaphor, especially if it is metaphor that has enough commonness that the reader may be aware of having heard it before and may be less concerned about processing it to a deeper level than the clearly unknown surrounding text. This, of course, is hypothetical and needs examination beyond the level possible in this study.

Whatever the specific dynamics enacted when reading difficulty increases, one could reasonably expect the same factors to affect the results of authentic classroom reading tasks involving the understanding of metaphor.

It might have been interesting to correlate MCMCA scores with data on student reading achievement and ability, as measured by recognized standardized tests, since the results would have provided yet another way to look at student performance in this study. However, recent scores were not available on a student-by-student basis. While one would be inclined to predict that more-capable

Table 13

Summary of Data from Table 3, Changes in MCMCA Scores According to Level of Passage Difficulty

	1st. Score	2nd. Score	Total
Higher (Expected[a])	15	24	39
Higher (Not Expected[a])	2	5	7
Total	17	29	46[b]

[a]Based on passage difficulty.
[b]Does not include 9 cases in which first and second scores were identical.

readers would score higher on the multiple choice activity--and miscue analysis does provide

provisional support for this view--this study does not give conclusive evidence.

Finding Pertaining to Question Three

Finding 5

There was no significant difference in understanding of metaphor for the same passage between the dyadic and individual conditions.

Given the random assignment of students and passages, this finding is as unexpected as

Finding 4. Social interactionism predicts higher scores in the dyadic condition (see, for example, the

research support for cooperative learning in Johnson & Johnson, 1994); however, at the single

passage level, students performed equally well in the individual condition. This suggests that when

passage difficulty remains constant, condition (dyadic or individual) is unimportant. Taken together

with Finding 4, this is perplexing, since condition was found to have an (unanticipated) effect with

change to a less or a more difficult passage.

Findings Pertaining to Question Four

Finding 6

Student understanding of metaphors of the copula-verb (equation) syntactic-frame type was significantly lower than of the descriptive-phrase syntactic-frame type.

This was the only metaphor-type effect identified in this study. Interestingly, it made no difference whether the comparisons involved incompatible- or disparate-type source/target combinations (i.e., whether the source and target came from disparate categories, sharing physical or functional features, or from incompatible categories, between which there is conventionally no shared feature [Broderick, 1992, p. 187]).

These findings suggest that for these students--and for certain metaphors--the significant element in metaphor construction was not what was compared but how it was compared--that is, how the metaphor was structured. This seems to suggest that the linguistic features of metaphor are an important factor in their understanding. On the other hand, it may be seen from the opposite point of view--that is, that the metaphor process remains intact but linguistic complexity reduces understanding. This need not be taken to support the idea that metaphor is primarily a linguistic device, as older views suggest, but simply that many and diverse factors affect the meaning-construction process. This would be consistent with the view of metaphor as mapping from conceptual domain to conceptual domain.

Finding 7

The Lakoff, Johnson, and Turner method of analyzing metaphors did not isolate differences to account for the varying performance scores on the MCMCAs.

The use of authentic text, as in this study, introduced metaphors of such diversity and complexity (refer to Appendix L) that analysis according to the ideas of Lakoff, Johnson, and Turner was not possible. In an experiment using specially designed metaphors, however, it should be possible to control both the design and the complexity of the metaphors so as to make such analysis

possible.

During the examination of Lakoff, Johnson, and Turner's ideas of metaphor as a conceptual mapping (Lakoff & Johnson, 1980; Lakoff & Turner, 1989; Lakoff, 1993), two potentially related factors were considered. The first was the degree of abstractness of the words involved in the metaphorical expression. This was felt to offer possible explanation for difficulty in understanding on the premise that the more abstract the source and target words, the more complex would be the mapping procedure. The second factor was the degree of conventionality or commonness of the metaphorical expression or major parts of it.

With regard to abstractness, the eight items constituting the high-extreme set (items X-2, X-5, X-6, X-9, Z-1, Z-6, Z-7, and Z-9) and the eight items constituting the low-extreme set (items X-4, Y-1, Y-5, Y-7, Y-9, Y-10, Z-3, and Z-4) were examined for abstractness and concreteness (see Table 14). The degree of abstractness is very high throughout. Of the high set, only one of the 18 key words or phrases is concrete. In the low set, of the 20 key words, three are concrete. The degree of abstractness does not seem to be a determining factor at the item level. Item Z-9, for example, in the high group (with 81% adult-like response), contains four abstract key words--more than any of the other 15 items. On the other hand, item Y-9, containing one abstract and one concrete key word, was understood by only 32% of the students--the lowest percentage of all items.

The second factor--degree of conventionality or commonness--appears to offer greater explanation of the differences between the extreme sets. Among the items in the high-extreme set, for example, common words, expressions, and concepts, such as "latches on," "growing up," "basket," "fall," "binding," and "maternity," contribute greatly to the structure of the metaphors. Among the items in the low-extreme set, on the other hand, less-common words, such as "abounding," "fleeing," "girdled," "based," and "protections," are key words in several of the metaphors, and, in some cases, otherwise familiar words, such as "walks," "life," "comforts," "interruption," and "shook," are used in conjunction with less familiar key words or in less familiar ways.

Table 14

Abstractness of Metaphor Key Words/Phrases--High- and Low-Extreme Items by MCMCA Score

Extreme	Item	Word/Phrase	Observation
High	X-2	sky	abstract
		night	abstract
		deepens	abstract
	X-5[a]	maternity	abstract
		colony	abstract
	X-6	forms (verb)	abstract
		basket	concrete
	X-9[a]	latches on	abstract
	Z-1	power	abstract
		crumbles (verb)	abstract
	Z-6	fall	abstract
		Roman Empire	abstract
	Z-7[a]	society	abstract
		growing up	abstract
	Z-9	oath	abstract
		loyalty	abstract
		binding	abstract
		life	abstract
Low	X-4	light	abstract
		fleeing	abstract
	Y-1	woods	concrete
		abounding	abstract

(Table 14 continued)

Extreme	Item	Word/Phrase	Observation
		shadows	abstract
		mystery	abstract
	Y-5[b]	walks (noun)	abstract
		life	abstract
	Y-7[b]	civilization	abstract
		comforts (noun)	abstract
		protections	abstract
	Y-9[b]	interruption	abstract
		trees	concrete
	Y-10	girdled	abstract
	Z-3	town	concrete
		based	abstract
		society	abstract
	Z-4	raids	abstract
		shook	abstract
		power	abstract

[a]Highest three items.
[b]Lowest three items.

The impact of degree of conventionality--that is, the familiarity one would expect members of our culture to possess--is consistent with the ideas of Lakoff and Johnson (1980), Lakoff and Turner (1989), and Lakoff (1993), as explained in Chapter Two. What is lacking, however, is a means to

measure the degree of conventionality. It is one matter to identify phrases (metaphorical and otherwise) that are conventional among adult members of a subculture, or possibly even in the larger culture, but it is much more difficult to predict the likelihood that children will have acquired the terms and conventionalized them at the personal level. This helps to explain why, for example, the metaphorical phrase "latches on" was understood well (87%) but "walks of life" showed a relatively low level of understanding (41%). For an adult member of the subculture, both expressions may be entirely conventionalized; for a child, on the other hand, the expressions may not yet have reached even early stages of familiarization. It is unknown, for example, the degree to which the child's immediate culture, including the home, provides linguistic practice with metaphorical expressions, leading to their conventionalization.

Unknown, too, is the extent to which students' past reading may have contributed to the process of conventionalizing the metaphors. One would expect that an avid reader would have had more opportunity to experience the conventional metaphors than a hesitant reader and to become familiar with their use in a variety of texts. This would be consistent with the idea that there is a cultural basis for metaphor, as proposed by Lakoff and Johnson (1980), Lakoff and Turner (1989), and Lakoff (1993).

Findings Pertaining to Question Five

Finding 8

Students produced significantly more analyzable utterances when working in dyads than when working individually.

If, as social interactionist theory maintains, talk can function as a mediator between text and meaning (Wells, 1991), then this finding should indicate an enhanced meaning-construction situation in the dyadic condition. This makes Finding 4 even more difficult to explain.

From Figures 9 and 10 (see Chapter Four), it can be seen that the relative percentages of specific traits in the three combined categories in the dyadic and individual conditions vary. For

example, the percent of meaning-construction utterances is about 65% of all utterances in the dyadic condition (Figure 9), but rises to about 76% in the individual condition. The neutral-states utterances (marking orientation toward task) account for about 15% of the utterances in the individual condition, but rise to about 27% in the dyadic condition. It seems reasonable to expect work with a partner to encourage the kind of task orientation talk found in the protocols of these students; indeed, one would be surprised if there were little such talk. Even with this shift, the dyadic protocols averaged over twice as many meaning-construction utterances as individual protocols.

All things being equal, then, the dyadic think aloud provides the opportunity for students to engage in high-quality talk, the sort Wells (1991) suggests will mediate learning. The challenge is to ensure that other factors do not interfere with the mediational power of the talk.

Finding 9

More utterances (70%) were for the purpose of constructing meaning than for other purposes.

This finding (see Figure 8, Chapter Four) confirms the value of the talk engaged in by these students, giving additional weight to the remarks made in Finding 8. The think-aloud demonstrations, the practice sessions, and the directions given during each target session all emphasized making meaning with the text. This finding suggests that the students followed the directions well.

Given the richness of the think alouds of these students, it was possible to examine not only the meanings they constructed, but in many cases to follow the processes the students engaged in as they went about constructing meaning. This study thus supports the findings of others (e.g., Afflerbach & Johnston, 1984; Ericsson & Simon, 1993). Clearly, the think aloud is a useful procedure for the type of study undertaken here. It may well have considerable potential for application in the classroom as a teaching tool and diagnostic device.

Finding 10

Students were consistent in their approach to the think-aloud task whether working dyadically or

<u>individually</u>.

This finding suggests that the think aloud should be applicable in a variety of classroom situations where the examination of text is called for, and, further, that the researcher or teacher should be confident that what is being revealed is dependable.

This consistency may have resulted in part from the demonstration and practice of the procedure. If this is so, it suggests that, with demonstration and frequent reinforcement by the classroom teacher, the students should become quite proficient with the process and, as a result, much more aware of their own thinking processes and outcomes.

On the other hand, there is a naturalness about the think-aloud process, especially when it involves students working together. This can be reassuring to the researcher or teacher who wishes to make use of the think aloud.

<u>Finding 11</u>

<u>When passage difficulty increased, the average percent of meaning-construction utterances in the individual condition dropped significantly (α=.05)</u>.

As indicated above (Chapter Three and Finding 4), the three passages differed in reading difficulty, with Passage X being least difficult and Passage Y being most difficult, based on the Flesch-Kincaid reading grade level formula. When the shift in meaning-construction utterances is examined, it appears that as the text difficulty increases, the meaning-construction process suffers, and more noticeably when the student is reading individually, since the support offered by a partner is lacking. This is consistent with reported observations that as reading difficulty increases, students rely on different strategies and exhibit different concepts of what constitutes the reading process (see, for example, Baker & Brown 1984). This suggests that the easier the passage, the more the reader is able to concentrate on meaning construction and, further, that a capable reader is able to maintain focus on meaning construction over a broader range of text difficulty.

Mention of a few features of the three text passages will make the matter of varying difficulty

clearer (see also Appendix S, Passage Statistics). Passage Y (Frontier Home), for example, focusing

on a topic with the potential to be of considerable interest to young people (i.e., difficulties settlers

faced in the colonization of a frontier, in this case the American West), distanced itself through a

high-demand vocabulary (e.g., abounding, clusters, ingenuity, interspersed, persisted, phenomenal,

versatile, withered), long sentences and difficult sentence structure (e.g., sentences had an average

length of 21.2 words, with the longest sentence having 36 words and only two sentences having

fewer than 12 words; six sentences were written in the passive voice; and sentence structure was

often complex--e.g., "Jolted by every rock and root, they rode along for days or weeks, tree branches

swirling over their heads"; "Yet with opportunity came phenomenal difficulties, including threats from

the weather, disease, wild animals, and sometimes from the Indians who were being displaced"), and

potentially unjustified assumptions regarding student prior knowledge of U.S. geography, history,

and culture (e.g., of the Appalachian region, the Conestoga wagon, the states of Indiana, Kentucky,

and Mississippi). The Dale-Chall Formula found 16.5% of the words to be unfamiliar, which is

somewhat higher than Passage X, but lower than Passage Z.

Passage Z (The Middle Ages) also presented textual difficulties, although less extreme than

Passage Y. It had a large number of words with three or more syllables (15.8%). It had fairly

specialized vocabulary (e.g., chieftain, dominated, fealty, feudalism, Germanic, Goths, homage,

Lombards, Syria, Vandals, villas). Interestingly, the word "society" caused readers considerable

difficulty. The passage had a few sentences with initial adverbial phrases and clauses that would make

the reading more difficult for some students (e.g., "At the beginning of the first century, the Roman

Empire dominated..."; "Although Roman customs continued for a while, a new way of running

society..."). For the most part, however, the sentences were in natural order, compensating for the

few more difficult cases. The Dale-Chall Formula found 19.5% of the words to be unfamiliar, highest of

the three passages.

Passage X (Shadows of Night: The Hidden World of the Little Brown Bat) had fewest difficult

text features. Seventy percent of the words had one syllable. Only 6% of the words had three or

more syllables. The sentences averaged 13.9 words in length, with 18 sentences having fewer than 12 words and only 3 having more than 24 words. There was one Latin term, <u>Myotis lucifugus</u>, but it was explained immediately. While a number of sentences began with adverbial phrases or clauses, these elements were generally fairly short. They were often simple expressions of time (e.g., "At dawn..."; "Two months later..."; "During the first day...") and were easily related to the following text. Most sentences, however, were in natural order, with the subject easily identified. The Dale-Chall Formula found 12.0% of the words to be unfamiliar.

