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Monte Gale Salyer

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THE SIGNIFICANCE OF DIFFICULT VOCABULARY TO
READING IN A SECOND LANGUAGE

By

Monte Gale Salyer

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ABSTRACT

**THE SIGNIFICANCE OF DIFFICULT VOCABULARY TO
READING IN A SECOND LANGUAGE**

By

Monte Gale Salyer

There is a gap in second-language reading research
regarding whether the activation of topical knowledge
enables readers to comprehend text with difficult
(unfamiliar) vocabulary. Although researchers (Swaffar,
1988; Barnitz, 1986) have supposed that strengths in
top-down processing may compensate for weaknesses in
bottom-up processing, few studies have examined this
hypothesis. This study investigates the effects of schema-
activation and of difficult vocabulary on reading
comprehension in a second language. Because schema-
activation may facilitate reading comprehension (Taglieber,
Johnson, and Yarbrough, 1988), and because difficult
vocabulary may disrupt the processing of L2 texts (Carter,
1987), it is assumed in the study that both schema-
activation and a lack of difficult vocabulary facilitate L2
reading comprehension.

The subjects of the study were international students
enrolled in an advanced-level ESL reading class in a small
Midwestern university. All subjects read four different

reading passages, in either the easy- or the difficult-vocabulary version. The reading conditions were (1) schema-activated and easy-vocabulary version, (2) schema-activated and difficult-vocabulary version, (3) no schema-activation and easy-vocabulary version, and (4) no schema-activation and difficult-vocabulary version.

Schemata were activated by means of scripted introductions to the topic followed by warm-up pre-writing activities. After reading the passages, subjects were administered cloze, written, and oral post-tests. Multivariate analysis of variance tests on the cloze and written tests showed significant effects for vocabulary, but not for schema-activation. Positive correlations between the cloze and written post-tests were found also.

These results show that vocabulary development, which has been neglected, is vital to ESL reading. The results of schema-activation, however, may not be as powerful as has been assumed.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

This chapter summarizes pertinent theories of both L1 and L2 reading so that readers from a variety of backgrounds will be able to appreciate the context of the present research regarding the second-language reading classroom. (Readers knowledgeable of these general backgrounds may wish to proceed directly to the formal review of the literature, which is Chapter Two.) Reader- and text-dominated theories, the psycholinguistic model, and the interactive model will be outlined. Although each model contains useful information, educational practice may be impeded by the extreme application of any theory. Because of an overemphasis on preteaching background knowledge, there has been a corresponding de-emphasis on ESL vocabulary development. Despite the importance of schema-theory, it may be unwise to neglect vocabulary development in ESL reading.

THE NATURE OF THE READING PROCESS

As a result of the considerable research conducted over the years, we now know a great deal regarding the mechanical (or physical) aspects of reading. For example, reading researchers have conducted numerous studies precisely measuring the movement of the eye so that the number and duration of fixations per page may be known.

1

As a result, the externally observable acts of reading are well known. We still lack full insight, however, into the internal meaning-making process of reading. We can confidently suppose that a text, the creation of an author, and external, structured objects somehow touch off meaning in the reader's mind, even as the reader "brings meaning" to text. What occurs between the text and the reader, however, remains only partly understood. To what extent either the text or the reader constructs meaning is unknown. Certain questions arise about this process. What meaning or structures do the reader bring to text? To what extent does text "dictate" meaning? Also, what choices does the reader possess in responding to visual cues?

READER- AND TEXT-DOMINATED THEORIES OF READING

One way to view reading theories is to create a continuum on which all theories may be placed, as represented in Figure 1 below. Theories emphasizing the significance of text would range toward one pole of the continuum, whereas views in support of the reader's role would tend toward the opposite pole.

FIGURE 1
The Relationship of Reading Theories

Reader-dominated   Text-dominated
     Theories   Theories
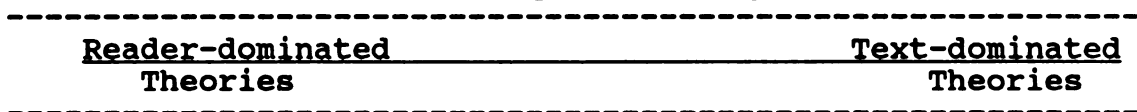
An earlier view of reading represented it as an adjunct to listening. In this construct, the passive reader, through

the text, took in whatever the author might have on his mind. For decades schoolchildren read their lessons out loud. It was thought that the oral production of the words on the page led to a meaningful realization of reading. Many schoolchildren still are drilled extensively in oral reading, presumably for similar reasons. Knowledge that such "reading" practices affect pronunciation more than reading comprehension has not affected educational methodology as yet.

In the audio-lingual model, reading was considered secondary to listening. The oral skills were thought primary, whereas reading and writing were considered limited extensions. Writing was referred to as encoding, and reading became known as decoding. Teachers sought to help students learn proper phonics skills so that they might convert encoded script to vital oral form. Reading problems essentially appeared to be seeing problems as this mechanical view dominated. When training in "cracking" the code did not produce capable readers, at times it was supposed that poor readers had visual problems.

Although existing at a different place in the educational spectrum, literary critics possess a model compatible with the simpler text-dominated views. In certain critical theories, it appears that there is a near worship of the text, as at least the indoctrinated reader's mind is said to be dominated by the author's voice. Close reading is preferred because of the value allotted to text.

In fact, the aim is to be converted to the author's point of view. Slowly the gap between the reader and the text is closed as the diligent disciple reads and rereads text. Although created by the author, once written, the text itself becomes a controlling context. The reader's opinion and context is "surrendered" to the context created by the text itself (Kreiger, 1976). In effect, this particular literary view assigns to the reader much the same role as does the decoding model. Text dominates readers in both cases, and reading deficiencies are believed to arise due to lack of perception.

