

A QUESTION OF ANSWERS IN READING COMPREHENSION

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SUMMARY

The question - what makes a written text easy or difficult to comprehend? - is a complex one. Traditionally, difficulty has been considered to be a property of texts alone. I have refuted this view. The basic postulate tested herein is that difficulty is a product of the interaction of three factors: the reader, the text and the questions used to test comprehension.

For the analysis of this interaction, the systemic-functional model of language was employed, and four questions in particular were addressed: (i) What kinds of questions are asked in reading comprehension tests?; (ii) What are these questions testing?; (iii) Are the questions graded in difficulty?; (iv) What makes a question easy or difficult?

A system for the classification of reading comprehension test questions was formulated by reference to the ways in which the information needed to reconstruct the correct answer was encoded in the language of the test passage. Thus, answers to questions (i) and (ii) above were provided. Empirical research revealed that test questions were graded in difficulty, and that the difficulty of a question depended upon: (i) the degree of integration required to reconstruct an answer; (ii) the alternative answers offered in multiple-choice tests; (iii) the polarity of answers in tasks involving yes/no questions.

Finally, the implications of these findings for the assessment of reading comprehension and readability are discussed.

CHAPTER ONE

READING ABILITY, READABILITY AND

THE QUESTION OF QUESTIONS

1.1 Introduction

The work presented in this thesis centres around the question: what makes a text easy or difficult to read? This question first attracted my attention when, in the course of teaching reading in primary and then secondary school classrooms, I observed that some reading comprehension exercises proved consistently more difficult than others. Ad hoc guesses as to why this was so gave way to a desire to investigate the problem more systematically. This chapter provides an overview of the direction this investigation took.

To undertake an investigation of the question - what makes a text easy or difficult to read? - it seemed expedient first of all to adopt a working, workable definition of reading. While acknowledging that perceptual processes play an integral role in the reading process, in this work the term reading is defined first and foremost as a comprehension process. Thus, my concern is with that level of processing for which the requisite perceptual tasks involved have become automatic.

This view of reading as a comprehension process is one which is shared by other educators. It is reported that at a recent N.S.W. Primary School Principals Conference

... principals wanted to know what was meant by 'reading'. Surely the mechanical trick of reading was not the desired end? Children needed to understand what they read, and teaching this was a far more difficult task.

(The Sydney Morning Herald, July 7, 1981)

What is meant by reading in this thesis is defined below. (Also see Chapter Two, pages 22-24.)

1.1.1 Reading Defined

The reading process inherently involves the interaction of two components: a reader and a written text. In this work, the reader is considered first and foremost to be an acculturated language user and text is considered an instance of language in use. This implies that the reader, through his linguistic ability, is capable of ascribing meaning to and interpreting meaning from text. As a person reads a text, he responds not only to the meanings mapped onto the linguistic elements, both structural and non-structural; he also responds to the context of situation which is reconstituted for him through the language patterns. And in understanding the text, the reader takes into account all he knows about what is going on, what part the language is playing, and who are involved. Both text and reader are participants in the creation of meaning (Gerot, 1980).

Having presented my own view of what reading is, I next turn to the literature on readability.

1.1.2 Readability Defined

Readability is the study of what makes a text easy or difficult to read. This question has been studied from at least three different perspectives. The term readability has been used to refer to (i) ease

of reading as related to legibility and/or typography; (ii) ease of reading due to the interest value of a text; and (iii) ease of understanding or comprehension, i.e. comprehensibility (Chall, 1958; Klare, 1963; Gilliland, 1972).

While not discounting the importance of all three of these factors in what makes a text readable, I elected to focus on the third part of the definition only: ease of understanding or comprehension. This decision was taken not only to meet the requirements of a study of this kind, but mainly because the third facet most nearly coincided with my view of reading as a comprehension process.

Given that reading is defined as a comprehension process and readability refers to the ease of understanding or comprehension, clearly the focal point of this study is: what makes a written text easy or difficult to comprehend?

1.1.3 Assessment of Reading

Posing the question in this way gives rise to yet another set of considerations. Reading comprehension is obviously a private act. To assess, and by implication, gain access to the quality of this process, some method of measuring comprehension is introduced. Naturally then the measurement of comprehension plays an integral role in the assessment of reading ability. The latter, in turn, plays an integral role in the assessment of readability, as we shall see later.

1.1.3.1 Reading Ability

The measurement of reading comprehension by means of standardized reading comprehension tests yields an index of an individual's reading ability. In these tests, readers are typically asked to read

a series of short texts, usually contrived for the purpose, and then answer questions based on the texts. It is assumed that the greater the number of questions answered correctly, the better the reader's comprehension of the text as a whole. Furthermore, a reader who answers all or most of the questions correctly is assumed to have more reading ability than one who answers some or only a few correctly. Thus, a reader's score on such a test provides a numerical indication of how well he reads, i.e. of his reading ability.

The scores of standardized reading comprehension tests are usually expressed as a reading age or reading grade equivalent. A reading age of 8.46, for example, indicates that the reader obtaining this score has the reading ability of average children between eight and nine years of age. The same figure if it expressed a grade level score would indicate that the reader reads as do average students in Year 8 (Second Form) of high school.

The distinction between reading ability and readability is crucial but not always readily apparent to the uninitiated. It is important to remember that reading ability is seen as an attribute of the individual; readability, on the other hand, is purported to be an attribute of the written text itself.

Having made this distinction, we can return to the question at hand: what makes a text easy or difficult to comprehend?

1.2 Readability Research

Research studies investigating this question were being conducted as early as the 1920's (Lively and Pressey, 1923; Vogel and Washburne, 1928; Lewerenz, 1929) and continue even to the present (Kintsch and

Vipond, 1979; Miller and Kintsch, 1980). The studies have been of two distinct types. Up to and including the 1960's, most of the studies centred around finding ways to predict readability, that is, to assign grade - or difficulty - levels to texts. More recent research has been directed at discovering those linguistic variables which cause difficulty, making a text difficult to understand.

1.2.1 Predicting Readability: the Development of Formulae

Research into the prediction of readability was born of practical need. Educators, publishers, journalists and others responsible for producing written materials needed a way to assess whether or not their materials would be understood by their reading audiences. Because subjective judgments in this matter were known to be unreliable, objective means for assessing difficulty levels of written materials were required. Readability formulae were developed to meet this need. Pearson (1974-75:158-59) outlines the steps taken to construct a readability formula:

- 1] A series of passages known to be graded with respect to difficulty is selected. The basis for grading the passages is usually the number of correct responses made by students judged to have the ability to read at various grade levels to a variety of multiple choice comprehension items accompanying the passage.

The most frequently used series of criterion passages has been the McCall-Crabbs Standard Test Lessons in Reading (1926, 1950, 1961).

The authors provide the average reading grade of pupils who can correctly answer 50, 75 or 90 percent of the comprehension questions accompanying each passage of this test.

- 2] All potential factors in the passages which might prove to be predictive of passage difficulty are enumerated....
- 3] A multiple regression analysis is performed to determine which factors are most highly related [correlated] to the criterion measure.... (Pearson, 1974-75:159)

The requirement that the factors selected be quantifiable in some way has imposed constraints on the kind of variables that could be used in formulae. As a quick perusal of the formulae presented in Appendix 1 indicates, the two factors most consistently included are (i) word difficulty, and (ii) sentence complexity/length. With negligible exception, measures of word difficulty are in fact measures of word frequency. Sentence length is generally considered to be a reflection of sentential syntactic complexity; in other words, long sentences are thought to be complex sentences. Sentence complexity is measured directly by counting the number of some specified immediate constituent structure(s), e.g. prepositional phrases or subordinate clauses.

- 4] Mathematical transformations are used to translate the formula into grade level [or reading age] equivalents. (Pearson, 1974-75:159)

When applied to a text, a readability formula thus yields a reading age or grade level score.

The scores readers obtain on standardized reading comprehension tests are also typically expressed as reading age or reading grade equivalents. Readability formulae thus provide means of matching reader and text in terms of numerical values, the assumption being that if there is a match, then the reader will be able to read that text with relative ease and understanding.

Although readability formulae may be useful for providing indices of difficulty level, they do not answer the question of what makes a text easy or difficult to comprehend. The language variables used in formulae correlate with criteria of difficulty. This is not the same thing as saying these variables cause difficulty. Finding the causes of difficulty requires a different approach.

1.2.2 Researching the Causes of Difficulty

Until quite recently research into the causes of difficulty was involved with finding out whether or not the language variables which were found to be useful predictors of difficulty were also causes of difficulty (Coleman, 1962, 1965; Palmer, 1974; Pearson, 1974-75; Peltz, 1973-74). The preoccupation with this pursuit is reflected in Klare's (1976:132) description of the steps such research typically takes:

1. Select an appropriate body of text for experimentation.
2. Modify the readability of the text to produce easier and/or harder versions.
3. Hold constant other crucial variables, such as content, technical terms, and length.
4. Apply a readability formula to indicate the differences between the versions.
5. Compare the versions experimentally on groups of subjects using comprehension and/or retention (or some other dependent variable) as a measure of performance.

Although the researchers cited above have all adhered to this basic procedure, their findings do not coincide. Coleman (1962, 1965) reported that simplifying vocabulary and sentence structure and/or shortening sentences had a significant positive effect on comprehension. Palmer (1974), Pearson (1974-75) and Peltz (1973-74), on the other hand, found that such simplification had a negligible or

even a detrimental effect on comprehension. These conflicting findings, at first bewildering, are not so inexplicable when one examines the definitions of sentence used, the difficulty of holding content (meaning) constant while altering the lexicogrammatical elements realizing the content, and the ways in which comprehension was assessed in the various studies.

All of the research just referred to focuses on the effects of vocabulary and/or sentential syntactic structure. Recent advances in the study of discourse processing have opened up new avenues of enquiry. Research in discourse processing, as the term suggests, is concerned with how meaning is encoded in and made accessible through text. My own work takes up these issues for they are directly relevant to the study of readability. Likewise, the work of Kintsch and Vipond (1979), and Miller and Kintsch (1980), which came to my attention after my own project was well underway, focuses on the study of readability in the context of discourse processing. There are many points of comparison and contrast between these researchers' work and my own. These similarities and differences will be pointed out as they become relevant to ensuing discussion.

1.3 The Role of Reading Comprehension Assessment in Readability Research

Although the goals and methodologies of the three approaches to readability research outlined above differ, they do have one feature in common: all three involve the assessment of reading comprehension.

Standardized reading comprehension test passages are often used

as the criterion measure of difficulty with which predictor variables of readability formulae are correlated. The McCall-Crabbs Standard Test Lessons in Reading (1926, 1950, 1961) has become the most frequently used criterion measure for this kind of formula. Even those formulae which use other formulae as the criterion measure - a dubious practice at best - rely on these test passages if only in a second hand way. Although not all formulae use standardized test passages as the criterion measure, such tests are perhaps the most reliable and readily available of the measures used.

In some instances the assessment of readability depends directly upon the assessment of reading comprehension. One method of establishing the readability level of a passage is to present the ungraded passage to a sample of readers whose reading ability has been predetermined on a standardized reading comprehension test. How this sample responds to questions or some other task testing their comprehension of the ungraded passage provides a measure of readability for the passage. McLaughlin (1969a:642) reports that the readability levels of the McCall-Crabbs Test Lessons were determined in this way. Children whose reading ability had been determined by the Thorndike-McCall Reading Test were given the hitherto ungraded passages which comprise the Test Lessons. This sample's pattern of responses to questions accompanying the Lessons was used to determine the grade difficulty levels of those Lessons.

The way in which the McCall-Crabbs passages came to be graded can be criticized on the grounds that the procedure was circular. In defence of the procedure, however, McCall and Crabbs did need an objective basis for determining the reading abilities of the children in the sample. The Thorndike-McCall Reading Test was considered a

valid and reliable test.

Research into the causes of difficulty does not involve the use of standardized comprehension tests but does incorporate non-standardized measures. To reiterate, in this research, until recently at least, formal features but not content, technical terms, or length of a selected text were altered so as to produce easier and/or harder versions of the text. The different versions were presented to groups of subjects and their comprehension of the various versions assessed. If there was a significant difference in the scores attained for the easier and harder versions, the variables altered were said to be the causes of difficulty. Thus, in this type of research, reading comprehension assessment served as the basis of comparison, which in turn served as the basis for inferring causality.

The discourse portion of discourse processing is tangible and can be studied first hand. Processing, however, occurring as it does in the recesses of the human mind, cannot be directly observed. Rather, it is the measure of comprehension that might throw light on the processing that is taking place. From this, it is possible to extend to the actual process undertaken by the human brain. Thus, it could be claimed that comprehension assessment provides a means of making process accessible, even if only indirectly and crudely. This is important in testing theories and/or models of discourse processing.

Measures of reading comprehension are also used as the basis for inferring causes of difficulty in those discourse processing studies which specifically address the question of readability. However, in this instance causes of difficulty are purported to be a product of the interaction of the meaning structure of the text and

the consequent processing requirements.

1.4 Methods of Assessing Reading Comprehension

Assessment of both reading ability and readability depends upon the assessment of reading comprehension. The question of how reading comprehension should be assessed is thus one of fundamental importance for both of these notions.

In this section I shall present a brief account of the outstanding approaches to the assessment of reading comprehension. The first four methods discussed require individual administration and have been used almost exclusively in experimental, laboratory research work. The last two are appropriate for use with either individuals or groups and are used in both experimental research and regular classroom practice.

1.4.1 Methods Used in Research Only

Of the methods used solely in experimental research, subjective report has been used least frequently. There are reasons why this is so. A simple yes or no response to the question: Did you understand what you have just read? - does not tell the tester very much, even when the honesty of the subject is assured. Danks (1969) however, has used subjects' subjective reports effectively. In Danks' study subjects were instructed to rate the comprehensibility of various grammatically and semantically deviant sentences as a means of studying the effect of grammaticalness and meaningfulness on sentence comprehension.

Recall tasks, as the term implies, involve subjects being asked

to recall, usually in writing, what they have just read. Coleman (1965), Kintsch and Keenan (1973) and Frase (1972) have used recall as a measure of comprehension to test effects of syntactic complexity, propositional rank, and inferencing respectively. A problem with using this method is finding consistent bases for scoring responses. Also, when a subject leaves information out of his rendering of the text, it is impossible to know whether he does so through forgetfulness, selective inattention, or lack of comprehension.

Reading rate/time has not often been used as a measure of comprehension in readability research. Fast reading, it has been pointed out, can be an indication of good comprehension or of word barking where little comprehension is occurring (McLaughlin, 1968: 192). However, this measure is often combined with recall, questions or recognition measures, particularly in the studies conducted by Kintsch and his associates (Kintsch, 1974; Kintsch and Vipond, 1979; Miller and Kintsch, 1980). These researchers, along with Klare (1963), have found that effects which are non-significant in untimed conditions become significant in severely timed conditions. The use of limited time conditions almost seems a way of forcing significant results.

In the recognition technique subjects are presented with material they are asked to inspect or learn. Either immediately or after a short delay the subjects are given snippets of the original material together with new or modified elements and are asked to indicate which elements are old and which are new. Bransford and Franks (1971) and Thorndyke (1976) have used variations of this basic method to investigate subjects' recognition of inferred as opposed to explicitly stated information.

1.4.2 Methods Used in Both Research and Classroom Practice

Of the methods used in both research and classroom practice, two stand out most readily:

- (i) the cloze procedure
- (ii) questions.

I will discuss these two means of assessing reading comprehension in some detail (i) because they are used so extensively, in quite varied contexts, and (ii) because they are of concern to my theoretical interests in this thesis and to my pragmatic interests in the school classroom.

1.4.2.1 The Cloze Procedure

First developed by Taylor (1953) as a means of assessing readability, the cloze procedure has been used as a measure of reading comprehension in research studies, in reading comprehension tests, both standardized and otherwise, and in teacher-made comprehension exercises.

In this procedure words are deleted from a passage according to some rule such as 'every fifth word' or 'every second verb'. The words deleted are replaced by blanks of a standard size. The reader is asked to fill in the blanks. A response is counted correct if it exactly matches the form that was deleted.

Despite its popular support, there is reason to doubt the content validity of cloze as a measure of reading comprehension. Gilliland (1972:163), enumerating the advantages of cloze over conventional sentence completion exercises, states that

The cloze procedure measures the ability of a reader to use a variety of contextual inter-relationships in completing any particular blank. It deals not only with specific word meanings but also the ability of the reader to respond to his own language pattern. It can be seen therefore that a response to a cloze test will reflect the total language abilities of the reader.

There are several flaws in Gilliland's argument. Firstly, there is no clear evidence to suggest that cloze scores, which are essentially measures of readers' ability to utilize redundancy in a passage, are necessarily indicative of ability to comprehend ideas or concepts that run through the whole discourse (Carroll, 1972; McLaughlin, 1968). That responses to cloze tests 'reflect the total language abilities of the reader' is thus open to question. Secondly, if the reader's response has to exactly match the word deleted, then the reader is not responding to his own language pattern, but to the particular language patterns utilized by the original producer of the text.

There is another, more serious reason for questioning the validity of cloze as a measure of reading comprehension. I will comment on this by way of a personal anecdote. Several years ago I tried to introduce cloze exercises into my reading programs. My adolescent students protested vehemently that 'It's not fair that the answers have to be exactly like yours; that's dumb!' Unfortunately, I had to agree with my students. The requirement that the response has to exactly match the word deleted contradicts what the children knew intuitively and what linguists know consciously about language: language permits choice; language is choice. This is reflected partly in the well-recognized principle of a one-to-many relation between

the levels of meaning and form (Lamb, 1966; Halliday, 1974).

Horvath's (1977:7) suggestion that children be encouraged to list as many possible words (synonyms and near-synonyms) as they can for a blank makes sense linguistically and would tell the tester more about the reader as a language user than the present approach does. At the least, it would silence the cries of 'unfair'.

1.4.2.2 Questions

Reference has already been made in this chapter to the use of questions in the context of both reading ability and readability assessment, and readability research. Questions have been the most widely and frequently used of all the methods available for the assessment of reading comprehension - in research, in standardized testing and in everyday classroom practice. Their use, however, often seems to be a matter of practical convenience rather than considered thought.

Carroll (1972) comments that very often the questions used in standardized tests of reading ability can be answered without reference to the text, that many can be answered solely on the basis of the reader's prior knowledge or on incidental cues in the questions themselves.

Kintsch and Vipond (1979) have criticized the use of questions in general on the grounds that questions are often constructed intuitively and haphazardly, without theoretical bases in text structure and text processing. Perhaps this is not surprising in light of the fact that theories of text structure and text processing are of very recent origin. But the point that questions are often constructed intuitively and haphazardly without theoretical basis is

valid. Pearson (1974-75:161-62) echoes this sentiment when he comments that many of the questions accompanying easier and harder versions of a text do not tap those variables which are thought to cause difficulty.

A further complication related to the use of questions arises in the context of readability prediction. As mentioned earlier, the McCall-Crabbs Test Lessons, which serves either directly or indirectly as the criterion measure for many readability formulae, uses questions to test comprehension. Lorge (1949) pointed out more than thirty years ago that the difficulty of comprehension tests using questions is due not only to the difficulty level of the text but also to the difficulty of the questions. Therefore, the apparent ease or difficulty of the criterion passage is dependent upon both the difficulty of the texts and the kinds of questions asked. Lorge's first observation would apply to any situation in which questions were used to assess comprehension. While the truth value of Lorge's comments can scarcely be doubted, he left us with two tantalizing, unanswered questions: (i) What kinds of questions are asked in reading comprehension tests? and (ii) What makes a question easy or difficult?

1.4.2.3 The Problem of Pragmatic and Theoretical Validity

My interest in the cloze procedure and questions arose because of my own problems in the classroom. I was faced with the need to understand why the students I teach find some reading comprehension exercises so much more difficult than others. This question, which forms the basic concern of my study, arose within the context of the classroom.

I found that most of the research work addressing this question had taken place in laboratories. Much of the language used and many of the testing procedures used bear little relationship to the language and testing procedures used in schools. The work, in short, has been divorced from classroom reality.

From their popularity in the educational system, it appeared that possibly the above two methods would furnish an answer, the validity of which would be demonstrated in their usefulness in the classroom. However, I was not justified in this assumption. The use of these methods disillusioned me and I agree with the views expressed by the scholars cited above who claim that a more analytical approach to the use of these methods is needed; that we need to have a much clearer theoretical understanding of what in fact is being tested.

1.5 The Question of Questions

I elected to study questions in particular. In so doing, I elected to study a topic relevant to my interests in (i) readability and reading comprehension assessment, and (ii) research and classroom practice.

In order to make my work maximally relevant, not only in theory but also in practice, I used as material for analysis texts and questions from standardized reading comprehension tests and instructional reading comprehension exercises which are used in Australian primary schools. I frequently cite texts and questions from these materials. In the interests of clarity (most of the materials analyzed are known better by their curricular name than by

author name) and brevity, I have used abbreviated forms of reference to the source materials. The materials analyzed and their abbreviated forms of reference are indicated in Table 1 below.

Table 1: Reading Comprehension Materials Analyzed

	Source Material	Abbreviated Form of Reference
Tests	<u>Progressive Achievement Test: Reading Comprehension</u> (ACER, 1970)	<u>PAT</u> , 1970
	<u>ACER Primary Reading Survey Tests</u> (ACER, 1972)	<u>ACER</u> , 1972
	<u>McCall-Crabbs Standard Test Lessons in Reading</u> (McCall and Crabbs, 1961)	McCall-Crabbs, 1961
	<u>Neale Analysis of Reading Ability</u> , 2nd ed. (Neale, 1966a)	<u>Neale</u> , 1966a
Books	<u>Read and Think</u> (Meddleton, 1966)	Meddleton, 1966
	<u>Getting the Meaning</u> (Dixon and Mitchell, 1971)	Dixon and Mitchell, 1971
	<u>Let's Make English Live</u> (Bruce, 1968)	Bruce, 1968
Kits	<u>WARDS</u> (Western Australian Reading Development Scheme) (ACER, 1967)	<u>WARDS</u> , 1967
	<u>SRA</u> (Science Research Associates) (Parker, 1960, 1961, 1964)	<u>SRA</u> , date
	<u>Endeavour Reading Programme</u> , 3rd ed. (Language Arts Associates, 1975)	<u>Endeavour</u> , 1975

In the following chapters I present an account of the analytical and empirical research I undertook in an attempt to provide answers to the questions raised in Section 1.4:

- (i) What kinds of questions are used in reading comprehension tests?
- (ii) What are these questions testing?
- (iii) What makes a question easy or difficult?
- (iv) How can these questions about questions be related to a theory of reading?

The last of these questions, question iv, is taken up in the next chapter while analytical research concerned with the first three questions is reported in Chapter Three. In Chapter Four an account of the empirical research study related to these three questions is presented. A related issue which did not become apparent until the research study was underway is then discussed. And in the final chapter, I shall provide a summary of research findings - my own and those of others - in an attempt to form the best answer possible at present to the question with which I began:

What makes a written text easy or difficult to comprehend?

CHAPTER TWO

THEORETICAL FOUNDATIONS2.1 Introduction

In my exploration of what it is that makes a text easy or difficult to comprehend, it has been my aim to balance pragmatic orientation with theoretical. Up to very recently, the former has often been emphasized to the neglect of the latter (Kintsch and Vipond, 1979). As the genesis of my research work lies in the classroom (see Chapter One, page 16), the work reported herein is based as nearly as possible on what children do and are asked to do in the classroom.

Despite this pragmatic orientation, I found that such pragmatic work must be grounded in a theoretical understanding of reading in relation to the total language ability. Such a theoretical understanding of reading, I am convinced, is an essential requisite of successful innovations in this field. However, this is not to suggest that the linguistic perspective is the only viable one from which to study reading; certainly theories of child development and socialization would be amongst some of the other significant perspectives on this matter.

The multifaceted nature of reading has been long recognized, as is evident from the literature on the subject. For example, Kolers (1969) and Tinker (1965) have studied extensively the physiological, and more particularly the visual perceptual processes involved in the act of reading. Kintsch (1974), Miller and Kintsch (1980) have

studied the role of memory in reading; Klare (1963, 1976) has investigated the effects of motivation on reading behaviour. Reading has also been studied from a cognitive viewpoint (Just and Carpenter, 1977), and from what might be called a skills approach (Davis, 1968). No one of these approaches alone will lead us to an adequate understanding of the nature of the reading process; all these perspectives are valid and necessary.

My reason for choosing a linguistic perspective lies in the nature of the problem chosen for study and by the context in which the problem arose. Reading is a central component of the language of the classroom. Much of the learning that takes place in schools takes place through reading. Talking, listening, writing and reading are the central modes through which learning occurs in the classroom; all four are modes of language use.

There have been a number of theories developed explaining the nature of language. The theory which I felt provided the greatest explanatory power for the phenomena of interest to me is currently known as the systemic-functional model, introduced first by Halliday (1961). Although I have by no means exploited the full potential of this model for my analysis, I have drawn extensively on the insights the theory provides, in particular, as represented in the work of Halliday (1978, 1980, in press) and Hasan (1975, 1980a, 1980b) and by Halliday and Hasan jointly (1976). My thinking about reading, questions, and readability has been informed by their thinking about language.

In this chapter, I will attempt to place reading as a part of the picture of the entire language development of the child. I will define some of the fundamental notions of the systemic-functional model, and

bring to notice those categories use of which has been made in my analysis.

2.2 Linguistic Perspectives on Reading

It would not be correct to imply that reading has received no attention from linguists, but it was not until quite recently that efforts have been made to place reading as an integral part of language ability.

Fries (1962), one of the few well-known linguists to work on reading, held the view that reading was largely a matter of responding to letters and spelling patterns. If a child could convert letters and letter patterns from print to spoken form, then he was reading.

It is true that readers cannot get far without the ability to recode - to convert letters from print to spoken form - and the studies of phonological-graphological correspondence made by Fries (1962) and Venezky (1967) have added significantly to our understanding of the recoding phase of the reading process. But it is equally true that readers cannot get far with recoding ability alone. Fries' view placed reading as a follow-up or secondary activity, mainly mechanical in its nature.

More recently, Goodman (Goodman and Niles, 1970) and Smith (1971, 1978) have emphasized the salience of meaning in the reading process. For Goodman and Smith, reading is taken to include all those processes necessary to reconstruct the meaning of the text. It is these researchers' view that reading involves both 'extracting' meaning from and 'bringing' meaning to the text. The creation of meaning entails the interaction of text and reader.

Mackay, Thompson, and Schaub (1970, 1978) also place meaning at

the centre of the reading process. Reading is seen by these authors to be a part of the total language development of the child. In this view, language is considered a resource for meaning.

Goodman and Smith have provided many useful insights into the reading process; I have incorporated a number of these insights into my own view of reading, as will be seen presently. But the underlying view of language and the place of reading in language which is most closely attuned to my own is that expressed by Mackay et al. That this should be so is not surprising since Mackay's view of language and more particularly of meaning in language, and my own are both based on the systemic-functional model of language.

A number of views of reading and language are presented in the N.S.W. Department of Education's Reading K-12 Curriculum Policy Statement, circulated to N.S.W. Schools in mid-1980. The influences of Mackay et al. (1978), Bullock (1975), Goodman (1970) and Smith (1978) are particularly noticeable in this document, not least in the definition of reading offered:

Reading is a process of bringing meaning to and
extracting meaning from print.

(Reading K-12, p.13)

The committee which formulated the K-12 document(s) has drawn together from these sources a number of useful insights into the nature of the reading process. Among these are:

- * readers extract meaning from print by using graphic (visual), phonological (sound), syntactic (grammatical), and semantic (meaning) cues ...;
- * readers predict as they read. They expect the repetition of spelling, syntactic and semantic cues;
- * readers use their stored knowledge, gained from past experience, to help them gain meaning from print;

- * meaning is gained by reading ... TEXT ...,
(italics mine) not individual words....
Reading is much more than mere word identification;
- * reading is not reading unless it involves some
degree of comprehension.
(Reading K-12, Support Statement:
Learning to Read, p.27)

These insights have found their way into the working definition of reading I have developed for the purposes of this thesis:

The reading process inherently involves the interaction of two components: a reader and a text. The reader is considered first and foremost to be an acculturated language user and text is considered to be an instance of language in use. This implies that the reader, through his linguistic ability, is capable of ascribing meaning to and interpreting meaning from text. As a person reads a text, he responds not only to the meanings mapped onto the linguistic elements, both structural and non-structural; he also responds to the context of the situation which is reconstituted for him through the language patterns. And in understanding the text, the reader takes into account all he knows about what is going on, what part the language is playing, and who are involved. Both text and reader are participants in the creation of meaning.
(Gerot, 1980)

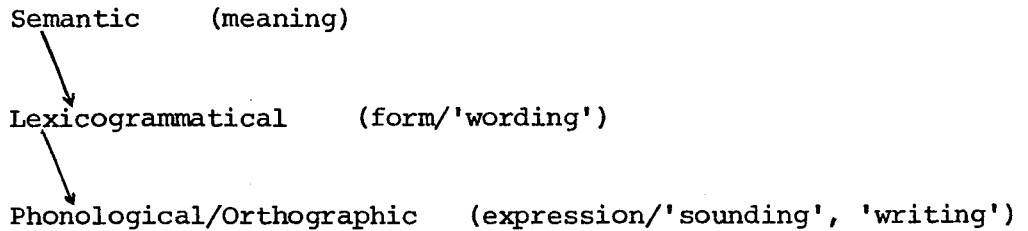
I believe that of the many definitions available, this one just quoted comes closest to paraphrasing what is meant by comprehension. If comprehension has taken place, then the reader will have exploited every means that the text has provided for the reconstruction of what the text is about. In this definition, language is being viewed as a resource for meaning.

2.3 Language: A Resource for Meaning

This is a fundamental tenet of the systemic-functional model. Language is not viewed as a set of rules, but as a resource for meaning. Unlike many models which have to build in the level of

meaning at a later stage, in the systemic-functional (SF) model meaning has always been built in, having equal prominence with other levels.

In the SF model, a natural language is seen as possessing three levels:



The semantic level is the level of meaning; the lexicogrammatical level is the level of form (vocabulary and grammar), or in folk terminology, of 'wording'. And the phonological/orthographic level is that of expression, in sound or in print.

The relationship linking these three levels, one to another, is not one of constituency, but is one of realization. Meanings are realized by (coded in) lexicogrammatical structures (forms), and the latter in turn are recoded in - or realized by - orthographic or phonological structures.

The semantic system has four functional components: the experiential, logical, interpersonal and textual. The first two of these are closely related and can be combined under the heading of ideational.

It seems appropriate here to quote Halliday's (1978) own characterization of these components:

The ideational component is concerned with the expression of content, with the function language has of being about something.

It expresses the phenomena of the environment:
the things - creatures, objects, actions, events,
qualities, states and relations - of the world
and of our own consciousness ...

(Halliday, 1978:112)

The interpersonal component is concerned with the social, expressive and conative functions of language.

This is the component through which the speaker intrudes himself into the context of situation, both expressing his own attitudes and judgements and seeking to influence the attitudes and behaviour of others. It expresses the role relationships associated with the situation ...

(Halliday, 1978:112)

The textual component is often described as the 'enabling' one; without it, the integration of the other two into a relevant message cannot be achieved.

The textual component represents the speaker's text-forming potential; it is that which makes language relevant. This is the component which provides the texture; that which makes the difference between language that is suspended in vacuo and language that is operational in a context of situation. It expresses the relation of the language to its environment, including both the verbal environment - what has been said or written before - and the nonverbal, situational environment. Hence, the textual component has an enabling function with respect to the other two; it is only in combination with textual meanings that ideational and interpersonal meanings are actualized.

(Halliday, 1978:112-13)

These three components of the semantic system - the ideational, interpersonal and textual - can be used as a means for characterizing meanings that are present in every use of language in every social context. And as we shall see in the next section, a text is a composite of all three kinds of meaning.

2.4 Language Function

In the tradition of Malinowski (1923, 1935) and Firth (1935, 1950), Halliday's perspective on language is a functional one.

Function in this perspective is used in several senses.

2.4.1 Function: Language Use in Context

Firstly, 'function' is used in the sense of how we use language - to buy oranges, discuss world politics and whisper sweet nothings for example. When we use language in these ways, we are exchanging meanings. But obviously, we do not do so in isolation from the context in which the language is functioning. This is a fundamental principle in the functional perspective - one to which Malinowski (1923:307) gives forceful voice:

A statement, spoken in real life, is never detached from the situation in which it is uttered. For each verbal statement by a human being has the aim and function of expressing some thought or feeling actual at that moment and in that situation, Without some imperative stimulus of the moment, there can be no spoken statement.

There follows from this a second tenet of the functional perspective:

In each case, therefore, utterance and situation are bound up inextricably with each other and the context of situation is indispensable for the understanding of the words. Exactly as in the reality of spoken or written languages, a word without linguistic context is a mere figment and stands for nothing by itself, so in the reality of a spoken, living tongue, the utterance has no meaning except in the context of situation.

(Malinowski, 1923:307; italics original)

The notion 'context' has a central place in the functional perspective of language for context is the environment in which

language functions, in which it comes to life. I shall return to this notion presently.

2.4.2 Function: the Organizing Principle of the Language System

'Function' in the sense discussed above is synonymous with use in context. But 'function' is also used in a more abstract and general sense.