While any single feature of the sort mentioned here may not be enough to increase significantly the difficulty of the reading task, it is likely that several such features in combination do change the nature of the reading task and, therefore, the meaning constructed with the text. This has implications for research examining the meaning-construction process and for the classroom teacher faced with choosing material for student use. In this study, the varying difficulty of the texts added an interesting additional factor, but it did not interfere with the central aim, which was to determine level of understanding of metaphor in authentic text. If the aim had been otherwise--to examine the psychological processes involved in understanding metaphors, for example--the varying difficulty of the passages may well have complicated analysis significantly.

<u>Finding 12</u>

<u>Holistic scoring revealed large but non-significant differences between the think-aloud protocols of students who scored at the low and high extremes on the multiple choice meaning clarification activities in the individual condition.</u>

Although the differences did not reach the level of statistical significance, they reflected a clear difference in quality to the raters (see Figures 14 and 15, Chapter Four). This perceived discrepancy is, perhaps, a reflection of the nature of the Likert-type scale used for the holistic rating; that is, the lowest value obtainable was one, and this designated a decidedly negative assessment of the protocol (see Appendix G). If the scale were to run from zero to five, for example, the magnitude of

the differences would be increased, and the differences might well reach the level of statistical

significance.

The usefulness of a measure like the holistic rating scale employed here perhaps needs to be

reevaluated. Its relative ease of use and its more-or-less "instant numbers" make it attractive; yet, it is

open to effects of subjectivity on the part of the raters, especially when tiredness induced by lengthy

rating sessions is involved.

On the other hand, it could be countered that much of the assessment of student work is of just

such a nature, where the teacher is judging quality against a set of descriptors not likely to be greatly

different from the descriptors used on this scale.

Perhaps the solution is to use the results for exactly what they are--descriptive indicators of

identifiable qualities--and avoid attaching too much weight to the numbers themselves.

Finding 13

Students' scores on the individual MCMCAs showed a significant negative correlation with the

level of serious miscues made while reading the passages.

There has been considerable disagreement as to what constitutes easy, instructional, and

frustrational levels of reading, based on miscue analysis, and whether the concepts are even

appropriate (see, for example, Lowell, 1970). That notwithstanding, it seemed that miscue analysis

could reveal enough about students' text-handling skills to permit comparisons. I believe this is

confirmed by the data presented in Appendix O.

The method of counting only serious miscues may not find favour with all educators, some of

whom may, for example, prefer to count all substitutions--meaningful as well as meaningless--as

serious. In a sense, then, there is a degree of arbitrariness about such decisions as whether to assign

levels or where to set the boundaries if levels are assigned. That having been said, then, one must

ask whether the parameters were adhered to and whether anything of interest was found. In the case

of the present study, I believe the inverse rank correlation between the MCMCA scores and level of

serious miscues (those that changed the meaning of the text) provides one more piece of evidence that the students who demonstrated higher meaning-construction skills also understood the metaphors better than those students whose meaning-construction skills were weaker. As can be seen from Appendix O, of the top 23 students in the individual condition (those scoring 8, 9, or 10 on the MCMCA), only one read below the instructional level, and then only marginally. On the other hand, among the bottom 20 (those who scored 2, 3, 4, 5, or 6), 13 students read at the frustrational level.

This is not to be construed as an endorsement for miscue analysis, per se. Rather, it is offered with the belief that where pooled information agrees, there may be something worth examining. In this case, the miscue analysis results are consistent with the results of both specific-trait scoring and holistic scoring.

Findings Pertaining to Question Six

Finding 14

With the exception of the two high-extreme groups (as determined by MCMCA scores), the understanding of metaphor by students in the extreme groups varied significantly.

The significant differences between the two low-extreme groups (EGI1 and EGD1) and their respective high-extreme groups (EGI4 and EGD4) are not surprising. It is perhaps not surprising that the two high-extreme groups did not vary significantly, since four students appeared in both groups, and there appeared to be a ceiling effect, with the top scores grouped at 9 and 10.

It is surprising, however, that the two low-extreme groups differed significantly, given that seven students--over half of each group--appeared in both groups. The statistical difference between the two groups is accounted for by the higher individual scores, but why the lowest performing students should perform at a higher level when working alone, rather than with a partner, is unclear. It may be that working with a partner is, for some reason, a distraction for these students. Whatever the cause, in this study, it was the very students who should have benefited most from the intended scaffolding

offered by dyadic work (Vygotsky, 1962, 1978; Wells, 1991) who, in fact, appear to have benefited least. Clearly, further examination of this effect is in order, given the widespread acceptance of social-interactionist theory.

Although it was intended to avoid examining the relative performance of boys and girls (since to do so would require a study devoted solely to the one issue), the makeup of the groups of students common to the two low-extreme groups and the two high-extreme groups was striking and surprising. Of the four students who appeared in both high-extreme groups, three were boys, while of the seven students who appeared in both low-extreme groups, six were girls. I have no basis upon which to speculate as to the cause of this phenomenon, but it would seem to merit further investigation.

Finding 15

Students in the low-extreme individual group produced fewest analyzable utterances.

Taken in conjunction with Findings 8 and 14, this finding suggests that, for these students, talk about the learning task may not be a familiar or comfortable strategy and may act as a distractor, rather than a scaffold. On the other hand, it may be that students with limited resources may have difficulty allocating those resources to more than one aspect of the task at the same time, that they become, essentially, single-strategy learners.

Should the foregoing be true, then it would seem that part of classroom strategy instruction should focus on how to bring to bear more than one strategy or skill at a time and how to do it consciously. This may be a place where more teacher modeling of metacognitive strategies and specific reading strategies is called for. And it may be, also, that the think aloud can play a significant part in this process, for demonstration and practice and as an ongoing learning strategy. Despite this study's surprising results with dyadic think alouds, the literature on cooperative learning is substantial enough to suggest that, if properly used, dyadic work enhances learning (see, for example, Johnson & Johnson, 1994).

In relation to the three findings (8, 14, and 15), it would seem that three issues may need further

examination: first, the nature and extent of the cognitive load of the think-aloud process for less-capable readers; second, whether the metacognitive demands are different for a reading think aloud than for a silent reading of text; and, third, whether the combined demands of engaging in the two processes simultaneously overload the less-capable student.

Finding 16

<u>Students in the high-extreme individual group produced the highest proportion of meaning-construction utterances.</u>

This finding indicates that these students were very focused on the meaning-making process. Two interpretations of this are possible. Either the students were performing according to the instructions they had been given--that is, to make meaning and to say what that meaning was--or they were under-reporting their thought processes. One would expect these particular students to be proficient in following directions. Additionally, since these students were likely fairly mature readers, judging from the way they handled text and the sophistication of some of their reading processes, it may be that some of the processes had become so automatic as to drop below ordinary consciousness (Anderson, 1980, and Ericsson & Simon, 1980, cited in Afflerbach & Johnston, 1984). Specifically, for example, the on-the-go decisions about the task may have been so well-established in the skills repertoire as to be spontaneous and, to the students, unnoteworthy.

A second issue is somewhat more complex, that is, the degree to which admission of lack of knowledge or acknowledgement that the meaning-making process has not been successful (the conditions identified by the Pre-meaning Conditions [P/M] group of specific traits) contributes, ultimately, to successful meaning making. In other words, when we do not know, is it important that we be aware of our lack of understanding? The answer to this question is of interest, not only to one involved in the type of research reported in this study, but also to the teacher involved in reading instruction.

In this study, the P/M specific traits were not considered positive contributors to the

meaning-making process, although quantity of talk (i.e., regardless of purpose) was seen as an indication of engagement with task. There is a sense in which this approach entails a logical inconsistency; however, for descriptive purposes, this approach seemed necessary.

Finding 17

Students who scored highest on the MCMCAs in the individual condition made fewer miscues when reading than did students who scored lowest on the MCMCAs in the individual condition.

This finding is consistent with the overall tendency discussed under Finding 13 above. In this case, however, the differences are large (see Tables 11 and 12, Chapter Four), providing one more piece of evidence of a link between metaphor understanding and text understanding, a link that is of particular interest in this study.

Findings Pertaining to Question Seven

Finding 18

It was difficult to identify links between MCMCA scores and holistic and specific-traits scores for dyads.

Because of the random assignment of students to dyads, it was common for members to vary considerably in their MCMCA scores. Of the 10 dyads contributing to the low-extreme group (EGD1), only two had both members placing in the group--that is, eight members of EGI1 had partners who scored outside the group. Similarly, of the 11 dyads contributing to the high-extreme group (EGD4), three had both members placing in the group--that is, eight members of EGD4 had partners who scored outside the group. As a result, any description of the dyadic think-aloud protocols applied to more than one quartile-like group, except in a minority of cases, therefore limiting the potential for interpretation.

Of interest in this regard, however, is the power of the dyad to mask certain aspects of the performance of weaker partners. In some protocols, for example, where there was a clear difference in

reading ability between the partners, there was some evidence of a tendency for the more capable reader to compensate for the weaker partner by reading more, with the weaker reader still contributing as an equal partner in the discussion portion of the think aloud.

On one hand, this makes analysis difficult; on the other hand, however, it suggests that the dyadic think aloud has the potential to benefit weaker readers by making them co-contributors to the meaning-making process.

Finding 19

Students working in the individual condition were more likely to separate into groups within which MCMCA scores and holistic scoring, as well as number of meaning-construction utterances, bore a positive relationship.

Although dyadic MCMCA scores did not relate clearly to specific-trait and holistic scores, the individual MCMCA scores did so (see again Figures 21 and 22, Chapter Four). For the individual MCMCAs, the boundary between the upper and lower groups for both holistic scores and average number of meaning-construction utterances was an MCMCA score of six. Interestingly, this corresponds closely to the grand mean for all MCMCA scores (6.52). This forms two fairly distinct groups: the first, those who scored six or above on the individual MCMCA, who had a holistic average score above three, and who had an average number of meaning-construction utterances of 30 or more; the second, all those who failed to reach these criteria.

There were, of course, individual variations, and this profile cannot be taken as indicative of the performance of any particular individual, nor should one of the values be taken as a predictor of either of the others. Nonetheless, this grouping extends beyond the extreme groups and gives an additional glimpse of the overall picture of the relationship between MCMCA scores and think-aloud performance.

<u>Finding 20</u>

<u>According to the criteria established for this study, when working individually, students with a higher understanding of the target metaphors demonstrated a higher level of understanding of the text passages in which the metaphors were presented.</u>

This finding should contribute to future research into children's understanding of metaphors in informational text by shifting the starting point to a higher level of assumptions than was possible for this study. In future studies, it will be possible to focus on the dynamics of the single issue of understanding of metaphor rather than to have a dual focus, as was the case here.

It must be noted that this finding does not imply a causal relationship of any sort; it does suggest that, on average, students who show more understanding of the metaphors also show more understanding of the text. Similarly, it should not be concluded that a student who shows a higher understanding of the metaphors in a text will necessarily understand the text at a correspondingly high level.

III. Conclusions

Based on the findings examined in Chapter Four and above, a number of concepts, comprising the conclusions of this study, have been identified. They are as follows:

1. Students understood about two-thirds of the metaphors;

2. Student understanding was significantly higher in the individual condition compared to the dyadic condition;

3. Overall text difficulty affected students' ability to construct meaning for metaphors;

4. The syntactic-frame structure of the metaphor affected students' ability to construct meaning;

5. Abstractness of the words in the metaphor did not affect student ability to construct meaning, but degree of conventionality of the metaphorical expression itself did have an effect;

6. There was a positive correlation between understanding of text and understanding of the

metaphors embedded in the text;

7. The think aloud revealed something of both the constructed meaning and the process of meaning construction; and

8. Students who could not perform well on the multiple choice activities could still participate as equal partners in the dyadic think alouds.

IV. Application

The eight conclusions are considered to have implications for classroom practice.

With regard to Conclusion 1, because there was a substantial percentage of metaphors not understood, and because other students may have more-or-less similar levels of understanding, teachers should find it worthwhile to give attention to metaphor in their teaching. This attention could involve sensitizing students to metaphor, using the ideas of Lakoff, Johnson, and Turner to show the ubiquity of metaphor. It could also involve drawing attention to specific examples of metaphor during reading activities and the use of specific metaphors in teaching, not only to raise linguistic awareness, but to make prior knowledge explicit and to enhance learning of specific information. This would be consistent with the approach to metaphor use in the classroom advocated by Pugh, Hicks, Davis, and Venstra (1992).

With regard to Conclusion 2, when teachers use paired reading activities, they need to be aware that careful monitoring is necessary to ensure that the anticipated outcomes are, in fact, being achieved. Part of this process should be the careful enunciation of the purpose of the reading event. This study found indication that some students were uncertain as to their personal purpose for reading and were, as a result, tentative in their approach to the task. This is consistent with Baker and Brown's (1984) contention that a clearly established purpose for reading enhances the quality of the reading. The observations made in the analysis of the think-aloud protocols in this study can be taken as support for the position that teachers should aid and encourage students to set clear purposes for reading.

It stands to reason, as well, that a clearly defined purpose helps establish which cognitive processes will need to be monitored during the reading and, in some situations, which metacognitive strategies should be given particular attention. Given adequate modeling of the various metacognitive strategies by the teacher, and given practice of the sort that can be monitored by the teacher, by having the students engage in think alouds, for example, achievement should be enhanced.

With regard to Conclusion 3, this study found that the level of students' serious reading miscues was correlated with understanding of metaphors in the text passage. Teachers need to be aware that miscue analysis can be a rough indicator of student understanding of metaphor, either potentially or as the outcome of the reading of a particular text. Conversely, a simple multiple choice test on metaphors in the passage may provide useful additional information about student understanding, as judged from miscue analysis.

This study found that students who performed at the high extreme individually and those who performed at the high extreme dyadically were likely to do equally well on the types of activities used to measure understanding. For the most proficient readers, teachers will need to make their decision to assign group or individual work on criteria other than simple test performance.

This study found that students in the low-extreme group, in terms of understanding of target metaphors, were likely to produce less talk in their individual think alouds than students in the high-extreme group. It may be possible for teachers to use the reading think aloud as a rough indicator of student understanding of text without the necessity of engaging in overly detailed analysis.

This study found also that students in the high-extreme individual group were likely to concentrate a higher percentage of their talk on meaning-construction processes than were students in other extreme groups. Teachers may wish to use the think-aloud skills of such students as models in their teaching of metacognitive skills to other students. Additionally, teachers need to ensure that text is of the appropriate level of reading difficulty for the students using it in order to encourage

students to concentrate more of their attention to the process of meaning construction.