In contrast, alternate theories of reading emphasize the reader. Subjectivists stress the reader's role in making meaning from text. In fact, one critic has questioned the very existence of text (Fish, 1980). The model subjectivist reader, however, admits the existence of text. Such readers follow text long enough to encounter a condition reminiscent of something in the reader's personal experience. At this point, the reader "steps in front of text" and constructs a new text which may relate but tangentially to the original text (Bleich, 1978). The end product of this process is a text which diverges radically from the original. Essentially, text serves as a jumping-off point for self-exploration and reflection. Reading only marginally relates to author-written text, but bears strong connections with the activities of the intentionally-creative reader. The subjective reader may

radically recreate text according to his or her own will. Subjective theory occupies the end of the reading continuum where the reader's role is paramount.

THE PSYCHOLINGUISTIC MODEL OF READING

The psycholinguistic model of reading allows for "behind the eyeball" guesswork as to meaning, but does not permit as much reader-domination as does subjectivism. In this model, the reader's role is to sample a variety of textual cues to meaning. Less textual sampling is required when the reader knows about the linguistic and cultural systems represented by a particular text. Full decoding is neither necessary nor advisable, as overconcern with the graphophonic aspects of text tends to encumber the reader's comprehension. Possessing limited attention, readers who attend too closely to the details of text may find it difficult to focus on the larger propositions of text as well.

Nor is fully linear processing necessary, even at the word level. For example, suppose that a person sees a sign spelling "clos" in the entrance to a cafe. Because we expect to find a sign indicating that the cafe is either open or closed, the person might believe the cafe to be closed on the basis of seeing just the letters "clos" in the door. Knowledge of the world, then, facilitates reading, and in fact makes text comprehensible. Despite the reader's distance from the text, and the reconstructive activity occurring "behind the eye", this model avoids

intentionally subjective distortion of text. The reader's
task is clearly defined as following the direction of text,
although the necessarily selective pose of the reader
suggests reliance on text or author as at least an initial
guide to thinking. The writer's implied role is to
facilitate the reader's sampling process by providing amply
redundant processing cues. In general, the
psycholinguistic model suggests that the reader actively
brings considerable knowledge to bear upon text in making
meaning.

THE INTERACTIVE MODEL AND PRETEACHING

More recently, reading researchers (Carrell, Devine,
and Eskey, 1988; Swaffar, 1988) have introduced the
interactive model (which builds on psycholinguistic
theory). This theory may be conceived as carrying the
psycholinguistic model one step further, and as filling in
blanks only suggested by the former theory. According to
the interactive construct, reading is actually a process in
which the reader's knowledge and text interact to create
meaning. In this way, an L2 reader who knows baseball
would then be able to comprehend a passage describing a
baseball game. A reader without much prior knowledge about
a particular topic, however, would encounter severe
processing difficulties. Foreign-language texts may be
understood by readers who possess critical background
knowledge. To what extent deficiencies in prior knowledge
impede reading is not known, but the effect has been

validated (Johnson, 1982; Carrell, 1985; Barnitz, 1986).

To meet the needs of readers from other cultures, second-language reading teachers have introduced preteaching, with various degrees of success. Generally, readers seem to use pretaught information in processing the main propositions of a passage. Sentence-level processing, however, does not appear to be affected. Some questions do remain, though, as to the real effect of preteaching. Do students learn what they need to know from the preteaching itself? Or do they merely resourcefully gather enough information in the pre-teaching activity to make the reading passage comprehensible, and then go on to fill in the blanks in their mental inventory either by actually extracting meaning from the text, or by informed guessing? The improved comprehension of main ideas by readers who have been pretaught, and the lack of effect on supporting information leave doubts as to the overall reading gains resulting from preteaching background knowledge.

On the other hand, having cultural knowledge seems to be very important to reading comprehension. Whether preteaching topical knowledge facilitates L2 reading or not, cultural knowledge is necessary for learners. It may well be that preinstruction in linguistic or cultural information has limited effect on the reading process because cues must be well assimilated before they may be of much use to the reader who is involved in the already complicated bottom-up and top-down reconstruction of text.

The attention-consuming factors of reading processing may overwhelm the effective use of additional preinstructional information. The interactive model has been expanded to include not only the interaction of content schema and text, but knowledge of rhetorical patterns and text as well. If readers recognize, for instance, that a paragraph is developed by description, they find more meaning. There is considerable evidence that readers can be taught text-structure patterns, and that reading comprehension is facilitated by such knowledge. Cohesive or connecting terms should be mentioned as well. It has been discovered that a lack of comprehension of connecting words, as well as of vocabulary, negatively affects the reader's comprehension (Barnitz, 1986).

THE OVEREMPHASIS ON PRETEACHING BACKGROUND KNOWLEDGE

Most reading researchers favor the interactive model. Nevertheless, some researchers (Carter, 1987; Eskey, 1988) express serious concerns over the tendency to focus nearly exclusively on the interaction of prior knowledge and to neglect vocabulary development. Whenever such attention is accorded to schemata, bottom-up processing is slighted. L2 reading researchers, in particular, should be sensitive to the language-related difficulties inherent in reading in a foreign language. A parallel between the complications of borrowing concepts from a dominant culture and from a larger field of research (from L1 to L2 reading research) may be made. Whenever two cultures meet, one becomes

dominant. Knowledge, technology, terms, and even ways of life tend to flow from the more powerful culture to the other society. Albeit the exchange often enriches the recipient culture, the interaction can be disruptive as well. Often considerable adaptation is required in order for a borrowed item to become suitable to the new context.

To be sure, the importation of schema-theory from L1 reading studies has enriched L2 reading theory. Even so, it may not be in our best interest to accept this theory without adaptation. While the similarities between the process of reading in a first and in a second language are marked, there are differences too, especially concerning aspects of language competence such as syntax and vocabulary. For schema-theory properly to be applied to second-language reading, the model must be adapted to account for not only schemata, but vocabulary difficulty as well. To date, it seems L2 theorists have overlooked this bottom-up process in applying the interactive theory to the conditions of top-down processing alone. No argument is made herein against the application of schema-theory to L2 reading. Rather, it is urged that besides the effect of background knowledge, the L2 model must account also for the role of vocabulary.