Inherently involved in all uses of language are three abstract functions:

- (i) the function of transmitting information between people;
- (ii) the function of establishing, maintaining and specifying social relations between people;
- (iii) the function of providing texture, the organization of discourse as relevant to the situation.

These three abstract metafunctions (Halliday, 1978) are built-in as the ideational, interpersonal and textual functional components of the semantic system of language; they form the basis of organization for the semantic system.

These functions, furthermore, form the basis of the grammatical organization of language, since the task of grammar is to encode the meanings deriving from these various functions into articulated structures (Halliday, 1978:22). 'Function' in this sense thus refers "... to the components of meaning in the language system, determining the internal organization of the system itself" (Halliday, 1978:72).

As is implied in the above, function has a pivotal position between extra-linguistic reality and the forms of language. That is, the meaning components of language serve to link the situational context in which an utterance is made to the lexicogrammatical component

through which the utterance is realized.

A third use of the term 'function' relates to the level of form where, for example, the elements of the structure of a clause might be referred to as 'functions' as in - Sir Christopher Wren built this gazebo - (taken from Halliday, 1973:39) where the function of 'agent' is realized by Sir Christopher Wren; 'process' is realized by built and 'goal' by this gazebo. This latter use is logically related to the notion of 'function' as an organizing principle, as I explain in greater detail below (see Section 2.4.5).

2.4.3 Context

Up to Malinowski's time, the word context had been used to mean the words and sentences before and after some particular textual item that was in focus - i.e., to the accompanying text. Indeed, context is still defined in this way in those exercises included in commercial reading schemes which exhort children to 'use context clues' to determine the meanings of unfamiliar words.

Through Malinowski, however, context has come to have a wider meaning, and for this reason, I will not use the term context to refer to accompanying text, but will use the term co-text to refer to this verbal aspect of the environment.

By context Malinowski meant the total environment of the text. In the course of his field work with the Trobriand Islanders, Malinowski realized that if translations of native texts were to be made intelligible to English speaking readers, information about the goings on - the sights and sounds - in which the utterances were made had to be included. Furthermore, information about the cultural beliefs and background had to be included if the texts were to be

adequately understood. Malinowski introduced the notion of context of situation to refer to the immediate sights and sounds surrounding the language event, and the notion context of culture to refer to the cultural environment of which the language event was a part.

Firth (1950) subsequently elaborated the notion 'context of situation', making it more abstract and general. Halliday, in turn, presents an abstract characterization of context of situation in terms of the three variables: field, tenor and mode.

Field (or field of discourse) refers to the social activity taking place in which language use plays a part, together with the purposive activity of the writer or speaker. Subject matter is one element of the field.

Tenor (or tenor of discourse) refers to the role relationships between the participants in the situation, including the roles of speaker and listener in the speech situation itself.

Mode (of discourse) refers to both the channel and genre of communication. Channel is the medium - spoken or written - of discourse while genre refers to the style of discourse as report, dialogue, epic poem and so on.

2.4.4 Context and Function

The components of the situation (field, tenor and mode) are systematically related to the functional components of the semantic system of language. Field is related to the ideational component, representing the 'content' function of language; tenor to the interpersonal component, representing the 'participation' function of language; and mode to the textual component, representing the 'relevance' function of language. There is, in other words, a tendency

for the field of social action to be encoded linguistically in the form of ideational meanings, the role relationships in the form of interpersonal meanings, and the symbolic mode in the form of textual meanings (Halliday, 1978:123).

2.4.5 Function and Form

It was stated earlier (see section 2.3) that meanings are realized by - or encoded in - lexicogrammatical structures. Just as the components of the situation are systematically related to the functional components of the semantic system, so these functional components are systematically related to the transitivity, mood and thematic systems of grammar at the rank of clause.

The options in each system can be seen as an input, whose cumulative output is a (syntagmatic) structure. The elements of these structures are themselves often referred to as 'functions' (see 2.4.2 above).

For example, ideational meanings are meanings about things - about the types of processes (material, mental and relational), and participant functions (actor, goal, beneficiary, instrument), and circumstances (temporal, locative and so on). These are the structural output of the options from the system of transitivity (Halliday, 1973; Berry, 1975). "Transitivity is the set of options relating to cognitive content, the linguistic representation of extralinguistic experience, whether of the phenomena of the external world or of feelings, thoughts and perceptions" (Halliday, 1967:199).

Interpersonal meanings are represented through patterns of mood - the selection of speech roles: making statements (declarative), asking questions (interrogative) or giving commands (imperative) - and of

modality (the speaker's assessment of the validity of what he is saying).

Textual meanings are encoded in the clause through the options of the systems of information and theme, as well as through patterns of cohesion. Options of the information system themselves are realized through the phonological patterns of intonation and stress. Although it is not irrelevant to reading, I have not considered information structure in my analysis. However, thematic structure and cohesion are considered.

The thematic systems are systems of the clause and represent the speaker's or writer's organization of the clause as a message. English clauses consist of a Theme and a Rheme. The Theme is what the message is concerned with - the point of departure for what the speaker is going to say - and is realized by the first element in the clause. The Rheme comprises the remainder of the message.

Cohesive relations are semantic relations. Cohesion occurs when the interpretation of an element in the text presupposes something other than itself and that something else is also explicitly realized in the text. When this happens, the two elements, the presupposing and the presupposed, form part of the same text, and constitute what is called a cohesive 'tie'. I shall discuss cohesion in some detail in section 2.5.

Any given clause in a text is a combination of structures (comprised of functional roles) each of which derives from one or other component of the semantic system. Thus the structures realized by the clause: Hyperno comes up on the outside rail, for example, may be represented as follows:

Hyperno (does) come up on the outside rail.			
Ideational (transitivity)	Actor	Process	Location
Interpersonal (mood)	Mood		Residue
Textual (theme)	Theme	Rheme	

In the above presentation the top line displays the structure of the clause, derived from the system of transitivity. The elements Actor, Process and Location are the output of options from this system. The second line displays the clause structure as derived from the mood system; the element Mood (consisting of Subject plus the Finite element in the verb) and the element Residue are the output of options from the mood system. And the third line shows the structure of the clause derived from the thematic system. The elements Theme and Rheme are the output of options in this system.

This view of structure has considerable advantages over the traditional and even modern views of syntactic structures. An exhaustive analysis of the structure of a clause following the systemic-functional model is a description easily relatable to the pluri-functional nature of meanings.

It is in this sense of 'structure' that the following statement from the definition of reading given on page 24 is to be interpreted:

As a person reads a text, he responds to the meanings which are mapped onto the structural elements.

(Gerot, 1980)

2.4.6 Context, Function and Form

The systematic relationship which exists between context, function and form is illustrated in summary form in Figure 1 below:

Context of Situation	realized by	Functional Components of Semantics	realized by	Lexico-grammatical Systems
field of discourse (what is going on)		ideational		transitivity
tenor of discourse (who are taking part)		interpersonal		mood, modality
mode of discourse (role assigned to language)		textual		theme, information, cohesion

Figure 1: The Relationship between Context, Function and Form at Clause Rank (Based on Halliday, 1980:40)

It is in this sense that function is pivotal to the relationship between the context of situation (extra-linguistic reality) and form. The field of discourse, since it largely determines the content of what is said, has the major influence on the selections from the transitivity systems of grammar. The tenor of discourse, since it refers to the participants in the speech situation, and how they relate to each other socially, influences the selection of mood and modality. The mode of discourse, which covers both channel and genre, tends to determine the way the language hangs together - the texture - including both internal organization of each clause as a thematic construct and the cohesive relations which link one sentence to another.

Because there is a systematic relationship between context, meaning (function) and expression (form), we are able to infer from situation to text, and from text to situation.

For example, given the following values - the contextual configuration - for the situational variables field, tenor and mode, we have a reasonably good idea of what meanings are likely to be expressed and how:

Field: teacher chastising a student for submitting untidy homework with aim of
 (i) punishing the student for this misdemeanor,
 and
 (ii) inducing the student to produce legible work.

Tenor: classroom teacher addressing young student in thinly veiled threatening manner.

Mode: spoken, 'pseudo' dialogue

Although we cannot predict exactly what expressions will appear in the text which this contextual configuration characterizes, we will not be surprised if the text goes something like this:

Teacher: This page is a mess. Do you really expect me to mark such sloppy work?

Student: I don't know. (snicker)

Teacher: You don't know, SIR.... Right, I'll see you back here first half of lunch to get it recopied.

Student: Yes sir.

In many instances we must infer from the text to the situation. Upon over-hearing the text fragment - Hyperno comes up on the outside rail - for example, we can infer that the fragment comes from a public broadcast of a horse race. Or upon reading:

Read each story carefully and then answer the questions beside it. Five answers are given for each question. You are to choose one answer you think is best.... Please do not mark this booklet. Do not start until you are told.

we can infer that the utterances comprise part of the instructions

issued to candidates about to undertake a multiple-choice reading comprehension test - probably standardized since the candidates are warned not to mark the test booklets, and since the test is apparently timed: 'Do not start until you are told.'

We can reconstruct a lot about the situation just by attending to that little bit of text. Any piece of text, long or short, spoken or written, will carry with it indications of its context. We only have to hear or read it to know where it comes from. This means that we reconstruct from the text certain aspects of the situation in terms of the field, the tenor and the mode. We make inferences from the text to the situation.

(Halliday, 1980:64)

To say that we are able to do this is to say that we can assign a text to some register. The linguistic features, both semantic and lexicogrammatical, which are typically associated with particular values of field, tenor and mode, constitute a register. We know that the Hyperno example above comes from a broadcast of a horse race because 'comes up on the outside rail' is an expression of a meaning that makes sense in the context of horse racing.

This sense of register or this idea of what kind of meanings relate to what kind of situation is largely a result of socialization. It follows that familiarity with a context and therefore with register depends to a large extent on patterns of socialization. And in this context socialization should not be seen only as 'primary socialization' (Bernstein, 1971), but also as a continuing process of acculturation in the various aspects of the life of the community, with the inevitable consequence that specialization - whether academic or technical - is itself a form of socialization, a process of getting to know the specific contexts to which one's life-chances expose one.

In reading, familiarity with context - and with register - plays

an important part, as I have attempted to show (see Chapter Three, page 79 and Chapter Five, page 124).

Figure 1 in section 2.4 captures the meaning of comprehension from the point of view of the role of language in context. Comprehension comes about when the reader responds to the meanings mapped onto the linguistic elements, both structural and non-structural (see pages 33 and 52 respectively), and when he responds to the context of situation which is reconstituted through the language patterns of the text. In understanding a text, the reader takes into account all he knows about what is going on, what part the language is playing, and what participants are involved. Figure 1 provides a model of this.

I have only partially exploited the insights of this model in my work. My analysis of the question of questions and of the language of texts used in reading comprehension tests has been primarily concerned with the textual function.

Studies which incorporate an analysis of language in terms of a propositional text base (Kintsch and Vipond, 1979; Miller and Kintsch, 1980; Kintsch and Van Dijk, 1978) focus on the ideational function. There are many insights to be gained from such analyses. But through my analysis of textual functions I have made discoveries about the nature of questions and texts used in reading tests which I believe would not have otherwise come to light.

This is not to say that ideational and interpersonal functions have not been called into question from time to time in my analysis, but simply to emphasize that the analysis is mostly concerned with textual functions. Therefore, textual notions need some explanation here.

2.5 Textual Function and Relevance

The textual function of language is the 'relevance' function. Two kinds of relevance are the domain of the textual function: the relevance of language of the text to the context - to extra-linguistic reality - and the relevance established by relating one bit of language to another in the inter-linguistic context - the co-text.

2.5.1 Relevance of Context to Language

Language is capable of establishing relevance to the outside universe "... not only in the rather limited philosophical sense of the onomastic or referential function, but also in its being answerable to the context of situation" (Hasan, 1980a:43). In the preceding section (2.4) we saw several ways in which language establishes relevance to the outside universe. Perhaps most fundamental is the fact that the very organization of the language system is governed by the functions language serves in the life of social man. And in the discussion of register I have attempted to show that the contextual configuration - a particular configuration of values for field, tenor and mode - determines what kinds of meanings may legitimately be expressed in a particular situation.

Hasan (1980a) has shown, furthermore, that the global or generic structure of a text can be predicted from the contextual configuration. There are, for example, certain elements of text structure whose presence is essential to any complete text embedded in the following contextual configuration, taken from Hasan (1980a):

field of discourse: economic transaction: purchase of
retail goods, perishable food ...

tenor of discourse: agents of transaction: salesman-customer;
social distance: near maximum ...

mode of discourse: channel aural: +visual contact; spoken
medium

Given this contextual configuration, the elements of text structure
which follow are obligatory:

SR (sales request) = can I have ten oranges and a kilo of
bananas please

SC (sales compliance) = yes anything else

no thanks

S (sale) = that'll be dollar forty

P (purchase) = two dollars

PC (purchase closure) = sixty, eighty, a hundred two
dollars and thank you.

(Hasan, 1980a:18-26)

There are also a number of optional elements which may occur in a sales exchange of the type characterized in the above contextual configuration. But the elements (SR, SC, S, P, and PC) shown here must occur in any complete text embedded in this particular contextual configuration. Were any of these elements left out, then the text - and the social transaction - would be incomplete.

The occurrence of these obligatory elements is predicted from the nature of the social activity: from what is going on, what participants are involved and the role language plays in the exchange - i.e. from the social requirements inherent in such an interaction. Sales request (SR) is predicted from the fact that if you want to buy something from a retailer of perishable goods, you must make your wants known to the salesman who is selling the goods. Sales compliance (SC) is predicted from the fact that the salesman acknowledges that he will fulfil your request and will invite you to suggest any other goods you might require. For buying-selling to occur, the buyer must be told the price of the

goods he is acquiring. Thus, the element S (sale) is predicted. Then payment (P) must be made by the buyer. The salesman then indicates that money has changed hands and that by implication, the buying has been completed (PC or purchase closure).

My presentation of Hasan's analysis, though condensed, is hopefully adequate to show how it is that the generic structure of a text is answerable to the social context in which the text is embedded. (For detailed discussions see Hasan, 1978, 1979, and 1980a.)

That language has exophoric potential provides additional confirmation that language establishes relevance to the situation. There are instances of language use in which some item or items in the utterance are interpretable only by reference to the situation. Take for example the utterance:

Now pick it up.

In this utterance the source of the interpretation for the item it is exophoric to the situational context in which the utterance was made. In fact, this utterance was made when a child, turning away from the school canteen, dropped his ice-cream wrapper to the ground. The supervising teacher riveted the child with an icy glare and said, 'Now pick it up.' The full meaning of the utterance becomes apparent only when its situational context is supplied.

If we were to place this utterance in linguistic context - e.g. 'I saw you drop that wrapper. Now pick it up' - the interpretation of it poses no problems; it clearly refers to wrapper.

In this text are other related items: you in the first sentence is related to 'you' in the second sentence, and pick up is related to drop. The relations that exist between it and wrapper, you and 'you',

pick up and drop provide the texture - the internal unity - of this text.

In the analysis of texture, the concept tie assumes a central role. A tie always implies a relation: there can be no tie without two members and the members cannot appear in a tie unless there is a relation between them (Hasan, 1980a:44). Thus, the items it and wrapper, drop and pick up in the 'wrapper' example above form cohesive ties. The texture of a text is provided by the semantic relations that tie up any given pair of cohesively related items.

We saw earlier that the global structure of a text is relatable to the contextual configuration in which the text is embedded. So too is texture. The items available for and entering into ties as well as the patterning of those ties within a text is dependent upon the nature of the goings on, the role language plays in those goings on, and the participants involved.

In the above text the goings on involve the dropping and picking up of an ice-cream wrapper. The participants are a teacher, acting in an authoritarian role, addressing a student, guilty of breaking a school rule. Not surprisingly then, in this text drop and pick up form a cohesive tie, as do it and wrapper; both occurrences of you refer to the student addressed.

In both this text and the one below (repeated from page 34), the participants are a teacher, acting in a role of authority, and a school student. In both, the goings on include the teacher chastising the student in some way for breaking a school rule. However, the nature of the rule broken differs in each case, and the punishment meted out also differs.

Teacher: (1) This page is a mess. (2) Do you really expect me to mark such sloppy work?

Student: (3) I don't know.

Teacher: (4) You don't know, SIR.... (5) Right, I'll see you back here first half of lunch to get it recopied.

Student: (6) Yes sir.

Since the texture of a text is relatable to its contextual configuration, we would expect that the texture provided by cohesive ties in the dialogue just presented would differ somewhat from that of the monologue regarding the ice-cream wrapper. And so it does.

In the 'messy page' dialogue, all references to you (S2,4,5) are to the student addressed. (Of course, when the student speaks, he refers to himself as I: see S3.) Me (S2) forms a tie with I (S5) since both refer to the speaker/teacher.

Given the nature of the participant roles in both this text and the 'wrapper' text above, it is not surprising that the teacher is I and the student you. In the 'wrapper' text the student makes no verbal response, and in the 'messy' text the student's response is minimal. In short, it is the teacher who is doing the talking.

But the content of the talk is different and this is reflected in the ties which exist between the items of the discourse. These may be represented as follows:

it (S5) → work (S2) → page (S1)

where (S) indicates the item's address and the arrow indicates the existence of a cohesive tie.

it (S5) → work (S2) → page (S1)

sloppy (S2) → mess (S1)

I don't know (S3) → S2 (if I expect you to mark such sloppy work)

You don't know (S4) → S3 → S2

Sir (S6) → SIR (S4)

The example presented in the last two sections (2.4.6 and 2.5.1) illustrate that the global or generic structure of a text is controlled by the contextual configuration in which the text is embedded. The contextual configuration also determines what kinds of meanings may legitimately be expressed in a particular situation, i.e. it determines the register used. Furthermore, by knowing the parameters of the situation in which an utterance is made an exphoric item like this in this page is a mess can be interpreted. We know that this page refers to 'this here page in front of the teacher's eyes', that it is present in the environment surrounding the language event. And in the last two examples presented, I have attempted to show that the internal unity - or texture - of a text is also controlled by the contextual configuration. The patterns of cohesion within a given text are determined by the nature of the goings on, the participants involved, and the role language plays in the goings on.

Hopefully the above discussion demonstrates how it is that language establishes relevance, how it is answerable to the context of situation. In the present study, various modes of indicating relevance have been examined in some detail. In particular, the linguistic means whereby the internal continuity of a text is maintained appeared most relevant. In the following section I present the concepts which I have employed.

2.5.2 Language Internal Relevance

Language internal relevance is created by relating one bit of language in the co-text to another. In the last section we saw that when one bit of language in the co-text is related to another, the two related members form a cohesive tie. The texture of a text, in turn, is provided by the patterns of cohesion within the text. Language internal relevance is effected by texture, which in turn is effected by patterns of cohesion.

In my work texture is an important notion. The texts I have analyzed in the course of my empirical research have all been written texts. In written texts, where the language is made accessible only through writing, the material - i.e. physical - situational setting for the creation and the reception of the text does not play a central role in the shaping of the text.

... there is no situation except the external situation of ourselves as readers, and we have to construct the inner situation entirely from the text.

(Halliday, 1980:62)

Therefore, when the mode is written, the presence of texture assumes greater centrality for the reconstruction of the context of situation.

There are three general types of relations whereby texture is manifested in the text: explicit, implicit and implied.

2.5.2.1 Explicit Relations

Relevance is established by relating two bits of the text, the referential meaning for both of which is explicit. A number of examples of this type are illustrated in the Dragon text cited below:

(1) The fearful roaring of the dragon guided the Knight to the monster's territory. (2) As the intruder crossed the dreaded marshes, the dragon charged furiously, whipping its enormous tail around the legs of the Knight's steed. (3) Horse and rider collapsed. (4) The Knight now realized that he must attack when the creature was off-guard. (5) He crouched down as though wounded. (6) The monster, accustomed to speedy victory, prepared to seize its prey. (7) Then the Knight struck powerfully beneath the beast's outstretched wing. (8) A despairing groan told the villagers that they would be troubled no more.

(Neale, 1966a)

Dragon (S1) and dragon (S2), for example, are related to each other through reiteration or repetition; because the same general meaning is being encoded, a link is established between the two. The occurrence of Knight (S1,2,4,7) provides another example of repetition.

Steed (S2) and horse (S3) are linked through the relation of synonymy; the ideational meanings of these two items are identical. The occurrence of roaring (S1) and groan (S8) provides an example of weak antonymy, the oppositeness of meaning; and there is a relation of hyponymy between creature (S4) and dragon (S1,2); the meaning of dragon subsumes the meaning of creature.

The items tail (S2) and dragon (S1,2) are related through a part-whole relation, i.e. through meronymy. The relation between Knight (S1) and intruder (S2), and between intruder and rider (S3), in turn, is one of 'instantial equivalence' (Hasan, 1980b:26); in this particular text Knight, intruder and rider are equated.

Two other explicit relations relevant to my work are 'naming' and 'semblance' (Hasan, 1980b:26). These are illustrated below:

naming: When his parents were asleep, Nubber,

the baby bear, crept out of the cave ...
(ACER, 1972)

In this example, Nubber is the name of the baby bear.

semblance: The waves roared in and he could see
their white caps in the distance,
looking like seahorses.
(ACER, 1972)

In this example, white caps (of waves) are said to look like
seahorses.

In all of the examples in this section, the meaning of each
of the two (or more) members entering into a relationship is
explicit. The relationship between the members arises from some
contiguity of meaning.

2.5.2.2 Implicit Relations

The relations discussed above are relations between explicit
encoding devices. The interpretation of horse, tail or dragon, for
example, requires that one look no farther than the item itself.
But the precise meaning of it in the utterance - Now pick it up -
must be retrieved from some source extrinsic to itself; the precise
meaning of it is provided through what it semantically presupposes.
We saw earlier that it in the above utterance referred to an
ice-cream wrapper dropped by a school child. In this case the
retrieval of the intended meaning was exophoric; that is, the
presupposed meaning was situationally mediated.

When the utterance was placed in linguistic context - i.e. I saw
you drop that wrapper. Now pick it up - the interpretation of it was
mediated through the explicit encoding device wrapper. When the

interpretation of an implicit device is provided by some part of the co-text, as it is in the latter example, the device is said to involve endophoric semantic presupposition (Hasan, 1975:6).

Lest the last cited example be misleading, I must point out that the interpretation of an implicit device is not always mediated directly. Often an implicit device in the text is related to the explicit device which serves as the source of its interpretation through the mediation of other items:

- (1) The young seagull was alone on his ledge.
- (2) His two brothers and sister had already flown away the day before. (3) He had been afraid to fly with them. (4) The great expanse of sea stretched beneath and it was such a long way down.
- (5) And all the morning the whole family had walked on the big plateau midway down the opposite cliff, taunting him with his cowardice.

(ACER, 1972)

In this text the interpretative source for his in Sentence 5 is the young seagull which occurs in Sentence 1. The interpretation of his in Sentence 5 is mediated by occurrences of him, he and his.

From the discussion above we can see that language internal relevance is established not only by relating two bits of the text, both of which are explicit; relevance is also created when an implicit bit of the text is related either directly or through the mediation of other items to an explicit bit of the same text.

The examples of implicit devices cited thus far can all be classified as reference. Furthermore, each example given is one of personal reference. Reference is not restricted to the personal type exemplified in the citations above, but it also extends to demonstrative and comparative types. These are illustrated below. In the two examples, the word or words underscored by a broken line function as the interpretative source for those underscored by a solid line.

Demonstrative: Did you hear? Reagan fired 12,000
air-traffic controllers.

That's incredible!

Comparative: Many people in America support
Reagan's action. But unionists in
other countries support the air-
traffic controllers.

The example of demonstrative reference above is at the same time an example of extended reference; the referential item that refers not to a thing in the sense of a participant, process or circumstance, but to a fact - the fact that Reagan fired 12,000 air-traffic controllers. In addition to the demonstrative reference items 'this' and 'that', the personal reference item 'it' frequently occurs in extended reference. (See Chapter Five, page 137.)

Bits of the text, one explicit and the other implicit, are also related to one another through relations of form. In the three examples below, the word underscored with a solid line presupposes the word(s) underlined with a broken line.

Nominal: If you could have a house with a view of
the mountains or the sea, which would you
choose?

I'd take the one with the view of the sea.

Verbal: I play the clarinet. John does too.

Clausal: Do you think your mother will enjoy her
visit to Sydney?

Oh, I should think so.

Because substitution is a relation between formal items, the substitute item has the same structural function as that for which it substitutes, as is apparent in the three examples above.

The mechanism of ellipsis is similar to that of substitution to the extent that ellipsis has sometimes been defined as substitution

by zero (Halliday and Hasan, 1976:142).

Nominal: Would you like another drink?

No thanks, I've already had two _____.

Verbal: Is she still preening in front of that mirror?

Yes, she is _____.

Clausal: Have you studied for your spelling test?

Yes _____.

The types of relations described thus far - both explicit and implicit - link components of individual messages, and for that reason may be called componential. Relevance can also be established in the text by relating one whole message to another. Relations which exist between whole messages, rather than their components alone, are referred to as organic (Hasan, 1980a:49). Organic relations are of two types: (i) adjacency pairs and (ii) those mediated through the use of cohesive conjunctions. The cohesive conjunctions, in turn, are of four types: additive, adversative, causal and temporal. These are illustrated below:

Adjacency pair: Who wanted the chocolate shake? I did.

Conjunctions: And all the King's horses and all the King's men couldn't put Humpty together again. (additive)

But he was hard boiled, so he bounced. (adversative)

So he was glad he belonged to the ambulance fund. (causal)

Then, to make matters worse, the ambulance attendants dropped him while lifting him onto the stretcher. (temporal)

Humpty Dumpty
had a great fall

In these four examples, the cohesive conjunctions are overtly encoded. Were the conjunctions omitted, however, the meaning relation between the two sentences of each pair would remain the same. It is true not only of these examples but of most organic ties that the meaning relation effected by the cohesive conjunction is present in the text whether the conjunction is realized in substance or not (Hasan, 1972:6).

2.5.2.3 Implied Relations

The final way in which relevance is established within the text is when the meaning of some bit of the text implies another meaning which is not explicitly (and literally) encoded. For example, in the sentence: There stands your rocket. Its metallic sides gleam in the starlight - starlight implies that the events being described are taking place at night. This latter information is not provided literally. Similarly, in the Dragon story - A despairing groan told the villagers that they would be troubled no more - implies that the dragon had been killed. The despairing groan signals the dragon's demise.

In some instances the source of the implication cannot be traced to any pin-pointable bit of the text, but emanates from diffuse clues throughout the text. A conclusion must be drawn from the total organization of the language patterns of the text. The following story provides an example:

The Pied Piper

The Pied Piper next started to blow a merry, rollicking tune that made the children's feet go tap-tap-tap. And then the strange thing happened! All the flower-pots began to change shape.... and in a very short time they were no longer flower-pots but seven children on the window sill, ...

(ACER, 1972)

The conclusion that the Pied Piper had magical powers is inescapable. This is not implied in any one particular bit of the text, but by the story as a whole.

The relations discussed in this section are summarized in Table 2:

Table 2: Relations Effecting Language Internal Relevance

<u>Componential</u>	<u>Organic</u>
I <u>Explicit</u> A. General i) reiteration ii) synonymy iii) antonymy iv) hyponymy v) meronymy B. Instantial i) equivalence ii) naming iii) semblance	I Adjacency pair
II <u>Implicit</u> Phoric 1. Reference a) personal b) demonstrative c) comparative 2. Substitution/Ellipsis a) nominal b) verbal c) clausal	II Joining a) additive b) adversative c) causal d) temporal
III <u>Implied</u> A. By some bit of the text B. By the (con)text as a whole	

The schema of relation types presented here serves a two-fold purpose in my work. Firstly, each of the categories entered under the headings Explicit and Implicit is a potential cohesive device.

Cohesion is actually created when through the use of a member of any one of these categories, a semantic bond is created between this member and some other element in the textual environment. The two elements thus linked form a cohesive tie.

(Hasan, 1980b:7)

Thus the schema of Explicit and Implicit relation types above serves as the basis for my analysis of the cohesion within texts used in reading comprehension tests. (See particularly Chapter 5, pages 145-153.

Secondly, this schema of relation types (Explicit, Implicit and Implied) serves as the basis for analyzing the kinds of meaning relations children must understand if they are to understand reading comprehension test passages, and if furthermore, they are to be able to answer the questions which accompany such passages. Here too the notion cohesive tie is important for it becomes defining of the kinds of syntheses children must be able to perform in order to respond successfully to certain reading test questions. I will develop this idea in detail in the next chapter.

The types of relations discussed in this section are relations in meaning. Moreover, they are non-structural; that is to say, these meaning relations are not realized by structures made up of immediate constituents. With this, we can place the third piece of the definition of reading presented on page 24 in perspective:

... a reader responds also to meanings mapped onto the non-structural linguistic elements.

In this chapter, then, we have seen how it is that as a person reads a text, he responds not only to the meanings mapped onto the linguistic elements, both structural and non-structural; he also responds to the context of situation which is reconstituted for him through the language patterns, taking into account all he knows about what is going on, what part the language is playing and what participants are involved. And we have seen how the systemic-functional model of language assists in the analysis of the linguistic factors involved in these phenomena.

The view of reading I have expressed in this chapter is an interactive view. The reading process involves the interaction of reader and text. In instances in which this process is tested, a third variable is introduced: questions. The question of questions is taken up in the next two chapters.

CHAPTER THREE

QUESTIONS: A CLASSIFICATION SYSTEM AND A HYPOTHESIS OF HIERARCHY3.1 Introduction

Questions are used in the assessment of both reading ability and readability. The number of questions answered correctly in standardized reading comprehension tests provides a measure of reading ability. How a group whose reading ability is known responds to questions testing their comprehension of an ungraded passage provides a measure of readability for that passage. Graded passages, in turn, provide criterion measures for readability formulae. Reading ability and readability scores are thus mutually defining and both are based fundamentally on the interaction of the reader, the text and the questions used to assess comprehension.

Lorge (1949) was alluding to such an interactive view when he suggested that the relative ease or difficulty of the comprehension task is a function not only of the difficulty level of the text itself - as had previously been assumed - but also of the questions used to assess comprehension of the text. Lorge made this interesting and insightful point, then dropped the matter, leaving us with several questions which neither he nor his successors attempted to answer:

- (i) What kinds of questions are asked in comprehension tests?
- (ii) What makes a question easy or difficult?

The first of these two questions demands a descriptive answer; the

second an explanatory answer. Even though they are different in kind, the answers to these two questions are clearly not unrelated.

Let me begin by making a fairly obvious statement: what makes a question easy or difficult to answer depends on what the reader has to know in order to answer that question. In a reading test situation, what the reader has to know is typically encoded in the text. However, the specific encoding of the needed information is subject to variation. Some questions ask about what is explicitly encoded while others ask about what is implicit or implied. Moreover, the answer to a given question may require that the reader integrate information presented in single lexical items, a sentence, consecutive sentences, a paragraph or from various sources throughout the whole text.

By describing questions in terms of the way in which the answers required are encoded in the language of the text, it becomes possible to develop a theory explaining in similar and related terms why one kind of question is more difficult to answer than another. This I have done.

In the remainder of the chapter I shall first discuss the system I developed to classify the kinds of questions asked in reading comprehension tests and materials. This system, based as it is on the way in which meaning is encoded in the text, also provides a partial account of what it is that is being assessed in such tests. Secondly, I shall develop the theory I proposed to explain what makes a question easy or difficult; and, finally, the implications for research arising from this theory will be brought to attention. First the system.

3.2 The System: Initial Considerations

3.2.1 Why a New System?

When I began my research, I had believed that it would be a simple matter to adopt a pre-existing taxonomy of question types for my own use. I found, instead, that there had been little research on questions used in reading comprehension tests. Admittedly, a number of question taxonomies have been devised but most of these are descriptive of:

- (i) the type of cognitive process required to answer a given question - e.g. Bloom's "Taxonomy of Educational Objectives" (Bloom, 1956), and Barrett's "Taxonomy of Cognitive and Affective Dimensions of Reading Comprehension" (Clymer, 1968:17-23); or
- (ii) the types of questions asked by teachers in the course of classroom instruction - e.g. Sanders' "taxonomy of questions" (Sanders, 1966), and Guszak's "Reading Comprehension Question-Response Inventory" (Guszak, 1967).

None of the abovementioned taxonomies specifically relate the question to the text on the basis of which the answer is supposedly provided.

Interestingly, Sanders, Guszak and Barrett have all drawn upon the work of Bloom (1956). Bloom's "Taxonomy" was based on an analysis of objectives for various tertiary subjects, and the categories comprising the taxonomy are said to provide means for characterizing the kinds of thinking that encompass all intellectual objectives in education.

The taxonomy is one of questions only secondarily: one of the ways Bloom defined each category was by using examples of questions that required students to engage in the specified kind of thinking.

While Bloom's "Taxonomy" serves well the purposes for which it was developed, I found I could not meaningfully apply it to the analysis of questions used in reading comprehension tests for primary school children.

Sanders' (1966) "taxonomy of questions" is a simplification of Bloom's, and was set up specifically to guide teachers in their questioning practices.

A teacher who has mastered the taxonomy of questions can use it in a number of ways to improve the intellectual climate of his classroom. It offers a means for him to answer this question: 'Am I offering all appropriate intellectual experiences in my classroom or am I overemphasizing some and neglecting others?' The answer can easily be found by classifying the questions asked on exams, homework and orally.