This study also found that students understood more metaphors in passages that were easy to read than in those passages that were at their frustrational level. This is consistent with the findings of Dean's study (cited in May, 1994, p. 410) that understanding breaks down when reading becomes too difficult. Teachers need to be aware that the potential benefit of metaphor-rich language may be lost if students are not given reading material at their instructional or easy-reading level.

With regard to Conclusion 4, this study found that these particular students experienced significantly more difficulty with metaphors of the copula-verb type than those of the descriptive-phrase type. This is consistent with the view held by Broderick (1992) that students encounter fewer cases of copula-verb metaphors in their reading and may not be as experienced with them as with other kinds. Teachers need to be aware, then, that students may be understanding descriptive-phrase type metaphors but experiencing difficulty making meaning for copula-verb type metaphors.

With regard to Conclusion 5, the importance of the conventionality of the metaphorical expressions underscores the need for rich, authentic language experiences in which students have the opportunity to use language purposefully. It also underscores the need for the teacher to ensure that the students become aware of the language environment created by their particular oral subculture, since it is that which will, in large part, contribute to the conventionalization of the forms and expressions that the students need in order to become mature users of the language. Also, since the underlying metaphors are part of the broader culture of which the subculture is a part, when students gain use of the language and thinking of the underlying metaphors, they become in fact members of the wider culture. The work of Lakoff, Johnson, and Turner can provide teachers with a starting point into the process, and the ideas of Pugh, Hicks, Davis, and Venstra (1992) can provide practical guidance.

This study showed that, at least in these particular metaphorical expressions, students were not affected by the presence of abstract terms, nor were they aided by the presence of concrete terms.

This suggests that there is no reason for the teacher to be overly concerned about students' ability to use and understand abstract terms, although this generalization must be respected as such, since individual students will vary greatly in this, as in all things.

With regard to Conclusion 6, teachers can make use of this relationship in their assessment of students' growth in understanding. By probing student understanding of metaphors during reading activities, the teacher can form a general idea of the depth of understanding of the text, since metaphorical language in a text is a powerful element of it. Clearly, if the metaphors are not understood, part of the meaning is lost. It follows, then, that by helping students strengthen their understanding of metaphor, teachers will contribute to their overall understanding of text. Part of this process should involve making the process explicit through example, discussion, and generation and examination of metaphors.

With regard to Conclusion 7, teachers have traditionally listened to students read and listened to their answers to questions, but one suspects that teachers spend little time examining students' talk for the purpose of detecting something about the process of thinking. This study has confirmed the findings of others (e.g., Afflerbach & Johnston, 1984; Dias, 1985; Baumann, Jones, and Seifert-Kessel, 1993; Baumann, Seifert-Kessel, and Jones, 1992; Ericsson & Simon, 1993), that the think aloud is a powerful assessment and learning device. For the teacher busily engaged in the myriad events of the classroom, the recorded think aloud, without the need for transcription, can provide a source of informative data for examination outside class time. Based on the evidence of this study, one would judge that the think aloud could take the place of some of the other, sometimes overused, forms of assessment, especially since the understandings reached through think-aloud analysis are so rich.

The specific traits used in this study (see Appendix D), derived as they were from actual student talk, should be useful to the classroom teacher. Although the list is fairly extensive, certain of the specific traits occur in student talk more often than others, and, with moderate practice, one can learn to identify them without undue effort. It seems, then, but a short and natural step to teach

identification of at least some of the specific traits to students, thereby giving them powerful, new

cognitive and metacognitive strategies, as suggested by Baumann, Jones, & Seifert-Kessell (1993).

With regard to Conclusion 8, the best dyadic think alouds were dynamic exchanges between

partners. The dyadic think aloud appears to be a procedure that encourages students to negotiate

roles and to share responsibility for successful completion of the task. In at least these two ways, the

dyadic think aloud conforms to the criteria for successful cooperative learning activities, as enunciated

by Johnson and Johnson (1994). Based on the results of this study, it seems to matter little whether

partners differ widely in reading ability, for the dyadic think aloud encourages them to contribute to the

talk, thus becoming equal participants in the process. With appropriate teacher modeling and student

practice, together with teacher monitoring and feedback, the dyadic think aloud has the potential to

become a powerful learning device, with the added advantage of giving students a sense of

accomplishment and belonging.

V. Limitations

This study was undertaken to examine how well grade six students understand metaphor in the

informational text they read, how well the same children understand the informational text itself, and

how understanding of text and understanding of metaphor are related. With these as the foci of the

study, other potentially interesting questions had to be set aside. It was not possible to investigate

children's understanding of metaphor in fiction or poetry nor to explore psychological aspects of

metaphor or text understanding.

This study was limited to grade six students. A comparison with students at different grade

levels would be informative. This study's results can be taken as only possible indications of metaphor

and text understanding of younger and older children.

This study was also limited to children of one small geographical area and one relatively

homogeneous linguistic and cultural subgroup. Because culture is considered to be such a powerful

influence on metaphor acquisition (Lakoff & Johnson, 1980; Lakoff & Turner, 1989; and Lakoff,

1993), one should exercise caution in applying the findings of this study to students of other or more diverse cultural backgrounds.

This study attempted to maintain the ecological validity of the material and activity and to maintain a closer contact with the curriculum than would have been possible if instruments and methods had been borrowed from previous studies. The test-like situation was not entirely avoided, however, and the ecological validity was weakened to the extent that the texts were not connected to topics being studied in the classrooms and students worked in small groups outside their classrooms under the direction of a stranger.

The contexts in which metaphors were presented were similar to the original texts; however, the complete books were not given to the students and numbered fluorescent dots were affixed at specific points in each text, thus slightly altering the appearance of the passages. The target passages were of different levels of reading difficulty, according to standard readability formulas; consequently, certain analyses involved a somewhat lower n than would have been the case had all passages been at the same reading level.

Although such an examination is needed, this study did not attempt to examine the potential problems metaphor presents to English-as-a-second-language (ESL) learners.

VI. Implications for Future Research

This study has raised several issues that merit further research. One has to do with research methodology, others have to do with children's meaning-making process and with metaphor.

Although this study used authentic text and attempted to make the data-gathering process as much as possible like an ordinary classroom reading event, the students were taken from their classrooms in small groups to work with an unfamiliar person for a purpose set entirely by that person. A less-intrusive study design is needed. An adaptation of the current study, using a modified design, could make an important contribution to metaphor research.

This study provided information about the metaphor understanding of one group of students at

the grade six level. Using an adaptation of the current study design, further research involving both younger and older students would be useful in revealing something of the developmental aspect of metaphor understanding as it relates to the reading of authentic informational text.

Given the cultural influence on both basic conceptual metaphors and specific metaphorical expressions (Lakoff & Johnson, 1980; Lakoff & Turner, 1989; Lakoff, 1993), research into the understanding of metaphor by non-native English speakers needs to be undertaken.

The study found that these particular students performed significantly better on the multiple choice activities after reading individually than after reading with a partner. At the outset, it was expected that should there be a significant difference, it would be in the opposite direction. Although the reason for the difference was partially explained by the difference in difficulty of the texts, the matter was not resolved and needs further study.

The study found that passage difficulty had a negative influence on understanding of metaphor. Although one would have been surprised to have found otherwise, it sheds no light on exactly what text features are implicated when metaphor understanding is reduced. Further, even though certain factors have been suggested by this study, there is no indication of how the factors work or interact. Research is needed on both of these problems.

The study found that the syntactic frame of the metaphors could have an influence on understanding, with a significant difference between copula-verb type and descriptive-phrase type metaphors. Broderick (1992) has suggested that children encounter relatively few metaphors of the first type in their reading. This may be enough to explain the difference in levels of understanding of the types, but there is no conclusive evidence that this is so, and the matter would benefit from further research.

The study found that the two high-extreme groups performed equally well. A ceiling effect may have been involved. This raises the question of what would happen to the groups if passage difficulty increased even further: Would the groups finally perform significantly differently? The question is also raised as to what can be learned about the nature of these students' understanding of metaphor.

These questions need further study.

This study suggested that the degree of conventionality, or commonness, of the specific metaphor may be a factor in determining student understanding. Very little is known at present about the effect of conventionality or the related topic of conventionality of the underlying metaphors, of which the specific metaphors are examples. Research is needed in both of these areas.

This study did not find a way to use the metaphor-as-mapping view as a predictive tool. The study did suggest, however, that Lakoff, Johnson, and Turner's view of metaphor as mapping may be useful as a descriptive and diagnostic tool. Further examination of their ideas and further research are needed if such a tool is to be developed.

VII. Concluding Remarks

As I examined views of metaphor and the specific examples used in this study, I was struck by the variety--of individual examples, certainly, but also of linguistic structure (as shown by Broderick) and conceptual structure (as shown by Lakoff, Johnson, and Turner). To say, as the older views of metaphor have, that it is simply a process of looking for preexisting similarity and comparing one thing to another, is, it seems to me, saying too little about what really happens when a metaphor is created or understood--a point made strongly by Glucksberg and Keysar (1990). Further, it seems that to reduce metaphor analysis to semantic-feature analysis and comparison, as is sometimes done, fails to take into account essential features of metaphors and the metaphor process--features such as the subtle transfer of meaning and structure from one conceptual domain to another, the affective imprint of the individual, the peculiar moulding of the metaphors and ways of thinking by the social subculture to which the individual belongs, the linguistic customs and conventions of the wider language group, and the impact of the great cultural metaphors that provide the context in which social interaction takes place and define the values and processes of the culture itself.

At first, I was surprised and dismayed that Lakoff, Johnson, and Turner's metaphor-as-mapping view did not yield a workable method to discriminate between the metaphors understood poorly and

those understood well by these students. Upon reflection, however, I realized that the richness of the mapping view precludes its reduction to a simple set of rules and procedures. As shown above (see Chapter Four, Question Four, and refer to Appendix L), it produces a wealth of information and leaves one with the sense that the possibilities for mapping among the elements and the possibility for prior experience to push one or another element to the fore during the meaning-making process are beyond simple explanation. As noted above, all this tends to make the mapping view less useful as a predictive tool but of potential value as a descriptive tool and possibly as a diagnostic tool.

If the multi-faceted promise of the metaphor-as-mapping view is realized through future research, our knowledge of children's understanding of metaphor will benefit greatly, and metaphor research itself will offer exciting new possibilities.

References

Afflerbach, P., & Johnston, P. (1984). On the use of verbal reports in reading research. Journal of Reading Behavior, 16(4), 307-322.

Anderson, R. C., & Pearson, P. D. (1984). A schema-theoretic view of basic processes in reading comprehension. In P. D. Pearson (Ed.), Handbook of reading research (pp. 255-291). New York: Longman.

Baker, L., & Brown, A. L. (1984). Cognitive monitoring in reading. In J. Flood (Ed.), Understanding reading comprehension (pp. 21-44). Newark, DE: International Reading Association.

Bartlett, F. C. (1932). Remembering. Cambridge: University Press.

Bash, B. (1993). Shadows of night. San Francisco, CA: Sierra Club Publications.

Baumann, J. F., Jones, L. A., & Seifert-Kessell, N. (1993). Using think alouds to enhance children's comprehension monitoring abilities. The Reading Teacher, 47(3), 184-193.

Baumann, J. F., Seifert-Kessell, N., & Jones, L. A. (1992). Effect of think-aloud instruction on elementary students' comprehension monitoring abilities. Journal of Reading Behavior, 24(2), 143-172.

Beck, I. L., & McKeown, M. G. (1992). Young students' social studies learning: Going for depth. In M. S. Dreher & W. H. Slater (Eds.), Elementary school literacy: Critical issues (pp. 133-156). Norwood, NJ: Christopher-Gordon.

Bial, R. (1993). Frontier home. New York: Houghton Mifflin.

Black, M. (1962). Models and metaphors: Studies in language and philosophy. Ithaca, NY: Cornell University Press.

Block, E. (1986). The comprehension strategies of second language learners. TESOL Quarterly, 20(3), 463-494.

Booth, J., Phenix, J., & Swartz, L. (Eds.). (1988). Impressions. Toronto, Ont.: Holt, Rinehart and Winston.

Booth, J., Booth, D., Phenix, J., & Swartz, L. (Eds.). (1987). All over the world. Toronto, Ont.: Holt, Rinehart & Winston.

Booth, J., Booth, D., Phenix, J., & Swartz, L. (Eds.). (1987). Knock at the door. Toronto, Ont.: Holt, Rinehart & Winston.

Booth, J., Booth, D., Phenix, J., & Swartz, L. (Eds.). (1987). Wherever you are. Toronto, Ont.: Holt, Rinehart & Winston.

Broderick, V. (1991). Young children's comprehension of similarities underlying metaphor. Journal of Psycholinguistic Research, 20(2), 65-81.

Broderick, V. (1992). Incidence of verbal comparisons in beginners' books and in metaphor comprehension research: A search for ecological validity. Journal of Child Language, 19, 183-193.

Brown, A. L. (1980). Metacognitive development and reading. In R. J. Spiro, B. C. Bruce, & W. F. Brewer (Eds.), Theoretical issues in reading comprehension (pp. 453-481). Hillsdale, NJ: Lawrence Erlbaum Associates.

Bruner, J. (1986). Actual minds, possible worlds. Cambridge, MA: Harvard University Press.

Bruner, J. (1990). Acts of meaning. Cambridge, MA: Harvard University Press.

Cazden, C. B. (1988). Classroom discourse: The language of teaching and learning. Portsmouth, NH: Heinemann.

Chandler, S. R. (1991). Metaphor comprehension: A connectionist approach to implications for the mental lexicon. Metaphor and Symbolic Activity, 6(4), 227-258.

Charlesworth, R., Jackson, M., Kneeshaw, D., & Stanton, S. (1985). All in good time. Toronto, Ont.: McGraw-Hill Ryerson.

Charlesworth, R., Jackson, M., Kneeshaw, D., & Stanton, S. (1985). Nineteenth moon. Toronto, Ont.: McGraw-Hill Ryerson.