Studies in L2 reading support the interactive theory. The theory is appealing for several reasons. The term itself suggests the complexity of the reading process, reflecting the involvement of more than one variable.

Educational practice in general presently encourages interactive teaching and learning. In addition, the term permits a certain range of interpretation. What interacts with what can be spelled out variously. L2 theorists have adapted the concept recently, so that it has been applied to the relationship between vocabulary and schema. Even this adaptation of the theory, however, has tended not to support vocabulary learning. It has been supposed that a reader's strength in one area may compensate for deficiencies in another. Thus, a reader with appropriate prior knowledge would be able to make up for inadequate vocabulary knowledge in processing a particular passage. Although this view admits that vocabulary strengths may compensate for schema weaknesses this possibility is not considered. Inasmuch as the schemata appear to be more teachable than vocabulary, there has been interest in preteaching prior knowledge to compensate for vocabulary weaknesses, but not in preteaching vocabulary to make up for schemata-deficiencies. The apparent relationship between vocabulary and background knowledge is considered hardly at all. Neither has it been remarked that appropriate vocabulary is necessary to the learning of topical knowledge.

THE IMPORTANCE OF BOTTOM-UP PROCESSING

Enabling L2 readers to process difficult text by initiating them into the discourse and thought patterns of a culture is useful. Still, such practice need not

preclude other basic aspects of language learning, such as grammar and vocabulary. No matter how much an intermediate-level ESL learner may know about American culture, it remains necessary for the language itself to be learned in order for reading comprehension actually to occur. The newcomer to English, who desires to learn vocabulary in connection with reading in a second language, may be dismayed to encounter more exercises in learning schemata than in vocabulary development in the reading textbook.

Such an occurrence is not unlikely, given the current emphasis on preteaching background knowledge. Indeed, because of the dominance of schema-theory, more attention has been given to top-down than to bottom-up processing in some ESL reading texts. Because top-down processing in a second language places high demands on the reader's attention, students may justifiably question why they must learn schema-theory before they have acquired the vocabulary necessary to process a text. A more balanced approach would include the simultaneous development of both vocabulary and schemata.

SUMMARY

It seems natural that bottom-up processing should receive the reader's primary attention especially at the beginning and to some extent at the intermediate L2 reading levels. It may be that L2 reading practice has surpassed theory. At present, there is no proof that background

knowledge compensates for a lack of vocabulary in either L1 or L2 reading. Studies (reviewed in the following chapter) have attempted to find such an interaction, but have not done so (Freebody and Anderson, 1983a; Stahl and Jacobson, 1986). There have been no studies on the interaction of vocabulary and prior knowledge in L2 reading. It seems fitting to investigate the hypothesized interactive effect between prior knowledge and vocabulary. If a relationship can be found, and should readers be enabled to fill in the gaps in their linguistic and cultural knowledge, then so much the better. By means of preteaching background information, readers would then be able to process even texts laden with considerable difficult vocabulary. On the other hand, there remains the possibility that L2 readers may not be able to overcome vocabulary and other bottom-up processing problems by means of explicit instruction in background information. If no evidence can be found for compensation, the theory may require revision.

In the following chapter, the relevant literature will be reviewed. Numerous experimental, non-experimental, and review studies of vocabulary, background knowledge, and rhetorical patterns in first and second language yield a wealth of information enlightening our understanding of the reading process. The purpose of this review of the literature will be to ascertain whether there is evidence that background knowledge compensates for deficiencies in vocabulary knowledge.

CHAPTER TWO

REVIEW OF THE LITERATURE

The following review of the literature examines studies
from three diverse and, in some ways, contrasting areas of
reading research. Each study will be summarized to reveal
our present knowledge of the impact of background knowledge
and difficult vocabulary in the reading process. First,
studies on the implications of schema-theory on
second-language reading will be examined, particularly to
determine the possible effect of preteaching background
knowledge. Second, research which investigates the
relationship between native-language reading and vocabulary
will be inspected. Finally, studies concerning the impact
of vocabulary knowledge on second-language reading will be
reviewed to indicate the important role that bottom-up
processing plays.

SCHEMA-THEORY AND READING IN A SECOND LANGUAGE

The work of Frank Smith (1973) regarding the connection
between psycholinguistics and reading has affected much of
the current work in both first- and second-language reading
theory. Smith's essential argument that very little of
what is needed for understanding text comes from the text
itself has been quite suggestive for reading researchers.
Nor was Smith alone; his work was complemented especially
by that of his contemporary, Kenneth Goodman (1973), who

who noted that effective readers sample text to confirm or
reject their predictions as to meaning. These and other
theorists proposed a reconstructive model of reading, one in
which the reader actively processes text for meaning.
Although the "behind the eye" view had been promoted decades
earlier by Huey (1908), literary critics (Krieger, 1976;
Scholes, 1985) and linguists (Bloomfield, 1942; Fries, 1962)
had given much more emphasis to the primacy of text in
reading.

The Psycholinguistic Model and Background Information

Emergent with the psycholinguistic view of reading,
however, was the importance of background information. If
reading is to a great extent recognizing old information in
new contexts, then reading problems might be attributable
to a deficiency in background information. Nowhere would a
lack of background information be as likely to occur or as
disruptive to reading as in a second language. Few readers
in a second language have extensive knowledge of the second
culture. Therefore, schemata problems would be expected
for L2 readers. Practical classroom experience showed that
although readers often felt they "knew" all the words in a
passage, they could not comprehend the total message. This
situation prompted an examination of the relevance of
schemata to reading, and in the process revolutionized
views of the reading process itself. In the course of
time, studies delving into the relationship between
schemata and reading comprehension appeared in L2 reading

literature. Various of these relevant research studies are summarized below.