(Sanders, 1966:5)

Sanders points out that his taxonomy also provides a useful standard in evaluating instructional materials (Sanders, 1966:6). And so it does, but it is clear from his comments and examples that instructional materials refer to Science, History and Physics textbooks, for example, rather than learning-to-read materials such as I am interested in. Sanders' taxonomy, like Bloom's, serves well the purpose for which it was developed, but did not meet my needs.

Guszk (1967) was interested in discovering what kinds of questions teachers ask about reading assignments in the primary grades, and how often each type of question was asked by teachers. Guszak's findings provide interesting insight into teachers' questioning practices, but like the taxonomies already mentioned, his classification of questions did not provide a characterization of text-question interaction.

Barrett (Clymer, 1968) draws on the work of his predecessors Bloom, Sanders and Guszak, basing his "Taxonomy of Cognitive and Affective Dimensions of Reading Comprehension" on the type of cognitive process required to answer a particular question. Barrett's "Taxonomy" is frequently cited in the literature regarding the teaching of reading (see Chapter Four, page 106) and consists of five categories: literal, reorganization, inferential, evaluation and appreciation. Definitions for the first three categories: literal, reorganization and inferential - are given in Chapter Four, page 106. Barrett's definitions for the categories evaluation and appreciation are given below:

Evaluation: Purposes for reading and teacher's questions, in this instance, require responses by the student which indicate that he has made an evaluative judgment by comparing ideas presented in the selection with external criteria provided by the teacher, other authorities, or other written sources, or with internal criteria provided by the reader's experiences, knowledge, or values.

(Clymer, 1968:22)

Appreciation: ... deals with the psychological and aesthetic impact of the selection on the reader. Appreciation calls for the student to be emotionally and aesthetically sensitive to the work and to have a reaction to the worth of its psychological and artistic elements.

(Clymer, 1968:22)

Barrett's "Taxonomy" applies equally to reading-to-learn and learning-to-read materials, and of the taxonomies already discussed, is perhaps the most concerned with text-question interaction. However, I did not adopt this taxonomy for my analysis for two reasons:

- (i) the system did not seem to be delicate enough to account for all of the questions in my data base, and

(ii) I did not know how to use these categories with reference to my enquiry since I could not discover any explicit linguistic criteria by which the distinction between evaluation and appreciation could be established.

While the taxonomies discussed above might serve well the purposes for which they were devised, I felt that their classification of questions had not adequately related the questions to the text on the basis of which the answers were supposedly to be provided. Thus, none of the existing taxonomies suited my particular purposes and it was necessary for me to develop a question classification system of my own.

3.2.2 Textual Notions

As I pointed out earlier (Chapter Two, page 37), textual notions have been brought into play in my classification of questions used in reading comprehension tests and in determining what makes a question easy or difficult to answer. Textual notions are relatively new, and we are only just beginning to discover how these notions can be applied to research questions.

In order to familiarize myself with the problems associated with the analysis of textual notions and in order to clarify for myself which considerations were important in my work, I conducted several pilot studies (see Appendices 2 and 3) prior to mounting the major research study reported herein. I will not recount the details of these pilot studies here, but will refer to them as they become relevant to ensuing discussion in this work. Suffice it to say at this point that the work reported in the next three chapters grew out

of these pilot studies. This is true not least of the system of question types I developed.

3.3 The System

The system presented below is based on an analysis of some five hundred questions accompanying reading test and instructional reading passages being used in Australian primary schools (Grades One through Six). It provides a systemic description of the kinds of responses required by the questions used in such material. The limited number of categories reflects my desire to keep the system simple enough to be intelligible while at the same time being delicate enough to account for both the original and new data.

I have described my schema of classification as systemic because it does constitute a system, conforming to Halliday's (1975) use of the term. To interpret the system fully and accurately it is necessary to understand the notational conventions used. I will take the simplest example first.

In the data I analyzed, the questions required

(A) either polar or non-polar responses. (All terms will be defined and examples provided in the following sections.) Non-polar types, in turn, required either a (constrained) open-ended or multiple-choice response. This part of the system, which I have called System A, is presented in Figure 2:

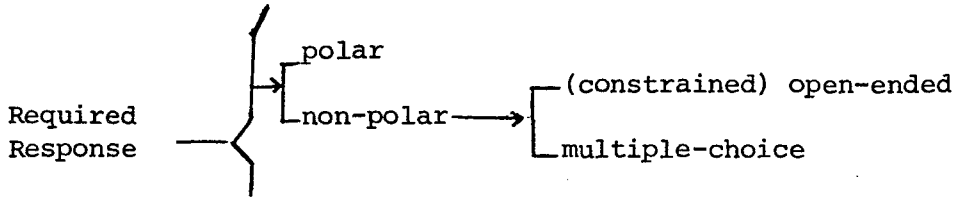


Figure 2: System A: Polar versus Non-polar Responses

(B) Simultaneously and independently the questions required information that was either extrinsic or intrinsic to the text. If the information needed to answer the question was extrinsic to the text, it was to be found either in some type of reference book, usually a dictionary, or had to be supplied from the reader's own reservoir of knowledge. The extrinsic versus intrinsic component of the system, called System B, is indicated in Figure 3:

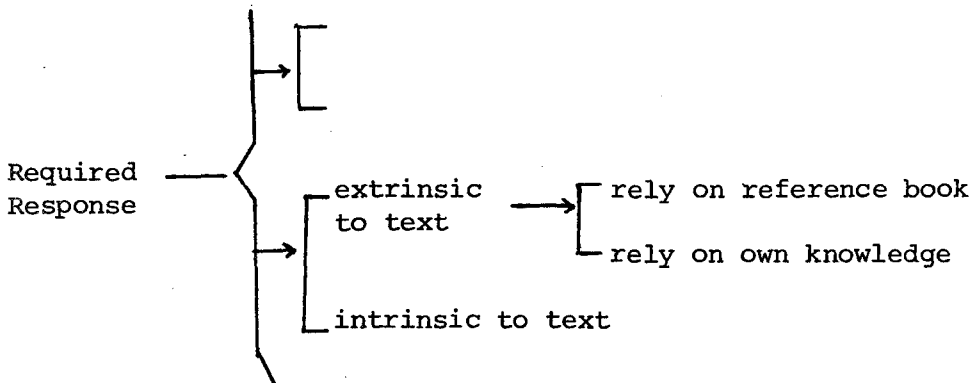


Figure 3: System B: Extrinsic versus Intrinsic Responses

When the information required to answer the question was intrinsic to the text, it was either replicative or non-replicative. If non-replicative, then it was either echoic or non-echoic. If non-echoic, it was either synthesis or inferential. If inferential, it was either oblique or surmise. This part of the system, which I have called System B', is presented in Figure 4 below:

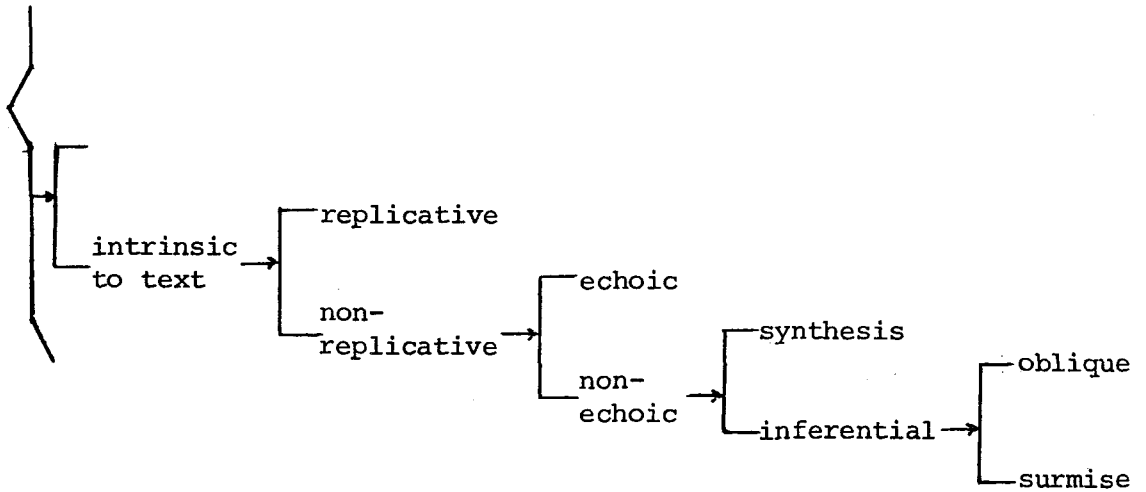


Figure 4: System B': Responses Requiring Information Intrinsic to the Text

A and B refer to the two concurrent systems which apply to all questions. These parts, put together in a properly expressed network, can be represented as in Figure 5:

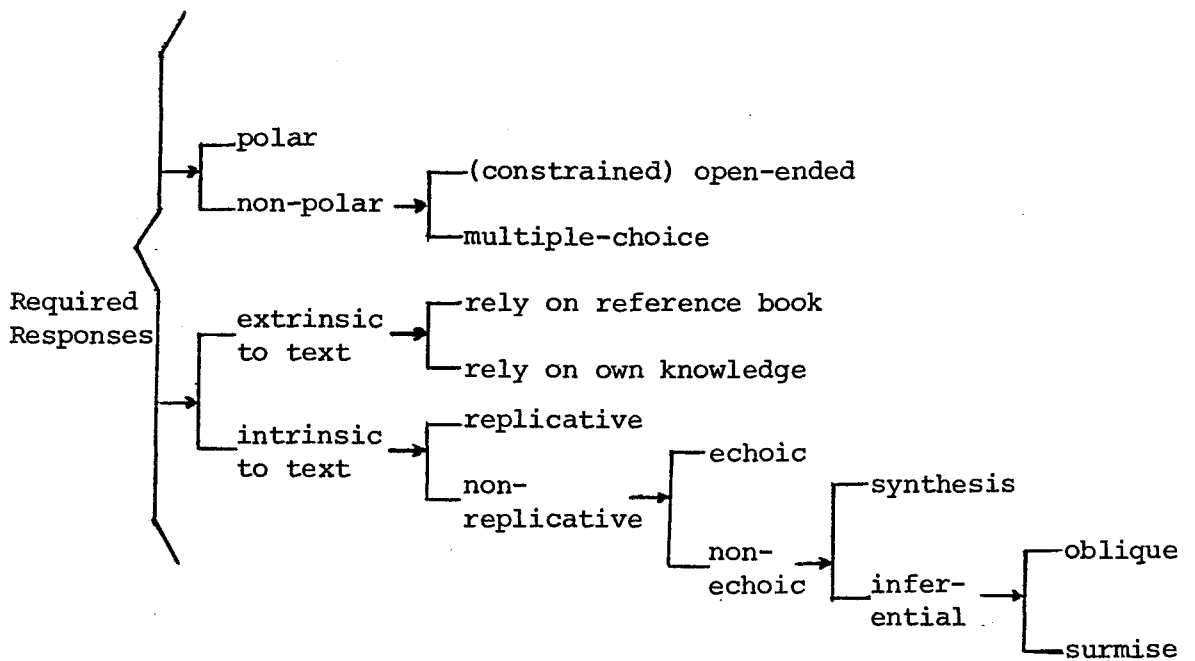


Figure 5: The System Network of Required Responses

3.3.1 System A: Polar versus Non-polar Responses

To make my work theoretically relevant, I have attempted to place reading in the systemic-functional model of language. And to make the work relevant to the classroom, I have used as material for analysis texts and questions used in reading comprehension tests and instructional material, found in Australian primary schools. The materials analyzed are listed on page 18 and again on page 69.

The questions accompanying these materials require one of two kinds of responses - either providing confirmation or information (Halliday, in press). Polar questions are an instruction to confirm either in the positive or the negative, calling for an answer 'yes'/'no', for it is the polarity of a statement that such questions query. The first three questions accompanying the story Digger are polar questions.

Digger

Digger is my puppy. He has a bone. Look at him put it in that box. A black cat is near the box. Sniff, sniff. What is that? The cat has the bone. Catch the cat, Digger. Digger has his tail. Bad cat! Drop that bone. Drop it!

1. Has Digger put the bone in the box?
2. Is the cat a good cat?
3. Will Digger catch the cat?
4. What has Digger put in the box?
5. What is near the box?
6. What will the cat drop?

(Endeavour, 1975)

Not infrequently polar questions are written as declaratives requiring verification or denial of truth value, as this example from Bruce (1968) shows:

- True or false.

- (a) There was electric light at Mole's house.
- (b) It was stuffy underground.

Polar questions, whether the yes/no or true/false type, occur more frequently in instructional materials than in test materials.

Non-polar questions are an instruction to provide information. The Wh-element in these questions functions as a pointer to the specific bit of information that is required. The what element in questions four, five and six accompanying Digger for example, all require the specification of a participant. When, where, how and why questions require the specification of circumstance, i.e. time, location, manner, and cause/effect respectively. The why and how questions accompanying John provide examples:

John

One day, after a long walk, John sat under a tree to rest. He felt the warm sun on his back, and the fresh grass tickling his toes. John took an apple from his bag and ate it. And when he had finished it he looked in his hand at what was left - just a few brown seeds. And John thought: If I gathered seeds and planted them, my land would soon be filled with apple trees.

Why did John need to rest?

- (a) He had a sore back.
- (b) The sun made him too hot.
- (c) He had walked a long way.

How did John feel when he first sat down?

- (a) excited
- (b) worried
- (c) happy

What did John want to do with the seeds?

- (a) eat them
- (b) plant them
- (c) throw them away

(ACER, 1972)

When the specific information relates to a process, e.g. an action, the form that the question takes is what + do, the latter realizing the element lexical verb (Halliday, in press). The third question accompanying John - What did John want to do with the seeds? - provides

an example of this.

In the natural use of language the range of possible answers to non-polar questions is quite wide. However, use of non-polar questions in the testing situation is somewhat different. In the latter situation, the range of possible correct answers is constrained (a) by the text, (b) by the mode of question presentation, and as will be seen presently, (c) by the test writer. Non-polar questions may be subcategorized as either (i) multiple-choice or (ii) constrained open-ended.

The questions accompanying John are multiple-choice questions. In such questions, the reader is instructed to select one ('the best') answer from the range of tester-determined alternatives offered. The set of possible answers is called the distractors, foils, or sometimes, distractor foils.

Another mode of presenting multiple-choice questions is illustrated below.

An insect's skin cannot

- (a) split.
- (b) grow.
- (c) be left behind.

(ACER, 1972)

In this case, the question is written as a declarative in which the Wh-element is simply left off the end of the statement. In the example given, the leading statement requires the specification of a process.

I have classified this type as non-polar because as it stands, a 'yes/no' answer is not possible. But in the absence of specific directions to 'choose the best answer', this question could be seen

as a polar question in which the truth value of each of the series of statements formed (An insect's skin cannot split; An insect's skin cannot grow; An insect's skin cannot be left behind) is to be verified or denied.

I have chosen to deal with the type illustrated above as non-polar because the directions to the student completing a test or exercise made up of multiple-choice questions make it clear that one answer, providing information, is required. Were a true/false answer required, this would be clearly indicated in the directions to the student taking the test. Even so, this un-natural way of asking a question is itself an interesting phenomenon, peculiar to reading instructions and tests. This naturally implies that the operative value of such questions has to be learned in the school environment.

The meaning of both forms of multiple-choice is - choose the right answer. To be counted right, the reader's answer must match the answer which has been indicated as the correct one in the answer book/sheet by the author(s).

The second category of non-polar questions is constrained open-ended. The questions accompanying Dragon, which has been cited in full in Chapter Two, page 44, are constrained open-ended. For example:

How did the dragon knock the Knight down?

Why would the villagers be pleased at the defeat of the dragon?

(Neale, 1966a)

These kinds of questions are called constrained open-ended for a reason. Two kinds of constraints are operative in these questions: (i) the text constrains the answer, and (ii) the test manual in which the

correct answers are indicated ratifies this constraint. Although the questions accompanying Dragon are written as open-ended questions, there is in fact only one right answer given for each in the test manual. As in the case of multiple-choice questions, here too the reader's answer must match the answer given by the tester; the main difference appears to be that in the case of constrained open-ended questions, the reader must articulate that answer for himself. The question might be considered open-ended by the reader but is not considered open-ended by the tester.

There is a further point to be made here regarding the notion 'constraint'. In questions such as the two cited above, there is a question of how much of an answer is to be counted as a 'correct' answer. How is a child's answer to be evaluated if he says either more or less than the tester indicates should be said? For example, the answer to - How did the dragon knock the Knight down? - is given in the test manual as: 'By whipping its tail around the horse's legs'. Whether or not the following two responses are to be counted as correct responses, then, becomes problematic: (a) 'He tripped him'. (b) 'He ran at the horse and Knight, probably to scare them, then curled his tail around the horse's legs. Then he pulled his tail so the horse would fall down. The Knight would fall down too 'cause he was on the horse'.

The manual does not help us out of this difficulty:

The question should take the form given in the record sheet, and though answers to them are acceptable in the pupil's own words, the examiner should be certain that the sense is identical with that of the answers supplied in the key. Each question answered correctly according to the

alternative answers supplied [in the test manual], whether by word, phrase or sentence, is given a mark.

(Neale, 1966b:21-22)

Since the tester's conception of language very often is an atomistic one wherein lexical and structural patterns are the focus of concern (see also Chapter Five, page 130) it is not surprising to find that the required answers are truncated.

Whether or not such a test is a true test of comprehension remains in my mind an open question. Just as second language learners can become proficient in providing the short-answer type responses to complete language pattern exercises without being able to use these patterns in natural language situations, so readers may become proficient in providing correct answers to reading comprehension test questions without being able to answer questions arising in pragmatic reading situations in which open-ended answers are required.

An open-ended question in the reading situation is thus only superficially like an information question in natural language use where it permits a range of admissible answers, the validity of which is judged by the participant's sense of the on-going discourse. In the reading situation, however, such questions are constrained: the person responding is not a participant in the discourse. Moreover, such questions can prove problematic on methodological grounds. The evaluation of responses to this type of question is in large part subjective, giving rise to problems associated with reliability of scoring. For this reason, even the constrained open-ended questions are not widely used in standardized reading comprehension tests.

The majority of materials investigated in this study were of the

multiple-choice format. This happened because the questions accompanying most of the tests and exercises used in Australian primary school classrooms are multiple-choice. Table 3 below provides an index of the question formats used in the materials analyzed.

Table 3: Question Formats of Materials Analyzed

	Multiple-choice	Constrained Open-ended
Tests	<u>Progressive Achievement Test: Reading Comprehension</u> , ACER, 1972 [PAT, 1970] <u>ACER Primary Reading Survey Tests</u> , ACER, 1972 [ACER, 1972] <u>McCall-Crabbs Standard Test Lessons in Reading</u> , McCall and Crabbs, 1961 [McCall-Crabbs, 1961]	<u>Neale Analysis of Reading Ability</u> , 2nd ed., Neale, 1966a [Neale, 1966a]
Books	<u>Read and Think</u> , Meddleton, 1966 [Meddleton, 1966]	<u>Getting the Meaning</u> , Dixon and Mitchell, 1971 [Dixon and Mitchell, 1971] <u>Let's Make English Live</u> , Bruce, 1968 [Bruce, 1968]
Kits	<u>WARDS</u> , ACER, 1967 [WARDS, 1967] <u>SRA</u> , Parker, 1960, 1961, 1964 [SRA, date] <u>Endeavour Reading Programme</u> , 3rd ed., Language Arts Associates, 1975 [Endeavour, 1975]	

3.3.2 System B: Extrinsic versus Intrinsic Responses

The categories polar/non-polar refer to types of questions used in reading comprehension tests and exercises. The classification of a question as polar or non-polar has a direct bearing on the type of response the reader is required to make. For example, a polar question requires a 'yes/no' or 'true/false' response. No other options are available. Whether the required response is a polar or non-polar type can be determined by reference to the question alone.

The system extrinsic versus intrinsic to text, on the other hand, is based on an analysis of question-text interaction. The categories extrinsic and intrinsic to text refer to where the information needed to answer a question comes from - i.e. to the source of information.

It is important to note that in the discussion of this system, the terms the required response and the answer are used synonymously, both referring to that answer which the tester has indicated in the test manual or answer sheet as the correct answer.

3.3.2.1 Responses Requiring Information Extrinsic to the Text

The category extrinsic to the text refers to those instances in which the information needed to answer a question is not encoded in the accompanying text but has to be imposed from some source extrinsic to the text. The reference book in the category rely on reference book is usually a dictionary. The following two-part question accompanies an extract for Grade Four students:

- (a) Find the meaning of the word 'hummock'.
- (b) What other word in the passage has a similar meaning?

(Bruce, 1968)

Clearly, (a) is an instruction to find the meaning of the word hummock in a dictionary.

While it is true that children are often able to answer questions from their knowledge of the topic dealt with, the category rely on own knowledge refers specifically to the situation in which the answer must be constructed from this source for the answer simply is not encoded in the text. The question accompanying A Cat's Claws, below, is a case in point.

A Cat's Claws

The claws of a cat are different from those of other animals. Apart from being long and very sharp the claws of a cat can be put in or out. It is very important that a cat can do this for if its long sharp claws were always sticking out, they would be worn off.

Each claw is fixed to a bone that turns like a hinge. When the cat does not want to use her claws she pulls them back on these hinges until they are covered in the soft part of the toe. When she is about to spring on a mouse she tightens the muscles which have the effect of pulling the claws over on their hinges until they stick out beyond the soft part of the paw.

Name another animal which you think would have claws like a cat.

(Meddleton, 1966)

The required response to this question is tiger, which does not occur anywhere in the text. Examples of questions requiring information extrinsic to the text were rare and occurred only in instructional materials. In all of the standardized test data that I reviewed, the answers were intrinsic to the text.

3.3.2.2 System B': Responses Requiring Information Intrinsic to the Text

Intrinsic to text refers to those instances in which the information needed to answer a question is encoded in the accompanying text. This category in and of itself is of limited use. Its utility lies in the fact that intrinsic to text serves as the initial entry condition to the system comprised of the categories replicative, echoic, synthesis, oblique and surmise. These latter five categories are descriptive of question-text interaction at a more delicate degree of analysis.

Replicative, oblique etc. characterize the relationship which exists between the answer and the bits of text the reader has available for reconstructing this answer. In other words, the categories provide means of describing the relationship of the language of the answer to the language of the text. And as will be seen shortly, this description has implications for the strategies used by the successful respondent.

Before discussing the five categories listed above, a note regarding the examples accompanying the discussion is in order. All of the examples provided in the remainder of this chapter are taken from the texts and questions used in my major research study (see Chapter Four, section 4.2.2; and Appendix 4). The texts used in the major study were taken from the ACER Primary Reading Survey Tests, Levels BB, B and D, forms R and S (ACER, 1972). These texts were left intact or were only minimally altered.

The questions used in the major study were based as nearly as possible on the original questions accompanying the ACER Tests passages, and are representative of the types found not only in the ACER Tests

but also in the other materials listed in Table 3 (page 69). For reasons to be made clear in the next chapter (Chapter Four, page 91), the questions used in the major study were cast in the polar (yes/no) rather than the multiple-choice format. So, although the texts cited in this section come from one source and the questions are all cast in one particular format, both the texts and questions are representative of those which appear in a wide variety of reading comprehension materials for primary school children.

The category replicative applies when the answer replicates or repeats the text word for word or with only minor alterations in tense, voice, number or person. The answers to the following three examples from the data are replicative:

Peter

Text: Peter ran ahead of the others, down the sandy track, to the long, empty beach....

Question: To reach the beach, did Peter run down a sandy track?

Answer: Yes

A Baby Seal

Text: It was a cave, full of fairy penguins with breasts as white as foam....

Question: Was the cave full of penguins?

Answer: Yes

The Captives

Text: ... The lamp was lit, and as there was still two hours to dinner, Mrs Grant proposed a game to pass the time. Everyone welcomed the suggestion, including Prior, who, out of politeness, extinguished his pipe.

Question: Was it Prior who proposed the game?

Answer: No

Echoic characterizes those cases in which the answer echoes the text. The answer and text differ lexicogrammatically but are semantically near-equivalents.

The Middle Wood

Text: ... The wind had a strange voice, and the leaves spoke in whispers....

Question: Did the leaves rustle softly?

Answer: Yes

The Captives

Text: They spent a miserable afternoon. Unable to interpret the erratic behaviour of the German officer, they were tormented by the most fantastic ideas....

Question: Was the German officer's behaviour unpredictable?

Answer: Yes

In echoic answers, lexical items are recoded as synonyms, near-synonyms, superordinate terms or (co)hyponyms. In the major research study, wherein some echoic questions were deliberately designed to be answered 'no', lexical items were recoded as antonyms.

A Baby Seal

Text: ... the baby seal hopped and wriggled nimbly up the rocks until she stopped, pointing with her flipper into a cave....

Question: Did the baby seal move up the rocks slowly and clumsily?

Answer: No

To answer a synthesis question, the reader must be able to connect, integrate and conflate a number of disparate though pin-pointable bits of information that are spread across (orthographic) sentences,

paragraphs or even the whole text. In this synthesis of information, cohesive devices play a crucial role.

Peter

Text: ... The waves roared in and he could see their white caps in the distance, looking like seahorses....

Question: Did the waves look like seahorses?

Answer: Yes

To answer this question, the reader must understand that their white caps forms a link or connection with the waves (through the concurrent relations of reference and meronymy); their white caps, in turn, forms a link with looking like seahorses through the relation of semblance. When these bits of information are integrated and conflated, i.e. are synthesized, it is clear that the waves indeed looked like seahorses.

The Play

Text: Please refer to Appendix 4, IVe (page 204)

Question: Was Paddington surprised when interval came because he had been so busy?

Answer: Yes

To answer this question, the reader must synthesize the information contained in Sentences 11, 13 and 13':

S11: Behind the scenes, Paddington was kept very busy.

S13: In fact there was so much to do it took him all his time to follow the script let alone watch the action on the stage.

S13': and he was quite surprised when he looked up suddenly in the middle of one of his thunder records and found it was interval.

The resulting text could be glossed as:

Behind the scenes, Paddington was kept very busy. In fact, he was too busy to watch the action on the stage and so was surprised - in the midst of playing a thunder record - to find that it was interval.

Note that the elaborative relation (Halliday, in press) between S10 and S13, signalled by In fact, and the causal relation between S13 and S13' are crucial to the reconstruction of this answer.

The Creature

Text: Please refer to Appendix 4, IVc (page 202)

Question: Did the smoke that Dick saw come from a fire inside the cave?

Answer: No

To answer this question correctly the reader must know that the source of the smoke Dick had seen coming from the cave was a dragon, not a fire. To reconstruct this answer, information from throughout the text must be synthesized.

In Sentences 1 and 2 it is established that smoke was coming from the cave: 'and out of this (which refers to cave in S1) two thin wisps of smoke were coming'. In Sentences 3, 4 and 5 the reader is informed that something is crawling/coming out, and in Sentence 6 that the thing (which is referred to as something in the previous three sentences) emerged from the cave (the same cave referred to in S2 and S1 above).

In Sentence 8 we learn that 'two lines of smoke were coming from its nostrils'; its refers simultaneously to its in S7, the thing which emerged from the cave in S6, and to the Dragon mentioned in S9.

The dragon, which had been emitting smoke from its nostrils all the while, had been in the cave and was the source of the smoke Dick had seen.

As these three examples show, a number of steps whereby disparate kinds of information are connected, integrated and conflated - i.e. synthesized - are required in the reconstruction of the answers. The relations through which the disparate bits of information are linked differ from one step or move to another. As this implies, I would not consider a question like the contrived one accompanying Peter, immediately below, a synthesis question:

Peter

Text: Peter ran ahead of the others, down the sandy track to the long, empty beach. The waves roared in and he could see their white caps in the distance, looking like seahorses.
 He raced along the surf, seeing if the waves could catch him as they came up the beach.

Question: Did Peter race along the surf?

In this example the links established are not between disparate kinds of information, and the relations through which the links are established are all of one kind, namely co-reference to Peter.

The category inferential applies when the answer must be inferred from information given in the text. There are two sub-categories of inference: oblique and surmise.

Oblique refers to those instances in which the answer is implied in some localized, pin-pointable stretch of the text; to reconstruct the answer the reader must infer something which follows from something mentioned.

Peter

Text: Peter ran ahead of the others, down the sandy track to the long, empty beach....

Question: Did Peter see anyone on the beach when he arrived?

Answer: No

The reader is informed that the beach was empty. If the beach was empty, then it follows that there was no one there, so Peter couldn't have seen anyone.

The Middle Wood

Text: When his parents were asleep, Nubber, the baby bear, crept out of the cave and made for the Middle Wood. At night the Middle Wood seemed different, almost magical. The wind had a strange voice, and the leaves spoke in whispers. Even a grown-up bear might have felt a touch of fear. Nubber held back only a minute. 'No honey for the bear who will not dare', he said, and marched into the wood.

Question: Did Nubber hold back for a minute because he was lost?

Answer: No

We are told that under the circumstances 'even a grown-up bear might have felt a touch of fear', and Nubber was, after all, only a baby bear. It follows from this that Nubber held back in fear, but only momentarily. He hesitated, not because he was lost but because he was frightened.

The Play

Text: Please refer to Appendix 4, IVe (page 204)

Question: Was the stage well lit?

Answer: No

There are three localized, pin-pointable clues which suggest that the stage was not well lit: in Sentence 9 Mr Brown quips, 'I think someone must have forgotten to pay the electric light bill', as he adjusts his glasses and peers at the scene. And in Sentence 10 the Browns found it difficult to see what was going on, even though their eyes did get accustomed to the gloom. From any one of these three clues, or from

all three in combination, the reader can infer that the stage lighting was inadequate.

An answer is surmise if it must be inferred, not from a localized or pin-pointable clue or clues in the text, but from diffuse clues throughout the text and from the reconstituted context of situation. In order to reconstruct a surmise answer the reader must take into account the total organization of the language patterns of the text.

Because information given in the whole text is required to reconstruct a surmise answer, I will discuss only one example from this category.

The Tower

Text: Please refer to Appendix 4, VIe (page 211)

Question: Do the boys consider diving from the tower a test of daring?

Answer: Yes

There are a number of clues in the text which taken together, suggest that diving from the tower is a test of daring. However, no one of these clues alone can carry this implication.

In Sentence 2 the reader is given the first indication that diving from the tower is an event of central importance in this text. In Sentences 3 to 11 the sense of excitement and tension builds up. In Sentence 12 George issues what turns out to be a direct challenge to Tom: 'You going to dive from the tower Tom?' Tom's thrill of being included in the group (S3) is matched by his dread of 'the unknown trial' (S16) - i.e. diving from the tower (S12).

This story is from the test for Grade Six students. By Grade Six the peer group has become all-important, and admission to a particular

group often entails enduring some kind of initiation rite. To be a member of Douglas' group, a boy apparently must be daring; the measure of daring is one's willingness to dive from the tower.

In order to determine that the boys consider diving from the tower a test of daring, the reader must draw upon diffuse clues encoded in the text and upon his world knowledge of the situation which is reconstituted through the language patterns of the text.

In the reconstruction of the above answer, the language of the text is the reader's point of departure. Texts used in reading comprehension tests are texts in displacement. Linguists have not yet fully worked out how the reader gets from the language of the displaced text to the (reconstituted) context of situation. And we do not know how to describe the process whereby the reader calls forth his world knowledge, but there must be something in the language that acts selectively upon the world knowledge the reader may have.

3.4 A Hypothesis of Hierarchy

It is by design that the categories replicative, echoic, synthesis, oblique and surmise are ordered as they are. This sequence, I believe, represents a move from the least difficult kind of question for primary school children to the most difficult. In other words, it is my suggestion that these five types of questions are graded or ordered in difficulty. (See Figure 6.)

Before discussing the implications for research which arise from this postulate, I shall provide the rationale for suggesting that the categories are ordered in difficulty.

3.4.1 Rationale

I have proposed that integrative work and implicitness jointly contribute to the difficulty of the comprehension task. These notions are discussed below.

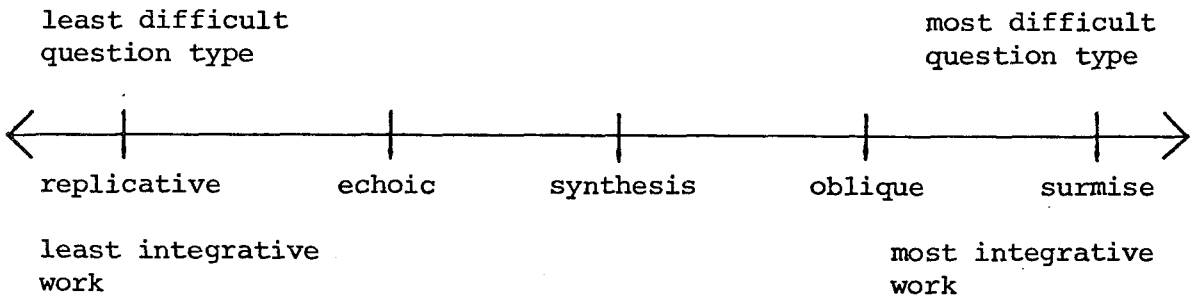


Figure 6: The Cline of Question Types

3.4.1.1 Integrative Work

The notion integrative work has a central place in my thinking about what makes a question easy or difficult to answer. In answering reading comprehension test questions, a reader has to perform different types of tasks. These tasks differ specifically in how the required information is to be retrieved. In some instances this may involve a relatively simple operation of pairing an expression with its paraphrase; in others it may involve putting together bits of information from separate parts of the text. Integrative work is an inherently variable concept; it is used to refer to the degree of reconstruction the reader is required to do in order to be able to supply the correct answer. Thus the first type of question mentioned above may be rated as involving relatively little integrative work and the second mentioned as involving a good deal because in the former

the reader may need to pair near-synonyms while in the latter he may need to trace a complex chain of cohesive or inferential relations.