Cunningham, J. W. (1976). Metaphor and reading comprehension. Journal of Reading Behavior, 8(4), 363-368.

Danesi, M. (1993). Vico, metaphor and the origin of language. Bloomington, IN: Indiana University Press.

Dent, C., & Rosenberg, L. (1990). Visual and verbal metaphors: Developmental interactions. Child Development, 61, 983-994.

Dias, P. X. (1987). Making sense of poetry: Patterns in the process. Ottawa, Ont.: The Canadian Council of Teachers of English.

Downie, N. M., & Heath, R. W. (1983). Basic statistical methods (5th. ed.). New York: Harper & Row.

Englert, C. S., & Semmel, M. I. (1981). The relationship of oral reading substitution miscues to comprehension. The Reading Teacher, 35, 273-280.

Ericsson, K. A., & Simon, H. A. (1993). Protocol analysis: Verbal reports as data (rev. ed.). Cambridge, MA: The MIT Press.

Esbensen, B. J. (1993). Playful slider. Toronto: Little, Brown & Co.

Evans, M. A., & Gamble, D. L. (1988). Attribute saliency and metaphor interpretation in school-age children. Journal of Child Language, 15, 435-449.

Gildea, P., & Glucksberg, S. (1983). On understanding metaphor: The role of context. Journal of Verbal Learning and Verbal Behavior, 22, 577-590.

von Glasersfeld, E. (1984). An introduction to radical constructivism. In P. Watzlawick (Ed.), The invented reality: How do we know what we believe we know? (pp. 17-40). New York: Norton.

von Glasersfeld, E. (1989). Facts and the self from a constructivist point of view. Poetics, 18, 435-448.

Glucksberg, S. (1991). Beyond literal meanings: The psychology of allusion. Psychological Science, 2(3), 146-152.

Glucksberg, S., & Keysar, B. (1990). Understanding metaphorical comparisons: Beyond similarity. Psychological Review, 97(1), 3-18.

Gregory, M. E., & Mergler, N. L. (1990). Metaphor comprehension: In search of literal truth, possible sense, and metaphoricity. Metaphor and Symbolic Activity, 5(3), 151-173.

Howarth, S. (1993). The Middle Ages. New York: Viking.

Inhoff, A. W., Lima, S. D., & Carroll, P. J. (1984). Contextual effects on metaphor comprehension in reading. Memory & Cognition, 12(6), 558-567.

Johnson, D. W., & Johnson, R. T. (1994). Learning together and alone: Cooperative, competitive, and individualistic learning (4th. ed.). Boston: Allyn & Bacon.

Johnson, M. (Ed.). (1981). Philosophical perspectives on metaphor. Minneapolis, MN: University of Minnesota Press.

Kanji, G. K. (1993). 100 statistical tests. London: Sage Publications Ltd.

Keil, F. C. (1986). Conceptual domains and the acquisition of metaphor. Cognitive Development, 1, 73-96.

Kincade, K. M. (1991). Patterns in children's ability to recall explicit, implicit and metaphorical information. Journal of Research in Reading, 14(2), 81-98.

Kogan, N., & Chadrow, M. (1986). Children's comprehension of metaphor in the pictorial and verbal modality. International Journal of Behavioral Development, 9, 285-295.

Kraus, S., & Mallory, K. (1993). The search for the Right whale. New York: Crown.

Lakoff, G. (1993). The contemporary theory of metaphor. In A. Ortony (Ed.), Metaphor and thought (pp. 202-251). Cambridge, MA: Cambridge University Press.

Lakoff, G., & Johnson, M. (1980). Metaphors we live by. Chicago, IL: The University of Chicago Press.

Lakoff, G., & Turner, M. (1989). More than cool reason: A field guide to poetic metaphor. Chicago, IL: The University of Chicago Press.

Lasky, K. (1993). Monarch. San Diego: Harcourt Brace & Co.

Lowell, R. E. (1970). Problems with identifying reading levels with informal reading inventories. In W. Durr (Ed.), Reading difficulties: Diagnosis, correction, and remediation (pp. 120-126). Newark, DE: International Reading Association.

Luke, A. (1988). Literacy, textbooks and ideology: Postwar literacy instruction and the mythology of Dick and Jane. Barcombe, Lewes: The Falmer Press.

Lythcott, J., & Duschl, R. (1990). Qualitative research: From methods to conclusions. Science Education, 74(4), 445-460.

Mac Cormac, E. R. (1985). A cognitive theory of metaphor. Cambridge, MA: The MIT Press.

Mate, Z., & Malicky, G. (1988). A semantic feature approach to metaphor comprehension: What children's processing of metaphors reveals. Reading--Canada--Lecture, 6(2), 110-117.

Matthews, D. (1993). Arctic summer. New York: Simon & Schuster.

May, F. B. (1990). Reading as communication: An interactive approach (3rd. ed.). Columbus, OH: Merrill.

May, F. B. (1994). Reading as communication (4th. ed.). New York: Macmillan.

Mayer, R. E., & Bromage, B. K. (1980). Different recall protocols for technical texts due to advance organizers. Journal of Educational Psychology, 72(2), 209-225.

McClelland, J. L., & Rumelhart, D. E. (1986). A distributed model of human learning and memory. In J. L. McClelland, D. E. Rumelhart, & the PDP Research Group (Eds.), Parallel distributed processing: Explorations in the microstructure of cognition. Volume 2: Psychological and biological models (pp. 170-215). Cambridge, MA: The MIT Press.

McInnes, J. (1984). Star flights. Scarborough, Ont.: Nelson.

McInnes, J. (1991). Spin among the stars. Scarborough, Ont.: Nelson.

McKenna, M. C. (1983). Informal reading inventories: A review of the issues. The Reading Teacher, 36, 670-679.

Mercer, K. L. (1985). An investigation of the effects of metaphor on seventh-grade students' comprehension of expository text. Unpublished master's thesis, The University of British Columbia, Vancouver, B. C.

Moffett, J., & Wagner, B. J. (1991). Student-centered reading activities. English Journal, 80(6), 70-73.

Norman, D. A. (1986). Reflections on cognition and parallel distributed processing. In J. L. McClelland, D. E. Rumelhart, & the PDP Research Group (Eds.), Parallel distributed processing: Explorations in the microstructure of cognition. Volume 2: Psychological and biological models (pp. 531-546). Cambridge, MA: The MIT Press.

Ortony, A. (1980). Metaphor. In R. J. Spiro, B. C. Bruce, & W. F. Brewer (Eds.), Theoretical issues in reading comprehension (pp. 349-365). Hillsdale, NJ: Lawrence Erlbaum Associates.

Pearson, B. Z. (1990). The comprehension of metaphor by preschool children. Journal of Child Language, 17, 185-203.

Pearson, P. D., & Raphael, T. E. (1981). The function of metaphor in children's recall of expository passages. Journal of Reading Behavior, 11(3), 249-261.

Pritchard, R. (1990). The effects of cultural schemata on reading processing strategies. Reading Research Quarterly, 25(4), 273-295.

Pugh, S. L., Hicks, J. W., Davis, M., & Venstra, T. (1992). Bridging: A teacher's guide to metaphorical thinking. Urbana, IL: NCTE & Bloomington, IN: ERIC Clearinghouse on Reading and Communication Skills.

Purves, A. C., & Rippere, V. (1968). Elements of writing about a literary work: A study of response to literature. Champaign, IL: NCTE.

Reynolds, R. E., & Schwartz, R. M. (1983). Relation of metaphoric processing to comprehension and memory. Journal of Educational Psychology, 75(3), 450-459.

Richards, I. A. (1936). The philosophy of rhetoric. New York: Oxford University Press.

Robbins, K. (1993). Power machines. New York: Henry Holt & Co.

Rosenblatt, L. M. (1978). The reader, the text, the poem: The transactional theory of the literary work. Carbondale, IL.: Southern Illinois University Press.

Rosenblatt, L. M. (1991). Literature--S.O.S.! Language Arts, 68, 444-448.

Rumelhart, D. E. (1980). Schemata: The building blocks of cognition. In R. J. Spiro, B. C. Bruce, & W. F. Brewer (Eds.), Theoretical issues in reading comprehension (pp. 33-58). Hillsdale, NJ: Lawrence Erlbaum Associates.

Rumelhart, D. E., Smolensky, P., McClelland, J. L., & Hinton, G. E. (1986). Schemata and sequential thought processes in PDP models. In J. L. McClelland, D. E. Rumelhart, & the PDP Research Group (Eds.), Parallel distributed processing: Explorations in the microstructure of cognition. Volume 2: Psychological and biological models (pp. 7-57). Cambridge, MA: The MIT Press.

Seidenberg, P. L., & Bernstein, D. K. (1988). Metaphor comprehension and performance on metaphor-related language tasks: A comparison of good and poor readers. RASE: Remedial & Special Education, 9(2), 39-45.

Silberstein, L., Gardner, H., Phelps, E., & Winner, E. (1982). Autumn leaves and old photographs: The development of metaphor preferences. Journal of Experimental Child Psychology, 34, 135-150.

Siltanen, S. A. (1989). Effects of three levels of context on children's metaphor comprehension. Journal of Genetic Psychology, 150(2), 197-215.

Siltanen, S. A. (1990). Effects of explicitness on children's metaphor comprehension. Metaphor and Symbolic Activity, 5(1), 1-20.

Spiro, R. J. (1980). Constructive processes in prose comprehension and recall. In R. J. Spiro, B. C. Bruce, & W. F. Brewer (Eds.), Theoretical issues in reading. Hillsdale, NJ: Lawrence Erlbaum Associates.

Spivey, N. N. (1987). Construing constructivism: Reading research in the United States. Occasional paper No. 12. Poetics, 16, 169-192.

Spivey, N. N. (1990). Transforming texts: Constructive processes in reading and writing. Written Communication, 7(2), 256-287.

Stein, N. L., & Glenn, C. G. (1979). An analysis of story comprehension in elementary school children. In R. O. Freedle (Ed.), New directions in discourse processing (pp. 53-120). Norwood, NJ: Ablex Publishing Corporation.

Stevens, J. (1990). Intermediate statistics: A modern approach. Hillsdale, NJ: Erlbaum.

Thorne, E. A., & Irwin, J. M. (1988). Handshakings. Toronto: Gage.

Thorne, E. A., & Irwin, J. M. (1988). Lobstick. Toronto: Gage.

Tuinman, J. (1988). Ride the wave. Toronto: Ginn.

Vosniadou, S. (1987). Children and metaphors. Child Development, 58, 870-885.

Vosniadou, S., Ortony, A., Reynolds, R. E., & Wilson, P. T. (1984). Sources of difficulty in the young child's understanding of metaphorical language. Child Development, 55, 1588-1606.

Vygotsky, L. S. (1962). Thought and language. Cambridge, MA: The MIT Press.

Vygotsky, L. S. (1978). Mind in society. Cambridge, MA: Harvard University Press.

Waern, Y. (1980). Thinking aloud during reading: A descriptive model and its application. Scandinavian Journal of Psychology, 21, 123-132.

Waggoner, J. E., Messe, M. J., & Palermo, D. S. (1985). Grasping the meaning of metaphor: Story recall and comprehension. Child Development, 56, 1156-1166.

Watzlawick, P. (1984). The invented reality: How do we know what we believe we know? New York: Norton.

Way, E. C. (1991). Knowledge representation and metaphor. The Netherlands: Kluwer Academic Publishers.

Webster's Ninth New Collegiate Dictionary. (1986). Markham, Ont.: Thomas Allen & Son.

Wells, G. (1990a, May/June). Learning to be literate. The ATA Magazine, pp. 10-13.

Wells, G. (1990b). Talk about text: Where literacy is learned and taught. Curriculum Inquiry, 20(4), 369-405.

Wells, G. (1991). Talk for learning and teaching. Paper presented at the International Convention on Language and Literacy, University of East Anglia, England, April 6-10, 1991.

Winner, E. (1988). The point of words: Children's understanding of metaphor and irony. Cambridge, MA: Harvard University Press.

Winner, E., Levy, J., Kaplan, J., & Rosenblatt, E. (1988). Children's understanding of nonliteral language. Journal of Aesthetic Education, 22(1), 51-63.

APPENDIX A

<u>Sample Letter to Publisher Seeking Permission to Photocopy</u>

Permissions Department
Houghton Mifflin Company
215 Park Avenue South
New York, New York 10003

Dear Sir or Madam,

I am a doctoral candidate in the Department of Language Education at The University of British Columbia. My dissertation will examine sixth-grade students' understanding of metaphorical language in informational trade books.

Your publishing company has contributed books for inclusion in the NCTE publication, <u>Adventuring With Books</u> (Eleventh Edition), being edited by Dr. Wendy Sutton of U.B.C.'s Dept. of Language Education. Dr. Sutton is interested in making the books widely known and in having the books make a contribution to research at the university level. As a member of my supervising committee, she has encouraged me to look at the books as possible sources of text for my research, which I have done, isolating several books that would be appropriate.

I am writing to you with two requests. The first is for permission to use one of your books -- <u>Frontier Home</u>, by Raymond Bial (© 1993) -- in my research. I would be using it with multiple groups of six students each from three separate grade six classes in schools in Nova Scotia, Canada, during the month of February, 1994. I wish to use the text in a form consistent with the way it occurs in the books, but, because of the cost of purchasing multiple copies of this and the other books I propose to use, my second request is for permission to colour photocopy the cover and pages 1 to 8 (six copies of each).

If you wish to verify the integrity of this request, you may contact Dr. Sutton or my advisor, Dr. Victor Froese, Head, Department of Language Education, U.B.C., at (604) 822-5235 (Dr. Froese) or (604) 822-5229 (Dr. Sutton).

Thank you for your consideration of my requests.

<div align="center">Sincerely,</div>

<div align="center">Leigh Faulkner</div>

APPENDIX B

Multiple Choice Meaning Clarification Activities--Passages X, Y, and Z

Passage X

Multiple Choice Meaning Clarification Activity -- "Shadows of Night"

Name:_____

Directions
(a) Do this activity as a think aloud.
(b) For each item below, look back to "Shadows of Night" and reread the part that's marked with a yellow dot having the same number as the item.
(c) Put a check mark in front of the ending that's closest to your meaning of the underlined part as it's used in "Shadows of Night". If no ending is close to the meaning you've made, write in your own meaning.
(d) When you're ready, turn on your cassette recorder and begin.