Johnson (1982) investigated precisely this issue in an experimental study of the effects of building background knowledge on second-language reading comprehension. Predicting that most foreign students would lack much information on the American holiday Halloween, Johnson designed a study to measure the reading problems subjects would encounter when called upon to read about this unknown cultural phenomena. Whereas half of the seventy-two subjects were pretaught cultural aspects of Halloween, the thirty-six subjects in the control group were given no background-building exercises. By relying on the pretaught information, the experimental group showed much better reading comprehension of the text than the control group as measured by an ANOVA. There was no measurable effect for preteaching vocabulary (without clues about Halloween) to the control group.

The Compensative Theory

As second-language researchers began to investigate the effects of background knowledge on reading, it was considered whether preteaching schemata might enable readers to compensate for language deficiencies. Hudson (1982) researched whether the preteaching of schemata could be more significant than language proficiency in reading comprehension. Three measures, or types of intervention were presented to the ESL readers in the study: schemata

induction, vocabulary training, and the read-and-test method
(which gave the subjects no special help in arriving at
meaning). Ninety-three subjects, who were at the beginning,
intermediate, or advanced levels, read nine SRA reading
passages intended for beginning, intermediate, and advanced
readers. Subjects read one passage at each reading level
and under each of the three treatments. Comparisons for
differences among the means on the ANOVA indicated that
beginners scored significantly higher (p<.05) in the
preteaching condition than in either the vocabulary or the
read-and-test methods. Intermediates achieved almost as
well under the read-and-test treatment as they did by the
vocabulary method. Advanced subjects scored highest in the
read-and-test treatment, although there was no significant
difference between any of their treatments. Although the
results appear to be mixed, Hudson concludes that
preteaching schemata can overcome readers' language or
decoding deficiencies. Thus, the experiment supports the
compensatory theory.

The Interactive Model of Reading

    The interactive nature of reading was underlined by
Carrell and Eisterhold (1983). According to schema-
theory, the reader's background information and the
information in the text interact in the reading process.
It is crucial to reading that the reader be able to relate
textual information to the reader's knowledge of the
world. The implications for ESL reading include a need for

sensitivity to cultural knowledge in a text and previewing texts for students so as to preteach culturally loaded concepts. Essentially, second-language teachers must become aware of the cultural differences implied in text, and be able to teach their students these features so as to avoid cultural interference. Thus, Carrell and Eisterhold's study provided valuable insight into the cultural aspect of background knowledge in L2 reading.

The Effect of Preteaching Text Structure

Carrell (1985) investigated the effect of teaching text structure on ESL reading. Noting that the direct teaching of text structure can facilitate reading in a first language, Carrell determined to examine whether similar preteaching might improve ESL reading performance. There were twenty-five subjects in the study, with fourteen composing the experimental group and eleven in the control group. During five hour-long training sessions, the intermediate-level reading students were taught to comprehend four main expository patterns associated with simple, natural reading selections. While the experimental group was receiving explicit training in specific structural patterns, the control group examined the same reading materials. The control group's preteaching, however, consisted of such linguistic operations as grammar drills, sentence analysis, vocabulary study, and reading comprehension. The control group did not receive preteaching in English rhetorical organization, but

otherwise was prepared similarly to the experimental group.
The experimental and control groups were given a pretest and
a posttest, and the experimental group was given a second
posttest to check for continued training effect. The tests
consisted of reading, written recall, and organizational
identification. The recalls were judged for quality of
ideas, whether thesis, main idea, topics, subtopic, or
detail.

Results show that experimental subjects recognized the
structural patterns they had been pretaught, and continued
to recognize them in the second posttest, indicating a very
definite persistence of effect. The control group scored
significantly lower according to Chi-square tests at $p < .05$.
An ANOVA yielded no significant difference between the
groups on the pretest. However, the posttest means for the
experimental group in recall of theses, main ideas, topics,
and subtopics were significantly higher ($p < .05$) than those
of the control group, according to an ANOVA. Hence, the
quality of the recall of the experimental group was
significantly better than that of the control group. This
result strongly indicates that overt preinstruction in
rhetorical organization can improve ESL reading
comprehension. Accordingly, Carrell recommends the
inclusion of training in text structure in ESL reading
programs. Her conclusion is that this type of schematic
knowledge is important to the development of comprehension
in reading as well as an appreciation of content schemata.

Barnitz and the Interactive Model of L2 Reading

Barnitz's (1986) "multidisciplinary" review argues for
"the roles of cultural schemata and discourse structure in
an interactive model of first- and second-language reading"
(p. 95). The review of content schemata and comprehension
in a second language harks back to an early study
(Bartlett, 1932) of how Englishmen recall Indian folk
stories differently from Indians. More recently, American
college students have been found to recall Grimm's fairy
tales more readily than Apache tales. Readers are found to
distort stories from unfamiliar cultures, and to remember
stories from the native culture more accurately. Hence,
cultural schemata can affect reading. Studies (Johnson,
1981; Johnson, 1982) are also reported which indicate that
"subjects made more cultural inferences/elaborations in the
recall of the text from their own culture, [demonstrating]
the interaction of language and culture in text
comprehension" (p. 101).

Barnitz also reviews the effect of formal schemata on
second-language reading. Kaplan's (1966, 1983) studies in
contrastive rhetoric show that the ethnolinguistic thought
patterns of various cultures vary. For example, English
rhetoric emphasizes linear thought patterns (topic followed
by support); Oriental rhetorics avoid direct discussion of
the topic, opting to view a topic from several tangential
viewpoints. Romance patterns feature many digressions and
additions; Semitic rhetoric involves numerous parallel

structures; and Vietnamese involves the joining of antithetical compound words. All of these linguistic patterns mirror the values of the culture, with English culture presumably placing a premium on direct logic.

Barnitz surveys psycholinguistic processing studies as well. In expository processing, it was found that English readers tend to process Japanese text by English rhetorical patterns and so experience considerable difficulty. When discourse patterns match readers' expectations, better reading occurs. Barnitz finds "text and text schemata [to be] independent variables in native and nonnative speakers' models of reading" (p. 106). Even stories, with their apparently universal properties, actually contain some culturally-specific aspects, as for example the lack of goals for heroes in Japanese tales.