Reconstructing replicative answers, I believe, entails the least integrative work. To reconstruct a replicative answer, the reader must be able to take note of the fact that the expression of some meaning in the text is replicated word for word in the question-answer sequence (though the sequence in which it occurred may not be replicated fully). For example:

Thorny

Text: Rufus the kangaroo was curious about the
 strange little creature in front of him. It was
 Thorny, a spiky lizard.

Question: Was Rufus a lizard?

In the reconstruction of an echoic answer, the reader has more integrative work to do. He has not only to locate the answer in the text but also has to recode that answer in order to satisfy the demands of the tester. In so doing, he has to be cognizant with the semantic relation existing between the lexical item(s) used in the answer and the text.

Thorny (continued)

Text: Although he was very small, Thorny looked quite
 fearsome.

Question: Did Thorny look fierce?

Synthesis reconstruction makes a yet greater demand, and for this reason, is more to the right on the cline of integrative work. The reader must interpret meaning explicitly encoded, and must also be able to explicate implicit cohesive devices in the process of connecting, integrating and conflating information.

Thorny (continued)

Text: All along his back the skin rose up in lumps, each bearing a prickly spike. Over his eyes were two horns. He looked like a dragon going into battle.

Question: Did Thorny have spikes on his back?

To know that Thorny had spikes on his back, the reader must synthesize the following information: All along (i) his (Thorny's) back (ii) the skin (belonging to the back) (iii) there rose up lumps, (iv) each (lump) bearing a prickly spike. By connecting, integrating and conflating this information, the reader will reconstruct the fact that Thorny did have spikes on his back.

The reconstruction of an oblique answer involves making an inference from some pin-pointable clues in the text. This entails a good deal of integrative work for the reader must single out those bits of the text which through their implied meaning will lead him to the correct answer. Thus the reconstruction of the correct answer demands an understanding of the literal/dictionary meaning of the items in the text; at the same time, it calls for an ability to answer the question: What follows from this?

Thorny (concluded)

Text: Rufus took a step backward. He was afraid to poke his soft little nose too close to Thorny. Those spikes looked sharp.

Question: Did Rufus take a step backward because he was afraid that Thorny might bite him?

It follows from those spikes looked sharp that Rufus was wary of being poked, not of being bitten.

The reconstruction of surmise answers takes this one step further. Again inference is involved, but in this case, the inference must be

made not by reference to any specific, localized clues in the text; the answer must be reconstructed from diffuse clues throughout the text and from what the reader knows about the context of situation which is reconstituted by the language patterns of the text.

Peter

Text: See Peter, page 77.

Question: Did Peter dislike being at the beach?

3.4.1.2 Implicitness

Just as the categories are ordered from the least to most integrative work, so they are ordered along a related dimension: that of implicitness. The categories replicative through to surmise are ordered along a dimension of implicitness ranging from fully explicit to implicit to implied (see Figure 7).

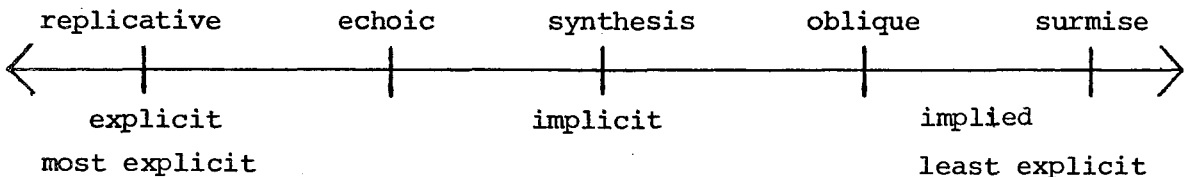


Figure 7: Implicitness Cline

I am using the terms explicit, implicit and implied here as Hasan (1975) defines them:

The explicit string is semantically self-sufficient ... the interpretation is arrived at without reference to any source of information extrinsic to the string itself ... whereas the implicit one involves semantic presupposition. Its precise meanings are not contained within itself but must be retrieved from some source extrinsic to the string.

(Hasan, 1975:5)

The term implied refers to information encoded in the text by implication (Hasan, 1975:22).

Replicative answers are maximally explicit. The information the reader needs to reconstruct the answer to such questions is encoded in the text word for word.

What is tested in echoic test items is the reader's ability to perceive semantic relations between distinct lexicogrammatical units. The semantic relation in question exists between an explicitly encoded lexical item and its variant coding in the question-answer sequence.

Cohesive devices play a crucial role in the reconstruction of synthesis answers. Presupposing cohesive items are implicit; their precise meanings must be retrieved from other items which are explicitly encoded in the text.

The categories oblique and surmise both involve inference. In the case of oblique, the answer is implied in some localized, pinpointable bit of the language in the text. For the category surmise the answer is implied by the total organization of the language of the text.

3.4.2 Implications for Research

As is evident from the above discussion, I am suggesting that to a certain extent each task in the system subsumes the ones before, and that the farther to the right each category is located on the cline, the more integrative work it entails.

I have postulated that integrative work contributes to the difficulty of the reconstruction task. The corollary of the above, then, is that with each move to the right on the cline, there is an

increase in the level of difficulty for providing the correct answer.

I have based the notion integrative work on linguistic criteria. None of the taxonomies of question types in the literature on reading had been concerned so purely and objectively with linguistic criteria (see discussion in 3.2.1 above), and, moreover, most of these taxonomies could not be viewed as creating a hierarchy. By contrast, my approach to the characterization of question types appeared to permit reasonable ground for postulating that the taxonomy presented above constituted a meaningful hierarchy by reference to which one might grade the difficulty of reading comprehension test questions.

I designed an empirical study to test the validity of this postulate. An account of this research is presented in the following chapter. The central problem addressed in the study can be simply phrased as follows:

Is it valid to postulate a hierarchical structure of any type in the system of responses requiring information intrinsic to the text?

CHAPTER FOUR

QUESTIONS: TESTING THE HYPOTHESIS OF HIERARCHY4.1 The Research Study: Introduction

The research study reported in this chapter is concerned with a particular set of options in the system of question types, those of System B' - the set of question responses requiring information intrinsic to the text. This system is reproduced below.

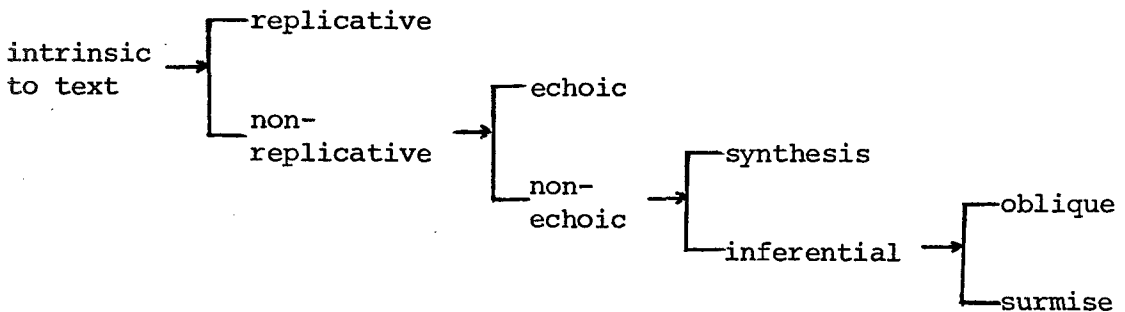


Figure 4: System B': Responses Requiring Information Intrinsic to the Text

As pointed out in the last chapter, the central concern of the study was to enquire whether it was valid to view the categories of the above system as constituting a hierarchy, members of which are ordered in degree of difficulty. More delicately, the basic postulate can be examined as an assertion of two hypotheses:

- (i) there is a hierarchy within System B'
- (ii) the hierarchy is linear.

The first of these two hypotheses I shall henceforth refer to as the hypothesis of hierarchy and the second as the hypothesis of linearity.

The notions hierarchy and linearity are in need of brief clarification here. The purpose of the present study was to determine whether or not the categories comprising System B', shown above, are ordered or graded in difficulty. It is in this specific sense that the term hierarchy is being used. Linearity refers to the nature of the ordering.

Taken together, these two hypotheses predict that replicative tasks will be prerequisite to (that is, will be a necessary precondition for success on - and by implication - will be easier than) non-replicative tasks (i.e. echoic, synthesis, oblique and surmise). Echoic tasks are hypothesized to be prerequisite to non-echoic tasks (synthesis, oblique and surmise). Synthesis tasks are predicted to be significantly easier than inferential ones (oblique and surmise), and oblique tasks are hypothesized to be easier than surmise.

As is implied in the above, the categories replicative, echoic, synthesis, oblique and surmise are hypothesized to form a linear hierarchy in which for any contiguous pair of categories abstracted from the cline (see Figure 6) the member on the left will be prerequisite to the member on the right.

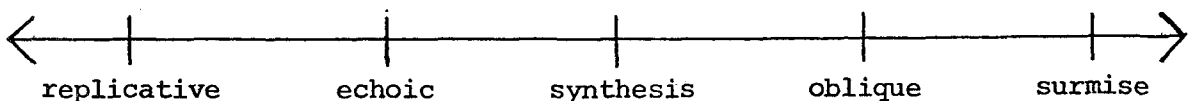


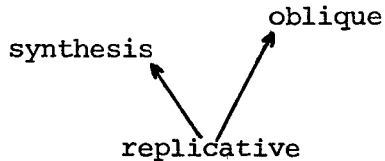
Figure 6: The Cline of Question Types

Hence, replicative tasks are predicted to be a necessary precondition

for success on echoic tasks; echoic tasks, in turn, to synthesis; synthesis tasks to oblique; and oblique tasks to surmise. This can be represented diagrammatically as follows:

replicative → echoic → synthesis → oblique → surmise

Of course, hierarchical structures are not restricted to linear types; they may alternatively be non-linear. There may be orderings in the system, but not necessarily between contiguous pairs of categories. So, for example, replicative tasks may be prerequisite to say, both synthesis and oblique tasks without being prerequisite to echoic and/or surmise and without synthesis being ordered with reference to oblique. The non-linear hierarchical structure just described would be diagrammed as follows:



The notions hierarchy, linear, and non-linear are discussed in more detail in Section 4.4.2 below.

Note that if the hypothesis of linearity is verified, then the hypothesis of hierarchy is automatically ratified. But the reverse is not true: if there are any non-linear hierarchical structures within System B', then by implication the hypothesis of hierarchy is verified, while the hypothesis of linearity is obviously refuted.

Should either the hypothesis of linearity or the hypothesis of hierarchy be verified then this study would show:

- (i) which kinds of questions are easier or harder than others;
- (ii) that the theory of integrative work as an explanation of what makes a question easy or difficult is at least suggestive;
- (iii) that the difficulty of the reading comprehension task is not a product solely of text difficulty but is at least in part an artifact of the questions used.

To present my findings I have organised this chapter as a research report. Thus, first I shall describe the methods - subjects, materials and procedures - employed. Then after presenting the results, I shall attempt to relate my findings to the above three points.

4.2 Method

4.2.1 Subjects

Three hundred children, one hundred each from Grades Two, Four and Six, served as subjects in the study. These grade levels were chosen because I felt they represented relatively distinct stages across a broad range of primary school age readers. The subjects came from eight different Class 1 and 2 primary schools in the North Sydney, Penrith and Western Metropolitan regions of suburban Sydney.

Because I wished to include only average to above average readers in the study, the eight schools were deliberately chosen; all eight were known to have 'normal' reading populations. (A further control for this factor was built into the study and will be discussed on page 93.) The grade to be tested in each school was randomly selected.

4.2.2 Materials

The test materials used were adapted from the ACER Primary Reading Survey Tests (ACER, 1972), Levels BB (Grade Two), B (Grade Four) and D (Grade Six), forms R and S. The texts used were left intact or were only minimally altered (see Appendix 4). Selecting texts from a single, standardized test meant that control for readability was not a problem.

Although the questions were cast in the polar (yes/no) format rather than the multiple-choice format, as many original questions as possible were retained. The 'yes'/'no'/'can't tell' format was chosen for both practical and theoretical reasons. Every question in fact had a 'yes' or 'no' answer. But by including three choices of answer, the possibility of getting an answer right by guesswork alone was reduced from 50 to 33 percent. The multiple-choice format was avoided so that answer encoding effects would not be confounded with the distractor foil effects (see Chapter Five, pages 142-44 and Appendix 3).

Each of the five texts for each grade was accompanied by five questions, one replicative, one echoic, one synthesis and so on. Altogether there were 75 questions, five in each of 15 cells.

Table 4: Number of Questions Included in the Original Data Base

Grade	replicative	echoic	synthesis	oblique	surmise	
Two	5	5	5	5	5	25
Four	5	5	5	5	5	25
Six	5	5	5	5	5	25
	15	15	15	15	15	75

During the course of question construction, it became apparent that echoic questions for which the answers were 'no' often appeared to be replicative questions instead. For example, I originally posed the echoic question accompanying Thorny as a 'no' answer question:

Relevant Text: Although he was very small, Thorny looked quite fearsome.

(ACER, 1972)

The question I originally posed was - Did Thorny look gentle?. A colleague read the question and promptly replied, 'No, he looked fearsome' and coded the question replicative. In the second draft, the question was written as - Did Thorny look fierce?. The judge for whom the inter-judge reliability statistic is reported below readily coded this latter question echoic.

Because so many echoic questions having 'no' answers appeared to be replicative questions instead, most of the echoic questions used in the study were 'yes' answer questions. For the other categories of question types, balanced numbers of 'yes'/'no' answers were used. The order of questions accompanying each text was randomized before the materials were printed and the order of each text in the test booklets was randomized to eliminate serial effects.

Before administering the test to students, an inter-observer reliability coefficient of .99, using the Spearman rank correlation coefficient (Hayslett and Murphy, 1968), was obtained for the categorization of task types.

4.2.3 Procedure

After gaining permission to contact primary school principals and then having secured their cooperation, copies of the tests were delivered to the participating schools. Teachers administered the tests to their own classes, adhering to a detailed but straightforward set of instructions for administration (see Appendix 4).

They complied with the request that the tests be administered during a morning session of their choice between September 22 and September 26. I purposely did not set a specific date or time for administration of the test. Firstly, to have done so would have shown an insensitivity to each school's particular needs. Secondly, Sydney was experiencing hot, windy weather during this time. Such weather conditions prove very unsettling to school children. By leaving the testing date and time flexible, the possible negative effect of inclement weather was avoided.

After they had completed a practice passage, students were given a maximum of fifty minutes in which to complete the test. (No child in fact took more than thirty-eight minutes.) Grade Two students were permitted to do the test in two shorter sittings. Children indicated their answers on the test paper itself by circling the answer of their choice.

Teachers had the option of exempting known non-readers and weak readers from taking the test or of indicating the papers of such readers by placing 'NR' or 'WR' on the cover page after the test had been completed and handed in. Papers specified 'NR' or 'WR' were not included in the analysis. I marked and scored all test papers.

Although I hypothesized that the categories comprising System B'

(see page 87) would form a linear hierarchy, I was aware that this assumption may not be ratified. There was a possibility (i) that no hierarchical structures would be found, or (ii) that the hierarchical structures would be non-linear.

Conceptually and intuitively, a linear ordering among a set of items represents the most parsimonious scaling of the items.... it is likely [however], that not all orderings among items are linear. Orderings developed both from logical and statistical analysis ... indicate that non-linear orderings among tasks are the rule rather than the exception.

(Krus, Bart and Airasian, 1975:40)

Thus, to provide an adequate test of the hypotheses, a test capable of showing the following was needed:

- (i) Whether or not there were any hierarchical structures in the data, and if so
- (ii) whether these structures were linear or non-linear.

To this end, Bailey's (1978) probabilistic test of non-linear hierarchy was used to test the hypotheses. The computations for this test, which will be discussed in more detail in section 4.4.2, were carried out using Bailey's computer program CONECT.

4.3 An Unexpected Finding: The 'No' Answer Effect

The data for each text at each grade level were analyzed. It was immediately apparent that the results were far from a simple verification of the central postulate. It became equally apparent, however, that an unexpected variable, which I have called the 'no' answer effect, may have confounded the results. Examination of the raw data revealed that questions having 'no' answers were answered

much less accurately than questions having 'yes' answers. These data are summarized in Table 5.

Table 5: Differential Response to Yes-No Answer Questions

Mean Error Rate Per Question and Response Type*										
Grade	Replicative		Echoic		Synthesis		Oblique		Surmise	
	yes	no	yes	no	yes	no	yes	no	yes	no
Two	12	29	30	NA	23	39	27	47	43	55
Four	13	31	22	54	26	41	19	25	48	42
Six	8	21	11	19	20	43	33	27	20	46

* All figures are rounded off to the nearest whole number.

From Table 5 it can be seen that, for example in Grade Four, each echoic question having a 'no' answer was missed on average by 54 subjects. Each echoic question having a 'yes' answer, on the other hand, was missed on average by only 22 subjects. In Grade Six each 'surmise-yes' question was missed on average by 20 subjects; 'surmise-no' questions, however, were missed on average by 46 subjects.

Overall, 'no' answer questions were missed between 1.5 and 2.5 times more often than 'yes' answer questions. The two exceptions to this pattern are in Grade Six for the category oblique and Grade Four for the category surmise.

4.3.1 A Check on the 'No' Answer Effect

To determine whether or not counter-balancing the 'no' effect would yield the hypothesized order of difficulty, I selected two

passages from the Grade Six test and re-wrote the questions such that those which originally had been 'yes' answers were now answered 'no' and vice versa (see Appendix 5). These two passages were administered to 54 Grade Six children who had taken the original version of the test the month before. The results of this analysis are presented in Table 6.

Table 6: Differential Number of Errors Made for Yes and No Questions:
Comparison of Original and Revised Items

Number of Errors Made for Question Type* (N=54)					
	Replicative	Echoic	Synthesis	Oblique	Surmise
'Captives'					
original	2 (no)	9 (yes)	41 (no)	29 (yes)	28 (no)
revised	0 (yes)	14 (no)	2 (yes)	11 (no)	33 (yes)
Mean	1	12	22	20	31
'Tower'					
original	9 (no)	8 (yes)	10 (yes)	28 (no)	12 (yes)
revised	3 (yes)	8 (no)	35 (no)	13 (yes)	15 (no)
Mean	6	8	23	21	14
Mean for both texts, four questions	4	10	22	20	22

* All figures are rounded off to the nearest whole number.

From the table we can see that averaging the two sets of responses failed to produce the hypothesized order. The means of the combined data (see bottom line of figures in the table) indicate that oblique

questions ($M=20$) were easier than synthesis questions ($M=22$) and also that synthesis and surmise questions proved equally difficult ($M=22$).

We can also see the pervasiveness and magnitude of the 'no' answer effect. Synthesis questions seem to be particularly sensitive to this effect. In the original version of the Captives story, for example, the answer to the synthesis question was 'no'; as is evident in the table, 41 out of 54 subjects missed this question. When the same question was revised such that the answer was 'yes', only two subjects missed it. The effect for the Tower story is not as dramatic, but is significant, nonetheless.

In only two instances were the effects reversed, that is, the 'yes' question proved more difficult than the 'no' question. The categories oblique and surmise for the Captives story showed this reversed pattern.

4.4 Analysis of 'Yes' Answer Data

Since the validity of the combined yes/no data was questionable, it was decided to re-test the hypotheses using 'yes' answer data only. This meant that the data base was reduced from a total of 75 questions to 41, and that the data had now to be considered holistically for each grade level. Furthermore, there were now unequal numbers of questions for each category in the data set to be analyzed. This proved problematic.

Initially a procedure whereby categories could be compared even though there were unequal numbers of questions in each was attempted. This approach was abandoned when it became apparent that a number of the results were demonstrably artifacts of the unequal number of

questions in the various categories being compared.

The methodological problems inherent in trying to compare categories comprised of unequal numbers of questions were ultimately overcome by including two questions for each category in the analysis. Although this entailed a further reduction in data, this procedure was justified:

- (i) it made comparison of data across categories valid and reliable
- (ii) there was still a pool of data large enough (see Table 7 below) to yield meaningful results.

For some categories, there were only two 'yes' answer questions, so these were automatically included in the data set analyzed. In categories for which there were three or more questions available, two were chosen on a random basis for inclusion in the analysis. If too many of the randomly selected questions loaded onto any one particular text, different questions were drawn, again randomly, until a better balance across texts was achieved. The specific questions which were used in the analysis are listed in Table 7 below. (Also see Appendix 4.) The table indicates that, for example in Grade Two, question number four accompanying the story of The Middle Wood (see Appendix 4, IIc) was included in the analysis. The other replicative question included in the data set for Grade Two was question number two accompanying the story Stars (Appendix 4, IIe).

Table 7: Questions Included in the 'Yes' Answer Data Set

Category	Grade Two	Grade Four	Grade Six
replicative	Woods 4 Stars 2	Seal 3 Creature 4	Gulls 4 -
echoic	Peter 2 Flip 1	Kangaroo 1 Play 5	Gulls 2 Captives 1
synthesis	Peter 1 Thorny 3	Cranes 1 Play 4	Worms 3 Tower 4
oblique	Flip 2 Stars 1	Cranes 3 Kangaroo 2	Worms 2 Bat 1
surmise	Woods 2 Thorny 5	Seal 4 Creature 2	Tower 3 Bat 2

4.4.1 Conversion of Raw Scores

To make the data amenable to analysis subjects' raw scores had to undergo two conversions. Firstly, the raw scores were converted to percentage scores. For example, if a subject got one surmise question right and the other wrong, he was awarded .50 for the category surmise; if he got four of the six questions comprising the category non-echoic correct, he was awarded .66 for non-echoic.

Then the percentage scores had to be converted into dichotomized scores, i.e. 1 for a right answer and 0 for a wrong answer, as required by the statistical analysis used. A minimum criterion of .66 was used as the cut-off point for right or wrong answer. Thus the fictitious subject above would score 0 for surmise and 1 for non-echoic.

When each subject's score for each category had been calculated, these data were analyzed, again using the probabilistic test of

non-linear hierarchy incorporated in Bailey's (1978) computer program CONECT. Before discussing the results of the analysis of the 'yes' answer data, it would be appropriate to discuss some of the terms employed in the discussion.

4.4.2 The Probabilistic Test of Non-linear Hierarchy

The purpose of the present study was to determine if the question types intrinsic to text were graded or ordered in difficulty. It is in this specific sense that the term hierarchy is being used. I have hypothesized, for example, that replicative questions will be easier, i.e. will be missed significantly less often by subjects than non-replicative questions. The facility index, that is, the proportion of subjects responding correctly (scoring 1 rather than 0 for a task type), determines the order of question types. In Grade Four the facility index for replicative was .82; eighty-two percent of the Fourth Grade subjects got replicative correct. The facility index for non-replicative was .59.

The critical values of items (Bailey, 1978) determine whether or not differences in facility - and by implication, in difficulty - between items are statistically significant. The critical values for replicative and non-replicative above was statistically significant.

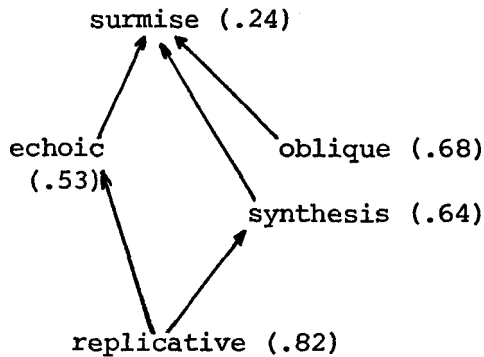
This finding is in line with the hypothesized order of difficulty, and can be represented diagrammatically as follows:

replicative → non-replicative

This 'sentence' is to be read as: replicative tasks are prerequisite to non-replicative tasks. That is, if subjects are successful on

non-replicative tasks, this implies success on replicative tasks.

Of course, hierarchical structures need not be restricted to two items or task types, nor to linear orderings. Hierarchical structures can be non-linear, and in fact nearly all of the structures found in the 'yes' answer data were non-linear. For example, the following non-linear hierarchical structure emerged from the Grade Four data:



This structure shows:

- (i) that replicative tasks are prerequisite to (a) synthesis and (b) echoic tasks.
 - (ii) synthesis and echoic tasks, in turn, are both preconditions for success on surmise tasks. Because replicative tasks are prerequisite to synthesis, and synthesis tasks in turn to surmise, replicative tasks are also prerequisite to surmise tasks. Likewise, replicative is prerequisite to echoic, and echoic to surmise, so replicative is again demonstrated to be prerequisite to surmise.
 - (iii) oblique tasks are ordered with reference to surmise tasks.
 - (iv) replicative and oblique tasks are independent of one another.
- Success on one says nothing about probable success (or failure) on the other. Likewise, echoic, synthesis and oblique tasks

are independent of one another.

- (v) from this result we can conclude that the hypothesis of linearity is not verified in Grade Four, but the hypothesis of hierarchy is validated for there is a hierarchical structure within System B'. Note that even though the hypothesis of linearity is not supported, all of the orderings found are in the direction predicted.

The diagram above also illustrates the importance of the notion probabilistic test; this it does by indicating that there is, for example, no prerequisite relationship between echoic and oblique. Admittedly the facility indices, shown in the diagram, for oblique (.68) and echoic (.53) differ. But the differences in critical values (not shown in the diagram) between these two categories are too minimal to be statistically significant. Therefore, no ordering relationship exists between these two categories.

Categories which are linked in the hierarchical structures reported in this study are associated at a five percent (.05) probability level.

4.5 Results

Four analyses were performed, each testing the hypothesis of hierarchy at a different degree of delicacy.

4.5.1 Analysis of Main Pairs

First to be tested were the main pairs of items comprising the system: replicative in relation to non-replicative; echoic to non-echoic; synthesis to inferential; and oblique to surmise. These were

tested for each grade separately.

One sequence was generated for Grade Two:

replicative	→	non-replicative
(.77)		(.61)

(The figure in brackets indicate the facility index for each item.)

This pattern shows that for Grade Two students, replicative tasks were prerequisite to non-replicative. Children missed replicative questions significantly fewer times than non-replicative questions.

In Grade Four the hierarchical structures to emerge were:

replicative	→	non-replicative
(.82)		(.59)
oblique	→	surmise
(.68)		(.24)

In Grade Six one sequence was generated:

replicative	→	non-replicative
(.91)		(.69)

These four patterns are consistent with the hypothesized order and are consistent with the results which emerged from the other three analyses. It is interesting to note that the results were similar for the three grades tested. This finding is discussed in Section 4.6.1.

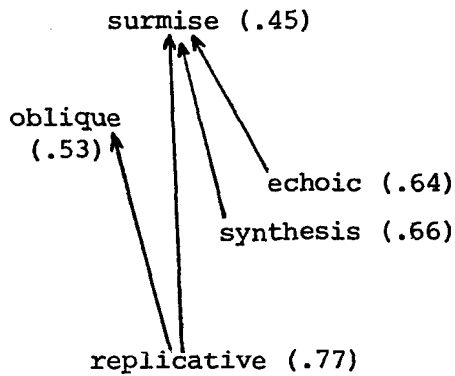
4.5.2 Analysis of Five Categories

A second analysis was carried out to locate the hierarchical structures, if any, existing in the system comprised of the categories replicative, echoic, synthesis, oblique and surmise. This analysis, of course, is one of greater delicacy than that already reported.

There are a number of non-linear hierarchical structures located

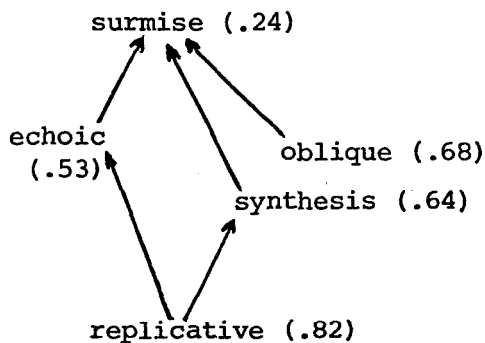
in the system, so the hypothesis of hierarchy is verified while the hypothesis of linearity is not. Although the structures formed are not linear, the results are in every instance consistent with the general direction predicted.

In Grade Two, all five items scaled, forming the structure shown:



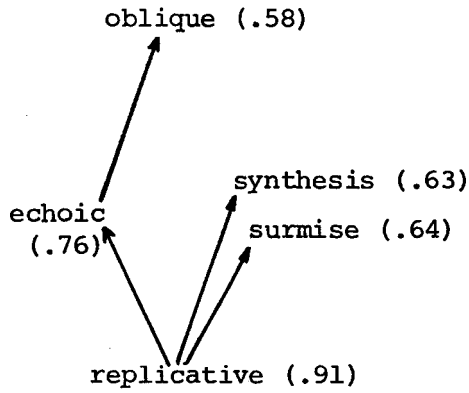
As can be seen, in Grade Two, replicative tasks were prerequisite to both oblique and surmise tasks. Synthesis and echoic tasks were also ordered with reference to surmise tasks. Overall, the results indicate that tasks which involve inference making are significantly more difficult for Grade Two children than those which do not. Tasks which do not involve inference making are for all practical intents and purposes undifferentiated in difficulty.

In Grade Four all five items again scaled. The structure formed is presented below.



As this figure shows, in Grade Four replicative is a necessary precondition for success on both synthesis and echoic tasks; the latter two tasks in turn are both prerequisite to surmise (and therefore, replicative is also prerequisite to surmise). Oblique tasks are also ordered with reference to surmise.

The structure formed for Grade Six again includes all five items:



This diagram illustrates that replicative tasks are prerequisite to the other four kinds of tasks: synthesis, surmise and echoic, and because echoic is prerequisite to oblique, also to oblique.

When the results for the three grades are compared, we can see that they are remarkably similar. Both the similarities and differences are most readily seen when the results are presented in tabular form.

Table 8: Summary of Results-Five Category Analysis

Grade Two	Grade Four	Grade Six
	replic → echoic	replic → echoic
	replic → synth	replic → synth
replic → obliq		replic → obliq
replic → surmise	replic → surmise	replic → surmise
		echoic → obliq
echoic → surmise	echoic → surmise	
synth → surmise	synth → surmise	
	obliq → surmise	

All of these structures follow the general order predicted. The findings presented here are discussed below (section 4.6.1).

4.5.3 Test of Barrett's Taxonomy

The third analysis involves my system only indirectly and Barrett's "Taxonomy" (Clymer, 1968) directly. Barrett's "Taxonomy" is frequently cited in the literature regarding the teaching of reading, appearing in such influential works as A Language for Life (Bullock, 1975); the BBC's Teaching Young Readers series (Longley, 1977); and Spearritt's Measuring Reading Comprehension in the Upper Primary School (Spearritt, 1977). This five category system is widely believed to be graded in difficulty. Clymer, who first introduced the hitherto unpublished "Taxonomy" states that

... the five major categories have been ordered to move from easy to difficult in terms of the requirements each category appears to demand.
(Clymer, 1968:18)

Pumfrey (1977) and Walker (1977) state explicitly that the "Taxonomy" is hierarchically structured. None of these claims are supported by empirical evidence.

In the course of the computer analysis of my data I realized that I would be able to test the claims that Barrett's "Taxonomy" is hierarchically ordered by collapsing my five category system so as to match the first three categories of Barrett. These are defined as follows:

Literal comprehension. Literal comprehension focuses on ideas and information which are explicitly stated in the selection.
(Clymer, 1968:19)

Reorganization. Reorganization requires the student to analyze, synthesize, and/or organize ideas or information explicitly stated in the selection. To produce the desired thought product, the reader may utilize the statement of the author verbatim or he may paraphrase or translate the author's statements.

(Clymer, 1968:20)

Inferential comprehension. Inferential comprehension is demonstrated by the student when he uses the ideas and information explicitly stated in the selection, his intuition, and his personal experience as a basis for conjectures and hypotheses.... Inferential comprehension is stimulated by purposes for reading and teachers' questions which demand thinking and imagination that go beyond the printed page.

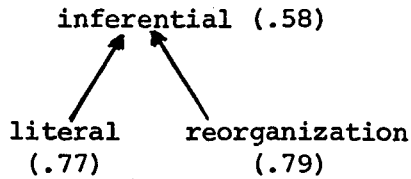
(Clymer, 1968:21)

If one compares these more general definitions of task types with the more specifically defined task types I have posited, it is at once clear that there is a good deal of overlap. The correspondence between the two systems, as I see it, is presented below.

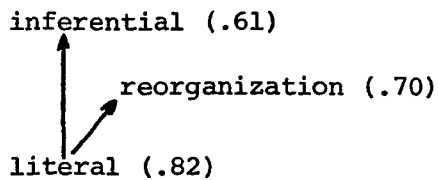
<u>Gerot</u>	<u>Barrett</u>
replicative	literal
echoic synthesis	reorganization
oblique surmise	inferential

Figure 8: The Correspondence of Gerot's System to Barrett's

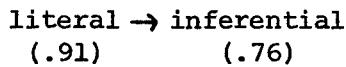
The same data conversion and analytical procedures described earlier were employed to analyze the 'yes' answer data by task type. The following hierarchical structures emerged:

Grade Two

This structure shows that literal and reorganization tasks were virtually undifferentiated in difficulty; both were prerequisite to inferential tasks.