1. "Shadows of Night"
_____ (a) moonlight makes shadows just the same as sunlight does.
_____ (b) it can be just as dark in shadows as it can at night.
_____ (c) bats are hidden by being darker than the night itself.
My own meaning:

_____

_____

2. "The evening sky deepens into night"
_____ (a) the sky is further away at night.
_____ (b) the sky fills with stars.
_____ (c) the sky gets darker.
My own meaning:

_____

_____

3. "Mouse-eared"
_____ (a) a bat's ears look like a mouse's ears.
_____ (b) a bat is a relative of a mouse.
_____ (c) a bat can hear the same things a mouse hears.
My own meaning:

_____

_____

4. "Light-fleeing"
_____ (a) a bat fears light.
_____ (b) a bat can fly faster because it doesn't weigh much.
_____ (c) a bat disappears when the light disappears.
My own meaning:

_____

_____

5. "<u>Maternity colony</u>"

_____ (a) a place where mothers go to learn how to care for the young.

_____ (b) a group of females who will soon have babies.

_____ (c) a main settlement that other settlements grow from.

My own meaning:

_____

_____

6. "<u>Forms a basket with her tail membrane</u>"

_____ (a) removes part of her tail.

_____ (b) curves her tail so it can hold something.

_____ (c) wraps her tail around her.

My own meaning:

_____

_____

7. "<u>Cradles the baby</u>"

_____ (a) rolls the baby up into a tight ball.

_____ (b) puts the baby in a special nest.

_____ (c) surrounds and protects the baby.

My own meaning:

_____

_____

8. "<u>Silky hair</u>"

_____ (a) hair that looks like smooth cloth.

_____ (b) a covering made of silk.

_____ (c) very, very soft hair.

My own meaning:

_____

_____

9. " <u>It also latches on securely</u>"

_____ (a) it lets go after a short time.

_____ (b) it takes a firm grip.

_____ (c) it has a hook for fastening.

My own meaning:

_____

_____

10. "<u>The first attempts to fly around the barn are full of confusion</u>"

_____ (a) their earliest flights are all mixed up.

_____ (b) they don't know how to communicate with each other.

_____ (c) they fly around the barn because something is scaring them.

My own meaning:

_____

_____

Passage Y

Multiple Choice Meaning Clarification Activity -- "Frontier Home"

Name:_____

Directions
(a) Do this activity as a think aloud.
(b) For each item below, look back to "Frontier Home" and reread the part that's marked with a yellow dot having the same number as the item.
(c) Put a check mark in front of the ending that's closest to your meaning of the underlined part as it's used in "Frontier Home". If no ending is close to the meaning you've made, write in your own meaning.
(d) When you're ready, turn on your cassette recorder and begin.

1. "Deep woods abounding in shadows and mystery"
_____ (a) the forest was made up of tall, dark trees of a kind the people didn't know.
_____ (b) the forest had many things that were unknown to the people.
_____ (c) strange animals bounded off through the dark forest.
My own meaning:

_____

_____

2. "Before cold weather set in again"
_____ (a) before they got to their new homes where the climate was colder.
_____ (b) before winter returned.
_____ (c) before dark when it got very cold in the wagons.
My own meaning:

_____

_____

3. "Occasional patches of snow persisted"
_____ (a) they would sometimes have snowstorms that went on and on.
_____ (b) they would sometimes see small areas of snow that hadn't yet melted.
_____ (c) they would sometimes find the road so full of snow they couldn't go on.
My own meaning:

_____

_____

4. "Wagons . . . were transporting not only the pioneers' fears but their expectations"
_____ (a) people were afraid their wagons would break down.
_____ (b) people depended on transport companies to carry their belongings.
_____ (c) people were both afraid and hopeful.
My own meaning:

_____

_____

5. "Came from all walks of life"
_____ (a) they had walked from community to community to find work.
_____ (b) they came from all different kinds of jobs and backgrounds.
_____ (c) they had to walk because the wagons were too full.
My own meaning:

_____

_____

6. "Threats from the weather "
_____ (a) the weather reports called for rain or snow.
_____ (b) there were serious problems because of the weather.
_____ (c) the people didn't have proper clothes for bad weather.
My own meaning:

_____

_____

7. "Civilization's comforts and protections"
_____ (a) means when they travelled together they felt more comfortable.
_____ (b) means the things they had enjoyed and depended on in their old homes.
_____ (c) means the wagons they brought with them from home were very safe.
My own meaning:

_____

_____

8. "Occasionally breaking into a strange, open country"
_____ (a) going into an area that was free for them to take.
_____ (b) going into an area where they were strangers.
_____ (c) going into an area where there weren't any forests.
My own meaning:

_____

_____

9. "Little more than an interruption to the trees"
_____ (a) a place filled with different kinds of trees.
_____ (b) a space before the forest started again.
_____ (c) a place where they wouldn't cut down the trees.
My own meaning:

_____

_____

10. "Girdled"
_____ (a) put a tight belt on.
_____ (b) made a circle around.
_____ (c) got sap from the trees.
My own meaning:

_____

_____

Passage Z

Multiple Choice Meaning Clarification Activity -- "The Middle Ages"

Name:_____

<u>Directions</u>
(a) Do this activity as a think aloud.
(b) For each item below, look back to "The Middle Ages" and reread the part that's marked with a yellow dot having the same number as the item.
(c) Put a check mark in front of the ending that's closest to <u>your meaning of the underlined part as it's used in "The Middle Ages"</u>. If no ending is close to the meaning you've made, write in your own meaning.
(d) When you're ready, turn on your cassette recorder and begin.

1. "<u>An old power crumbles</u>"
_____ (a) things break to pieces when they get old.
_____ (b) power breaks things that are old.
_____ (c) something that had once been very strong breaks into pieces.
My own meaning:

_____

_____

2. "<u>The sack of the great city of Rome</u>"
_____ (a) a kind of pack that Romans carried things in.
_____ (b) the part of Rome where poor people lived.
_____ (c) the defeat of Rome and stealing of its riches.
My own meaning:

_____

_____

3. "<u>Town-based society</u>"
_____ (a) new towns built where old ones had been destroyed.
_____ (b) a society where people lived in the country but worked in town.
_____ (c) a society that depended on the organization of towns.
My own meaning:

_____

_____

4. "<u>Raids by Germanic tribes shook the power of the Roman Empire</u>"
_____ (a) attacks from outside encouraged people to form tribes.
_____ (b) attacks by outsiders weakened the government.
_____ (c) uprisings by soldiers took place against their own government.
My own meaning:

_____

_____

5. "Daring raids put the Roman Empire under pressure"

_____ (a) foreign soldiers were hired to protect Rome.

_____ (b) attacks from outside threatened society.

_____ (c) Rome found a new way to attack its enemies.

My own meaning:

_____

_____

6. "The fall of the Roman Empire"

_____ (a) the pulling down of the walls around the Roman Empire.

_____ (b) a special celebration held in autumn in the Roman Empire.

_____ (c) the destruction of the Roman Empire.

My own meaning:

_____

_____

7. "A new sort of society was growing up"

_____ (a) many new cities were taking the place of old ones.

_____ (b) a different way of living was developing.

_____ (c) most of the people in the society were adults.

My own meaning:

_____

_____

8. "A special ceremony marked such occasions"

_____ (a) the people celebrated with dancing and singing.

_____ (b) a special list recorded the names of the people who attended.

_____ (c) a big event was held to give the agreement extra meaning.

My own meaning:

_____

_____

9. "The oath of loyalty was meant to be binding for life"

_____ (a) a person was never allowed to change his or her mind.

_____ (b) a kind of chain used to hold prisoners in dungeons.

_____ (c) a kind of cloth wrapped around their legs for protection.

My own meaning:

_____

_____

10. "Anyone who broke it would be regarded as a traitor"

_____ (a) anyone who didn't do what they'd promised would be an enemy.

_____ (b) anyone who escaped from the chains would be hunted down.

_____ (c) anyone who lost their leg cloths would be in danger.

My own meaning:

_____

_____

APPENDIX C

Sample Individual Think-Aloud Protocol (Main Study)

[Note--Student's own words in **bold print**; original text in plain print.]

Shadows of Night

Code X1F4J

From the title, I guess it means (?) the people outside in the shadows that (?)

The evening sky deepens into night. Birds return to their root... to their roasts (sic), and many other animals quiet...ly nesttle (sic) into their burrows. But some creatures are just waking up. Dark shapes flutter across the sky, suddenly turning, diving, swooping. Bats are beginning to hunt.

This is the story of the Little Brown Bat, one of the most common bats in North America. For its small size, this species has a very long life span -- sometimes more than thirty years. Its scientific name is *Myot... myontis* (sic)*...* These latin words mean "mouse-eared" and "light-feeling" (sic)." **Well! I don't know what that word means...** "mouse-eared **and... I know that bats begin to hunt... hunt at night and they sleep during the day.**

It's springtime. A female Little Brown Bat has reccontly (sic) emerred (sic) a ... hundred... a hibernating (sic) cave hidden deep in the woods. She has travelled near... nearly a hundred miles in just two nights. A baby is growing inside her, and she is looking for the right place to give birth. **Well! Most people ... I guess have to find the right place to give birth to their baby.** At dawn, the female bat slips through the narrow opening at the top of the (sic) abandoned barn. Inside, she finds a maternity colony of hundreds of pregnant bats hanging from the rafters. She closes... she chooses her spot amongs (sic) them and falls asleep.

All other (sic) North America, female bats are gathering -- inside barns, churches (sic) steeples, attics, cellars, and chimleys (sic) -- often unnoticed by the humans living nearby. **So... I guess this means that they could be living in my chimley and I wouldn't know.**

Two months later, the baby bat is ready to be born. During the birth, the mother turns herself... turns herself... head up (which is upside down for a bat). She hangs from her numb claws... from her numb (sic) claws and forms a basket with her tail... The baby is... the baby is born feet first and clutches immediately to (sic) a foothold well... with its well-developed toes, squirming and pushing to help the rest of the (sic) body emerge. **So I guess this means, it has trouble getting born.**

Um... As soon as the baby is born, the mother turns head down again and cradles the baby under her wing to... to nurse. As it drinks the sweet, warm milk, she cuts the umbilical cord and grooms the baby carefully. **So... I guess it's like... when humans have babies, they have to cut the (?) cord or whatever.**

During the first day, the baby bat clings to the (sic) mother, struggling (sic) under her wing. Its body is covered with fine, skilky hair... silky hair, and its eyes are still closed. The baby grips its mother's fur tightly to prevent a fall. It also latches on securely to her nipple as it nurses. If the mother is distrupted (sic), she will carry her baby with her as she circles inside the ... barn. **I guess this means she takes good care of the bat and makes sure nobody hurts her... or it or whatever.**

Hundreds of other baby bats (called pups) ... **I never knew they were called pups!** ...were born in the barn around the same time. When the mother bats go out to hunt at night, they leave the pups clustered together tightly, hanging from the barn ceiling. **Well! I didn't know that. Well, I'm just surprised at that!** Waiting for their mothers to return, they romp and twistle (sic) like kittens. To... like kittens...To a human, the heat and the den... and the denis, pungient (sic) smells (sic) of a bat roast (sic) to (sic) overpowering. But to a naked... but to a naked bat pup, the roast (sic) is... is wonderfully warm and comfort... and comftorting (sic). **I didn't know that!**

When a mother returns, she finds her baby in the midist (sic) of ... the screaming pups by calling out the (sic) listening for its particularly (sic) cry... cry. When she reaches her baby, she snif...she sniffs and licks it, making sure it is the right one. When they settle down... then they settle down to nurse. **Well! It seems like she takes good care...**

In about three weeks, the young bats are ready to fly. Their pink skin is ... covered with soft, brown fur, and their wings have grown much larger. The first attempts to fly around the barn with... are careful (sic) of coll... colisions (sic). Jostling... jostling, squeaking pups are everywhere. One young bat manages to take off and fly to the other side without colliding with the others. But landing is harder. The pup doesn't know what... how to flip around at the end of its flight, so it lands head up and has to turn around awkward (sic) on the wall. **Hmm! Landing is pretty hard. Boy, I wouldn't want to be a bat!**

Well! I... kinda found out about bats. And it tells me... mostly, how babies were born, how they grow, their skin, and how the mother makes... how the mother tells which baby is hers. And, I found out that it isn't easy to fly in three weeks. And it's kinda hard... when the room is all filled with bats. They have trouble... coming around... cause you're scared that your gonna cry. And I... huh... feel that the bats take good care... just like our parents take care of us.

APPENDIX D

<u>Specific Traits and Definitions</u>

MEANING-CONSTRUCTION PROCESSES

The processes named by the following specific traits are considered to involve meaning construction. In these processes the student is seen to be actively engaged with the text or the meaning-making process, itself, either affectively or intellectually.

AR   A̲ffective R̲esponse

        -- expresses a <u>personal response</u> to the meaning of the text

        -- e.g., "Holy cow! That's cheap!"; "That's a lot!"

        -- expresses a <u>personal position</u> in relation to meaning of text

        -- e.g., "I don't believe in that."

AR(a)   -- agrees with partner's or own AR statement

RAR   Retell -- A̲ffective R̲esponse

RAR(a)   -- agrees with AR statement in Retell

TRP   R̲estatement/ P̲araphrase

        -- <u>repeats</u> an idea in the same or substantially the same words (includes whole, recognizable phrases from the original)

        -- e.g., "...but there are still sharks..." (phrase appeared in the text)

        -- <u>paraphrases</u> by repeating an idea in different or substantially different words (only necessary identifying words carried over from the original)

        -- e.g., "...all the dinosaurs are gone..." (phrase did not appear in the text)

        -- <u>states</u> that the section of text just read is about a particular topic

        -- e.g., "...that's just talking about ... like the sharks and what they do..."