Cohesion, "the property of text whereby the surface elements of a text are connected" (p. 107) is thought to affect second-language reading also. Cohesion studies show that recall is influenced by cohesion. For instance, the distance between a pronoun and its referrent is a significant variable in second-language reading. The number of possible antecedents may also overload the second-language learner's processor.

Barnitz suggests that L2 reading instructors consider both schemata and linguistic factors. Preteaching schemata may facilitate the comprehension of text with difficult vocabulary. Background knowledge-learning strategies

must be taught, and techniques in relating schemata to
passages are vital. Both content schemata and discourse
structure must be viewed as interacting with the elements of
language proficiency in the process of reading in a second
language.

The Effect of Preteaching Background Information

Floyd and Carrell (1987) investigated the effect of
preteaching cultural content schemata. The question behind
the study was: "Could reading be improved by teaching
background knowledge?" The twenty intermediate-level
subjects were unaware of the two cultural aspects of
American culture to be tested. The testing materials
consisted of two accounts of a common Fourth of July
festivity at Boston. Although both accounts had an
identical number of idea units, one was much more complex
syntactically. The experimental group had two hour-long
training sessions. The text was not taught, although
vocabulary was presented. The control group received no
special training. To test for the difficulty of the
syntactically harder version of the text, half of the
control and half of the experimental group read this
complex version, while the other half of each group read
the easy-grammar text. Even after controlling for variance
due to pretesting, there were significant differences
between the means of the experimental and control groups on
the recall exam, but no significant differences between the
syntactically easy and hard scores. The researchers

concluded that "in the ESL classroom cultural content is of the utmost importance, and that content may be, and often must be, explicitly taught" (p. 103).

Taglieber, Johnson, and Yarbrough's (1988) research yields further insight into the effect of prereading activities in EFL. In the study, three prereading activities, plus a control condition, were utilized. All forty subjects read each of the four passages, but under varying treatments. Before reading, the subjects not in the control condition received training in either pictorial context, vocabulary, or prequestioning. After reading, the subjects completed both open-ended and multiple-choice examinations. Subsequent statistical analysis revealed that all prereading activities produced markedly improved scores on the multiple-choice measure. It was speculated that the open-ended examination produced no significant results because of the time constraints and difficulty in recalling in a foreign language. The researchers assume that relatively higher mean scores for pictorial context and prequestioning compared with the means for vocabulary preteaching indicate the presence of a compensatory effect. The method of vocabulary teaching was noted as a possible cause for the lower scores.

Schematizing as Interactive Reading

The interactive nature of the reading process is further reviewed by Swaffar (1988). As with several other reading theorists, by "interactive" Swaffar actually means

"schematizing." To be sure, Swaffar mentions the top-down and bottom-up processes. Yet, the emphasis on the role of the reader's knowledge emerges as central in this study. The boldest assertion in this direction may be: "What is understood depends on the reader rather than on the text" (p. 124). Other strong remarks to this effect include: "One strong interactive component can compensate for a weaker one", and "Limited command of language is not an insurmountable barrier to L2 reading" (p. 125).

Citing an instance when a student interpreted the German word "Wald" (woods) correctly in one context, but mistook it for "world" in another, Swaffar states that schematizing may overpower word meaning in L2 reading because the surface representation (lexicon and syntax) of a passage is less important than background knowledge to comprehension. The problems posed by a lack of knowledge of appropriate rhetorical patterns are noted as well. Whereas inadequate proficiency in the language poses real reading problems, Swaffar argues that "L2 students rely more heavily on these factors [background and formal schemata] than do native language readers" (p. 129).

Nevertheless, Swaffar supposes that a bare minimum vocabulary (2,000 to 5,000 words) seems logically necessary in order for the L2 reader to engage in even "ballpark guessing." Because so many texts use metaphorical language, L2 readers must also be trained to comprehend semantic extensions (p. 131). There is evidence that syntax and

lexicon play virtually equal roles in reading. Subjects
with reduced ability in either area showed limited gains in
reading compared to subjects with more balanced syntactic
and vocabulary knowledge. The two variables must be seen as
interactive. In sum, Swaffar finds the L1 and L2 reading
process to be highly interactive, and a part of
communicative language learning (p. 140). Because reading
is above all a reasoning task (albeit connected to a
language task), prereading is paramount (p. 141).

Summary

The application of schema-theory has advanced our
understanding of L2 reading. Insight into the role of
background knowledge in the reading process has been
gained. Even when the L2 reader literally understands
every word in a passage, the overall meaning may prove
elusive because of insufficient cultural background
information. In order to fill this gap, second-language
reading teachers have pretaught cultural information.
Similarly, L2 readers may lack knowledge of L1 structural
patterns. Explicit preteaching of rhetorical patterns has
proven successful. On the other hand, preinstruction in
vocabulary and grammatical patterns has not proven useful.
It has been hypothesized that induced schemata may increase
reading comprehension. Further, the compensatory theory
specifies that background knowledge compensates for the
reader's vocabulary, syntactic, and other linguistic
shortcomings in a second language. There is no evidence,

however, to support the compensatory theory. Whereas some studies (Carrell, 1985; Barnitz, 1986) support the idea that preteaching background knowledge and rhetorical patterns may improve reading comprehension, there is a lack of research to show that L2 readers compensate for vocabulary limitations by use of pretaught topical information. Barnitz' comment that several variables (including language ability) may interact in reading seems valid. Yet there is no positive evidence that vocabulary comprehension and background knowledge, for example, are indeed interactive variables. Swaffar's suggestion that there may be a "bare minimum" language ability requisite before top-down processing may be used appears to be logical. Nevertheless, such comments are merely speculative. Schemata knowlege undoubtedly affects the reading process. Yet this fact does not necessitate the slighting of bottom-up processing in L2 reading models.