Grade Four

In Grade Four, literal tasks are prerequisite to both inferential and reorganization tasks; the difference in difficulty of the latter two is not statistically significant.

Grade Six

In Grade Six, literal tasks were found to be prerequisite to inferential tasks. The category reorganization did not figure in the sequence generated.

Provided that my assumption regarding the correspondence between my categories and Barrett's is correct, the claim that Barrett's "Taxonomy" is hierarchically structured is here empirically verified, but the assumption that the hierarchy is linear is not validated.

4.5.4 Analysis of General Relations

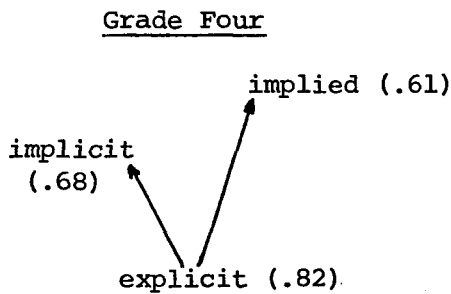
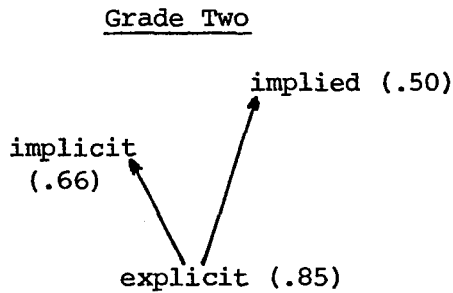
This analysis was carried out to see if the tasks corresponding to the general relation types - explicit, implicit and implied - were

ordered in difficulty. To test for this possibility, the categories were again collapsed, as shown in Figure 9 below. This configuration follows the distinctions made between the general types of relations illustrated in Table 2 (see page 51).

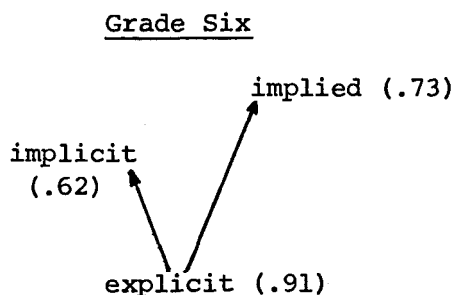
<u>General Relation Type</u>	<u>Categories</u>
Explicit	replicative and echoic
Implicit	synthesis
Implied	oblique and surmise

Figure 9: Categories Comprising Explicit, Implicit and Implied Relation Types

Scores were converted as before and the probabilistic test of non-linear hierarchy applied. The resulting hierarchical structures for Grades Two, Four and Six were identical.



In contrast to Grades Two and Four, in Grade Six tasks involving implicit relations were marginally more difficult than those involving implication:



I shall discuss the findings presented in this section below.

4.5.5 Summary of Results

The results presented in the preceding sections (4.3, 4.5.1-4.5.4) can be summarized as follows:

- (i) Questions answered in the negative were generally more difficult than questions answered in the affirmative. Synthesis questions were particularly sensitive to this factor.
- (ii) The system of responses requiring information intrinsic to the text (System B') is hierarchically structured. The hierarchical structures found were predominantly non-linear, and were similar from one grade level to the next. Although the hypothesis of linearity was not verified, in every instance the orderings were in the general direction predicted.
- (iii) The first three categories of Barrett's "Taxonomy" form a hierarchy, but this hierarchy is also non-linear.

The implications of these results are discussed below.

4.6 Discussion

In Section 4.1 (page 90) I stated that should a hierarchy be found then we would have evidence for suggesting:

- (a) which kinds of questions are easier or harder than others
- (b) that the theory of integrative work as an explanation of what makes a question easy or difficult is at least credible
- (c) that the difficulty of the reading comprehension task is not a product solely of text difficulty but is at least in part an artifact of the questions used.

Now that the results have been presented, I shall attempt to relate them to these three points.

4.6.1 Which Kinds of Questions are Easier or Harder Than Others?

From the evidence provided by this study it appears that the relative ease or difficulty of a question is a function (i) of whether that question is to be answered in the affirmative or negative, and (ii) of that question's place in the hierarchy.

4.6.1.1 The 'No' Answer Effect

The most unexpected finding in this study was that questions to be answered in the negative were so much more difficult than questions answered in the affirmative.

There are two possible tentative explanations for the 'no' answer effect emanating from this study. Firstly, when children missed an item, they tended to answer the item yes rather than no or can't tell. From this response pattern it would appear that acquiescence - the tendency to agree with most statements regardless of their contents

(Crowne and Marlowe, 1964) - operates in reading tests as well as tests of personality.

The children may have interpreted can't tell as either I can't tell or the information doesn't say. The latter would probably seem illogical to a child taking a reading comprehension test for he has learned to expect that the information he needs to answer questions is in the text. I can't tell is a socially unacceptable answer, to both the tester and the child. For most people, it is better - in the sense of more ego-preserving - to say yes than to admit that they don't know (Crowne and Marlowe, 1964). Children may have answered yes to poorly understood no questions as a means of saving face.

There is an alternative but complementary explanation possible. Of the thirty-four no answer questions used in this study, nine were questions with because in them, e.g. Did Nubber hold back because he was lost?. Of these nine 'no-because' questions seven were missed by forty-five or more children, i.e. well above chance level. (Altogether there were twenty-six questions which were missed above chance level.) It seems likely that the children either (i) did not understand the causal relationship existing between the cause and effect parts of the proposition as a whole, or more likely still, (ii) did not know which part of the proposition, cause or effect, was being called into question.

Whatever the explanation, the 'no' answer effect was a very significant one. It is certainly powerful and intriguing enough to recommend a follow-up research study, which unfortunately could not be accommodated within the scope of this work because of the extensive demands it would make in terms of time, scope and organization.

4.6.1.2 Hierarchical Structures

The results of this study suggest that the difficulty the children in each grade experienced in the successful completion of a comprehension task was in part a product of the particular task's place in the hierarchy. It should perhaps be reiterated that this hierarchy, despite overall similarities, varied in its details from grade to grade. For ease of reference, the results of all of the analyses are presented in tabular form below.

Table 9: Summary of Hierarchical Structures Within System B'

Analysis	Grade Two	Grade Four	Grade Six
Main Pairs	replic → non-replic	replic → non-replic obliqu → surmise	replic → non-replic
Five Categories	replic → obliqu replic → surmise echoic → surmise synthe → surmise	replic → echoic replic → synthe replic → surmise echoic → surmise synthe → surmise obliqu → surmise	replic → echoic replic → synthe replic → obliqu replic → surmise echoic → obliqu
Barrett's Taxonomy	liter → infer reorg → infer	liter → reorg liter → infer	liter → infer
General Relations	explic → implic explic → implied	explic → implic explic → implied	explic → implic explic → implied

From the table we can see that there are five patterns which are shared by Grades Two, Four and Six:

replicative	→ non-replicative
replicative	→ surmise
literal	→ inferential
explicit	→ implicit
explicit	→ implied

From these shared patterns it can be concluded that for the children in Grades Two, Four and Six alike, the reconstruction of fully explicit answers was prerequisite to the reconstruction of answers involving inference making.

That the tasks comprising the end points of the continuum of task types were most differentiated was not unexpected. In analyses of items arranged along a continuum one expects that the farther apart on the cline two items are, the more likely they are to be clearly differentiated, and the closer together on the cline two items are to one another, the less likely they are to be so clearly differentiated. This pattern is evident in the study at hand.

In Grade Two replicative tasks were easiest. Echoic and synthesis tasks were a little more difficult but not enough to enter into a linear order. Replicative, echoic and synthesis tasks were all prerequisite to surmise.

The results for the analyses of Barrett's 'Taxonomy' and General Relations highlight one of the problems inherent in analyzing items arranged on a cline. The category echoic is neither fully explicit nor fully implicit, but shares something of both. When echoic is aligned with synthesis under the heading reorganization in Barrett's categories, then these tasks taken together are prerequisite to inferential ones. When, on the other hand, echoic is aligned with replicative under the heading Explicit in the General Relations

analysis, then Explicit is prerequisite to both Implicit and Implied. The results for these two analyses, which may at first glance appear contradictory, are accounted for by the differing alignment of echoic in the two analyses, and constitute a good example of the point made regarding the function of adjacent categories on a continuum.

The results for Grade Four are both most complete and most consistent with reference to the orderings hypothesized. In Grade Four, replicative tasks were prerequisite to echoic and to synthesis, and the latter two in turn, to surmise. Oblique tasks were also prerequisite to surmise, a finding unique to Grade Four.

It is interesting that in Grade Four, in contrast to Grade Two but in common with Grade Six, replicative tasks were prerequisite to echoic ones. This may be a product in part of the facility of replicative tasks and in part of the nature of echoic tasks themselves. I shall return to the latter point below.

In Grade Six, replicative tasks were prerequisite to echoic and echoic in turn to oblique. Replicative was also prerequisite to synthesis and to surmise.

It is instructive to note not only the hierarchical structures themselves, but also the facility indices which indirectly determine the hierarchical orderings of the various categories.

In each of the three grades tested, the category replicative has the highest index, and interestingly, even this simplest of tasks becomes easier through the grades. The facility indices for the category synthesis are nearly identical across the three grades. The facility indices for echoic, oblique and surmise are much more variable.

Table 10: Facility Indices

Category	Grade Two	Grade Four	Grade Six
replicative	.77	.82	.91
echoic	.64	.53	.76
synthesis	.66	.64	.63
oblique	.53	.68	.58
surmise	.45	.24	.64

For example, the facility index for surmise in Grade Four is a low .24. The indices for this category in Grade Two (.45) and Grade Six (.64) are not high, but it seems incongruous that Fourth Grade children would be less able to answer surmise questions than either Grade Two or Six children.

It would appear that the variability in the categories echoic, oblique and surmise is in part a reflection of levels of difficulty within these categories. Examination of the raw data reveals that questions within these three categories (unlike those for replicative and synthesis) varied markedly in difficulty. Of course, it has been my purpose to investigate levels of difficulty across categories, not within them, but I shall comment briefly on the latter.

Echoic tasks test knowledge of specific items. For example, a Second Grade child may know the meaning of 'the leaves rustled softly' without knowing that an experientially equivalent expression of this meaning is 'the leaves spoke in whispers'; he may not know, in other words, that these two expressions of meaning are interchangeable in some contexts. On the other hand, it would be surprising if Grade

Two children did not know the meanings of both of the following equivalent expressions:

'Flip was easily frightened.'

'Flip was easily scared.'

When speculating as to why echoic questions may prove to be easy or difficult, one must consider how frequent the equivalent phrases are in the children's everyday experience of language.

When speculating as to why oblique and/or surmise questions vary in difficulty, it appears that one must consider the level at which inference is being involved. Grade Two children, for example, had little difficulty inferring that the Middle Wood (see page 78) was spooky at night. For seven to eight year old children, woods are spooky places at night, and certainly in much of the literature for young children, woods are made out to be spooky, if not downright sinister, at night. On the other hand, Grade Four students performed poorly on the surmise question which accompanies The Creature (see Appendix 4, IVc).

Was Dick trapped with the dragon?

In the reconstruction of the answer to this question, readers would have had less recourse to world knowledge, and the clues provided in the text apparently were too subtle for Grade Four students to grasp.

It is also true that a question which requires one reader to make an inference may be a straightforward test of factual knowledge for another. A number of Grade Six students no doubt were able to answer the question -

Is the bat an eerie creature?

from their world knowledge alone; the clues provided in the text for the reconstruction of the answer to this surmise question would have been superfluous for such students.

Thus, a comparison of the facility of echoic vis à vis, say oblique or surmise, might involve an enquiry into two questions:

- (i) how frequent are the equivalent (echoic) phrases in the child's everyday experience of language? and
- (ii) at what level is inference being involved?

Both are questions of the actual state of the child's knowledge. The first relates specifically to knowledge of language form, and the other to knowledge of the world in whose construction the inferential aspects of language play a major role.

This points to the necessity for recognizing an interaction between language and cognitive growth. This is an area of research which could complement the work being done presently on the role of memory in children's comprehension (Paris, 1975; Paris and Upton, 1976; Poulsen, Kintsch, Kintsch and Premack, 1979; Santa and Hayes, 1981). I shall have more to say about language and cognitive growth in Chapter Six (see page 170).

4.6.2 Integrative Work

The validity of the theory of integrative work as an explanation of why some questions are easier or harder than others cannot be established by one research study. But neither can it be dismissed in the face of the evidence obtained in this study. It is true that the categories comprising System B' did not form a linear sequence.

But the ordering relationships found were in every instance in the direction predicted.

I have based the notion integrative work on the number and types of demands made on one's linguistic resources. Other researchers have not articulated theories in the same terms, but have arrived at conclusions very similar to those which I have drawn in this study. For example, Miller and Kintsch (1980), using a psychological model, and empirical procedures completely different from those I used, concluded that 're-instatements' and 'inferencing' are causes of reading comprehension difficulty. (Also see pages 165-168.) It is interesting that two studies which were conducted independently and in which the theoretical and empirical approaches were so different should arrive at convergent conclusions.

Barrett may have had some notion similar to integrative work in mind when he stated of his taxonomy:

... the categories have been ordered to move from
easy to difficult in terms of the requirements
each category appears to demand.

(Clymer, 1968:18)

The study reported in this thesis has shown that the categories I have proposed and those proposed by Barrett are ordered in difficulty in terms of 'the requirements each category appears to demand' - in my terminology - in terms of integrative work. Educators and/or researchers needing a set of broadly defined, general categories of question types will find Barrett's "Taxonomy" useful, while those needing a more delicate and precisely defined system will hopefully find the system I have proposed of value.

Based on the evidence presented in this chapter, the notion integrative work appears to be a viable one. But this is not to suggest that it stands as a fully articulated theory. The notion integrative work needs a great deal of refinement. It accounts only at a very general level for difficulty across task types and accounts not at all for the variability of difficulty within categories. The notion needs to be informed to a much greater extent by what is being learned about children's natural language and cognitive development.

4.6.3 Difficulty: A Product of Text-Question Interaction

Within the limitations of a single experiment, this study has shown that the difficulty of the reading comprehension task using questions is a function not only of the difficulty level of the text but also of the questions used. Questions for which the correct answers were 'no', were significantly more difficult overall than questions answered in the affirmative. Within the latter set, difficulty was a product of a particular question's place in the hierarchical structures which emerged for each grade tested. In Grades Two, Four and Six alike replicative tasks were prerequisite to those involving inference making.

When the indications provided by the present study have been confirmed in other researches, we shall be in a position to know which questions are easier or harder for children; it will be possible within limits to systematically control the difficulty level of questions. This will be important in the development of new instructional reading materials, tests, and in future studies of reading comprehension, text comprehension and readability.

At a time when the public is being led to believe that literacy standards are declining, it is also instructive to look at both the difficulty of texts and the difficulty of questions used in older and more contemporary reading comprehension tests. If my analysis is correct, the texts and questions used in contemporary tests (Progressive Achievement Tests: Reading Comprehension - ACER, 1970; and ACER Primary Reading Survey Tests - ACER, 1972) are much more difficult than those used in older tests (Neale Analysis of Reading Ability - Neale, 1966a; McCall-Crabbs Standard Test Lessons in Reading - McCall and Crabbs, 1961).

The publishers of these tests include information regarding which parts (i.e. which passages) of the test are appropriate for students in the various grades. Passages for particular grade levels in the Neale and McCall-Crabbs tests are nearly always less lexicogrammatically complex - as measured by any one of the standard readability formulae discussed in Appendix 1 - than comparable passages in the PAT and ACER tests.

Furthermore, a large proportion of the questions used in the Neale and McCall-Crabbs tests are replicative. There are very few replicative questions used in the ACER and PAT tests; in these tests, echoic, synthesis, oblique and surmise questions are used in approximately equal proportion. This evidence suggests and detailed analysis (Gerot, 1980) confirms that overall, the questions accompanying the latter two tests entail a good deal more integrative work than do the questions accompanying the Neale and McCall-Crabbs tests.

The difficulty of the test instruments must be taken into account if reading test scores are to provide valid bases for comparing literacy standards in the past and currently.

4.6.3.1 A Warning

Before concluding this chapter I would like to sound a warning. It is my fear that because the types of questions used in reading comprehension tests and materials have been found to be ordered in difficulty, some educators will think that 'questions must be taught in order of difficulty', that only replicative questions should be taught (i.e. used) in the Infants grades, echoic and synthesis in Grade Three and so on.

Judging by the number of replicative questions used in Grade One, Two and remedial materials, it appears that some educators already think this way. Such a view is educationally and linguistically misguided. Young children are quite able to paraphrase, to synthesize information and to draw inferences from everyday talk. There is no reason they should not be encouraged to do the same from written language.

To think that the hierarchy of question types found in this study represents a sequence for teaching questions is to completely misinterpret and misunderstand the findings. The value of knowing that question types are ordered in difficulty lies not in its implications for teaching questions but in its implications for the assessment of reading ability and readability.

Furthermore, the work reported in this thesis is exploratory; the results presented and the conclusions drawn should not be taken as fully confirmed. This is not to devalue the work, but to acknowledge that the answers to the questions raised in this study are tentative.

Much more work in this area of enquiry is needed. One of the

useful functions the present study serves is in providing direction for future research and in alerting future researchers to some of the problems and pitfalls associated with such an enquiry.

The work in this chapter has been concerned with text-question interaction as a source of comprehension difficulty. In the course of investigating the nature of this interaction, it became apparent that another variable, one considered neither by readability formulae nor by text-question interaction as, for example, reported here, contributes to difficulty. This variable relates to the quality of the language used in reading comprehension tests and materials. This issue is taken up in the next chapter.

CHAPTER FIVE

THE LANGUAGE OF READING COMPREHENSION TESTS5.1 Introduction

The success a child has in the reading test/exercise situation depends both upon his ability to interpret meaning from and ascribe meaning to texts, and to interpret and answer questions. To score well, the reader must be at home with the language of the texts and with the types of questions used.

Some test writers appear to subscribe to the view that reading tests should be literary obstacle courses that the reader must overcome in the course of becoming a good reader. As will become apparent by my remarks in this chapter, I do not agree with such an ideology.

It is my belief that if reading is to become an enabling activity, the language upon which children practice and are tested should provide optimal help for facilitating comprehension. It is from this point of view that the language of texts and questions drawn from reading test and instructional reading materials being used in Australian primary schools is discussed below. In particular, the language of these texts and questions is discussed in terms of the meanings involved and the cohesive patterns displayed.

Many of the texts and questions used in these materials are well formed. Many are not. The comments made herein focus on those that are not. Admittedly the discussion is thus critical, but it is

motivated by a desire to analyze, as far as possible, those factors which appear significant to reading. Furthermore, such a discussion is interesting in its own right for it provides at least a partial answer to the question: 'What kind of language is being used to measure Australian children's reading comprehension?' In addition, I hope to show through this discussion that readability is a product not only of the lexicogrammatical structures which realize the meanings of the text but of the meanings themselves.

It must be noted at this point that the ill-formed texts and questions mentioned herein were found in a corpus of passages selected on a completely random basis from the tests, kits, and instructional materials cited on page 69 of Chapter Three. Because the kinds of flaws discussed were found in randomly selected passages and because they were not the product of a directed search, they are assumed to be a generally occurring feature which is, in all likelihood, not specific to this one particular corpus of data. It should be further noted that only those flaws which appeared repeatedly, i.e. which were typical, are included here for discussion.

5.2 Texts and Questions: Factors Relevant to Understanding and Misunderstanding

It is not an exaggeration to claim that a child will be successful in the reading test situation to the extent that he understands the cultural/situational context encapsulated by the text and to the extent that he understands how the language used in the text is functioning. The child's lack of success in the reading test situation cannot always be blamed solely on the child. There are instances in which the test

writer appears to be insensitive to or unaware of what a child reader can be expected to know through and about language. As a result, the test writer places - albeit unconsciously - stumbling blocks in the reader's way.

In the data these stumbling blocks were of five general types. Some were related to contextual factors, some to formal; others were related not to form per se but with the way in which certain units of form functioned within the particular environment of which they were a part. Still others were related to what I have called 'the best answer syndrome'. The final type of stumbling block discussed is related to the cohesive properties in some of the texts analyzed.

That these factors cause difficulty is based on my own observation over a period of years, of children while they are reading, and on remarks made by children themselves. Evidence provided by other researchers - e.g. Pearson (1974-75); Thorndyke (1977); Rosenberg and Lambert (1974); and Bormuth, Manning, Carr and Pearson (1970) - supports a number of these observations.

5.3 Cultural and Situational Contexts

Many of the reading comprehension tests and materials used in Australian schools were written in and for other countries, most notably the United States, England, and New Zealand. These materials naturally enough tend to be culturally bound. The Progressive Achievement Tests: Reading Comprehension, first published by the New Zealand Council for Educational Research in 1969, and distributed unmodified (except for the norms) in Australia in 1970 by the Australian Council for Educational Research, contains a number of

culture specific passages. This would not matter were this not one of the tests issued to schools by the N.S.W. Department of Education.

Australian children perhaps could be forgiven for not fully understanding the following passage from this test:

Hawks are birds which eat animals and live by hunting. The harrier hawk lives in the open-country, among sand-hills and manuka scrub, in tussock-grass country and near the sea. It flies slowly in great circles for hours at a time, only stopping when it has sighted its prey. Then it swoops down and strikes with its sharp talons. It eats any kind of animal, dead or alive, but the largest birds it dares to attack are ducks and pukekos.... (PAT, 1970)

What is 'manuka scrub' and what is a 'pukeko'? How many different places are harrier hawks found? Are sand-hills and manuka scrub found to occur together or are these two separate locales?

It is good that children read about cultures other than their own, and the inclusion of passages involving New Zealand culture in a New Zealand test is certainly to be expected. What is worrying is the uncritical use of such a passage to test the reading comprehension of Australian children.

Some stumbling blocks to understanding relate more to the particular situational context of the passage than to the cultural context. The following story comes from a test for Grade Two/Three children. It is doubtful that in this day and age many children associate horses and carts with milkmen.

Tom stopped on his way to school. The milkman's horse had wandered in the fog. The horse and cart blocked the centre of the road. Traffic was coming. There was no time to call the milkman. Quickly Tom led the horse to safety just as the frightened milkman returned.
(Neale, 1966a)

Many children understand this story adequately enough to answer questions about it, but were the story presented during a reading lesson in which, prior to reading the story, the children and teacher talked about how milk was delivered in the olden days, the story would make more sense to the children and be culturally instructive.

5.4 Contextual and Formal Factors

In the following story both contextual and formal factors make it difficult to know just who the writer is talking about.

Camp Fires

(1) When the camp fires flickered at night the cares of the day were forgotten. (2) Someone began to sing a monotonous chant and sticks were tapped together. (3) Feet began to shuffle, bodies swayed. (4) A man or woman sprang up. (5) Soon everyone was stamping round in a circle, feet moving to the rhythm of the song and the tapping of the sticks. (6) The events of the day were lived over again. (7) Men, women, and children, animals and plants, sky and desert, were all parts of the world of the spirit ancestors.

(8) The songs they sang made fun of anyone who had done something wrong during the day; (9) there were songs of magic that made things grow; (10) there were Dreamtime songs; (11) there were songs that retold the old, old legends of the tribe. (12) Some of the songs were made up as they were sung, but the words and music of others were sacred, and had been handed down for many generations. (13) The singers all became part of one happy, carefree family.

(14) That is why the people enjoyed themselves as they learned the legends and secrets of their tribe. (15) As the night went on the dancers grew tired. (16) One by one they threw themselves on the ground and fell asleep, until only a few elders remained squatting by the fires, dreaming of the days when they were young.

(ACER, 1972)

Adult Australian readers will realize that the people referred to in this story are New Guinean or Australian aborigines. Chanting and dancing to the tapping of sticks around a campfire are typical

behaviours of the members of these groups. Notice, however, that the only explicit suggestion that the people being talked about are aborigines rather than African natives or American Indians for example, is the mention of Dreamtime songs in line 10.

Part of the difficulty in determining who is doing what in this passage is a product of the use of passive constructions in which the actor is not specified. Even where the active voice is used, the actor is nearly always denoted by a general noun: someone (S2), man/woman (S4), everyone (S5), people (S14). Other nouns referring to actors are also non-specific: singers (S13), dancers (S15), elders (S16). And the child could scarcely be blamed if in Sentence 8 he could not tell if the referential item they referred anaphorically to everyone in S5, or men, women and children in S7; cataphorically to the singers in S13; exophorically to the aborigines or if he thinks that the writer has made an error and referred to the unspecified actors in the passive Sentences 1, 2 and 6.

The writer's use of grammatical metaphor (Halliday, in press) also contributes to the problem under discussion. In Sentence 3 feet begin to shuffle and bodies sway as if of their own volition. It is not difficult to infer that the feet and bodies belong to the dancers who are mentioned explicitly later. But the problem of knowing who the dancers are remains.

The title of this passage is a metaphor of another kind. Contrary to what young readers might be led to believe by the title, the story is not about camp fires but is about the customs involved in the transmission of culture amongst aborigines. Camp Fires serves as a metaphor for this process. That the title of a story plays a significant role in the reader's understanding of a story has been

shown in research studies conducted by Bransford and Johnson (1973) and Kozminsky (1977).

My experience suggests that 10-11 year old children are not sufficiently versed in aboriginal culture nor in the use of agentless passives and metaphor to permit full understanding and enjoyment of this story.

The following story is taken from the Endeavour Reading Programme (1975).

- (1) One Saturday, Dad took Andrew fishing.
- (2) Sue did not go with them. (3) They went fishing in the dam near the back paddock.
- (4) Andrew dropped his line into the water.
- (5) On the line was a hook.
- (6) Soon there was a pull on Andrew's line.
- (7) It was a fish. (8) Andrew could not see it.
- (9) It was under the water. (10) He pulled the line in. (11) He pulled it in fast. (12) A big yellow fish was on the hook. (13) Dad helped him to take it off the hook. (14) Then Andrew put it in the fishing bag. (15) Andrew got eight fish that day.

The text is representative of early reading materials in which vocabulary and sentence structure is controlled.

The sentence structures are carefully controlled but mirror the patterns the child is already using in his everyday speech. The progressive use of regularly patterned words assists the child to develop positive word attack skills.

(Endeavour Reading Programme:
Teacher's Manual, 1975:7)

Such control is well-intentioned. But one does not have to be a linguist to notice how stilted the language is. This is a product, I believe, of the writers' focus on form within sentences rather than the organization of the discourse.

In an attempt to provide for the reinforcement of certain sound-grapheme patterns in words and certain syntactic patterns in sentences, the writers repeat several utterances:

S4 and S5 - Andrew dropped his line in the water. On the line
was a hook.

S10 and S11 - He pulled the line in. He pulled it in fast.

In natural discourse, these utterances would almost certainly be expressed as:

Andrew dropped his hook and line into the water.

He pulled the line in fast. or
He quickly pulled the line in.

If the writers wish to provide for repetition of patterns, perhaps it would be better to repeat across texts rather than within them.

The recommendations I have made for rewriting the two sentences above increase the length of each. The sentences in this story are short. One cannot tell from the manual whether or not this is the result of deliberate decisions, but it appears that the writers have subscribed to the commonly held view that short sentences are syntactically simple - and therefore are easy to understand. The corollary of this view is that long sentences are syntactically complex and for that reason, are difficult to comprehend.

Pearson (1974-75:157) calls this view the 'readability hypothesis'. In his article, Pearson convincingly disproves the readability hypothesis. He tested third and fourth grade readers' comprehension of synonymous versions of utterances - some made up of two (or more) short, syntactically simple sentences; others of one longer, more syntactically complex sentence. For example:

- (1) Because John was lazy, he slept all day.
 John was lazy. So he slept all day.
 John slept all day because he was lazy.
 John slept all day. This was because he was lazy.
 John was lazy and he slept all day.
 John was lazy. He slept all day.
 John slept all day, and he was lazy.
 John slept all day. He was lazy.
 Why did John sleep all day?
- (2) The tall man liked the short woman.
 The man who was tall liked the short woman.
 The man liked the short woman. He was tall.
 The man liked the woman. He was tall. She was short.
 Which man liked the short woman?

Children's comprehension of examples like those in (1) above was equally efficient across the longer and shorter versions of the utterance. And their comprehension was significantly better for the longer, more complex version in examples like those in (2) above. Pearson concludes that "... the present findings certainly support an easing of concern for sentence length and complexity in the middle grades" (Pearson, 1974-75:190).

If Pearson's findings apply to sentences within connected discourse as well as sentence pairs in isolation, then children's comprehension of Andrew should not suffer and indeed might be improved if Sentences 4 and 5 are rewritten as: Andrew dropped his hook and line into the water, Sentences 10 and 11 as: He pulled the line in fast, and Sentences 8 and 9 as: But Andrew could not see it because it was under water.

I shall return to the discussion of the sentence complexity in Chapter Six.

5.5 Generic Structure

The following citation also comes from the Endeavour Reading Programme (1975). The writers of this program are to be commended for including within it a number of exercises based on published newspaper articles. But unless the children reading these materials have learned about the newspaper as an object of study in its own right, they could be disadvantaged by their lack of knowledge about the generic structures that various journalistic sub-genres take. In the example below, the child has to be familiar with the generic form of an editorial to know (i) who is talking and (ii) whose opinions are which. And unlike the questions accompanying so many texts, the questions of this particular exercise require that these things be understood.

THE BANNER, SUNDAY, OCTOBER 21, 1973

EDITORIAL

Making the Impossible Dream Possible

Sydney's Opera House - "A gift for all times"

Beautiful design, but impossible to build.
On the boundaries of what is technically possible.

These were two of the expert opinions given following the announcement in 1957 of Joern Utzon's prize-winning design for the Sydney Opera House.

Today, seventeen years later, it is standing on the foreshores of Sydney Harbour at Bennelong Point - a magnificent monument to the modern day achievement of an architect-engineer-builder combination that did not know the meaning of the word "impossible".

Complementing - perhaps even supplanting - the Harbour Bridge as the gateway to the city of Sydney, the Opera House stands completed, bold yet graceful, a triumph of technology, a permanent tribute to the vision of its creators.

Q3: Which statement is true?

- a) The Opera House was built seventeen years ago.
- *b) Some experts thought the Opera House would be impossible to build.
- c) The Opera House takes up all of Bennelong Point.
- d) The Opera House will be renowned as the gateway to Sydney.

Q4: How does the editor describe the Opera House?

- a) The gateway to Sydney Harbour.
- b) Impossible to build.
- *c) A triumph of technology.
- d) On the boundaries of what is technically possible.

It is interesting to note the crucial role the extended reference item these in the first paragraph plays in separating what the editor says about the Opera House from what others have said about it. If the Grade Five students reading this text fail to interpret these fully and accurately, they will have difficulty interpreting the text and answering the questions. The evidence provided by the study reported in Chapter Four suggests that children may have difficulty determining the extent of the presupposition.

5.6 Language Functions

If we are to believe readability formulae, it is the wording of a text per se which causes difficulty. In the story cited below, the difficulty is not associated so much with the formal patterns in the text - whether lexical or grammatical - but with the way these patterns function in realizing the meaning of the story.

Billy

(1) Billy kept on walking. (2) There was nothing to be seen but trees, and he began to worry. (3) Where was the road? (4) When he looked for the sun to find which way he should go, he saw that the sky had become very dark and cloudy. (5) It looked as though a storm was coming, and Billy was a little

scared. (6) He must get home before it rained.
 (7) He started to run.

(ACER, 1972)

Let us examine Sentences 1 and 2 of this story first. In these two sentences the writer is setting the scene. The utterance Billy kept on walking presupposes that he had been walking some little time already, that part of the story has already taken place. From Sentence 2 we, as adults, can reconstruct the situational context which makes the meaning of Sentence 1 explicable: Billy is lost in a wooded area, and having already unsuccessfully spent time and effort trying to find his way, is growing anxious. As we saw in the last chapter (pages 104-114), Grade Two children may not be so successful in inferring that Billy is lost.

Now let us look at Sentence 3. This utterance is not an expression of the writer's point of view, as were Sentences 1 and 2, but is an expression of Billy's point of view. Where was the road? is a question Billy asked of himself. I would argue that it is the shift of focus (Hasan, 1964:378-380; Spencer and Gregory, 1964:89) from the writer's point of view in Sentences 1 and 2 to Billy's in Sentence 3 which lies at the source of the difficulty Grade Two children experience answering the following test question:

- Billy was worried because
- *(a) he could not see the road.
 - (b) the trees were very tall.
 - (c) the sun was too hot.

The true source of Billy's anxiety is not the fact that 'there was nothing to be seen but trees' but the fact that he could not find the road. To reconstruct the above answer, the reader must interpret Sentences 2 and 3 as something like:

'All Billy could see were trees. He couldn't find the road anywhere, and he began to worry.'

And in order to interpret these two sentences in this way, the reader must extrapolate from Billy's point of view back to the writer's.

Success on this item depends on the reader being able to (i) infer that Billy was lost, and (ii) assimilate the focal shift. By leaving his Grade Two audience to infer that Billy was lost, the writer may not have provided immediacy of meaning for the utterance Where was the road?.

A sentence by sentence analysis of the language of this text could not have revealed these sources of difficulty. Concentrating on one 'proposition' or sentence does not - in fact, cannot - tell us how it is related to the preceding or following sentences.