        -- <u>provides the name</u> for something previously named in the text

        -- e.g., "Yeah, they're called the rivets..." ("rivets" had not been mentioned in the immediately preceding portion of text, but had been mentioned earlier)

        -- draws attention to a <u>section title</u>, a <u>picture</u> or a <u>map</u> to get new information

        -- e.g., "This part is called..."

TRP(a)   -- agrees with partner's or own TRP statement

RTRP   Retell -- <u>R</u>estatement/<u>P</u>araphrase

RTRP(a)   -- agrees with TRP statement in Retell

MA   <u>A</u>ffirmation of Understanding

    -- <u>affirms</u> own understanding of text

    -- e.g., "Okay... so... I understand that..."

    -- <u>states</u> that the text is self-explanatory or that it makes sense

    -- e.g., "Okay... that paragraph makes sense to me..."

    -- <u>mentions</u> that information was or was not previously known

    -- e.g., "I never knew that..." or "I knew that..."

    -- <u>mentions</u> that a textual meaning has just become clear

    -- e.g., "Oh, I get it..." (the meaning had not been clear and had been under discussion)

    -- <u>states</u> that something has been learned (may or may not explain the information)

    -- e.g., "I learned quite a bit..."

MA(a)   -- agrees with partner's or own correct MA statement or <u>comments</u> on own understanding or pronunciation

RMA   Retell -- <u>A</u>ffirmation of Understanding

RMA(a)   -- agrees with MA statement in Retell

TI   <u>I</u>nterpretation

    -- draws a correct <u>inference</u> or correctly <u>predicts</u> what the selection or a section of text will be about, but must go beyond TRP

    -- e.g., "So, what he's saying is we should... respect the animals..." ("respect" had not been mentioned in the text)

    -- determines the meaning of a term through <u>inference</u> or <u>analogy</u>

    -- e.g., "So... it just goes up to here... up to your waist..." (the term being discussed was "waisthigh overalls")

TI(a)   -- agrees with partner's or own correct TI statement

RTI   Retell -- Interpretation

RTI(a)   -- agrees with TI statement in Retell

MAT   Truth Assessment

           -- considers the truth of information as possible but not certain

           -- e.g., "That could be very possible..."

           -- offers an opinion or disagrees with text

           -- e.g., "I wouldn't see why..." (this was said in relation to a statement made in the text)

           -- poses a question about information contained in the text or suggested by it (but not about meanings of terms contained in the text)

           -- e.g., "Well, the thing is... I wonder if any animals can catch diseases from other animals..." (the text had mentioned that sickly fish were eaten by sharks)

           -- remarks with uncertainty or disagreement about comment, suggestion or question posed by partner or by self

MAT(a)   -- agrees with partner's or own MAT statement

RMAT   Retell -- Truth Assessment

MCL   Compares/Contrasts/Links Portions of Text or Ideas

           -- examines two or more portions of text to determine whether they present similar or different information

           -- e.g., "I guess that explains the top paragraph..." (this was said about a later portion of text)

           -- states that an idea from one part of the text is the same as, explains, or is connected in some way to another idea in the text

           -- e.g., "That explains that sentence about 'what has Toronto done in return'..."

           -- relates an idea from the text to self or another person

           -- connects ideas or information from text with general or specific human experience

           -- e.g., "They don't have them on my jeans..." (this refers to 'rivets', which had just been mentioned in the text)

           -- answers a question by referring to specific information in the text

           -- e.g., "Well... it says it's 'untold'..." (a question had been raised during discussion of the text and "untold" was a correct answer to the question)

-- refers to a picture or map <u>to support an idea</u>

MCL(a) -- agrees with partner's or own MCL statement

RMCL Retell -- <u>C</u>ompares/<u>C</u>ontrasts/<u>L</u>inks Portions of Text or Ideas

RMCL(a) -- agrees with MCL statement in Retell

MPK <u>P</u>rior <u>K</u>nowledge

-- offers <u>accurate information</u> from memory

-- e.g., "I found that there's more than the great white shark... there's mako shark and stuff..." (this information had come from a book read previously)

-- gives from memory a <u>correct meaning</u> of a word or conventional phrase

-- e.g., "Adapt means... umm... get used to..." ("adapt" had just been used without explanation)

MPK(a) -- makes a statement emphasizing an MPK statement

-- e.g., "Really."

RMPK Retell -- <u>P</u>rior <u>K</u>nowledge

RMPK(a) -- agrees with MPK statement in Retell

MSK <u>S</u>ource of Own <u>K</u>nowledge

-- <u>tells how or where</u> information was gained

-- e.g., "I've seen a shark eat something..."

MSK(a) -- agrees with partner's or own correct MSK statement

ET <u>E</u>valuation of <u>T</u>ext *qua* Text

-- <u>comments</u> on the style, textual features, effectiveness or appropriateness of the text itself

-- e.g., "They're not explaining it enough."

-- <u>comments</u> on the purpose of a portion of text

-- e.g., "And that's a niced little wrap up."

-- <u>mentions</u> a structural element of the genre (such as the 'introduction')

-- e.g., "... a big introduction, I guess."

-- <u>suggests</u> that something does or does not belong in the text or that something potentially useful has not been included

-- e.g., "But it doesn't tell us what kind of sharks it's about."

-- <u>suggests</u> when the text was written (for the purpose of commenting on the text)

-- e.g., "Mmm... this must have been made a while ago."

ET(a)   -- agrees with partner's or own ET statement

RET   Retell -- <u>E</u>valuation of <u>T</u>ext

RET(a)   -- agrees with ET statement in Retell

SRS   <u>S</u>uggests a Specific <u>R</u>eading <u>S</u>trategy

      -- <u>suggests</u> a particular strategy in order to clarify text or to find information

      -- e.g., "So, let's just read on and see..."

SRS(a)   -- agrees with partner's or own SRS statement

ED   <u>D</u>iscussion

      -- <u>remarks</u> on the course or effectiveness of the dyadic discussion

      -- e.g., "I think that's getting a little off topic, but it's a good comparison." (commenting on a personal experience recounted by other member of the dyad)

ED(a)   -- agrees with partner's or own ED statement

NEUTRAL STATES

The states named by the following specific traits are considered to involve orientation toward the task, itself.

EP   <u>P</u>rocedural

      -- in dyad, asks question of partner <u>to initiate turn change</u>

      -- e.g., "Well, what happened?" or "Do you know?"

      -- remarks on, discusses or questions what to do or what has been done, how it should be

done, order, turn-taking, interpretation of directions or non-text features, or completion of task

-- e.g., "You read this."

-- remarks that there is nothing more to add to a point

-- e.g., "...and I guess that was it."

-- uses a standard phrase to initiate turn-taking

-- e.g., "Okay."

-- uses a standard phrase to end one section or begin another

-- e.g., "Yeh" (where other's dialogue is broken into units, thus encouraging other to continue)

EP(a)   -- agrees with partner's or own EP statement

REP   Retell -- Procedural

REP(a)   -- agrees with EP statement in Retell

OM   Other/Miscellaneous

-- any meaning unit that does not belong under any specific trait given above, including incomplete utterances

ROM   Retell -- Other/Miscellaneous

PRE-MEANING CONDITIONS

The conditions named by the following specific traits are considered to represent understanding inconsistent with either the text or commonly-accepted information.

MD   Denial of Understanding

-- admits text is not understood

-- expresses doubt about own understanding of text, including the meaning or pronunciation of specific terms in text or raised in discussion

-- e.g., "That part is still confusing to me..."; "I don't get that part..."; "Hmm...wonder what dredging is..."

-- suggests that a question can't be answered because information hasn't been given

-- e.g., "I can't answer that because I haven't read the next sentence yet..."

MD(a)   -- agrees with an incorrect statement of meaning or pronunciation made by dyadic partner or comments on own understanding or pronunciation

RMD   Retell -- Denial of Understanding

RMD(a)   -- agrees with MD statement in Retell

TM   Misinterpretation

-- draws an incorrect inference or incorrectly predicts what the selection or a section of the text will be about

-- e.g., "So... not very many people like the water... so nobody wants it, basically to be there..." (the point of the text was that people did not look after their water resource)

-- states an interpretation not supported by the text

-- e.g., "So I guess that means that the water forms almost every city..." (the point was that every major city was situated on a body of water)

-- incorrectly infers the meaning of a term used in the text

-- e.g., "Probably just a little ship 'cause 'clipper' is sort of a short word..." (this was an attempt to understand the term "clipper ship", mentioned in the text)

TM(a)   -- agrees with partner's or own incorrect TM statement

RTM   Retell -- Misinterpretation

RTM(a)   -- agrees with TM statement in Retell

MPB   Prior Belief

-- offers inaccurate information from memory

-- e.g., "I'm sure they called it *denime*..." (term "denim" had been used in the text)

-- gives from memory an incorrect meaning of a word or conventional phrase

-- e.g., "It's kind of like a bluey, greeny kind of..." (term "indigo" had been used in the text)

MPB(a)   -- agrees with partner's or own MPB statement

APPENDIX E

Sample Specific-Trait Analysis (Sample Dyadic Think-Aloud Protocol, Main Study)

[Note--Students' own words in **bold print**; original text in plain print.]

Shadows of Night

Code X2F3H & X2M3N (Dyad 3A)

S1. (?)

S2. and this is [student's name]

S1. doing a voice testing. Shadows of the (sic) Night **You can talk you Know.** (1)

S2. The Hidden World of The Little Brown Bat

S1. So it's probably about bats. (2)

S2 The evening sky deepens into the (sic) night. The (sic) birds return to their roosts, and the (sic) man... and the (sic) many of (sic) the (sic)   other animals quietly nestle into their burrows.

S1. So... (3)

S2. But some of (sic) the (sic) creatures are just waking up.

S1. So that means that they're...the birds are... the bats are going to... the birds are going in trees and... (4)

S2. They're going back to their homes... (5)

S1. And the little animals are going under ground. (6) // **(laughter) They're all going asleep...** (7) // **oh they're all waking up.** (8) **(laughter)**

S2. Dark shapes flutter across the sky, suddenly turning, diving, swooping. Bats are beginning to hunt.

S1. So... bats are hunting in the night. (9) This is the story of the Little Brown Bat, one of the most common bats in North America. **Uh...** For its small size, these (sic) species ... very long life span... **You can...** (10)

S2. It's telling us... (11)

S1.... come in any time now. (12) // **(laughter) (?) interrupting is the thing to do (?)** (13) // **I guess so.** (14)

S2. It's tells us about the Little Brown Bats. (15)

S1. (laughs) Big Wings! (16) // --sometimes more than thirty years. **Oh! Life Span!** (17) // **I thought it was wing span.** (18) // **Oops!** (19) // **They have along life!** (20) // Its scientifics (sic) name is Myso... so...Mys... *Myotis uckifus.(sic)* These latin words mean "mouse-eared" and light-fleeing." **They could have just said that!** (21) // **They didn't**

need to get (?) (22)

S2. At (sic) springtime. A female Little Brown Bat has recently emerged from the (sic) hibernation

cave hidden deep in the woods. She has travelled nearly a hundred miles in just two nights. A

baby is growing inside of (sic) her, and she is looking for the right place to give birth. At dawn,

the female bat slips through the narrow opening in (sic) the top of the (sic) abandoned barn.

Inside, she finds a matern...

S1. maternity

S2. colony of hundreds of pregnant bats **(laughs)** hanging... She chooses her spot among them

and falls asleep.

S1. Oh! That's nice to know! (23) // **Just what I wanted to know today.** (24) //

Hundreds of bats are pregnant in a barn. (25) // **(laughter)** All over North America,

female bats are gathering -- inside barns, church steeples, attics, cellars, and chimneys -- often

unnoticed by the humans living nearby. **We (?) hundreds of bats in our barn.** (26) //

Huh! I didn't even notice them!(27)

S2. During the birth **(?)**, the baby is **(?)**...

S1. What is (?) (28)

S2. Oh! (29) Two months later, the baby bat is ready to be born. During the birth, the mother turns

herself head up...up (which is upside down for a bat). She hangs from her thum... thumb claws

and forms a basket with her tail... membrane.

S1. Where are you? (30)

S2. Right Here! (31) The baby is born feet first and clutches immediately to... for a foothold with a

(sic) well-developed toes, squirming and pushing to help the rest of the (sic) body emerge.

S1. Oh! Okay! (32) As soon as the baby is born, the mother turns head down again and cradles

the baby under her wing... to nurse. As it drinks the sweet, warm milk, she cuts the umbilical

cord and grooms the baby carefully.

S2. During the first day, the baby bat clings to (her) mother, snuggled under her wing. It... its body is

covered with fine, silky hair, and its eyes are still closed. The baby grips the (sic) mother's full...

fur tightly to prevent a fall. It also latches to (sic) securely to her nipple and (sic) nurses. When

(sic) the mother is disturbed, she will carry her baby ... as she circles inside of (sic) the dark barn.

S1. So a bat has a baby (33) // **and they... put them under their wing.** (34) Hundreds of

other baby bats (called pups) were born in the barn around the same time. When the mother

bats go out to hunt at night, they leave the ba... the pups clustered together tightly, hanging

from the barn ceiling. Waiting for their mothers to return, they romp and tussle like kittens. To a

human, the heat and the dense, pungent smell of a bat roost is overpowering. But to a naked

bat pup, the roost is wonderfully warm and comforting. **Hmm!** (35)

S2. When the (sic) mother returns, she finds her babies (sic) in the midst of... screaming pups by

calling out ... listening to (sic) a (sic) peculiar (sic) cry. When she reaches her baby, she sniffs

and licks it, making sure that (sic) it's (sic) the right one. Then she (sic) settles (sic) down to

nurse.

S1. They look funny! (36) // **Oh! This is not... not my child!** (37) In about three weeks,

the young bats are ready to fly. Their pink skin is now covered with soft, brown fur, and their

wings have grown much larger. The first attempts to fly around the barn are full of confusion.

Jostling, squeaking pups are everywhere. One young bat manages to take off and fly to the

other side without colliding with the others. But landing is harder. The pup doesn't know how

to flip around at the end of its flight, so it lands head up and... turns ... awkwardly to (sic) the wall.