STUDIES ON THE EFFECT OF VOCABULARY IN L1 READING

Marks, Doctorow, and Wittrock (1974) examined more than two hundred sixth graders to determine if varying the frequency of difficult (unknown) words would significantly affect comprehension. The authors hypothesized that "even a few minor variations in meaningfulness, such as inserting a few words that are well understood, can be sufficient to enhance the comprehension of the total story" (p. 259). Word difficulty as measured by word frequency is posited to be vital to readability. Five stories from the sixth grade

level of SRA were adapted as materials. Fifteen percent of
the content words in the reading materials were altered.
Half of the paragraphs became "difficult", and half were
rendered "easy" by word substitution. The frequency of the
substitution words was determined by referring to Carroll,
Davies, and Richman's Word Frequency Book. Even the low
frequency words occur in sixth grade readers, however. The
hypothesis was supported by a MANOVA at the .05 level. The
mean increase in comprehension under the "easy" vocabulary
treatment as tested reached twenty-five percent as correct
answers averaged forty-two percent on the low-frequency
versions and sixty-seven percent on the high-frequency
versions of the reading materials. The authors remark that
"specific words in sentences [have] important, integral
messages within themselves" (p. 262). Such messages are
responded to by the reader in a non-linear way. Because
significant increases in reading comprehension can be
achieved by the use of higher-frequency vocabulary,
children's reading materials should be carefully adapted.

When Vocabulary Preteaching May Not Help

Jenkins et al. (1978) conducted a series of experiments
to ascertain the effects of vocabulary instruction on
vocabulary and reading comprehension. In three experiments
involving learning disabled and non-disabled school-age
children, the researcher found that vocabulary could be
learned through as little as two hours of direct
instruction. Subjects were drilled on synonyms and allowed

to make inferences. Most students acquired some vocabulary from the instruction, although the learning-disabled children required more training and showed reduced gains. Although most subjects evidenced increased comprehension at the sentence level, little effect was indicated at the passage comprehension level due to training. Jenkins concludes that the importance of vocabulary to over-all reading comprehension may be overrated. Nevertheless, vocabulary training does appear useful to vocabulary learning.

Jenkin's study may not prove the importance of vocabulary knowledge to reading, but it does underline the depth of vocabulary comprehension necessary in order for reading comprehension to be improved. Mere awareness of synonym matches may not be enough to increase reading comprehension. As the following research reveals, the reader must have several available associations for vocabulary items in order to process text efficiently.

In-depth Vocabulary Knowledge and Reading Comprehension

Anderson and Freebody (1981) have contributed an excellent summary on vocabulary and reading comprehension. This work particularly investigates readers' knowledge of word meanings. It is suggested that the number of meanings a reader attaches to a lexical item strongly predicts discourse comprehension. Merely knowing a single synonym match for a word does not facilitate reading. In such an instance, retrieval is slow and uncertain, and the whole

reading process readily fails as the reader's attention turns from the topic to the grasping of a difficult or elusive vocabulary item.

The authors cite the "most robust" connection between vocabulary and intelligence, with reported correlations exceeding .90. Studies linking vocabulary to reading exhibit correlations from .41 to .93, regardless of reader-age or language. Readability analyses also underscore vocabulary, and some find it to be eighty percent of variance (r= .90). Why does vocabulary comprehension greatly affect reading? The instrumental hypothesis holds that word knowledge enables readers to comprehend text. Adherents to the aptitude hypothesis claim that superior readers read better and have better vocabularies because these readers are more apt. The knowledge hypothesis reads that persons who know the culture well also know more vocabulary, and it is this understanding of culture which largely enables reading. Reading teachers who believe the aptitude position would be rather fatalistic about their students' prospects. Instrumentalists might favor direct instruction of vocabulary. And knowledge proponents would propose wide reading experiences.

Anderson and Freebody (1981) show that learners grasp only part of the meaning of new words at first. For example, young children may know that "sell" corresponds to "give", but they may not realize that the seller also obtains something in the bargain. Vocabulary knowledge

deepens over time as nuances follow broad distinctions of
meaning. Perhaps because of this depth of word knowledge,
and also due to the existence of roots and derivates,
estimates of individuals' vocabulary size vary wildly. One
researcher (Seashore, 1933) estimates college sophomores'
vocabulary to be 15,000, while another (Hartman, 1946) cites
200,000. Anderson and Freebody note that another problem in
estimating vocabulary size is the unbalanced distribution of
words by frequency. Whereas 2,000 words may account for
ninety-five percent of words, forty percent of the words in
one sampling occurred once. More frequent words are likely
to be known. They conclude that although vocabulary
knowledge is significantly correlated to reading
comprehension, it may be impossible to determine how many
words a person knows. Perhaps our static idea of isolated
words renders our measurements ineffective.

The Effect of Difficult Vocabulary on Reading Comprehension

Freebody and Anderson (1983a) have investigated the
effect of difficult vocabulary on reading comprehension in
a series of studies. In the first experiment, one hundred
sixth grade children read in three treatments. Whereas one
passage contained high-frequency words, another had low-
frequency words substituted for every third content word,
and the third version replaced one content word in six with
a more difficult synonym. Replacement words were selected
by intuition, and the passages were taken from a social
studies textbook for sixth graders. Reliable effects for

reduced comprehension were not found for the easy word or for the intermediate condition. Only in the condition with one difficult (rare) word per three words was a significant lowering of comprehension scores found. The experimenters guessed that the readers may not have been bothered by encountering one difficult word in six because some of the words occurred in supporting rather than main information positions.

To control for this effect, Freebody and Anderson conducted a second experiment on the effect of difficult vocabulary in unimportant and important propositions. When rare vocabulary occured in trivial propositions, students' retrieval of main ideas was facilitated, perhaps because subjects simply did not process sentences with difficult vocabulary. The effect of rare words in important propositions is unclear, although sentence recognition was impaired compared to the easy condition. It was found that a high proportion of low-frequency vocabulary is necessary to significantly impede the reading process. This may be due to insensitivity of measurement and the normal redundancy of text. School text authors, however, may not include rare words unless they are especially needed. Thus, difficult words may not occur often in trivial propositions. The experimenters suppose that readers read around difficult words, if at all possible, in their attempts to reconstruct text. In additon, the readers may not have found the words as difficult as it was supposed.