As I am attempting to show in this thesis, using only formal criteria which are simply sentence internal is a procedure which at best can be only partially successful in determining what language is 'easy' to understand and what language is 'difficult'. It is only through a textual orientation to the analysis of language that the problems inherent in the texts cited in this chapter become apparent.

The story of Billy opens with a presupposing sentence. Use of a presupposing utterance to open a story is by no means uncommon in reading comprehension passages. The opening sentence of a passage from a Grade Three test is similar in kind to Billy kept on walking.

The Pied Piper next started to blow a merry, rollicking tune ...

ACER, 1972)

Considering the atypical constraints on writers of test or test-like passages to say what they say in texts of very limited length, it is perhaps not surprising that these writers use any means at their

disposal for getting into the text quickly. In addition to the two presupposing opening sentences cited above, this one appeared in the data:

And then it happened. In the middle of the night. Just below the top of the Kuhelihorn a great mass of snow broke loose with a crash like an explosion.

(Bruce, 1968)

When such an opening sentence is used, suspense is immediately created; the reader's attention is engaged from the outset as he begins to search for the interpretation of it. In this example, the reader has to read to Sentence 3 to determine what happened.

The text for the second example is cited in full in Appendix 6. To interpret the first sentence of this text: "They could scarcely believe it" (Bruce, 1968) the reader must read right to the end of the text to find out who they refers to and that it refers to the fact that Anna played with a bear alone in the forest without coming to harm. Again, the opening sentence creates immediate interest and suspense, but because the interpretative sources for it and they are so diffuse and remote, the precise interpretation of these items is somewhat difficult to pin down.

5.7 Some Comments About the Questions Used

Despite the objections raised to Hawks, Tom, Andrew and Camp Fires, most children score well on the questions accompanying these passages. The reason for this lies not in the properties of the texts but in the properties of the questions which test understanding of isolated or peripheral bits of information from within the text. It is possible for example to answer the following questions from Camp Fires without

understanding who or what the story as a whole is about:

When night came the people were

- (a) afraid (b) angry (c) blood-thirsty (d) care-free

The people stopped dancing when

- (a) it was almost daylight.
(b) they felt tired.
(c) the fire had burnt down.
(d) they were told to do so.

Many questions used in reading tests/exercises focus on peripheral issues. The first question which accompanies Andrew, cited earlier, provides a case in point:

Did Sue go fishing with Andrew?

The fact that 'Sue did not go with them' seems an irrelevant detail; Sue's inaction has no bearing whatsoever on the subsequent events. To question this information is to give it status it does not merit.

The value of such questioning has been queried not only by concerned educators but by children themselves. In the original, standardized version of Old Man Kangaroo (ACER, 1972), an adaptation of which I used in my study (see Appendix 4), there are two questions related to the matter of the clearing:

Q: Where did the kangaroo stand?

A: in a little patch of grass.

Q: Where was the clearing?

A: in dense scrub.

One child, encouraged to talk through the test rather than doing it with pencil and paper, remarked: What does it matter where the kangaroo stood? What matters is whether the boys are going to chase the kangaroo or whether the kangaroo is going to chase the boys!

Just as it is possible to answer questions without understanding the story, it is possible to understand the story without understanding

the questions asked. Bormuth, Manning, Carr and Pearson (1970), have provided evidence which suggests that the way in which a question is worded affects children's comprehension of the question. Bormuth and his colleagues used some rather unusual constructions such as What was the breaking of the boy's arm caused by? to test comprehension of the sequence: The boy fell off the steed. He fractured his arm. Children do not perform particularly well on the quoted question.

Such constructions are not common, but I did find the following example in the data. The question accompanies the Dragon story, cited in Chapter Two, page 45:

What did the Knight realize would be a good
moment to attack the dragon?

(Neale, 1966a)

The questions analyzed in the course of my study were written in the third person almost without exception. The exceptions in fact sound decidedly odd:

... I looked everywhere for him, calling 'Curly,
Curly'.

Q: Who called 'Curly, Curly'?

A: (a) Curly (b) my father *(c) I (d) the man
(McCall-Crabbs, 1961)

In some cases the questions were written in the third person even though the stories were written in the first or second person. Such switches are made necessary by the nature of the text and the focus of the questions.

A black cat came to my house....

Q: What came to the little boy's house?

(Neale, 1966a)

... There is an explosive sound and a terrific roar. You are on your way!

Q: How did the person in the story know that the rocket had taken off?

(ACER, 1972)

The use of the first and second person in stories is a natural use of language. And the use of the third person in questions is a valid way - indeed is perhaps the most valid way - of expressing a question accompanying reading test passages. Were the question to Black Cat expressed as - 'What came to my house?' - the child could truthfully answer 'nothing' or 'a snake' or anything else that might have found its way to the individual reader's home. And were the question to Rocket - 'How did you know that the rocket had taken off?' - children could answer: the story said so!

Despite the validity of using the third person in questions, the switches in person between question and text result in awkward conversions. I have taught children who have asked, 'Miss, what person are they talking about?' It would seem that for these children, the question is more difficult to interpret than is the answer the question is asking for. One wonders in such cases what is being tested - understanding of the text or of the question.

It could be argued that in testing materials, questions in which conversions are problematic be avoided or that they be formulated in such a way that the conversion problem is side-stepped.

5.7.1 The Best Answer Syndrome

In multiple-choice tests and exercises children are often asked to choose the best answer. This instruction is based on the dual assumptions that (i) there is one answer which is better than all others and

(ii) that the test writer's answer is best. So in fact the instruction could just as well read 'Choose the tester's answer'. Furthermore, these tests/exercises are scored dichotomously; that is, either the answer is right (matches the tester's answer) or is wrong. There is no margin for well-reasoned alternative answers.

In questions of this type the tester has the responsibility of making sure that the answer is clearly the logical answer and the other alternatives not. This does not always happen. For example, it would be difficult for readers to know which is the most logical alternative in this question which accompanies the Opera House Editorial (page 133):

- The Opera House could not have been built without
- (a) the ideas of Joern Utzon.
 - * (b) modern day technology.
 - (c) the different opinions of experts.
 - (d) its magnificent site.

Children could argue quite rightfully that the Opera House as we know it couldn't have been built without Utzon's ideas and that the different opinions of experts were needed to reach consensus as to the best way to proceed with the building.

I have presented the next question to a number of post-graduate students.

- What words best tell how the editor feels about the Opera House?
- (a) Technically impossible.
 - * (b) A prize-winning design.
 - (c) A modern-day achievement.
 - (d) A permanent tribute to the vision of its creators.

Most of these students have been cagey enough to circle several of the answers or none at all. One would have to interview the writer of the question to find out why he maintains that (b) is the best answer.

That the test writer's answer is not always the best or most logical answer as far as children are concerned was demonstrated in one of the pilot studies (see Appendix 2) run preliminary to the major study reported in Chapter Four. I will not recount the details of this pilot study here, but will restrict my remarks to the finding of this study which is directly relevant to the issue at hand. The particular instance being referred to revolves around the following story and question:

Tom pretended to be ill. His Aunt Polly insisted that he take his medicine every day, and knowing Tom well, she watched the bottle carefully. The medicine really did grow less, but she had no idea that the boy was mending the health of a crack in the floor with it.

One day, while Tom was in the act of dosing the crack, his aunt's ginger cat came along, purring, eyeing the teaspoon greedily, and begging for a taste.

'Don't ask for it unless you want it, Peter,' said Tom. 'Well, I'll give it to you because there's nothing mean about me.'

Tom opened the cat's mouth and poured down the medicine. Peter sprang a couple of yards in the air, let out a yowl, and set off round and round the room, banging against the furniture and upsetting flower-pots. Next he rose on his hind feet and pranced around. Aunt Polly entered in time to see him throw a few double-somersaults and sail through the window, carrying the flower-pots with him. The old lady peered over her glasses in astonishment. Tom lay on the floor helpless with laughter.

Q: Why do you think Tom gave some medicine to the cat?

- *(a) He thought it would be funny.
- (b) The cat did not seem well.
- (c) He did not like Peter.
- (d) He was very kind to animals.
- (e) He wanted to use up the medicine quickly.

(PAT, 1970)

Of the sixty-four children in the sample, fifty-one (80%) answered (e).

Unfortunately for them the test writers had indicated in the test

manual that (a) was the correct answer. Only five children in the sample chose answer (a). Upon going back to the Teachers Handbook, Progressive Achievement Tests (ACER, 1973), I was surprised to learn that the facility index (which is an indication of the percent of children in the norming population getting the item correct) for this item was only 15 for Grade Four. Obviously the norming population did not agree with the writers' answer either.

From an analysis of error patterns for all of the multiple-choice questions used in the pilot study, it appeared that the difficulty children had with any particular question may have been due in part to the distractor foils offered. As a means of testing the effects of distractor foils, I conducted a second pilot study. Using the story of Tom, two forms of the test were made. The two forms were identical with the exception of one distractor foil per question. (See Appendix 3.) So, for example, question 3 on Form A read:

- Why do you think Tom gave some medicine to the cat?
- *(a) He thought it would be funny.
 - (b) The cat did not seem well.
 - (c) He did not like Peter.
 - (d) He wanted to use up the medicine quickly.

On Form B, question 3 read:

- Why do you think Tom gave some medicine to the cat?
- *(a) He thought it would be funny.
 - (b) The cat did not seem well.
 - (c) He did not like Peter.
 - (d) He was very kind to animals.

Eighty-two Grade Four students were assigned at random to read one of the two forms of the test passage. The results of the Independent Samples T-Test are presented below:

Table 11: Distractor Foil Effects

Distractor Foil Effects			
Test Form	M	SD	t
A	2.66	1.01	*3.7
B	3.68	1.40	
*p < .001			

As can be seen, the effects of changing the selections from which the answer is to be chosen has a very significant effect on children's performance. It was because of the power of this effect that multiple-choice questions were avoided in the major research study.

There are instances in which the best answer seems to contradict the information provided in the text. Question 4 accompanying Billy, cited on page 134 provides an example:

- When Billy saw the stormy sky, he
- * (a) ran for home.
 - (b) climbed a tree.
 - (c) hid under a tree.

There is no evidence to suggest that Billy either climbed or hid under a tree. There is evidence that Billy's goal was home and the means to get there was running, but there is also ample evidence to suggest that Billy did not know where home was. The answer to the first question of the set accompanying this story is:

- Q: What happened to Billy in this story?
A: He got lost.

That Billy, in his fear, suddenly was able to run for home contradicts the information given in the text.

To conclude this section, I would like to acknowledge that the questions used in the research study reported in Chapter Four, based as they were on the questions used in the original, standardized versions of the ACER Reading Survey Tests, are subject to the same criticisms made in this section. Through the research study and through the course of my own teaching experience I have come to appreciate fully the seriousness of the following comment:

It makes no sense to simply ask questions
- any kind of question that occurs to the
researcher - about a text. Much misuse has
occurred in this way ...

(Kintsch and Vipond, 1979:338)

5.8 Cohesion

Research studies by Rosenberg and Lambert (1974); Thorndyke (1977); and Krulee, Fairweather and Bergquist (n.d.) have shown that scrambling the order of sentences in a text has a detrimental effect on comprehension. This is not surprising for if the sentence order of a text is scrambled, the cohesiveness which integrates those sentences into text is disrupted. For example, pronoun referents cannot be determined and conjunctive relations are disrupted.

In the studies cited above sentence order was deliberately scrambled to test the effects of such scrambling. However, the ambiguous pronominal reference and sometimes inexplicable conjunctive relations of the text below are not the result of deliberate scrambling. The passage is quoted verbatim (except for the sentence numbering)

from a standardized reading comprehension test used widely in N.S.W. schools.

(1) Hawks are birds which eat animals and live by hunting. (2) The harrier hawk lives in the open country, among the sand-hills and manuka scrub, in tussock-grass country and near the sea. (3) It flies in great circles for hours at a time, (3a) only stopping when it has sighted its prey. (4) Then it swoops down and strikes with its sharp talons. (5) It eats any kind of animal, dead or alive, (5a) but the largest birds it dares to attack are ducks and pukekos. (6) Its usual food is small birds, insects, worms, birds' eggs and fish. (7) It is a fussy feeder, (7a) plucking the feathers from the other birds before eating them. (8) It lays four white eggs in a grass nest which is placed carelessly among the tussocks in the open country or in wide dry river beds. (9) The eggs are not all laid at the same time (9a) and, as some of the young birds are born before others, (9b) they make a meal of the younger ones. (10) This cruel habit makes them useful in keeping down rats, mice and rabbits, (10a) but unfortunately they attack hens and young lambs, (10b) and because of this they are often trapped and shot.

(PAT, 1970)

The main problems in the cohesion of this text lie (i) in the use of ambiguous reference items; (ii) associated with this is a confusing array of birds - hawks, harrier hawks, large, small, young and other - to keep track of; (iii) in several instances conjunctions are used not only ambiguously but inappropriately; and (iv) several times the ordering of clauses disrupts the logical development of the ideas being expressed.

As a means of drawing attention to the incohesiveness of this text, I have presented the original version and a revised, more cohesive version in parallel. The original is presented in standard type, the revised in italics. Accompanying the two versions is an account of why changes were made to the original version.

Sentence
Number:

1 O: Hawks are birds which eat animals and live by hunting.

R: *Harrier hawks are birds which eat animals and so they live by hunting.*

Although I have provided an altered version of the first sentence, the text is improved if the first sentence is omitted. It is harrier hawks which are under focus in the whole selection. There seems little motivation to talk about the whole family of hawks in the first sentence and then to talk about a particular species of hawk in the remainder of the text, especially when the text is not going to return to the general species 'hawk' at any time - or is there a switch at some point which even adult readers, teachers included, cannot locate?

If the first sentence is to be retained, the following changes are in order: the and in the original version needs to be disambiguated. If in the original version and is interpreted in the additive sense, then the reader is being told two different facts about hawks: hawks eat animals and additionally hawks live (survive) by hunting. The causal interpretation of and in the revised version seems a more likely one.

In the revised version, harrier hawks are introduced from the outset for the reasons outlined above.

Sentence
Number:

2 O: The harrier hawk lives in the open country, ... etc.

R: *They live in the open country, etc. ...*

The harrier hawk has been introduced in the original version as a way of defining and delimiting the topic of hawks to the particular species under discussion in this text. It has been my experience that some children even in Junior Secondary school are confused by use of such generic reference, interpreting an example like the harrier hawk as one particular member of the species.

I believe that generic reference in this particular sentence is best avoided. It is true that children must learn the meaning of generic reference as part of their language/reading development. But such learning will result from a directed learning situation, not from a test passage in which such learning is assumed. Furthermore, the mention of the harrier hawk in Sentence 2 is the only explicit mention of this term in the whole original version; throughout the remainder of the story, the harrier hawk is referred to as it. Children could interpret it as 'the one particular harrier hawk' mentioned in Sentence 2. This could then become confusing when it lays eggs in Sentence 8 and they attack hens in Sentence 10b.

In the revised version the use of generic reference is avoided. They could conceivably be interpreted as animals by the child, but the context would quickly indicate that this is the wrong interpretation of they. Furthermore, as Halliday and Hasan (1976:312) point out, the most probable target of a cohesive reference item is the Theme of the preceding sentence. Children seem to know this as part of their operational knowledge of language.

Sentence

Number:

3 O: It flies slowly in great circles for hours at a time,

R: *When hunting, a harrier hawk flies slowly in great circles for hours at a time,*

When hunting in the revised version reinforces the notion of harrier hawk as hunter. The phrase when hunting also provides an explanation of when and why it is that harrier hawks fly in circles for many hours at a time.

A harrier hawk is used in the revised version for now it could be any member of the species 'harrier hawk' that is being referred to.

3a O: only stopping when it has sighted its prey.

R: *stopping only when it has sighted its prey.*

In the original version only is used ambiguously. The phrase only stopping could be interpreted in the sense that stopping is the only one of several goings-on that alters when the hawk has sighted its prey. In the revised version this interpretation is not possible. Only in this latter case indicates that the stopping occurs at a particular time, that time being when the harrier hawk sights its prey.

4 O: Then it swoops down and strikes with its sharp talons.

R: *No change.*

Sentence
Number:

- 5 O: It eats any kind of animal, dead or alive,
5a but the largest birds it dares to attack are
 ducks and pukekos.
6 Its usual food is small birds, insects, worms,
 birds' eggs and fish.

There are several problems here. In the first place, the meaning of Sentence 5 and Sentence 5a is unclear. Presumably the writer is trying to tell his readers that harrier hawks will eat any kind of animal if that animal is already dead, but will kill live animals only up to a certain limited size, e.g. birds the size of ducks and pukekos.

Secondly, the internal unity of this segment suffers as the writer switches from discussing the eating of animals (S5) to the attacking of large birds, i.e. ducks and pukekos (S5a) to its usual food (i.e., it eats) being small birds, insects, worms, birds' eggs and fish (S6) to eating the other birds in S7a.

Thirdly, the notion of the hawk as carrion eater is given Thematic status in this segment even though in both this segment and in the passage as a whole the emphasis is on the hawk as a hunter.

By changing the order of clauses and serial list order the writer could have overcome these problems.

- 5 R: *Its usual food is insects, worms, fish, birds' eggs and small birds -*
5a *the largest birds it dares to attack are ducks and pukekos.*
6 *It will also attack small farm animals, and will eat larger animals if they are already dead.*

In this version, the theme of hawks as hunters is maintained. In S4 we were told that the hawk strikes (its prey, which by definition is a live animal) with its sharp talons. All of the 'foods' listed in S5 are examples of prey. In S5a 'the largest birds - ducks and pukekos' serves to define the size of the small birds which the hawk kills and eats. Sentence 6 helps to establish the fact that the hawk also eats small mammals (echoed in S10 and S10a), and that secondarily, it is a carrion eater. In this version emphasis is given to the hawk as hunter, particularly of birds, since this is most consistent with the whole segment comprised of Sentences 5 through to 7a.

Sentence
Number:

- 7 O: It is a fussy feeder,
 R: *Harrier hawks are fussy feeders;*

Harrier hawks are mentioned in the revised version as a means of keeping clear which birds are being talked about when.

- 7a: O: plucking the feathers from the other birds before eating them.
 R: *before eating the birds, they pluck their feathers out.*

In the original version it is difficult to know which the other birds the writer is referring to - other hawks, other harrier hawks, small birds, ducks and pukekos, young birds? This reference to the other birds is ambiguous and is resolvable only through inference.

Several readers have found Sentence 7a quite amusing, imagining a group of hawks carefully plucking 'the other birds' clean and then feasting on the feathers! The revised version - perhaps disappointingly

- eliminates the possibilities of cannibalistic and/or quillful cuisine.

Sentence
Number:

8 O: It lays four white eggs etc.

R: *The mother hawk lays four white eggs etc.*

See notes for Sentence 2.

9 O: The eggs are not all laid at the same time,

9a and, as some of the young birds are born before others,

9b they make a meal of the younger ones:

9 R: *The eggs are not all laid at the same time,*

9a *so some of the young harrier hawks are born before others.*

9b *Those born earlier make a meal of the ones which are born later.*

Ambiguous reference and inappropriate use of conjunctions in the original version detract from the coherence of this segment. As in Sentence 9a is used as a causal conjunction but there is nothing in the fact that some of the young birds (presumably young harrier hawks) are born before others that causes them to make a meal of the younger ones.

The cause-effect relationships and references are made clearer in the revised version. Because the eggs are laid at different times, the young hawks are born at different times. This is where the cause-effect relationship lies. In 9b the reader is told clearly which baby hawks eat which.

Sentence

Number:

- 10 O: This cruel habit makes them useful in keeping
 down rats, mice and rabbits,

Which cruel habit? Presumably, this refers to they make a meal of the younger ones (Sentence 9b). But how does making a meal of the younger ones make them useful in keeping down rats, mice and rabbits? The reader must supply information to bridge the gap this expression leaves. In the following version, such help is explicitly provided to the child.

R: *Being born killers makes the young hawks
 useful in keeping down the number of rats,
 mice and rabbits.*

- 10a O: but unfortunately they attack hens and young
 lambs,

R: *But unfortunately, harrier hawks also attack
 hens and young lambs ...*

Harrier hawks in general, not just the young ones under focus in Sentences 9a, 9b and 10, attack hens and lambs. A new sentence is begun to avoid an over-long, run-on structure. Also provides an additional link with Sentence 10.

- 10b O: and because of this they are often trapped
 and shot.

R: *No change.*

The two versions of Harrier Hawks presented here illustrate well the point made in the beginning of this chapter about apparent ideology underlying the use of language in reading comprehension tests. The writer of the original version has either wittingly or unwittingly

made of this passage an obstacle course readers must overcome. The revised version reflects my belief that if the passage is to be a preparation for good reading, reading as an enabling activity, then the language should facilitate comprehension.

This does not mean, however, that I reject as invalid the argument that children must be able to cope with less than quality writing since they do encounter such writing in their reading materials. I accept this argument but will meet it with another. If we as educators are to help children learn to cope with texts like *Harrier Hawks* and *Billy*, for example, we need to be aware of the language used in such materials, and aware of what the problems are.

The problems discussed in this chapter were not apparent to me during the first, second nor even the third readings of the texts cited. I only had a sense - like any other native speaker of English - that these passages were less than clear. I became aware of the specific factors only over a period of time, as a result of focusing on text-question interaction. Through the study of what it was that children had to understand in order to answer various kinds of comprehension questions, my awareness of what was present in the language of reading comprehension test passages was heightened.

This experience has demonstrated the usefulness of approaching data from a theoretical point of view. Analyzing text-question interaction and trying to determine what children have to understand very effectively demonstrates that the organization of discourse has to be the point of departure. A sentence by sentence analysis is inadequate to throw sufficient light on the issue. On the other hand, when the organization of discourse is considered, a number of semantic

variables come to light which from observation appear to contribute to the difficulty of the reading comprehension task.

That the problems discussed herein are 'problems' is based on observation. Their status as sources of difficulty awaits empirical verification. Even so, the evidence provided in this thesis suggests that difficulty is not a product solely of lexicogrammatical characteristics of sentences, as traditional measures of readability would lead us to believe. The question - what makes a written text easy or difficult to comprehend? - is a complex one. From the evidence presented in my work, it would appear that 'difficulty' is a product of reader, text and question interaction.

I shall return to the discussion of reader-text-question interaction in the final chapter.

CHAPTER SIX

A QUESTION OF ANSWERS IN READING COMPREHENSION6.1 Questions in Reading Comprehension

The central issue around which this study revolves - what makes a written text easy or difficult to comprehend? - is a complex one. My interest in this issue arose in the context of the classroom. I noticed that the children I teach experience great difficulty with some reading comprehension exercises and little with others, and I felt that I needed to know why this was so, to understand where the source of difficulty lay.

Traditionally, difficulty has been considered a property inherent to texts. I have concluded otherwise. The evidence provided by this study suggests that the difficulty of a reading comprehension task can be differently assessed depending upon what questions are asked of whom. In other words, difficulty appears to be a product of reader-text-question interaction.

The analysis of reader-text-question interactions I have placed in the systemic-functional model of language. I focused on the textual function of language in particular for I wanted to see what part of a text a reader had to understand and integrate in order to supply the correct answer to a test question.

The study specifically raised the following four questions:

- (i) What kinds of questions are asked in reading comprehension tests?
- (ii) What are these questions testing?
- (iii) Are these questions graded in difficulty?
- (iv) What makes a question easy or difficult?

The first of these questions led me to the establishment of a system for the classification of questions, discussed in Chapter Three. There I have attempted to show that such a system can be formulated by reference to the ways in which the information required to answer the question is encoded in the language of the text. By implication, this provides an answer to what the questions are testing. The categories of my postulated system represent a hierarchy, albeit not simply linear, wherein the different categories of questions can be ranged from 'most easy' to 'most difficult'. The last question - what makes a question easy or difficult? - is a complex one.

6.1.1 Question Difficulty

In this study, three separate factors were identified which contribute to question difficulty:

- (i) a question's place in the hierarchy of integrative work;
- (ii) the distractor foil effect;
- (iii) the negation effect.

6.1.1.1 Hierarchical Structures

The difficulty of a question depends upon its place in the hierarchy of question types. While the categories replicative, echoic, synthesis, oblique and surmise did not form a strict linear hierarchy

as I thought they might, the non-linear orderings found were in every instance in the direction predicted. For Grades Two, Four and Six alike, replicative questions were the easiest and either oblique and/or surmise (i.e. questions involving inference) the most difficult. This finding supports the hypothesis that the more explicit the mode of information encoding in the text, the easier the required response to a question is to reconstruct.

Examination of the facility indices for the five categories revealed that replicative tasks had the highest facility in all three grades tested. Interestingly, this task became easier through the grades. Synthesis tasks were remarkably similar in facility in Grades Two, Four and Six. The facility indices for echoic, oblique and surmise tasks were more variable, a reflection of varying levels of difficulty of questions within these categories.

6.1.1.2 Distractor Foil and Negation Effects

Two other factors were found to contribute to the difficulty of the question-answering task: the distractor foil effect and the negation effect.

Prior to mounting the major research study, it was revealed in a pilot study (Appendix 3) that the nature of the distractor foils offered in multiple-choice tests has a significant effect on readers' test performance. In the pilot study, altering just one foil per question in a short test rendered one form of the test markedly more difficult than the other.

I did not attempt to determine why some 'wrong' answers were so much more appealing to young readers than either the 'right' answer or the other wrong answers. Letting children talk through reading tests

would provide interesting insight into this matter. Such an approach may show that in many cases, 'right' answers are those that reflect adult ways of thinking rather than children's.

Because of the power of the 'distractor foil' effect, polar questions were used in the study. These proved nearly as problematic. Not only did I find 'no' answer questions more difficult to write than 'yes' answer ones, but readers in the study missed 'no' answer questions nearly twice as often as 'yes' answer questions.

Although I am familiar with the notion 'response bias', I have never come across any suggestion in the literature regarding the teaching and testing of reading that 'no' answer questions are necessarily more difficult than ones with 'yes' answers. If future studies should prove that this is so, it would then be interesting and useful to know whether the effect is cognitive (as it apparently is in some other spheres of testing) or purely linguistic in origin.

6.1.1.3 Implications for Reading Ability and Readability Assessment

These findings are important to the interpretation of standardized reading comprehension test results. Comparison of older and more recently published tests being used in Australian primary schools revealed that in the older tests (e.g. Neale, 1966a; McCall-Crabbs, 1961) many of the questions used are replicative. By contrast, the newer tests (e.g. PAT, 1970; ACER, 1972) include few replicative questions, but many more synthesis and inferential ones. Bearing in mind the limitations of any standardized reading test to test reading comprehension, it could still be argued that the newer tests are probably better suited to provide a truer picture of 'reading ability' than the older ones.

The above findings must also be kept in mind when comparing standards of literacy, past and present. One could speculate that the so-called decline in literacy standards is more apparent than real. Firstly, for many years the minimum criterion for 'literacy' was a measured reading age of 10.0. Several years ago the minimum criterion for literacy was increased to reading age 12.0. I would argue that not only are readers of today expected to attain a higher standard in order to be considered 'literate', but they are additionally expected to do so on tests that are more difficult than those used in the past.

Implicit in my argument is the suggestion that the notion 'standardization' is at best an equivocal one. Because 'standardized' tests vary greatly in difficulty - in the degree of integrative work required, for example - it is not possible to validly compare readers' results across tests. I certainly am not the first to make this observation. But it has been my experience that this point is overlooked with surprising frequency, even by educators.

The finding that the difficulty of a reading comprehension task can be differently assessed depending upon what questions are asked of whom also has implications for the assessment of readability. It seems apparent that readability measures which do not account for questions in any way are likely to be misleading. Such measures provide only a partial account of difficulty.

6.2 Questions in the School Curriculum

My work has been concerned with relating reading comprehension test questions to texts on the basis of which answers are supposedly provided. Although my point of departure in this work was reading comprehension, I would like to suggest that the concern with the

nature of questions is central to the entire educational spectrum. Scholars have expressed increasing dissatisfaction with standardization and with the use of standardized tests, not only in reading but also in other areas of the school curriculum. However, questions will remain an important strategy in the business of learning and teaching. Even if standardized tests disappear from the educational scene, educators will need some means of checking learners' understanding. Questions provide the most efficient, economical and easy means of checking comprehension, and questioning will remain a central point of teacher expertise.

It is essential, therefore, that educators understand what it is that questions are requiring a learner to do. An understanding of the relationship of text and question, and an understanding of what it is a student is being asked to comprehend is of central importance not only in reading instruction but in all areas of curriculum. Thus, the taxonomy of questions I have presented appears to be of interest to educators across the curriculum.

6.3 Limitations of the Present Study

In retrospect, I have certain reservations regarding some aspects of my study. These reservations have clarified themselves as a result of my enquiry. Firstly, I must acknowledge that part of the taxonomy I have proposed is in need of revision, and secondly, I have ignored certain traditionally recognized correlates of difficulty, i.e. sentence complexity and word difficulty. I shall discuss these two points below.

6.3.1 A Revised Question Taxonomy

Neither Barrett's "Taxonomy" nor my own is linearly ordered. This makes me think that as categories become more delicate, the distinctions between them are not simply binary, but in fact cut across each other. In short, the taxonomy I have postulated has an inherent weakness. I am confident this weakness can be overcome, but I have not been able to show this in the present study. However, presented below in Figure 10 is a revised system which provides an example of the kind of formulation wherein instead of simple binary distinctions, more complex cross-cutting distinctions are built in. Although tentative, this system serves as a means of exemplifying how cross-cutting distinctions could be handled in a system network.

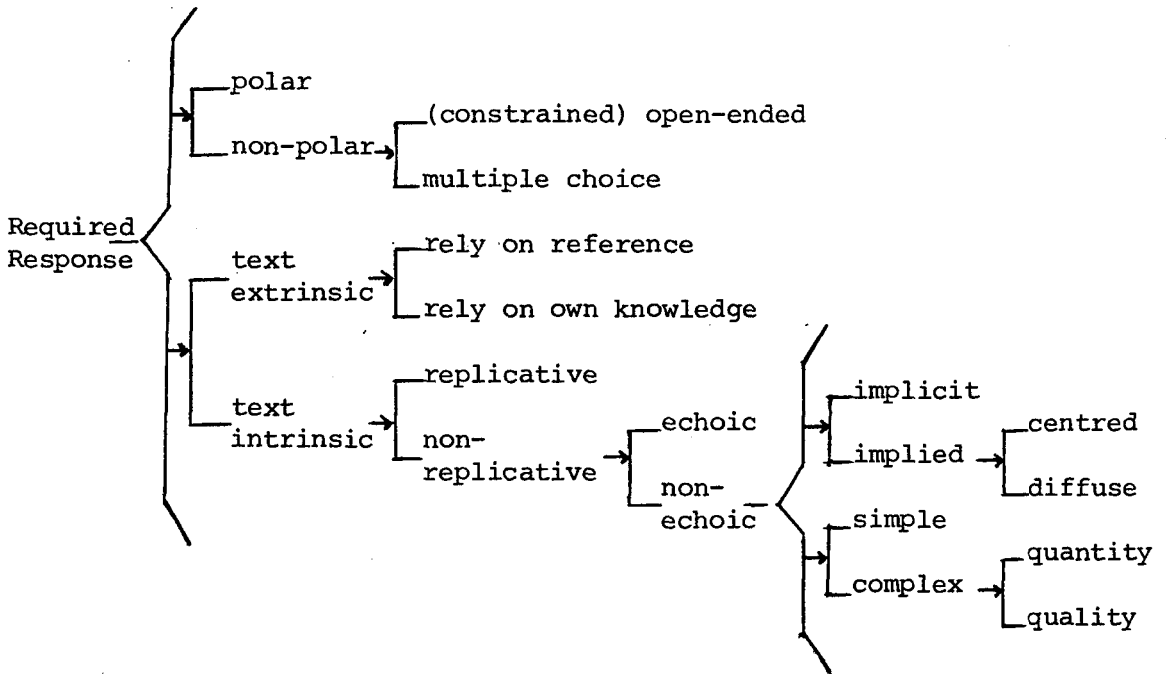


Figure 10: Revised System with Cross-Cutting Distinctions

In this system the categories simple and complex refer not to any notion of difficulty but to the number of integrative steps required in

answer reconstruction. The category simple applies in instances wherein reconstruction of an answer entails a single integrative step. Complex:quantity refers to those cases which involve a number of integrative steps, and complex:quality to those in which a number of different types of integrative steps are involved. Implied question types are either centred or diffuse.

The two concurrent systems right-most in Figure 10 permit a total of nine permutations. While the definitions of these categories are but tentative and inexact, I have included examples which I feel illustrate each in Table 12 below.

Table 12: Cross-Cutting Categories

Category	Example	page
implicit simple	Rocket Trip Q1	185
implicit complex quantity	Middle Wood Q4	196
implicit complex quality	Peter Q1	194
implied centred simple	Rocket Trip Q5	185
implied centred complex quantity	The Play Q5	204
implied centred complex quality	Thorny Q2	197
implied diffuse simple	Middle Wood Q2	196
implied diffuse complex quantity	Tower Q3	211
implied diffuse complex quality	Creature Q2	202

Empirical tests will reveal any orderings in difficulty within this sub-system of categories. One could speculate, for example, that 'implicit simple' would prove easiest; possibly 'implied:centred; simple' and 'implicit;complex:quantity' are of equal difficulty, and perhaps 'implied:diffuse;complex:quality' the most difficult.