They fly around the ball, run in... barn... run into each other (38) // **and bang**

into walls. (39) // **Okay! So...** (40)

S2. Now we have to do the retell? (41)

S1. So... this story was about...other Little Brown Bats, (42) // **how they (?)** (43) //

Pretty much... about their life and stuff. (44) // **Like (?) things in the night.** (45)

S2. They live in barns and stuff. (46)

S1. It's quite interesting (?) (47) // **Okay! Let's...** (48)

Specific Trait Tally -- Code X2F3H & X2M3N (Dyad 3A)

1. EP	17. TRP	33. TRP
2. TRP	18. MA	34. TRP
3. OM	19. OM	35. OM
4. TRP	20. AR	36. AR
5. TRP	21. ET	37. OM
6. TRP	22. ET	38. TRP
7. TRP	23. AR	39. TRP
8. TRP	24. AR	40. EP
9. TRP	25. TRP	41. EP
10. EP	26. MSK	42. RTRP
11. OM	27. MSK	43. ROM
12. EP	28. OM	44. RTRP
13. EP	29. OM	45. RTRP
14. EP	30. EP	46. RTRP
15. TRP	31. EP	47. RAR
16. TM	32. EP	48. REP

APPENDIX F

Average Specific Traits Profile Graphs (Combined Categories) of Students
in Extreme Groups by MCMCA Score
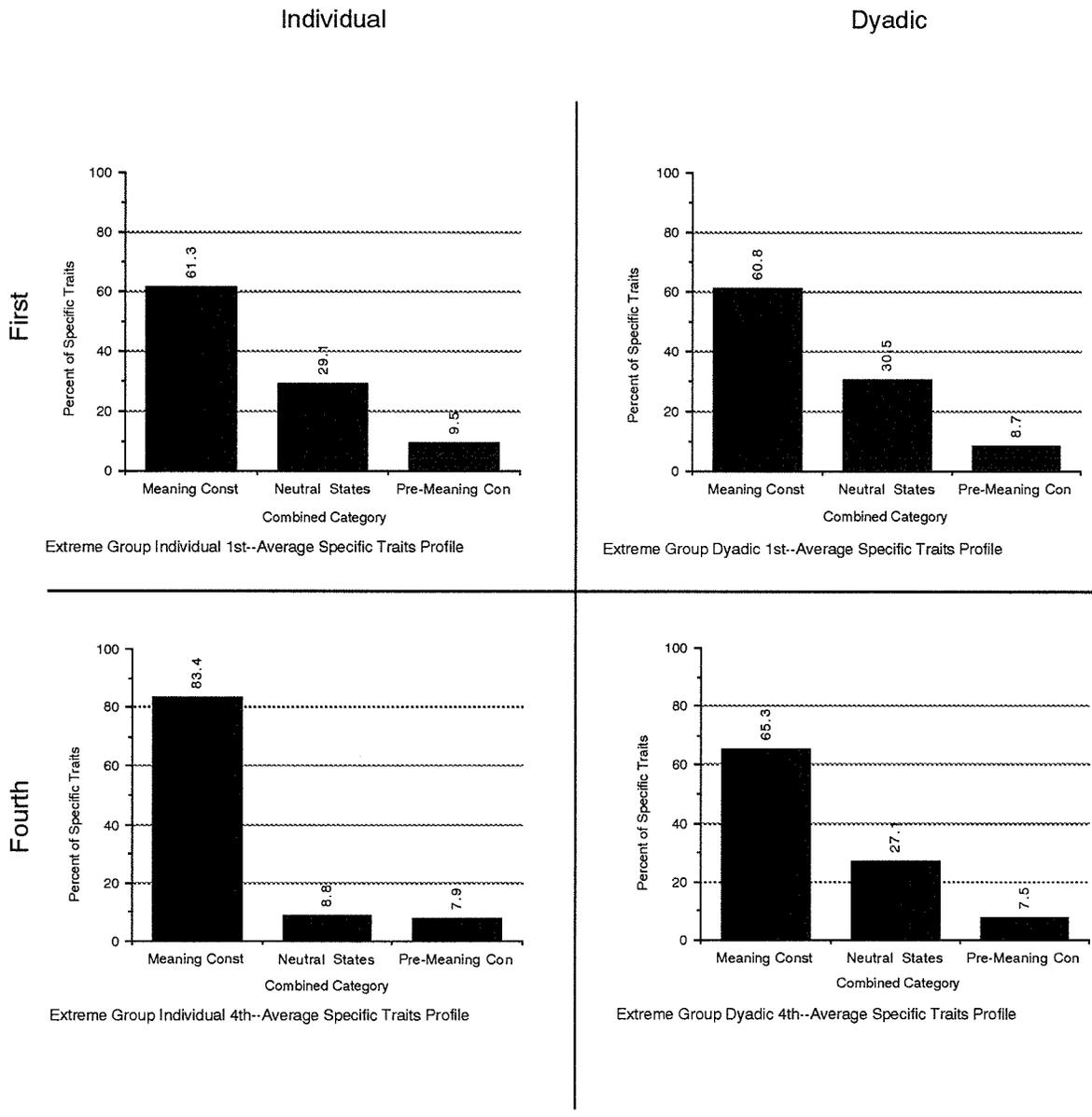
Individual

Dyadic

Extreme Group Individual 1st--Average Specific Traits Profile

Extreme Group Dyadic 1st--Average Specific Traits Profile

Extreme Group Individual 4th--Average Specific Traits Profile

Extreme Group Dyadic 4th--Average Specific Traits Profile

APPENDIX G

Holistic Rating Scale

HOLISTIC RATING SCALE -- THINK-ALOUD PROTOCOLS

Protocol Identification _____

Rater Identification _____

Directions: Circle the number that best indicates the degree to which the protocol exhibits each set of constructs.

DULL	1	2	3	4	5	6	VIGOROUS
FEELING OF REMOTE-NESS	1	2	3	4	5	6	SENSE OF ENGAGEMENT
NOT MUCH TALK	1	2	3	4	5	6	LOTS OF TALK
"POINTLESS" TALK	1	2	3	4	5	6	"THOUGHTFUL" TALK
LONG "DEAD" SPACES WITHOUT COMMENTARY	1	2	3	4	5	6	COMMENTARY THROUGHOUT
OVER-DEPENDENCE ON A FEW COGNITIVE STRATEGIES	1	2	3	4	5	6	VARIETY OF COGNITIVE STRATEGIES
LOW-LEVEL COGNITIVE STRATEGIES	1	2	3	4	5	6	HIGH-LEVEL COGNITIVE STRATEGIES
FOR DYADS: ONE OVERPOWERS THE OTHER	1	2	3	4	5	6	FOR DYADS: BALANCE BETWEEN PARTNERS

APPENDIX H

MCMCA Scores--All Students, Individual and Dyadic Conditions

	Score	
Student	Individual	Dyadic
F3A	5	7
F3B	7	4
F3C	9	4
F3D	5	6
F3H	8	9
F3I	9	6
F3J	10	7
F3L	7	4
F3M	8	8
F4A	7	9
F4B	7	1
F4C	8	10
F4D	8	7
F4F	5	3
F4I	3	2
F4J	6	5
F4K	10	5
F4Q	9	7
F4R	4	4
F4S	6	7
F4V	4	2
F4X	5	4
F5D	8	7
F5F	8	1
F5H	6	7
F5I	9	9
F5M	6	6
F5O	7	7
F5P	4	4

(APPENDIX H continued)

Student	Score	
	Individual	Dyadic
M3E	7	8
M3F	2	3
M3G	9	7
M3K	10	10
M3N	6	7
M4E	7	5
M4G	4	8
M4H	7	5
M4L	7	5
M4M	7	8
M4N	9	8
M4O	5	7
M4P	8	7
M4T	5	7
M4U	8	9
M4W	9	7
M5A	9	5
M5B	9	5
M5C	6	7
M5E	6	5
M5G	7	6
M5J	8	6
M5K	3	8
M5L	6	6
M5N	10	8
M5Q	8	8

APPENDIX I

MCMCA Scores by Student, Passage, and Condition

Student	X(Indiv)	X(Dyadic)	Y(Indiv)	Y(Dyadic)	Z(Indiv)	Z(Dyadic)
F3A			5			7
F3B	7					4
F3C	9					4
F3D		6	5			
M3E	7					8
M3F			2			3
M3G				7	9	
F3H		9	8			
F3I				6	9	
F3J				7	10	
M3K		10			10	
F3L	7			4		
F3M	8					8
M3N		7	6			
F4A		9	7			
F4B				1	7	
F4C		10	8			
F4D				7	8	
M4E		5			7	
F4F				3	5	
M4G			4			8
M4H				5	7	
F4I				2	3	
F4J	6					5
F4K	10					5
M4L		5	7			
M4M		8			7	
M4N	9					8
M4O		7	5			
M4P	8					7

(APPENDIX I Continued)

Student	X(Indiv)	X(Dyadic)	Y(Indiv)	Y(Dyadic)	Z(Indiv)	Z(Dyadic)
F4Q	9			7		
F4R				4	4	
F4S			6			7
M4T		7	5			
M4U	8					9
F4V		2	4			
M4W	9					7
F4X	5			4		
M5A			9			5
M5B				5	9	
M5C		7			6	
F5D		7			8	
M5E	6			5		
F5F				1	8	
M5G	7					6
F5H		7	6			
F5I		9	9			
M5J	8			6		
M5K			3			8
M5L	6					6
F5M		6	6			
M5N	10			8		
F5O	7					7
F5P		4	4			
M5Q				8	8	

APPENDIX J

Overall MCMCA Performance by Syntactic Frame and Similarity Type

(After Broderick, 1992)

IS(Implied)/Incompatible-kind comparison

X-1 - 21/37; Y-5 - 15/37; Y-6 - 23/37; Y-7 - 13/37; Z-2 - 21/36; Z-6 - 29/36

Total: 122/220; 55.5% (6 items)

IS/Incompatible-kind comparison

X-6 - 30/37

Total: 30/37; 81.1% (1 item)

IS/Disparate-kind comparison

Y-9 - 12/37

Total: 12/37; 32.4% (1 item)

DS(VP)/Incompatible-kind comparison

X-2 - 30/37; X-7 - 27/37; X-9 - 32/37; Y-2 - 27/37; Y-3 - 27/37; Y-10 - 18/37; Z-1 - 20/36; Z-4 - 16/36;

Z-5 - 22/36; Z-7 - 31/36; Z-8 - 24/36; Z-10 - 28/36

Total: 312/438; 71.2% (12 items)

DS(Adj)/Incompatible-kind comparison

X-4 - 17/37; X-10 - 28/37; Z-9 - 29/36

Total: 74/110; 67.3% (3 items)

DS(Adj)/Disparate-kind comparison

X-3 - 27/37; X-8 - 27/37; Z-3 - 17/36

Total: 71/110; 64.5% (3 items)

DS(NP)/Disparate-kind comparison

X-5 - 32/37

Total: 32/37; 86.5% (1 item)

DS(PP)/Disparate-kind comparison

Y-8 - 19/37

Total: 19/37; 51.4% (1 item)

(APPENDIX J continued)

_____

Combined

{[DS(Adj)/Incompatible-kind comparison] + [DS(VP)/Disparate-kind comparison]}

    Y-1 - 18/37

    Total: 18/37; 48.6% (1 item)

{[DS(VP)/Disparate-kind comparison] + [IS(Implied)/Incompatible-kind comparison]}

    Y-4 - 27/37

    Total: 27/37; 73.0% (1 item)

Totals (excluding combined metaphors)

    IS: 164/294; 55.8%

    DS: 508/732; 69.4%

    Incompatible-kind comparison: 538/805; 66.8%

    Disparate-kind comparison: 134/221; 60.6%

_____

APPENDIX K

MCMCA Results by Item

_____

Passage X

Item #	1	2	3	4	5	6	7	8	9	10
Raw Score										
Individual	13	16	15	9	17	15	13	15	16	17
Dyadic	8	14	12	8	15	15	14	12	16	11
Total	21	30	27	17	32	30	27	27	32	28
Percent	56.8	81.1	73.0	46.0	86.5	81.1	73.0	73.0	86.5	75.7

Passage Y

Item #	1	2	3	4	5	6	7	8	9	10
Raw Score										
Individual	11	16	13	15	8	14	6	11	5	10
Dyadic	7	11	14	12	7	9	7	8	7	8
Total	18	27	27	27	15	23	13	19	12	18
Percent	48.6	73.0	73.0	73.0	40.5	62.2	35.1	51.4	32.4	48.6

Passage Z

Item #	1	2	3	4	5	6	7	8	9	10
Raw Score										
Individual	16	10	9	10	11	14	15	12	15	13
Dyadic	14	11	8	6	11	15	16	12	14	15
Total	30	21	17	16	22	29	31	24	29	28
Percent	83.3	58.3	47.2	44.4	61.1	80.6	86.1	66.7	80.6	77.8

(APPENDIX K continued)

_____

Totals -- Passage x Condition

	Raw Score	Percent
Passage X		
Individual	146/190	76.8
Dyadic	125/180	69.4
Total	271/370	73.2
Passage Y		
Individual	109/190	57.4
Dyadic	90/180	50.0
Total	199/370	53.8
Passage Z		
Individual	125/170	73.5
Dyadic	122/190	64.2
Total	247/360	68.6
All Passages	717/1100	65.2

_____

Note. All percents rounded to the nearest tenth.