The Effects of Vocabulary and Schema on L1 Reading

Freebody and Anderson (1983b) have extended their research to include the effects of difficult vocabulary, cohesion, and schema. Both studies cited herein relate to the interactive theory of reading, yet neither experiment supports it. The hypothesis for the first experiment states that "difficulty will have minimal effects on comprehension when cohesion is high, but that, with decreasing cohesion, the effects of difficult vocabulary will become less pronounced" (p. 281). Eighty fourth graders read three passages from fifth grade social studies texts. The high-cohesion version of the text was created by using even more repetitions and simplified substitutions than were employed in the natural text; the low-cohesion versions had less explicit ties (produced by using more pronouns and ellipsis and by avoiding the use of connectives). A third "inconsiderate" version was formed by inserting extraneous propositions in the text. Difficult synonyms were then inserted in some versions, thus creating a total of six textual versions (three levels of cohesion and two levels of vocabulary). Half of the subjects read the difficult-vocabulary versions, and half read the easy-vocabulary texts. All students read texts at all three levels of cohesion. After reading, students took a multiple-choice vocabulary test, wrote a brief summary, and completed a sentence-verification task over important ideas, unimportant ideas, and ideas not in the text.

The amazing result of the multiple regression analysis is a perfectly null F value ($F < 1.00$) for interaction between the variables of vocabulary and cohesion! Performance improved in the easy vocabulary treatment, and "inconsiderate" text negatively influenced reading comprehension. Lack of cohesion did not yield lowered scores, except in particular sentence measures, showing the consequences of a processing load factor, which makes reading more difficult, but does not seriously impede it. But vocabulary showed a direct effect on comprehension, exhibiting "no interactions with ability, passage, position, or cohesion levels" (p. 286). Freebody and Anderson speculate that vocabulary and cohesion affect the reader differently. When readers encounter hard words, they may skip them, so that the load factor is not increased. Lack of cohesion, however, is less obvious. So the reader plows through incohesive text, and experiences loading.

Are Schemata and Vocabulary Interactive Variables?

In the second experiment cited, Freeman and Anderson investigate the relationship of schemata knowledge and vocabulary. Topical and vocabulary knowledge have been found to correlate to reading comprehension. The researchers hypothesized that a significant interaction could be measured between the two variables. Eighty-eight sixth graders read a familiar and an unknown passage, with vocabulary difficulty held as a between-subject variable.

The main hypothesis was not supported by analysis, as the vocabulary by familiarity interaction was insignificant in all measures ($F<1.00$). Easy vocabulary versions were read better, although not generally at a significant level. Familiar versions were also better remembered. The main finding of both experiments is that no support was gained for the compensatory or interactive view of reading. No matter how probable such a theory may seem, this research does not show that readers use strengths in schemata to compensate for vocabulary, or vice-versa.

Preteaching May Not Overcome Difficult Vocabulary

Stahl and Jacobson (1986) also have examined the connections between vocabulary difficulty and topical knowledge. In this study, sixty-one sixth graders read easy or difficult versions of one text. The research varies from that of Freebody and Anderson in that it included cultural preinstruction to specifically control for amount of prior knowledge. An obscure topic was deliberately selected for the reading passage. A difficult version was created by substituting for about every third content word. Multiple-choice and sentence-verification tests were developed to measure explicit, implicit, and sentence-level comprehension. Subjects were divided into two groups and given either relevant or irrelevant preteaching. A vocabulary-by-preteaching multivariate analysis of variance and one way ANOVA to detect significant sources of variation were utilized. The effect

of vocabulary was highly significant on the MANOVA (p<.001),
while that of preinstruction yielded significance at the
lowest level (p<.05). The authors found that "preteaching
improved comprehensioin but did not overcome the effects of
vocabulary difficulty" (p. 316). Because no significant
interaction between preteaching and vocabulary was found,
the compensatory view was not supported.

Attempts to Find Interaction Between Vocabulary and
Schemata

Interest in the interactive effect led Stahl, Jacobson,
Davis and Davis (1989) to readdress the issue in three
experimental studies. In each of the studies, the
researchers attempted to find interaction between
vocabulary and prior knowledge, but failed, although
vocabulary and background knowledge were found to be
independently significant variables. Ninety sixth graders
from four classes were assigned to groups for either
pertinent or irrelevant preteaching in study one. After
reading either an easy- or a difficult-vocabulary version
of text, subjects took free-recall, multiple-choice, and
sentence-verification tests. The free-recalls were divided
into pausal units, and rated as main ideas, details, or
distracting ideas. Multiple-choice questions were
classified as textually explicit, implicit, or inferred
from prior knowledge. In the sentence-verification,
subjects merely indicated whether propositions were from
the text or not. To test for the effect of preteaching,

two of the groups were given correct preinstruction regarding the text, whereas two groups were provided irrelevant preteaching. Analysis revealed that both vocabulary and preinstruction significantly affected the comprehension of main ideas and supporting information, but there was no interaction between vocabulary and preinstruction. Difficulty with vocabulary seems to have disrupted the structuring of a "coherent text base" (p. 36). Incorrect prior knowledge appears to have affected which information readers focus on. Thus, interaction may not occur because the variables operate independently.