My purpose in presenting this revised system is not primarily to hypothesize ordering in difficulty, but to show how the system of

question types can be made more flexible and more sensitive to those factors which appear to be significant to the reconstruction of answers to comprehension questions, whether in reading tests or in other subject areas.

6.3.2 Sentence Complexity and Word Frequency

I have ignored sentence complexity/length in my study. But my findings make me think that it is just possible that certain forms of complexity might make the retrieval of information more difficult. Future study might benefit by paying greater attention to both organic relations between messages and embedding. The key, however, is likely to lie in the semantic value of these patterns rather than in the counts of formal elements.

I have also ignored word frequency. In hindsight I realize that if 'frequency' can be given a theoretical basis, then this notion could be of central importance to reading comprehension assessment.

I would argue that 'frequency' is a pre-theoretical label for the basis of familiarity. Traditionally, lists of 'easy/difficult' or 'familiar/unfamiliar' words have been compiled on the basis of counts of words occurring in the writings of adults for children. As a result of approaching reading comprehension textually, and by defining the text as language in operation, it now seems that word frequency can be given a more theoretical basis. By thinking of frequency in relation to register, and by enquiring which registers are appropriate for which age ranges, the notion 'frequency' - and by implication, 'familiarity' - can be made theoretically viable.

These comments are made as suggestive. I have not supplied details here for conducting such a study. But I do feel that such

an approach to the study of word frequency is possible. For example, there is an acknowledgment of the importance of this approach in the work of Hart, Walker and Gray (1977). These scholars have compiled lists of the most frequently used single words and word sequences in the natural, spoken language of children of various ages.

Unlike some who have intimated that the notions 'complexity' and 'frequency' are beyond salvation, I feel that they can be given valid theoretical bases if approached from a functional linguistic perspective, and will yet provide valuable insights into the question of what it is that makes a written text easy or difficult to comprehend.

6.4 A Processing Model of Comprehension

Studies in reading comprehension which take the meaning characteristics of texts as their point of departure are a fairly recent development. Such textual orientation is not very common in the field under discussion. In recent years some interesting work has been done in comprehension with a textual orientation, but this orientation has a linguistic model somewhat different to my own. I refer here to the work of Kintsch and Vipond (1979), and Miller and Kintsch (1980).

The points of agreement between myself and these researchers are strong. I believe with these scholars that research in this area must be based on theory, and that the total organization of the text must be the point of departure for analysis. However, there are also some rather important differences between my approach and that taken by Kintsch and his colleagues. As a means of highlighting these, I shall provide a brief sketch of these scholars' work.

Kintsch, Vipond and Miller are primarily concerned with the representation of meaning in and retrieval of meaning from memory. In their approach, the reader is viewed as an information processor and text as an ordered list of propositions.

Central to these researchers' work is the assumption that text is represented in memory in the form of a text-base, an ordered list of propositions. A proposition consists of a predicate and one or more arguments. Arguments, in turn, are concepts or propositions themselves, and are realized in the language by words. For purposes of illustration, I have reproduced in Figure 11 below the analysis of part of a text presented by Kintsch and Vipond (1979:342).

Relevant Portion of the Text:

A great black and yellow rocket forty-six feet long stood in a New Mexico desert. Empty, it weighed five tons.... (Kintsch and Vipond, 1979:339)

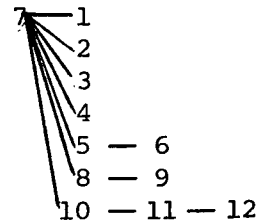
The text-base for this segment of the text is presented in the left half of Figure 11:

Text-base

- 1 (GREAT, ROCKET)
- 2 (BLACK, ROCKET)
- 3 (YELLOW, ROCKET)
- 4 (V-2, ROCKET)
- 5 (LONG, ROCKET)
- 6 (FORTY-SIX, 5)
- 7 (STAND, ROCKET)
- 8 (IN, 7, DESERT)
- 9 (NEW MEXICO, DESERT)
- 10 (EMPTY, ROCKET)
- 11 (WEIGH, 10)
- 12 (FIVE TON, 11)

(Reproduced from Kintsch and Vipond, 1979:342)

Coherence Graph



(Reproduced from Kintsch and Vipond, 1979:346)

Figure 11: Propositional Text-base and Coherence Graph

In this representation of the text-base, if one proposition serves as an argument of another, it is simply referred to by its number. For example, P5 serves as an argument for P6 and so the former is indicated by its numerical reference in P6. Also, in interpreting the text-base, it is important to note that once a concept is introduced, repetitions of it are assumed to have the same referent unless otherwise indicated (c.f. P10).

A second critical assumption is that a text-base must be coherent to be comprehensible. Kintsch and Vipond consider a text-base coherent if it is connected by argument repetition. The coherence graph for the twelve propositions listed for the rocket story is reproduced along side these propositions in Figure 11. As these authors point out, from P7 there are connections to all propositions that repeat the argument ROCKET. P6 is connected to P5 because P5 is embedded in P6 as one of its arguments; P9 shares an argument with P8 and is therefore connected to it. In short, coherence is maintained through the mechanisms of lexical repetition, embedding and identity of reference.

A third critical assumption is that human memory capacity is so limited that only a small number of propositions can be processed at any given time. (Kintsch and Vipond unfortunately do not define what they mean by 'process', but their use of the term seems to correspond to something like 'commit to memory'.) This means that the text-base has to be processed in cycles, each containing a limited number of propositions. Once processed, the propositions are annexed to long-term memory, there to form a coherence graph. Carried over from each preceding cycle is a sub-graph of only a few propositions, the contents of a very limited short-term memory. If arguments in the short-term

memory sub-graph are repeated in the group of incoming propositions in the next cycle, the maintenance of coherence, and with it, comprehension, is said to proceed smoothly.

If arguments are not repeated between the sub-graph and incoming propositions of the new cycle, then a long-term memory search must be made. If a repeated argument is found there, it is reinstated into short-term memory, and processing continues. In the event that no such repeated argument is found as a result of the long-term memory search, the reader is required to make a bridging inference so that coherence can be maintained. Reinstatements and inferences were hypothesized to contribute to comprehension difficulty, and thus to affect readability.

Miller and Kintsch (1980) tested these hypotheses using reading time per unit (proposition) recalled as the measure of readability. They found that number of reinstatements and inferences required correlated highly with the above measure of readability, and also with recall and reading time.

Several questions regarding the above work can be raised. Firstly, I would question Kintsch, Vipond and Miller's assumption that recall is synonymous with comprehension. While it is obvious that what is recalled, if correct, must have been understood, the inverse is by no means obvious: lack of recall cannot necessarily be taken as evidence for lack of understanding. A reader's failure to recall some segment of a text may be indicative of lack of comprehension, but equally could be indicative of selective inattention or forgetfulness.

Secondly, there is a question of the adequacy of Kintsch, Vipond

and Miller's analysis of coherence. When, in their analysis, these researchers talk about propositions, they are essentially talking about units that are equivalent to one clause. In their analysis, propositions are brought together through lexical repetition, embedding and identity. These are precisely the things that are explicitized when I talk about texture. I have made clear that linguistic means exist whereby identity, for example, can be established; there are, in short, devices for establishing identity of say rocket and it. It is not clear to me how Kintsch and Vipond establish identity except through subjective means.

The third point relates to the applicability of Miller and Kintsch's findings. While it is interesting that the number of inferences and reinstatements correlated highly with the readability measure used (reading time per proposition recalled), it must be borne in mind that these results were obtained using a computer simulation model of the comprehension process. Whether or not these findings will have any pragmatic utility remains to be seen.

My reservations notwithstanding, I must acknowledge that there is in Kintsch, Vipond and Miller's work an element of concern with the psychological processes involved in the comprehension of a text with which I have not concerned myself. What is interesting to me is that the above scholars' work is a partial support of my own view that reading ability and readability must be examined from a textual angle. I realize that my approach to the analysis of textness is different from theirs, but this does not obscure the fact that both these scholars and I have attempted to place the study of comprehension in a text-linguistic framework.

6.5 Conclusion

The value of the approach I have taken in this study lies not only in discovering variables which appear to be important to reading, but also in suggesting the direction future research might take. Results of analyses of both text-question interactions (Chapter Four) and reader-text interactions (Chapter Five) point to the necessity for recognizing some relationship between natural language and cognitive development. In other words, work in reading comprehension and readability needs to be informed to a much greater extent by what it is that readers of various ages can be expected to know about and through language.

When we are equipped with such knowledge, and with knowledge about the meaning characteristics of texts read by these readers, and understand what kinds of demands are placed on the readers' linguistic and cognitive resources by various kinds of questions, the pieces of the complex puzzle of what it is that makes a written text easy or difficult to comprehend will begin to fall into place.

APPENDIX 1

READABILITY FORMULAE

To date more than fifty readability formulae and graphs have been devised. All of these have incorporated vocabulary and/or sentence variables in some guise. Below are presented in precis form six formulae and two graphs. These eight devices have been chosen for discussion because

- (i) they are standard to the field:

The Lorge Formula (Lorge, 1944)
Flesch Reading Ease Formula (Flesch, 1948)
Dale-Chall Formula (Dale and Chall, 1948)

or

- (ii) they are recommended for use in N.S.W. schools:

The Readability Graph (Fry, 1968)
SMOG (McLaughlin, 1969a)
The Elley Noun Frequency Method (Elley, 1969)

or

- (iii) they represent an innovative approach to the measurement of readability:

The Bormuth Formulae (Bormuth, 1966)
The Botel-Granowsky Formula for Measuring Syntactic Complexity
 (Botel and Granowsky, 1972).

The Lorge Formula (Lorge, 1944; Klare, 1974-75:67-68)

Devised by Irving Lorge

First Published in 1939

Range: children's material grades three through twelve

Criterion: McCall-Crabbs Standard Test Lessons in Reading (1926)
 (first to use this criterion)

Correlation of criterion to difficulty: .77

Formula -

$$X_1 \text{ (grade placement)} = .07X_2 + .1301X_3 + .0173X_4 + 1.6126$$

where X_2 = average sentence length in words

X_3 = number of prepositional phrases per 100 words

X_4 = number of different words not on the Dale List of 769 Words
 (included in Lorge, 1944).

The grade placement score signifies the reading ability necessary to answer correctly three-fourths of the test questions on a McCall-Crabbs passage.

Assumptions (over and above those given for word and sentence variables)

- a) difficulty is related to the density of ideas; indirectly idea density can be measured by the relative number of prepositional phrases.
- b) sentence length and relative number of prepositional phrases are highly interrelated.

Subsequent Conclusions -

On the whole, relative number of prepositional phrases correlates lower with difficulty than either vocabulary load or sentence structure and adds little to the overall prediction of difficulty once these two factors are included in a formula.

Revisions to Formula -

- a) Lorge recalculated the formula in 1948 following the discovery of an error in the original calculation:

$$X_1 = .06X_2 + .10X_3 + .10X_4 + 3.856$$
- b) Several further revisions were made by other researchers following publication of the 1961 edition of the McCall-Crabbs Test Lessons.

Flesch Reading Ease Formula (Flesch, 1948)

Devised by Rudolph Flesch

First published in 1948

Range: primary to intermediate grades

Criterion: McCall-Crabbs Lessons (1926)

Reading Ease Formula:

$$R.E. = 206.835 - .846w_1 - 1.015s_1$$

where w_1 = number of syllables per 100 words

s_1 = average number of words per sentence

The 'reading ease' score places a piece of writing on a scale between 0 (practically unreadable) and 100 (easy for any literate person).

The Reading Ease Formula correlated .70 with the McCall-Crabbs criterion and has been one of the most widely used formulas in the history of readability measurement.

Reading Ease Score	Description of Style
0-30	Very Difficult
30-50	Difficult
50-60	Fairly Difficult
60-70	Standard
70-80	Fairly Easy
80-90	Easy
90-100	Very Easy

Dale-Chall Formula (Dale and Chall, 1948)

Devised by Edgar Dale and Jeanne Chall

Published in 1948

Range: intermediate to adult

Criterion: McCall-Crabbs (1926)

Correlation: .70 with McCall-Crabbs criterion scores

Formula:

$$XC50 = .1579X_1 + .0496X_2 + 3.6365$$

where XC50 = reading grade score of a pupil who could answer one half of the test questions on a passage correctly

X_1 = Dale score, or percentage of words outside Dale List of 3000 Words (included in Dale and Chall, 1948)

X_2 = average sentence length in words

Dale and Chall supply a table of estimated corrected grade levels:

Formula Score	Corrected Grade Level
4.9 and below	Grade 4 and below
5.0-5.9	Grade 5-6
6.0-6.9	Grade 7-8
7.0-7.9	Grade 9-10
8.0-8.9	Grade 11-12
9.0-9.9	University
10.0 and above	University Graduate

This formula is one of the most widely used and is still one of the most accurate. Revisions of the formula have occurred following publication of the 1950 and 1961 editions of McCall-Crabbs Lessons.

The most recent formula is given as follows:

$$XC50 = .0512X_2 + .1142X_1 + 3.442$$

Subsequent Conclusions -

It is possible that changes in the vocabulary and reading abilities of students since Dale and Chall's work have lowered the validity of the formula for today's use.

The Readability Graph (Fry, 1968, 1975)

Devised by Edward Fry

Published in 1968

Range: primary and secondary materials

Criterion: Correlation with other well-known formulae

Correlation:

Fry to SRA = .98

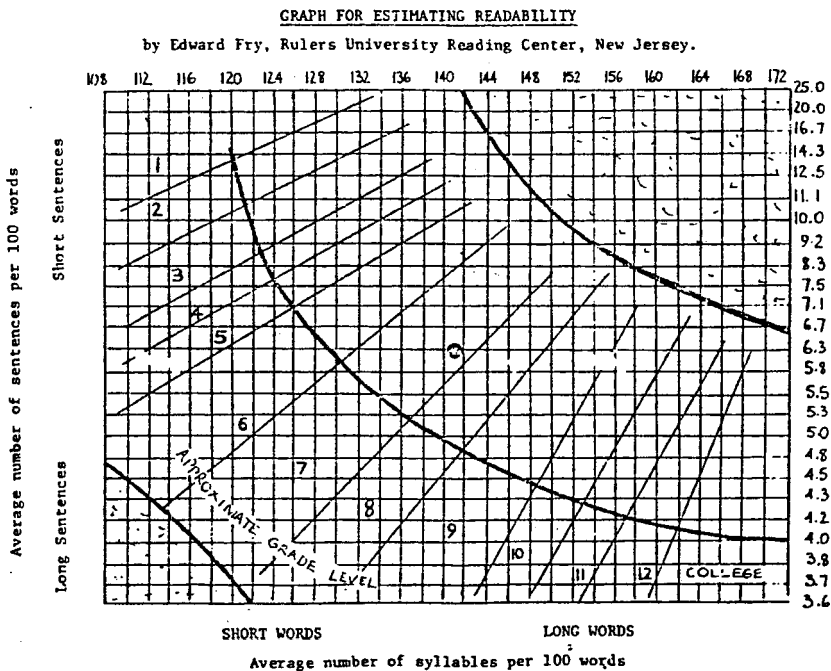
Botel = .78

Dale-Chall = .94

Flesch = .96

Procedure:

- i) select three 100 word passages from the text
- ii) count the total number of sentences in the total sample
- iii) find the average number of sentences in the total sample
- iv) count the number of syllables in each passage
- v) find the average number of syllables per passage
- vi) plot on graph to find appropriate grade level



Subsequent Conclusions -

The graph is easier and quicker to use than the traditional formulae and provides a reliable predictor of difficulty. The standard grade error is one-two grades.

SMOG (McLaughlin, 1969a, 1969b)

Devised by G. Harry McLaughlin

Published in 1969

Range: Grade six to tertiary

Criterion: McCall-Crabbs (1961). McLaughlin used 100 percent comprehension rather than 75 or 50 percent used by most other researchers. Thus McLaughlin's procedure gives scores two grades higher (less readable) than the Dale-Chall formula.

Correlation: .71

Procedure:

- i) count ten consecutive sentences near the beginning, ten near the middle, and ten near the end of the text
- ii) in the 30 selected sentences count every word of three or more syllables
- iii) estimate the square root of the number of polysyllabic words thus counted
- iv) add 3 to the approximate square root.

This gives the SMOG grade which is the reading grade that a person must have reached if he is to fully understand the text assessed.

Subsequent Conclusions -

There has been some criticism that this procedure measures only a word factor. McLaughlin (1969b) refutes this by pointing out that the count of polysyllabic words varies with sentence length. Exactly three 10 sentence samples are required. These sentences will vary in length and with them the number of polysyllabic words will vary.

The Elley Noun Frequency Method (Elley, 1969, 1975)

Devised by Warwick B. Elley

First published: 1969

Range: 7-14+ years

Criterion: teachers' and students' assessment of difficulty

Correlation: .90 median correlational value to judges' assessments

Procedure:

- i) select three passages long enough to contain at least 20 different nouns
- ii) determine frequency value of each noun by referring to the 'Noun Frequency' list (found in Elley, 1975)
- iii) determine reading age levels by means of the table:

Suitable age levels for different readability ratings

Mean Noun Frequency Rating	Approximate Age Range
Below 3.2	Up to 8½ years
3.2 to 3.6	8 to 9 years
3.6 to 4.0	8½ to 9½ years
4.0 to 4.4	9 to 10 years
4.4 to 4.8	9½ to 10½ years
4.8 to 5.2	10 to 12 years
5.2 to 5.6	11 to 13 years
5.6 to 6.0	12 to 14 years
6.0 to 6.4	13 to 16 years
Over 6.4	15 years and over

Source: Elley, 1975:8

Assumption -

- the best single predictor of readability is some measure of vocabulary load
- noun frequency in five series of passages correlated more highly than did other measures with judges' criteria of difficulty for the passages
- nouns carry the weight of meaning in a passage.

The Elley formula was used to grade the passages in the Progressive Achievement Reading Comprehension Test which is very widely used in N.S.W. schools.

The Bormuth Formulae (Bormuth, 1966)

In 1966 John Bormuth devised numerous formulae using a range of materials from first grade to tertiary level. Although Bormuth's formulae do not enjoy widespread use, several features of his work are of particular interest.

- He used cloze comprehension scores as his criterion of difficulty claiming that cloze testing "... has solved the problem of reliably measuring language difficulty" (Bormuth, 1966:84).
- In his studies Bormuth used cloze tests to determine the difficulty not only of passages but also of individual words, independent clauses and sentences within the passage.
- He found that letters, syllables or words per independent clause and pronoun/conjunction and verb/conjunction measures have higher correlations with difficulty than do traditional variables, counts of the Dale Lists or syllables per word for example.
- He determined that the ability level of the reader did not affect the predictive value of his formulae. Earlier researchers had argued that separate formulae would have to be devised for less able readers.

Subsequent Conclusions -

That cloze testing has solved the problem of reliably measuring difficulty is questionable.

Bormuth's work has stimulated interest in seeking new linguistic variables affecting readability.

The Botel-Granowsky Formula for Measuring Syntactic Complexity (Botel and Granowsky, 1972, 1974)

Devised by Morton Botel and Alvin Granowsky

Published in 1972

Range: primary to adult

Assumptions Underlying Formula -

Sentence length does not offer a reliable indication of the grammatical makeup and complexity of a sentence.

In the formula various syntactic structures are weighted from 0-3. The syntactic complexity of any passage or sampling of sentences is the arithmetic average of the complexity counts of the sentences evaluated. The formula is not a precise measuring instrument but it does provide a means of ranking structures in terms of their relative complexity. The formula should be used in conjunction with a vocabulary measure and as yet, represents a directional effort requiring further validation.

The formula is based on -

- a) transformational-generative theory
- b) experimental data on children's processing of syntactic structures
- c) language development and performance studies of the oral and written language used by children

0 count structures:

Sentence patterns with two or three items

- a) subject verb adverbial/object/infinitive
subject be complement
- b) simple transformations
 - i) interrogative ii) exclamatory iii) imperative
- c) coordinate clauses joined by 'and'
- d) non-sentence expressions (oh, well ...)

1 count structures:

Sentence patterns of four items

- a) subject verb indirect object object
subject verb object complement
- b) Noun modifier - adjectives, possessives, predeterminers, participles in the natural adjective position, prepositional phrases
- c) Other modifiers - adverbials, modals, negatives, set expressions (once upon a time, etc.), gerunds used as subject, infinitives not immediately following the verb in a S V Inf pattern

- d) Coordinates
 - i) coordinate clauses joined by 'but, or, for, so, yet'
 - ii) deletion in coordinate clauses
 - iii) paired coordinates (both ... and)

2 count structures

passives, paired conjunctions, dependent clauses, comparatives, participles not used in usual adjective position, infinitives as subjects, appositives, and conjunctive adverbs

3 count structures

- a) clauses used as subjects
- b) absolutes (The children in bed, Marie propped her feet up.)

Syntactic complexity of reading materials may be graded from a starting point of 0 count complexity to any average syntactic complexity count designated a terminal reading level.

Primer materials usually score 0 count complexity.

Primary materials range up to 3.5 to 4.0.

Readers' Digest sample sentences equalled 6.8.

New York Times sample equalled 13.9.

No standardized body of materials have been assessed to date.

The Botel-Granowsky formula must still be considered a directional effort.

APPENDIX 2

PILOT STUDY I: INTEGRATIVE WORK

In October 1979, I conducted a pilot study to test the hypothesis that 'integrative work' combined with 'implicitness' contributed to the difficulty children experienced answering reading comprehension test questions. My definition of what constituted integrative work and implicitness was still in the formative stage at this time.

Four passages were selected from standardized reading materials for Grade Four students. Each story was accompanied by five multiple-choice questions. Proceeding on a tentative definition of what integrative work was, I judged that the questions accompanying Tom and Dead Sea (see following pages) required a good deal more integrative work on the part of the reader than those accompanying A Cat's Claws and Rocket Trip.

Sixty-four Grade Four students from a North Sydney Region primary school read the four passages. The order of the stories in the test booklets was randomized to eliminate serial effects. Teachers administered the tests to their own classes, adhering to a straightforward set of directions for administration (see enclosure). I marked the test papers.

An analysis of variance was used to test the hypothesis. The results of this analysis are presented below.

Analysis of variance having repeated measures
of the same subjects*

<u>Source</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>
Between	252.87	63		
Within	315.00	64		
Encoding Effect	236.53	1	236.53	189.22**
Residual	78.47	63	1.25	
	567.87	127		

**F.99(1,63) = 7.08

p < .01

*Winer, 1962:105-113

The results seemed clearly to indicate that integrative work had a significant effect on the difficulty these Grade Four children experienced when answering reading comprehension test questions. Therefore, I felt that the notion integrative work was a viable one and was worth developing in detail.

Subsequent work revealed that the above results possibly were a product of the combined effect of integrative work and the kinds of distractor foils used in the multiple-choice questions. In a second pilot study conducted in early 1980, it became evident that the difficulty children experience when choosing the correct answer (the answer indicated as being the right one in the test handbook, manual or answer book) in multiple-choice tests is in part a function of the alternatives offered for selection. (See Appendix 3 for details.)

It seems likely, therefore, that the variance in the first pilot study was due in part to integrative work and in part to the distractor foil effects.

READING COMPREHENSION TEST

Name _____
Class _____
School _____
Date _____

Sample Story:

There is only one mother in a hive of bees. She is called the queen. The queen is larger than the other bees, and her only job is to lay eggs. She does not have to take care of the baby bees that hatch from the eggs because the worker bees do that.

S1: Each hive of bees has

- (a) six mothers
- (b) one mother
- (c) many mothers

S2: The mother bee's only work is to

- (a) clean the hive
- (b) take care of baby bees
- (c) lay eggs

(SRA, 1960)

Tom

Tom pretended to be ill. His Aunt Polly insisted that he take his medicine every day, and, knowing Tom well, she watched the bottle carefully. The medicine really did grow less, but she had no idea that the boy was mending the health of a crack in the floor with it.

One day, while Tom was in the act of dosing the crack, his aunt's ginger cat came along, purring, eyeing the teaspoon greedily, and begging for a taste.

"Don't ask for it unless you want it, Peter," said Tom. "Well, I'll give it to you because there's nothing mean about me."

Tom opened the cat's mouth and poured down the medicine. Peter sprang a couple of yards in the air, let out a yowl, and set off round and round the room, banging against the furniture and upsetting flower-pots. Next he rose on his hind feet and pranced around. Aunt Polly entered in time to see him throw a few double-somersaults and sail through the window, carrying the flower-pots with him. The old lady peered over her glasses in astonishment. Tom lay on the floor helpless with laughter.

1. What was Tom doing with the medicine each day?
 - a) Drinking it regularly.
 - b) Watering the flower-pots.
 - c) Putting it down a crack.
 - d) Giving it to the cat.
2. What did Peter do first after having the medicine?
 - a) Banged against the furniture.
 - b) Raced around the room.
 - c) Let out a yowl.
 - d) Made a great leap.
3. Why do you think Tom gave some medicine to the cat?
 - a) He thought it would be funny.
 - b) The cat did not seem well.
 - c) He did not like Peter.
 - d) He wanted to use up the medicine quickly.
4. How did Aunt Polly feel after she came into the room?
 - a) Pleased that more medicine had gone.
 - b) Surprised at the cat's behaviour.
 - c) Angry about the noise.
 - d) Annoyed about the upset flower-pots.
4. What do you think Aunt Polly would do next?
 - a) Send Tom to bed.
 - b) Make Tom clean up the mess.
 - c) Chase after Peter.
 - d) Ask Tom to explain.

The Dead Sea

The Dead Sea is the lowest point on the earth's surface. Since water cannot flow uphill, the Dead Sea has no outlet. Every day the Jordan River pours into this sea six million tons of water that has nowhere to go. This would flood a normal valley. But in the Jordan Valley the air is very dry. The water evaporates into the parched air.

The Jordan carries some salt. This is left behind when the water dries up. Thus the Dead Sea is the saltiest in the world. If you swim in it, you float like a cork. You could break your neck by making a high dive. The brine tastes dreadful. If it gets in your hair, it acts like glue.

1. The Dead Sea is
 - a) the saltiest sea in the world.
 - b) in the lowest valley on earth.
 - c) in the driest spot on earth.
 - d) both a) and b).
2. The Dead Sea is unusual in that it has no
 - a) outlet.
 - b) tides.
 - c) beaches.
 - d) colour.
3. The water that flows into the Dead Sea
 - a) empties into the ocean.
 - b) runs into the Jordan River.
 - c) evaporates into the air.
 - d) floods the Jordan Valley.
4. The salt in the Dead Sea comes from
 - a) ocean water.
 - b) river water.
 - c) salt beds.
 - d) none of the above.
5. A swim in the Dead Sea is unpleasant if you
 - a) get your hair wet.
 - b) like underwater swimming only.
 - c) swallow water.
 - d) all of the above.

(SRA, 1964)

A Cat's Claws

The claws of a cat are different from those of other animals. Apart from being long and very sharp the claws of a cat can be put in or out. It is important that a cat can do this for if its long sharp claws were always sticking out, they would be worn off.

Each claw is fixed to a bone that turns like a hinge. When the cat does not want to use her claws she pulls them back on these hinges until they are covered in the soft part of the toe. When she is about to spring on a mouse she tightens the muscles which have the effect of pulling the claws over on their hinges until they stick out beyond the soft part of the paw.

1. The claws of a cat are
 - a) the same as those of other animals.
 - b) different from those of other animals.
 - c) always sticking out.
 - d) can never move.
2. The bone to which a cat's claw is fixed turns like
 - a) a soft place.
 - b) a stick.
 - c) a hinge.
 - d) a toe.
3. What is it that tightens to make the claws come out?
 - a) its tail.
 - b) muscle.
 - c) a rope.
 - d) a bone.
4. Another animal which would have claws like a cat is the
 - a) horse.
 - b) monkey.
 - c) mouse.
 - d) tiger.
5. What would happen to a cat's claws if they were always sticking out?
 - a) They would be worn off.
 - b) They would be covered in the soft part of the toe.
 - c) They would be long and sharp.
 - d) They would pull back on their hinges.

(Meddleton, 1965)

Rocket Trip

Very soon the rocket will be ready. You glance at your watch; in two minutes you may go aboard.

All aboard! There stands your rocket ship, pointing straight up into the sky. It is long, slim like a pencil. Its highly polished metal shell gleams in the starlight. Men are scurrying about on the concrete launching platform, checking equipment and instruments. Suddenly, the green light flashes on. An announcement is made over the public-address system. You and the other passengers move forward, without hurrying, and enter the ship. Just a few moments more, and you will be on your way. The pilot adjusts levers, turns dials, and pushes buttons. There is an explosive sound and a terrific roar. You are on your way!

In one minute the rocket ship vanishes out of sight of your friends on the earth. Two minutes later it is beyond the earth's atmosphere. Eight minutes after leaving the ship's surface, you are moving at a speed of seven miles per second. You do some mental maths, and figure that you are travelling at 25,000 miles per hour!

1. What does the rocket look like?
 - a) red and short
 - b) long and slim
 - c) thick and shiny
 - d) small and thin
2. At the beginning the person in this story is
 - a) inside the rocket ready for take-off
 - b) hurrying to get on board the rocket
 - c) waiting to board a rocket
 - d) watching a rocket land
3. The passengers knew the rocket was ready to go because
 - a) the pilot called out to them
 - b) the men on the launching platform stopped work
 - c) a hostess made an announcement
 - d) a green light came on
4. How did the person in the story know the rocket had taken off?
 - a) He heard the sound of the blast-off.
 - b) He saw the pilot pushing levers.
 - c) One of the passengers told him they had taken off.
 - d) He could no longer see his friends out of the window.
5. When was the rocket taking off?
 - a) late at night
 - b) as the sun was setting
 - c) around mid-day
 - d) at dawn

Administering the Test:

1. Children need not be placed in a special seating order.
- A. Announce to the class that they are having a test to show how well they understand what they read, and that they should have two pens/pencils (but nothing else) on their desk.
- B. Instruct the class to leave their test booklets turned face down on their desk until requested to turn them over.
2. Distribute test booklets.
- C. Ask the class to turn their test booklets over so the front page is showing. Direct children in filling out the personal data section in the upper left hand corner of the page.
3. When children have completed filling in the personal data section, draw their attention to the sample passage and questions on the front page.
- D. Read the sample passage aloud to the class as they follow along. Read question S1 and the choices of answer which follow aloud.
4. Children are to circle the letter of the answer they feel best answers the question.
- E. Immediately confirm that choice b is the best answer for this item.
- F. Read question S2 and the choices of answer aloud. Again children are to circle the letter of the best answer, which is c.
- G. Remind the children not to start working on the test until told to do so.
5. If children wish to change an answer they should cross out (X) their original choice and neatly circle the letter of the new choice. If a child changes his mind several times, he may cross out all previous choices and write the letter of his final choice neatly to the left of the item number.
- H. Reemphasize that all answers are to be indicated right on the test paper itself.
- I. Inform children that they will have forty minutes in which to do the test, but that they should not start until told.
6. If a child finishes the test before the 40 minutes are up, he should place his test booklet face down on the desk. The administrator may immediately collect the booklet. The child should quietly proceed with some independent work at his desk. He should not leave his seat.
At the end of the forty minutes, announce that time is up, and that children should close their test booklets and place them face down on their desks. The administrator should collect the booklets.
- J. Inform the children that they should attempt all four pages of the test and instruct them to open their booklets to the first page and commence work.
7. During the test, the administrator may answer procedural questions only. He/she may not assist children with the actual content of the test.

APPENDIX 3

PILOT STUDY II: DISTRACTOR FOIL EFFECTS

In multiple-choice tests there is an interaction of four variables: the reader, the text, the questions themselves, and the distractor foils. In a pilot study conducted in early 1980, 82 Grade Four students were assigned at random to read one of two forms of a test passage. The two passages were identical with the exception of one distractor foil per question. (See following page.) To test what effect, if any, varying the distractor foil had, an Independent Samples T-Test was used. The results of this test are presented below.

Distractor Foil Effect			
<u>Test Form</u>	<u>M</u>	<u>SD</u>	<u>t</u>
A	2.66	1.01	*3.7
B	3.68	1.40	
*p < .001			

As can be seen in the table, varying the selections from which children chose multiple-choice answers had a very significant effect on children's performance.

"Tom"

Original Standardized Version -

Tom pretended to be ill. His Aunt Polly insisted that he take his medicine every day, and, knowing Tom well, she watched the bottle carefully. The medicine really did grow less, but she had no idea that the boy was mending the health of a crack in the floor with it.

One day, while Tom was in the act of dosing the crack, his aunt's ginger cat came along, purring, eyeing the teaspoon greedily, and begging for a taste.

"Don't ask for it unless you want it, Peter," said Tom. "Well, I'll give it to you because there's nothing mean about me."

Tom opened the cat's mouth and poured down the medicine. Peter sprang a couple of metres in the air, let out a yowl, and set off round and round the room, banging against the furniture and upsetting flower-pots. Next he rose on his hind feet and pranced around. Aunt Polly entered in time to see him throw a few double-somersaults and sail through the window, carrying the flower-pots with him. The old lady peered over her glasses in astonishment. Tom lay on the floor helpless with laughter.