APPENDIX L

<u>MCMCA Metaphor Analysis</u>

<u>(After Lakoff and Johnson, 1980, and Lakoff and Turner, 1989)</u>

Passage X										
Item #	1	2	3	4	5	6	7	8	9	10
Metaphor										
Structural	1									
Structure Mapping					1					
Orientational									1	
Ontological	2	2		1	1	1				2
Event/Action		1		1		1	1		1	1
Container							1			1
Life/Journey										
Simile										
Actual								1		
Implied			1							
Analogy										
Simple										
Complex										
Total	3	3	1	2	2	2	2	1	2	3
Additional Features										
Conventional										
Metaphor									√	
Simile								√		
Phrase							√			√
Other										
Metonymy										
Synecdoche					√					

(APPENDIX L continued)

Passage Y

Item #	1	2	3	4	5	6	7	8	9	10
Metaphor										
Structural										
Structure Mapping										
Orientational					1	1		1		
Ontological	2	1	1	2	2	2	3		1	
Event/Action	1	1	1	1				1		1
Container	1							1		
Life/Journey										
Simile										
Actual										
Implied										
Analogy										
Simple										1
Complex									1	
Total	4	2	2	3	3	3	3	3	2	2

Additional Features										
Conventional										
Metaphor										
Simile										
Phrase					√					
Other										
Metonymy		√		√			√			
Synecdoche										

[APPENDIX L continued)

Passage Z

Item #	1	2	3	4	5	6	7	8	9	10
Metaphor										
Structural										
Structure Mapping										
Orientational					1		1			
Ontological	1	2	2	4	3	2	2	2	3	1
Event/Action	1		1	1	1		1	1	1	2
Container										
Life/Journey									1	
Simile										
Actual										
Implied										
Analogy										
Simple										
Complex										
Total	2	2	3	5	5	2	4	3	5	3
Additional Features										
Conventional										
Metaphor										
Simile										
Phrase										
Other										
Metonymy	√	√		√						
Synecdoche										

APPENDIX M

Holistic Scores--Dyadic Average

Dyad	Sum/7Items	Items	Average
X2F3D/M3K	34.250	7	4.893
X2F3H/M3N	18.750	7	2.679
X2F4A/M4T	20.750	7	2.964
X2M4M/F4C	33.750	7	4.821
X2M4O/M4L	30.500	7	4.357
X2F4V/M4E	22.750	7	3.250
X2M5C/F5H	13.000	7	1.857
X2F5D/F5P	39.000	7	5.571
X2F5I/F5M	36.000	7	5.143
Y2M3G/F3L	19.000	7	2.714
Y2F3I/F3J	18.000	7	2.571
Y2F4F/F4Q	21.250	7	3.036
Y2F4I/M4H	15.750	7	2.250
Y2F4R/F4D	35.500	7	5.071
Y2F4X/F4B	17.000	7	2.429
Y2M5B/F5F	29.250	7	4.179
Y2M5E/M5J	37.750	7	5.393
Y2M5N/M5Q	35.500	7	5.071
Z2F3A/F3M	12.250	7	1.750
Z2F3B/M3E	7.000	7	1.000
Z2F3C/M3F	18.750	7	2.679
Z2F4J/M4N	24.000	7	3.429
Z2F4S/M4P	13.250	7	1.893
Z2M4U/M4G	22.000	7	3.143
Z2M4W/F4K	7.000	7	1.000
Z2M5A(+M5R)	28.250	7	4.036
Z2M5G/M5L	14.000	7	2.000
Z2M5K/F5O	15.000	7	2.143

APPENDIX N

Holistic Scores--Individual Average

Student	Sum/7Items	Items	Average
X1F3B	35.000	7	5.000
X1F3C	27.000	7	3.857
X1M3E	7.500	7	1.071
X1F3L	21.750	7	3.107
X1F3M	7.500	7	1.071
X1F4J	24.000	7	3.429
X1F4K	12.500	7	1.786
X1M4N	25.250	7	3.607
X1M4P	34.750	7	4.964
X1F4Q	31.250	7	4.464
X1M4U	27.750	7	3.964
X1M4W	7.000	7	1.000
X1F4X	17.500	7	2.500
X1M5E	25.500	7	3.643
X1M5G	11.750	7	1.679
X1M5J	35.000	7	5.000
X1M5L	33.750	7	4.821
X1M5N	32.250	7	4.607
X1F5O	17.500	7	2.500
Y1F3A	8.500	7	1.214
Y1F3D	13.500	7	1.929
Y1M3F	7.750	7	1.107
Y1F3H	29.750	7	4.250
Y1M3N	22.000	7	3.143
Y1F4A	29.500	7	4.214
Y1F4C	26.750	7	3.821
Y1M4G	8.750	7	1.250
Y1M4L	24.750	7	3.536
Y1M4O	27.500	7	3.929

(APPENDIX N continued)

Student	Sum/7Items	Items	Average
Y1F4S	27.250	7	3.893
Y1M4T	9.250	7	1.321
Y1F4V	11.000	7	1.571
Y1M5A	33.000	7	4.714
Y1F5H	20.250	7	2.893
Y1F5I	26.000	7	3.714
Y1M5K	18.500	7	2.643
Y1F5M	26.000	7	3.714
Y1F5P	14.500	7	2.071
Z1M3G	19.000	7	2.714
Z1F3I	26.750	7	3.821
Z1F3J	15.250	7	2.179
Z1M3K	37.000	7	5.286
Z1F4B	23.500	7	3.357
Z1F4D	27.250	7	3.893
Z1M4E	16.000	7	2.286
Z1F4F	13.500	7	1.929
Z1M4H	13.750	7	1.964
Z1F4I	9.500	7	1.357
Z1M4M	36.500	7	5.214
Z1F4R	11.250	7	1.607
Z1M5B	32.000	7	4.571
Z1M5C	9.250	7	1.321
Z1F5D	28.250	7	4.036
Z1F5F	21.500	7	3.071
Z1M5Q	27.750	7	3.964

APPENDIX O

Individual MCMCA Scores and Level of Miscue--Comparison

			Miscue Rating Level		
Student	MCMCA Score	Miscue %	Easy	Instructional	Frustrational
Z1M3K	10	1.2	√		
X1M5N	10	1.5	√		
Z1F3J	10	4.7		√	
X1F4K	10	1.9	√		
Y1F5I	9	2.5		√	
X1M4N	9	0.4	√		
X1F4Q	9	0.4	√		
Z1M3G	9	1.2	√		
X1M4W	9	0.7	√		
Z1F3I	9	3.1		√	
Y1M5A	9	1.1	√		
Z1M5B	9	2.0		√	
X1F3C	9	3.0		√	
Y1F4C	8	0	√		
Y1F3H	8	1.4	√		
X1M4U	8	4.8		√	
X1F3M	8	1.1	√		
Z1M5Q	8	3.1		√	
Z1F4D	8	0.8	√		
Z1F5D	8	3.1		√	
X1M4P	8	1.1	√		
X1M5J	8	0.4	√		
Z1F5F	8	5.9			√
Y1F4A	7	2.9		√	
X1M3E	7	1.1	√		
Z1M4M	7	1.6	√		
X1F5O	7	1.5	√		
X1M5G	7	0.4	√		
Z1M4E	7	15.6			√
Z1M4H	7	7.8			√
Y1M4L	7	9.6			√
X1F3B	7	0.7	√		
X1F3L	7	1.5	√		
Z1F4B	7	7.0			√
Y1F4S	6	7.1			√
Y1F5H	6	4.6		√	
Y1M3N	6	3.9		√	

(APPENDIX O continued)

			Miscue Rating Level		
Student	MCMCA Score	Miscue %	Easy	Instructional	Frustrational
Z1M5C	6	7.0			√
Y1F5M	6	1.8	√		
X1M5L	6	1.1	√		
X1F4J	6	4.8		√	
X1M5E	6	0.7	√		
Y1F3A	5	1.8	√		
Y1M4O	5	14.3			√
Y1M4T	5	6.1			√
Y1F3D	5	11.1			√
X1F4X	5	13.4			√
Z1F4F	5	12.1			√
Y1M4G	4	2.1		√	
Z1F4R	4	5.1			√
Y1F5P	4	x[a]			√
Y1F4V	4	10.7			√
Y1M5K	3	10.7			√
Z1F4I	3	24.6			√
Y1M3F	2	8.9			√

x[a]Too many miscues to count.

APPENDIX P

<u>Specific Traits Aggregate Summaries (Combined Categories)--Extreme Groups</u>

Group	Student	M/C	N/S	P/M	Total
EGD1	X2F5P	306	134	26	466
	Y2F4X/F4B	52	85	16	153
	Y2F4R	144	43	18	205
	Y2F3L	38	26	5	69
	Z2F3C/M3F	37	29	4	70
	Z2F3B	2	20	9	31
	Y2F4F	63	6	7	76
	X2F4V	32	16	7	55
	Y2F4I	14	24	15	53
	Y2F5F	110	18	7	135
	Average	79.8	40.1	11.4	131.3
EGD4	X2F4C/M4M	110	33	5	148
	X2M3K	153	67	16	236
	X2F5I	151	49	6	206
	Z2M4U/M4G	59	38	13	110
	X2F4A	38	10	1	49
	X2F3H	28	19	1	48
	Y2M5Q/M5N	158	50	8	216
	Z2M5K	22	13	11	46
	Z2M4N	51	11	16	78
	Z2F3M	16	17	5	38
	Z2M3E	2	20	9	31
	Average	71.636	29.727	8.273	109.636
EGI1	X1F4X	23	7	0	30
	Y1F3A	4	4	0	8
	Y1F3D	14	18	4	36
	Y1F4V	15	2	1	18
	Y1F5P	41	41	9	91
	Y1M3F	7	0	1	8
	Y1M4G	10	4	0	14
	Y1M4O	64	14	4	82
	Y1M4T	10	5	1	16
	Y1M5K	31	12	9	52
	Z1F4F	11	5	8	24
	Z1F4I	15	8	1	24
	Z1F4R	12	2	2	16
	Average	19.769	9.385	3.077	32.231

(APPENDIX P continued)

Group	Student	M/C	N/S	P/M	Total
EGI4	X1F3C	52	4	4	60
	X1F4K	18	1	0	19
	X1F4Q	68	0	1	69
	X1M4N	36	9	1	46
	X1M4W	14	0	0	14
	X1M5N	58	6	1	65
	Y1F5I	51	8	21	80
	Y1M5A	71	3	8	82
	Z1F3I	31	4	0	35
	Z1F3J	27	4	2	33
	Z1M3G	25	9	2	36
	Z1M3K	74	9	7	90
	Z1M5B	46	3	7	56
	Average	43.923	4.615	4.154	52.692

APPENDIX Q

Specific Traits Aggregate Percent Summaries (Combined Categories)--Extreme Groups

Group	Student	M/C%	N/S%	P/M%
EGD1	X2F5P	65.667	28.755	5.580
	Y2F4X/F4B	33.990	55.556	10.458
	Y2F4R	70.245	20.976	8.781
	Y2F3L	55.072	37.682	7.246
	Z2F3C/M3F	52.863	41.429	5.715
	Z2F3B	6.452	64.517	29.032
	Y2F4F	82.906	7.894	9.210
	X2F4V	58.181	29.092	12.727
	Y2F4I	26.417	45.283	28.301
	Y2F5F	81.480	13.333	5.185
	Average	60.777	30.541	8.682
EGD4	X2F4C/M4M	74.324	22.296	3.378
	X2M3K	64.831	28.389	6.780
	X2F5I	73.299	23.787	2.912
	Z2M4U/M4G	53.636	34.546	11.818
	X2F4A	77.552	20.409	2.041
	X2F3H	58.333	39.582	2.083
	Y2M5Q/M5N	73.151	23.149	3.704
	Z2M5K	47.827	28.261	23.913
	Z2M4N	65.383	14.102	20.539
	Z2F3M	42.107	44.737	13.158
	Z2M3E	6.452	64.517	29.032
	Average	65.340	27.114	7.546
EGI1	X1F4X	76.666	23.334	0
	Y1F3A	50.000	50.000	0
	Y1F3D	38.890	50.000	11.111
	Y1F4V	83.333	11.111	5.556
	Y1F5P	45.056	45.056	9.89
	Y1M3F	87.500	0	12.500
	Y1M4G	71.429	28.572	0
	Y1M4O	78.052	17.074	4.879
	Y1M4T	62.500	31.250	6.250
	Y1M5K	59.614	23.077	17.307
	Z1F4F	45.834	20.834	33.334
	Z1F4I	62.501	33.334	4.167
	Z1F4R	75.000	12.500	12.500
	Average	61.335	29.118	9.547

(APPENDIX Q continued)

Group	Student	M/C%	N/S%	P/M%
EGI4	X1F3C	86.668	6.667	6.667
	X1F4K	94.736	5.263	0
	X1F4Q	98.549	0	1.449
	X1M4N	78.263	19.566	2.174
	X1M4W	100.000	0	0
	X1M5N	89.230	9.230	1.538
	Y1F5I	63.750	10.000	26.250
	Y1M5A	86.586	3.659	9.757
	Z1F3I	88.571	11.428	0
	Z1F3J	81.818	12.122	6.061
	Z1M3G	69.445	25.001	5.556
	Z1M3K	82.221	10.000	7.778
	Z1M5B	82.143	5.358	12.500
	Average	83.358	8.758	7.884

APPENDIX R

Composition of Extreme Groups EGI4 and EGD4, with Passage Read

EGI4	EGD4	Passage
F3C		X
M3G		Z
F3I		Z
F3J		Z
F4K		X
F4Q		X
M4W		X
M5A		Y
M5B		Z
M3K	M3K	Z/X
M4N	M4N	X/Z
F5I	F5I	Y/X
M5N	M5N	X/Y
	M3E	Z
	F3H	X
	F3M	Z
	F4A	X
	F4C	X
	M4G	Z
	M4M	X
	M4U	Z
	M5K	Z
	M5Q	Y

APPENDIX S

Passage Statistics

Feature[a]	Passage		
	X	Y	Z
Number of Paragraphs	10	7	8
Average Length (Sentences)	4.3	4.1	4.3
Number of Sentences	43	29	35
Average Length (Words)	13.9	21.2	15.2
Longest Sentence (Words)	28	36	28
Shortest Sentence (Words)	2	9	5
Passive Voice	3	6	3
Short (<12 Words)	18	2	14
Long (>24 Words)	3	8	4
Number of Words	600	615	533
Average Length (Letters)	4.38	4.75	4.60
Average Length (Syllables)	1.38	1.52	1.49
Number of Little Words (1 Syllable)	425	416	347
Percent	70.8	67.5	65.2
Number of Big Words (3+ Syllables)	36	78	84
Percent	6.0	12.7	15.8
Number of Prepositions	72	84	74
Flesch-Kincaid Grade Level	6	11	8

[a]Exclusive of titles, subtitles, and section headings.