26. What was Tom doing with the medicine each day?
 - a) Drinking it regularly.
 - b) Watering the flower-pots.
 - *c) Putting it down a crack.
 - d) Tasting it now and then.
 - e) Giving it to the cat.
27. What did Peter do first after having the medicine?
 - a) Banged against the furniture.
 - b) Raced around the room.
 - c) Let out a yowl.
 - d) Threw some double-somersaults.
 - *e) Made a great leap.
28. Why do you think Tom gave some medicine to the cat?
 - *a) He thought it would be funny.
 - b) The cat did not seem well.
 - c) He did not like Peter.
 - d) He was very kind to animals.
 - e) He wanted to use up the medicine quickly.
29. How did Aunt Polly feel after she came into the room?
 - a) Pleased that more medicine had gone.
 - *b) Surprised at the cat's behaviour.
 - c) Happy because Tom seemed better.
 - d) Angry about the noise.
 - e) Annoyed about the upset flower-pots.
30. What do you think Aunt Polly would do next?
 - a) Take the medicine from Tom.
 - b) Send Tom to bed.
 - c) Make Tom clean up the mess.
 - d) Chase after Peter.
 - *e) Ask Tom to explain.

Questions Used in Pilot Study:

Form A

1. What was Tom doing with the medicine each day?
 - a) Drinking it regularly.
 - b) Watering the flower-pots.
 - *c) Putting it down a crack.
 - d) Giving it to the cat.
2. What did Peter do first after having the medicine?
 - a) Banged against the furniture.
 - b) Raced around the room.
 - c) Let out a yowl.
 - *d) Made a great leap.
3. Why do you think Tom gave some medicine to the cat?
 - *a) He thought it would be funny.
 - b) The cat did not seem well.
 - c) He did not like Peter.
 - d) He wanted to use up the medicine quickly.
4. How did Aunt Polly feel after she came into the room?
 - a) Pleased that the medicine had gone.
 - *b) Surprised at the cat's behaviour.
 - c) Angry about the noise.
 - d) Annoyed about the flower-pots.
5. What do you think Aunt Polly would do next?
 - a) Send Tom to bed.
 - b) Make Tom clean up the mess.
 - c) Chase after Peter.
 - *d) Ask Tom to explain.

Form B

1. What was Tom doing with the medicine each day?
 - a) Drinking it regularly.
 - b) Watering the flower-pots.
 - *c) Putting it down a crack.
 - d) Tasting it now and then.
2. What did Peter do first after having the medicine?
 - a) Raced around the room.
 - b) Banged against the furniture.
 - *c) Made a great leap.
 - d) Threw some double-somersaults.
3. Why do you think Tom gave some medicine to the cat?
 - *a) He thought it would be funny.
 - b) The cat did not seem well.
 - c) He did not like Peter.
 - d) He was very kind to animals.
4. How did Aunt Polly feel after she came into the room?
 - a) Pleased that more medicine had gone.
 - *b) Surprised at the cat's behaviour.
 - c) Happy because Tom seemed better.
 - d) Angry about the noise.
5. What do you think Aunt Polly would do next?
 - a) Take the medicine from Tom.
 - b) Send Tom to bed.
 - c) Chase after Peter.
 - *d) Ask Tom to explain.

APPENDIX 4

TEXTS AND QUESTIONS

USED IN THE

MAJOR RESEARCH STUDY

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Directions for Administration

All of the texts used came from the ACER Primary Reading Survey,
Part 2: Comprehension, Forms R and S, 1972, Australian Council for
Educational Research, Frederick Street, Hawthorn, Victoria.

Coding and Answer Key:

Grade 2: Level BB

Title and Source	Question Number	Question Type	Answer
<u>Rags</u> (practice exercise for Level BB test)			
<u>Peter</u> form S page 4	1	synthesis	yes
	2	replicative	yes
	3	oblique	no
	4	echoic	yes
	5	surmise	no
<u>Flip</u> form R page 4	1	echoic	yes
	2	oblique	yes
	3	replicative	no
	4	surmise	yes
	5	synthesis	no
<u>Middle Wood</u> form R page 5	1	replicative	yes
	2	surmise	yes
	3	oblique	no
	4	synthesis	no
	5	echoic	yes
<u>Thorny</u> form S page 6	1	echoic	yes
	2	oblique	no
	3	synthesis	yes
	4	replicative	no
	5	surmise	yes

Grade 2: Level BB cont.

<u>The Stars</u>	1	oblique	yes
	2	replicative	yes
form R	3	surmise	no
page 7	4	synthesis	no
	5	echoic	yes

Grade 4: Level B

The Ball (sample story) Level A
Form R page 6

<u>Cranes</u>	1	synthesis	yes
	2	echoic	yes
form R	3	oblique	yes
page 3	4	replicative	no
	5	surmise	no
<u>Baby Seal</u>	1	echoic	no
	2	oblique	no
form R	3	replicative	yes
page 4	4	surmise	yes
	5	synthesis	no
<u>Creature</u>	1	oblique	no
	2	surmise	yes
form R	3	synthesis	no
page 5	4	replicative	yes
	5	echoic	no
<u>Kangaroo</u>	1	echoic	yes
	2	oblique	yes
form S	3	synthesis	yes
page 7	4	replicative	yes
	5	surmise	no
<u>Play</u>	1	oblique	no
	2	replicative	no
form S	3	surmise	no
page 8	4	synthesis	yes
	5	echoic	yes

Grade 6: Level D

Trains (sample story) Level C
Form R page 5

<u>The Seagull</u>	1	synthesis	no
	2	echoic	yes
form S	3	oblique	no
page 3	4	replicative	yes
	5	surmise	yes

Grade 6: Level D cont.

<u>Captives</u>	1	echoic	yes
	2	oblique	yes
form R	3	replicative	no
page 3	4	surmise	no
	5	synthesis	no
<u>The Bat</u>	1	oblique	yes
	2	surmise	yes
form R	3	synthesis	no
page 4	4	replicative	no
	5	echoic	yes
<u>Earthworms</u>	1	echoic	yes
	2	oblique	yes
form R	3	synthesis	yes
page 5	4	replicative	no
	5	surmise	no
<u>The Tower</u>	1	oblique	no
	2	replicative	no
form R	3	surmise	yes
page 6	4	synthesis	yes
	5	echoic	no

GRADE TWO

READING COMPREHENSION TEST

Name _____

Grade _____

School _____

Sample Story: Rags

Rags was a small black dog. He was a very friendly dog, but he had one bad habit. He liked to chase cars.

S1: Was Rags a cat?

Yes No Can't tell

S2: Was Rags friendly?

Yes No Can't tell

S3: Did Rags like to chase cars?

Yes No Can't tell

IIa - Peter

Peter ran ahead of the others, down the sandy track to the long, empty beach. The waves roared in and he could see their white caps in the distance, looking like seahorses.

He raced along the surf, seeing if the waves could catch him as they came up the beach.

1. Did the waves look like seahorses?

Yes No Can't tell

2. To reach the beach, did Peter run down a sandy track?

Yes No Can't tell

3. Did Peter see anyone on the beach when he arrived?

Yes No Can't tell

4. Did he race along the edge of the water?

Yes No Can't tell

5. Did Peter dislike being at the beach?

Yes No Can't tell

IIb - Flip

High up in one of the hollow branches of a tall gum tree was a hide-away hole, and this was where Flip the possum made his home.

Flip was easily frightened, so during the day he stayed in his hole and slept. At night, when all was quiet, he came out to play.

1. Was Flip easily scared?

Yes No Can't tell

2. Was Flip active mostly at night?

Yes No Can't tell

3. Did he come out to play during the day?

Yes No Can't tell

4. Are possums timid animals?

Yes No Can't tell

5. Did Flip make his home in a hole in the ground?

Yes No Can't tell

IIC - The Middle Wood

When his parents were asleep, Nubber, the baby bear, crept out of the cave and made for the Middle Wood. At night the Middle Wood seemed different, almost magical. The wind had a strange voice, and the leaves spoke in whispers. Even a grown-up bear might have felt a touch of fear. Nubber held back only a minute. 'No honey for the bear who will not dare', he said, and marched into the wood.

1. Did Nubber creep out of the cave when his parents were asleep?

Yes No Can't tell

2. Was the Middle Wood spooky at night?

Yes No Can't tell

3. Did Nubber hold back for a minute because he was lost?

Yes No Can't tell

4. Did a grown-up bear march into the wood?

Yes No Can't tell

5. Did the leaves rustle softly?

Yes No Can't tell

IId - Thorny

Rufus the kangaroo was curious about the strange little creature in front of him. It was Thorny, a spiky lizard. Although he was very small, Thorny looked quite fearsome.

All along his back the skin rose up in lumps, each bearing a prickly spike. Over his eyes were two horns. He looked like a dragon going into battle.

Rufus took a step backward. He was afraid to poke his soft little nose too close to Thorny. Those spikes looked sharp.

1. Did Thorny look fierce?

Yes No Can't tell

2. Did Rufus take a step backward because he was afraid that Thorny might bite him?

Yes No Can't tell

3. Did Thorny have spikes on his back?

Yes No Can't tell

4. Was Rufus a lizard?

Yes No Can't tell

5. Was Thorny called Thorny because of the way he looked?

Yes No Can't tell

Ile - The Stars

In the sky at night, you can see hundreds of specks of light, some bright, others dim.

These are all stars. They are very hot and this is why they shine in the sky. Our Sun is a star and we can feel its heat because it is nearer to us than any other star.

Stars are not all the same colour. A few are red, many are white and some are blue. This is because some stars are hotter than others. The hottest stars are blue ones.

1. Does the amount of heat in stars give them their different colours?

Yes No Can't tell

2. Can we feel the sun's heat because it is nearer to us than any other star?

Yes No Can't tell

3. Are red stars hotter than white stars?

Yes No Can't tell

4. Do stars shine because they are coloured?

Yes No Can't tell

5. Do some specks of light in the night sky look faint?

Yes No Can't tell

GRADE FOUR

READING COMPREHENSION TEST

Name _____

Grade _____

School _____

Sample Story: The Ball

Janik shut the door and the window, put the ball on the table, clapped his hands and said:

'Ball, whenever my hands I clap

Remember your manners and raise your cap!'

Before he had time to say anything more, the ball bounced off the table and broke in half. Out of each half jumped a little man in leather trousers and a green apron. Before Janik had recovered from his astonishment, they were running around the kitchen, laying the table with knives and forks and crockery and a delicious meal.

This was really most extraordinary, because there was no food in the house.

S1: When the little men appeared was Janik frightened?

Yes No Can't tell

S2: Did the ball bounce off the table because of what Janik had said?

Yes No Can't tell

S3: Were the words that Janik spoke magic words?

Yes No Can't tell

IVa - Cranes

There are many different kinds of cranes. They lift and move things from one place to another, without danger and without breaking anything.

The enormous tower and derrick cranes used on building sites do not move about, but can be quickly taken to pieces and rebuilt. Thus tower cranes can have their towers made taller as the buildings they work on grow higher.

The driver sits in a cab, guiding the crane with controls or levers. He has to be a tough man to stand the noise and shaking when the crane is hard at work.

1. Can pieces be added to a tower crane to make it taller?

Yes No Can't tell

2. Do cranes try to move things safely?

Yes No Can't tell

3. Can some cranes move about?

Yes No Can't tell

4. Does the driver guide the crane with a steering wheel?

Yes No Can't tell

5. Is the driver's cab on the ground beside the crane?

Yes No Can't tell

IVb - A Baby Seal

They went back to the baby seal, who had looked so much as if she wanted to talk to them. Her mother lifted her nose suspiciously, then she lowered her head and went back to sleep.

But not the baby. She wanted to come and play with the boys. Heaving herself along with her flippers, with surprising ease and speed, she came right up to the boys and her cheerful face smiled at them as she tossed her nose in the air.

'Hey!' said Francis, getting just a bit alarmed, 'she's going to chase us.' 'No, she's not,' said James calmly. She just wants to play with us.' Francis relaxed. It was true, that baby seal wanted those boys so much to come and play with her. Now she was heading back towards the rocks, looking over her shoulder and jerking her head, obviously saying, 'Come on, come on!'

Francis followed, quite forgetting his earlier fears, and the baby seal hopped and wriggled nimbly up the rocks until she stopped, pointing with her flipper into a cave. 'Quick, James, quick. Just look what's here.'

It was a cave, full of fairy penguins with breasts as white as foam and backs as glowing blue and inky dark as the deep sea over the weeds and rocks.

1. Did the baby seal move up the rocks slowly and clumsily?

Yes No Can't tell

2. Did the baby seal head back to the rocks because she was tired of playing?

Yes No Can't tell

3. Was the cave full of penguins?

Yes No Can't tell

4. Did this story take place at a beach?

Yes No Can't tell

5. Was Francis alarmed because he thought the mother seal was going to chase him?

Yes No Can't tell

IVc - The Creature

(1) At the bottom of the cliff, a little to Dick's left, was a low, dark hole - the entrance to a cave perhaps. (2) And out of this two thin wisps of smoke were coming. (3) And the loose stones just beneath the dark hollow were moving (that was the noise he had heard) just as if something were crawling in the dark behind them.

(4) Something was crawling. (5) Worse still, something was coming out. (6) The thing that came out of the cave was something he had never even imagined - (7) a long lead-coloured snout, dull red eyes, no feathers or fur, a long body that trailed on the ground, legs whose elbows went up higher than its back like a spider's cruel claws, bat's wings that made a rasping noise on the stones, metres of tail. (8) And two lines of smoke were coming from its nostrils. (9) He never said the word Dragon to himself. (10) Nor would it have made things any better if he had.

1. Was the creature's tail short and stumpy?

Yes No Can't tell

2. Was Dick trapped with the Dragon?

Yes No Can't tell

3. Did the smoke that Dick saw come from a fire inside the cave?

Yes No Can't tell

4. Did the thing that came out of the cave have a long snout and dull red eyes?

5. Did the creature's wings make a thumping sound on the stones?

Yes No Can't tell

IVd - Old Man Kangaroo

Down the hill they ran through the dry, scratchy scrub with the sand warm between their toes. On and on they went, deeper and deeper into the scrub. When they stopped they could hear the booming of the surf in the distance, and they kept going in that direction. Suddenly, 'Look!' whispered Francis, pointing. There was a huge old man kangaroo, fast asleep in the sun. Slowly, while the boys watched as silent as stones, he stretched and got up till he stood with his front paws resting on the ground, and his huge tail lying in the grass. Francis shifted his foot and broke a twig. 'Sssshh!' hissed James, but the kangaroo had seen them. Slowly he turned his head towards them and wrinkled up his nose. But he did not move away. There he stood, in the little clearing in the middle of the dense scrub, just soaking up the sun and thinking about these two boys who had wandered into his wild world.

1. Was the clearing surrounded by thick bush?

Yes No Can't tell

2. Did the twig make a noise when Francis stepped on it?

Yes No Can't tell

3. Were the boys running in the direction of the surf?

Yes No Can't tell

4. Was the kangaroo asleep when the boys first saw him?

Yes No Can't tell

5. Were the boys quiet because they were afraid of the kangaroo?

Yes No Can't tell

IVe - At the Play

(1) As the Browns settled down in their seats a roll of thunder shook the hall and Mrs Brown looked up anxiously. (2) 'That's very odd,' she exclaimed. (3) 'Thunder at this time of the year. (4) It was just starting to snow when we came in.'

(5) 'I expect that was Paddington testing his sound effects,' said Jonathan knowledgeably. (6) 'He said he had quite a few claps to do.'

(7) 'Well, I wish he'd turn the volume down a bit,' said Bird, turning her attention to the stage as the curtain began to rise.

(8) 'That ceiling doesn't look too safe to me.'

(9) 'I think someone must have forgotten to pay the electric light bill,' whispered Mr Brown as he adjusted his glasses and peered at the scene.

(10) From where they were sitting, the Browns not only found it difficult to see what was going on, but when their eyes did get accustomed to the gloom, they found it even harder to understand what the play was about anyway.

(11) Behind the scenes, Paddington was kept very busy. (12) Apart from the thunder, there were the coconut shells to be banged together whenever anyone walked toward the castle, not to mention clanking drawbridge noises and creaking sounds each time a door was opened.

(13) In fact there was so much to do it took him all his time to follow the script let alone watch the action on the stage (13') and he was quite surprised when he looked up suddenly in the middle of one of his thunder records and found it was interval.

1. Was the stage well lit?

Yes No Can't tell

2. Was the sound of walking made by clanking chains?

Yes No Can't tell

3. Did Paddington's sound effects make the play easier to understand?

Yes No Can't tell

4. Was Paddington surprised when interval came because he had been so busy?

Yes No Can't tell

5. Did the Brown's find the play difficult to follow?

Yes No Can't tell

GRADE SIX

READING COMPREHENSION TEST

Name _____

Grade _____

School _____

Sample Story: Trains

Macpherson stood in the doorway. All he could see was a boy sitting on the floor playing with a train-set.

Such a train-set! It was an entire railway-system. Signals! Tunnels! Stations! Goods trains! Engines - even one called The Flying Scotsman! The boy had only to press a button and they went racing round the track, in and out of tunnels, stopping at stations, shunting into sidings. Macpherson stood and stared. Fancy having a toy like that! It must have cost a fortune.

The boy was younger than Macpherson, with a darker skin, as if he had been used to a hot climate. But there was nothing sunny about his expression. He was frowning at the trains as he made them go faster, and there was a fretful note in his voice as he spoke.

S1: Was Macpherson playing with the trains?

Yes No Can't tell

S2: Did Macpherson feel amazed when he saw the train-set?

Yes No Can't tell

S3: Was 'The Flying Scotsman' the name of an engine?

Yes No Can't tell

Vla - The Seagull

The young seagull was alone on his ledge. His two brothers and sister had already flown away the day before. He had been afraid to fly with them. The great expanse of sea stretched beneath and it was such a long way down. And all the morning the whole family had walked on the big plateau midway down the opposite cliff, taunting him with his cowardice.

Now his brothers and sister were asleep; his father was preening his feathers; only his mother was watching him as she tore at a piece of fish. He uttered a low cackle begging her to bring him over some food. Then he uttered a joyful scream for his mother was flying across to him with a piece of fish. He leaned out from the ledge trying to get nearer to her as she flew across.

But when she was just opposite him, she halted, her legs hanging limp, her wings motionless, the piece of fish in her beak almost within the reach of his beak. He waited a moment in surprise, wondering why she did not come nearer, and then, maddened by hunger, he dived at the fish. With a loud scream, he fell outwards and downwards into space. A monstrous terror seized him and his heart stood still. He could hear nothing.

But it lasted only a moment. The next moment he felt his wings spread outwards. He could feel the tips of his wings cutting through the air. He was not falling now. He flapped his wings once and he soared upwards. He uttered a joyous scream and flapped again.

1. Had the young seagull not followed the rest of the family to the plateau because he liked having a ledge for himself?

Yes No Can't tell

2. When the young bird fell out of the nest, was he at first panic stricken?

Yes No Can't tell

3. Did the seagull fall to his death?

Yes No Can't tell

4. Did a great expanse of sea stretch beneath the ledge?

Yes No Can't tell

5. Did the mother seagull hold the fish just out of the young seagull's reach on purpose?

Yes No Can't tell

VIIb - The Captives

They spent a miserable afternoon. Unable to interpret the erratic behaviour of the German officer, they were tormented by the most fantastic ideas. Gathered in the kitchen, they engaged in endless discussions and offered the wildest suggestions. Perhaps they were to be kept as hostages - but for what purpose? - or to be taken away as prisoners, or, more likely still, to be held for a large ransom. At this suggestion they were panic stricken. The wealthier they were the more horrified they were. They saw themselves forced to buy their lives with bags of gold poured into the lap of that insolent soldier. They racked their brains for ways of disguising their wealth, and for passing themselves off as very poor people indeed. Grant took off his watch and hid it in his pocket. With nightfall their fears increased. The lamp was lit, and as there was still two hours to dinner, Mrs Grant proposed a game to pass the time. Everyone welcomed this suggestion, including Prior, who, out of politeness, extinguished his pipe.

1. Was the German officer's behaviour unpredictable?

Yes No Can't tell

2. Did the captives look down on the German officer despite their fear of him?

Yes No Can't tell

3. Was it Prior who proposed a game?

Yes No Can't tell

4. Does it appear that the captives will lose their lives?

Yes No Can't tell

5. Did the captives become panic stricken at the suggestion that they were to be kept as hostages?

Yes No Can't tell

Vic - The Bat

- 1 By day the bat is cousin to the mouse.
- 2 He likes the attic of an ageing house.
- 3 His fingers make a hat about his head.
- 4 His pulse beat is so slow we think him dead.
- 5 He loops in crazy figures half the night,
- 6 Among the trees that face the corner light.
- 7 But when he brushes up against the screen,
- 8 We are afraid of what our eyes have seen:
- 9 For something is amiss or out of place
- 10 When mice with wings can wear a human face.

1. In this poem has the poet likened bats to mice and humans?

Yes No Can't tell

2. Is the bat an eerie creature?

Yes No Can't tell

3. Does the poet suggest 'We are afraid' because the bat suddenly makes a noise which surprises us?

Yes No Can't tell

4. Does the bat like the cellar of an ageing house?

Yes No Can't tell

5. Does the bat dart and swoop about during the night?

Yes No Can't tell

Vid - Earthworms

On the gravel-walks in my garden a very large number of leaves of the species of *Pinus* is regularly drawn into the mouths of worm-burrows. These leaves consist of two needles, which are of considerable length and are united to a common base; and it is by this part that they are drawn into the burrows. As the sharply pointed needles diverge a little, and as several leaves are drawn into the same burrow, each tuft forms a perfect hedge guarding the burrow. These leaves could not be dragged into the burrows to any depth, except by their bases, as a worm cannot seize hold of the two needles at the same time, and if one alone were seized, the other would be pressed against the ground and would resist the entry of the seized one. In order, therefore, that worms should do their work well, they must drag pine-leaves into their burrows by their bases, where the two needles are conjoined. But how the worms are guided in their work is a perplexing question.

This difficulty led my son and myself to observe worms during several nights by the aid of a dim light, while they dragged the leaves of the pines into their burrows. They moved the anterior extremities of their bodies about the leaves, and on several occasions when they touched the sharp end of the needle, the worms withdrew suddenly as if pricked. But I doubt whether they were hurt, for they are indifferent to very sharp objects, and will swallow small splinters of glass. It may also be doubted whether the sharp ends of the needles serve to tell them that this is the wrong end to seize; for the points were cut off many leaves, and fifty-seven of them thus treated were drawn into the burrows by their bases, and not one by the cut-off ends. As soon as they touched the base of a pine-leaf, this was seized in their mouths and the leaf was then quickly dragged or rather jerked into their burrows. It appeared to both my son and myself as if the worms instantly perceived as soon as they had seized a leaf in the proper manner.

1. Is the question of how the worms are guided in their work a puzzling one?

Yes No Can't tell

2. Did the author and his son cut the ends off some pine needles because they wanted to test if worms would still seize these leaves in a particular way?

Yes No Can't tell

3. By watching the worms closely for several nights were the author and his son hoping to learn how the worms selected a particular part of the leaf to seize before dragging it to the burrow?

Yes No Can't tell

4. When they touched the sharp end of a needle, did the worms die?

Yes No Can't tell

5. In this passage was the author primarily concerned with describing the reaction of earthworms to pain?

Yes No Can't tell

Vie - The Tower

(1) Out in the yard waiting, there were five boys, including George, Andrew and Spunky. (2) Each one of them had dived from the tower.

(3) 'Let's take off,' Douglas said and Tom felt a thrill of pride come over him as the group moved out as one. (4) It was almost as if a casual command had been given which no one of them ever could or would ignore.

(5) They moved briskly out of town onto the sandy road leading through the simmering hot cotton fields, through the occasional shaded woods where the yellow sand was cool and damp. (6) The movement seemed to dispel the heat. (7) Their spirits rose as they approached the spot, four miles from town. (8) The talk became louder, more braggadocio, their voices more shrill - all but Douglas'. (9) He said little and walked at a steady pace. (10) No one of them knew his plan for the day, but the thrill and uncertainty of it pervaded them all. (11) It was an occasion; what went into it was the best from each of them and something from Douglas called this forth.

(12) 'You going to dive from the tower, Tom?' George asked quickly in an excited voice.

(13) Tom grinned. 'I don't know,' he said. (14) 'I never tried it before.' (15) No one replied but he felt their eyes on him and knew their doubts and their curiosity. (16) And the old doubt of himself, the old terror of an unknown trial took hold of him again. (17) They could see the tower standing up against the sky above the tree tops even before the lake was in sight. (18) It's higher than the floodgate tower, Tom thought, way higher.

(19) 'There it is, there it is,' George yelled. (20) And they began to move out at a run. (21) Tom could feel his heart beating hard and fast inside him.

(22) 'I don't see any gals,' Robert Phillips yelled, snatching at his clothes as they came up the sandy bank of the lake. (23) 'Let's go in the raw.'

(24) They were dropping their clothes behind them as they came up to the edge. (25) Their naked bodies pitched into the cold water like rapid fire. (26) The seven of them struck out across the pond toward the opposite bank and the sky searching tower.

1. Was George leader of the group?

Yes No Can't tell

2. Did the sandy road lead through corn fields?

Yes No Can't tell

3. Do the boys consider diving from the tower a test of daring?

Yes No Can't tell

4. Was Tom's heart beating hard and fast because 'the old terror of an unknown trial had taken hold of him again'?

Yes No Can't tell

5. As they approached the spot, did the boys' voices become increasingly quiet and subdued?

Yes No Can't tell

Dear Teacher,

Thank you for participating in this study. Enclosed is a copy of the directions for administering the test. Please familiarize yourself with these directions before attempting to administer the test to your class. I would ask that you give the test to your class on a morning convenient to you within the next week or so. When your class has completed the test, please leave the test papers with your school secretary.

Special note: Known non-readers may be exempted from taking the test if you feel this is in the best interests of the child. If you have any exempted readers, please indicate their names, school and grade on a separate sheet of paper and place it in the bundle of completed tests. [This was done because the tests were also used to supply survey information relevant to my work as a reading resource teacher.] If your very weak readers sit for the test, please indicate that the student is known to be a weak reader by putting the letters 'WR' on the front of his test booklet after he has completed the test.

Should you have any questions about the directions for administering the test, please feel free to contact me at

Again, thank you for your cooperation.

Sincerely,

Linda L. Gerot,
Reading Resource Teacher
..... High School

Administering the Test

1. Announce to the class that they are having a test to show how well they understand what they read, and that they should have two pens/pencils (but nothing else) on their desk.
2. Instruct the class to leave their test booklets turned face down on their desk until requested to turn them over.
3. Distribute the test booklets.
4. Ask the class to turn their test booklets over so the front page is showing. Direct children in filling out the personal data section in the upper right hand corner of the page.
5. When children have completed filling in the personal data section, direct their attention to the sample passage and questions on the front page.
6. Read the sample passage aloud to the class as they follow along. Read question S1 and the choices of answer which follow it aloud.
7. Children are to circle the answer they feel best answers the question.
8. Immediately confirm that 'no' is the best answer for this item.
9. Read question S2 and the choices of answer aloud. Again children are to circle the best answer, which is 'yes'.
10. Children should read and answer question S3 silently and independently. After a few moments confirm that the best answer for this item is 'yes'.
11. Remind children not to start working on the test until told to do so.
12. If children wish to change their answer, they should erase or cross out their first choice and neatly circle their new choice. If a child changes his mind several times, he may cross out all previous choices and write the answer neatly to the left of the item number.
13. Reemphasize that all answers are to be indicated right on the test paper itself.
14. Inform children that they will have fifty minutes (maximum) in which to do the test and that they should attempt all five stories, but that they should not start until told.

15. If a child finishes the test before the fifty minutes are up he should place his test booklet face down on the desk. The administrator should immediately collect the test paper. The child should quietly proceed with some independent work at his desk. He should not leave his seat.
At the end of the fifty minutes, announce that time is up, and that children should close their test papers and place them face down on their desks. The administrator should collect the papers.
16. Inform the children that they should attempt all five stories and instruct them to open their test papers to the first page and commence work.
17. During the test the administrator may answer procedural questions only; he/she may not assist children with the actual content of the test.

APPENDIX 5

A CHECK ON THE 'NO' ANSWER EFFECT:TEXTS AND QUESTIONS USEDThe Captives

They spent a miserable afternoon. Unable to interpret the erratic behaviour of the German officer, they were tormented by the most fantastic ideas. Gathered in the kitchen, they engaged in endless discussions and offered the wildest suggestions. Perhaps they were to be kept as hostages - but for what purpose? - or to be taken away as prisoners, or, more likely still, to be held for a large ransom. At this suggestion they were panic stricken. The wealthier they were the more horrified they were. They saw themselves forced to buy their lives with bags of gold poured into the lap of that insolent soldier. They racked their brains for ways of disguising their wealth, and for passing themselves off as very poor people indeed. Grant took off his watch and hid it in his pocket. With nightfall their fears increased. The lamp was lit, and as there was still two hours to dinner, Mrs Grant proposed a game to pass the time. Everyone welcomed this suggestion, including Prior, who, out of politeness, extinguished his pipe.

(ACER, 1972)

Original:

1. Was the German officer's behaviour unpredictable?

Yes No Can't tell

2. Did the captives look down on the German officer despite their fear of him?

Yes No Can't tell

3. Was it Prior who proposed a game?

Yes No Can't tell

4. Does it appear that the captives will lose their lives?

Yes No Can't tell

5. Did the captives become panic stricken at the suggestion that they were to be kept as hostages?

Yes No Can't tell

Reversed:

1. Was the German officer's behaviour predictable?

Yes No Can't tell

2. Did the captives respect the German officer?

Yes No Can't tell

3. Was it Mrs Grant who proposed a game?

Yes No Can't tell

4. Does it appear that the captives will survive their ordeal?

Yes No Can't tell

5. Did the captives become panic stricken at the suggestion that they were to be held for ransom?

Yes No Can't tell

The Tower

Out in the yard waiting, there were five boys, including George, Andrew and Spunky. Each one of them had dived from the tower.

'Let's take off,' Douglas said and Tom felt a thrill of pride come over him as the group moved out as one. It was almost as if a casual command had been given which no one of them ever could or would ignore.

They moved briskly out of town onto the sandy road leading through the simmering hot cotton fields, through the occasional shaded woods where the yellow sand was cool and damp. The movement seemed to dispel the heat. Their spirits rose as they approached the spot, four miles from town. The talk became louder, more braggadocio, their voices more shrill - all but Douglas'. He said little and walked at a steady pace. No one of them knew his plan for the day, but the thrill and uncertainty of it pervaded them all. It was an occasion; what went into it was the best from each of them and something from Douglas called this forth.

'You going to dive from the tower, Tom?' George asked quickly in an excited voice.

Tom grinned. 'I don't know,' he said. 'I never tried it before.' No one replied but he felt their eyes on him and knew their doubts and their curiosity. And the old doubt of himself, the old terror of an unknown trial took hold of him again. They could see the tower standing up against the sky above the tree tops even before the lake was in sight. It's higher than the floodgate tower, Tom thought, way higher.

'There it is, there it is,' George yelled. And they began to move out at a run. Tom could feel his heart beating hard and fast inside him.

'I don't see any gals,' Robert Phillips yelled, snatching at his clothes as they came up the sandy bank of the lake. 'Let's go in raw.'

They were dropping their clothes behind them as they came up to the edge. Their naked bodies pitched into the cold water like rapid fire. The seven of them struck out across the pond toward the opposite bank and the sky searching tower.

(ACER, 1972)

Original

1. Was George leader of the group?

Yes No Can't tell

2. Did the sandy road lead through corn fields?

Yes No Can't tell

3. Do the boys consider diving from the tower a test of daring?

Yes No Can't tell

4. Was Tom's heart beating hard and fast because 'the old terror of an unknown trial had taken hold of him again?

Yes No Can't tell

5. As they approached the spot, did the boys' voices become increasingly quiet and subdued?

Yes No Can't tell

Reversed

1. Was Douglas leader of the group?

Yes No Can't tell

2. Did the sandy road lead through cotton fields?

Yes No Can't tell

3. Do the boys consider diving from the tower an everyday bit of fun?

Yes No Can't tell

4. Was Tom's heart beating hard and fast because 'they had begun to move out at a run'?

Yes No Can't tell

5. As they approached the spot, did the boys' voices become increasingly high pitched and boastful?

Yes No Can't tell

APPENDIX 6

'ANNA OF THE BEARS'

About Books

from 'Anna of the Bears', by Bjørn Rongen

Life or Death

They could scarcely believe it. The mother bear must have been on the other side of the mound and had evidently no idea that they were there. The east wind was still blowing gently, towards them and away from the bear. Then they saw Anna come running out from behind a tree stump, her hands full of berries.

At this it looked as if Mother couldn't control herself any longer. The cub began to whimper in his sack. Perhaps he recognised the scent of his mother. For there was the bear herself, lumbering peacefully out from behind a low hummock towards Anna. Knut stood with his finger on the trigger, but he did not dare to shoot, for Anna had run fearlessly up to the bear.

The bear yawned, showing her great white teeth and red tongue, and Anna put her little hand full of berries right into the bear's mouth. Anna was laughing. Mother's heart missed a beat at the sight, but she knew that she must not move or scream. She stood there straining her eyes to see whether the great mouth would close on Anna's hand.

But the mother bear did not bite the little girl. She lay down, rolled Anna towards her with her heavy paw, and played with her. Anna laughed again and pulled the long red tongue that was licking her hands.

Seconds passed. The two boys lay absolutely still. Nils breathed heavily. He was old enough to know the danger to Anna. But Ivar smiled with delight. He was proud of Anna. He had a little sister who had dared to play with a bear alone in the forest. That would be something to boast of.

(Bruce, 1968)

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