To determine whether prior knowledge affects sentence-level recall, the researchers created a cloze test. Prior studies had indicated that cloze is sensitive to sentence comprehension, but not to discourse comprehension. It was hypothesized that preinstruction would not affect cloze scores, but that vocabulary would. Again 92 sixth graders were chosen, but this time to complete either difficult- or easy-vocabulary versions from which every fifth word had been deleted. Once more, two groups received pertinent preinstruction, while two others received misinformation. Analysis showed that neither preteaching nor interaction were significant, albeit preinstruction neared significance (p<.10). Vocabulary had a very significant effect (p<.01), as expected. The replacement of function words was also impeded in the difficult -ocabulary condition. This result indicates that

vocabulary difficulty can impair the construction of coherent text base because function words signal sentence connections. Perhaps because the difficult vocabulary in this passage was general in nature, preteaching did not affect the replacement of content words.

Study three was conducted to examine two further hypotheses. First, it was hypothesized that the recall of the order of events from a passage would be affected by vocabulary difficulty. Second, it was supposed that preteaching would affect the causal relations measure, which depended on inferences. Ninety-nine sixth graders from four classes read the same passages, but were given a sequencing, a multiple-choice assessment of causal- relations test, and an importance-rating task. Analysis found the effect of vocabulary significant (p<.03), but no effect was found for preteaching or interaction for the event-ordering and causal-relations measures. In the importance-rating test, preteaching was significant (p<.02), but vocabulary and interaction were not. The authors conclude that whereas vocabulary and preteaching may be found to affect comprehension independently, there appears to be no interactive or compensatory effect. The researchers conclude that "vocabulary difficulty affects a very literal comprehension of the text" (p. 40). On the other hand, preteaching may have more affect on summarization, or the more selective process of tagging propositions as important, as it affects knowledge.

The Relationship of Difficult Vocabulary to L1 Reading

Studies in first language reading support that the presence of difficult (low-frequency) vocabulary may affect reading comprehension significantly. Unknown vocabulary correlate strongly to low frequency. It may be that missing the meaning of difficult words, some of which bear "compressed meaning", causes comprehension problems. Such words are utilized because one word serves to convey meaning which otherwise would have to be expressed in several words. Schemata knowledge does not seem to help readers process difficult-vocabulary text.

VOCABULARY AND PRIOR KNOWLEDGE IN SECOND-LANGUAGE READING

As in first-language studies, there has been considerable interest in the effect of vocabulary and background knowledge in reading in a second language. The parallel is not exact, however. For whereas first-language researchers continue to examine the role of difficult vocabulary as well as schemata in reading, in L2 reading such research has become scarce. There are some early papers on vocabulary in ESL which shall be cited first.

An Emphasis on Vocabulary in Earlier L2 Reading Studies

Twaddell (1973) recommended that vocabulary be expanded through extensive experience in the target language, and not by artificial vocabulary exercises. His basic argument was that massive vocabulary learning is practical only by this natural method, and that "the indispensable [aspect]

of FL [foreign-language] acquisition" is vocabulary
expansion (p. 64). Given the polysemy of words, glosses
provide at best merely a beginning point for second-
language reading. Because of the large number of
low-frequency words, "sensible guessing" is the best way to
acquire vocabulary. Teachers should accept and even expect
a "temporary vagueness" in learner's answers.

Eskey (1973) remarked that the reading teacher must give
indirect instruction in reading components such as syntax,
lexicon, cultural information, and rhetoric, "since no one
knows what reading is or how readers do it" (p. 169). His
comments are quite progressive, as they anticipate current
interest in preteaching both prior knowledge and rhetorical
text patterns in L2 reading. Eskey underlines the
importance of vocabulary in reading, and suggests that it be
directly taught and then reinforced by extensive reading.
Cloze is also recommended to promote the acquisition and
testing of various reading skills.

Do Language Deficiencies "Short-Circuit" L2 Reading?

Clarke (1979) introduced the concept of the
"short-circuit" effect in his study of good L1 readers who
became poor readers in English due to language
deficiencies. Good reading skills may not transfer into
the L2 when the reader's basic competence is below a
critical level. The research Clarke investigated
emphasized the importance of teaching reading as "a
psycholinguistic guessing game". However, "attempting to

teach someone to use the phonemic, morphemic, syntactic, semantic, and discourse cues of the language before he has learned what they are . . . seems unrealistic" (p. 139). Clarke finds that L2 reading teachers must teach both language skills and reading skills. He remarks on the weaknesses of assuming that oral miscues produced in oral reading parallelled those made in silent reading. Flaws in retelling procedures constitute another methodological problem, as subjects simply may not tell all they know. Cloze tests appear to be very useful tools in determining reading comprehension.

Perkins (1983) recognized the potential hazards of linguistic interference to the second-language reading process. Perkins researched the degree of inferential misrecognitions of forty simple locative/spatial sentences. The forty-three beginning, intermediate, and advanced level adult subjects were asked to mark sentence matches as true statements, false statements, true inferences, or false inferences. An ANOVA indicated that the degree of misrecognition was significant (p<.01) between groups. Beginning and intermediate readers made significantly more misrecognitions than advanced readers. The implication from the research is that (advanced) readers who completely process a text understand its implications more than those (beginning- and intermediate-level readers) who process less fully.

Devine (1987) indicates that overall language

proficiency correlates positively with L2 reading ability. Low general competence in the target language imposes a "linguistic limit" on second-language reading. To verify this assumption, an on-going study of the general L2 proficiency as well as of the L2 reading competence of twenty beginning-level ESL students was conducted during the 1982-83 school year. The subjects were given three tests at three-month intervals. The findings support that "increasing language competence correlates positively with increases in syntactic and semantic acceptability of oral reading miscues" (p. 83). Students who improved in holistic test scores also tended to show increased reading ability. Interestingly, the good readers in this study did not change from dependence on syntactic cues to reliance on semantic ones. They continued to utilize both types of information. Furthermore, subjects did not attend less to processing visual cues as their ability to consider textual meaning improved. Both findings support the view that, despite emerging L2 reading proficiency, bottom-up processing is not replaced by top-down processing.

The Importance of L2 Vocabulary to Academic Achievement

In a study of which variables count most in second-language learning, Saville-Troike (1984) rates vocabulary as very important for academic achievement. Although the children in this study began the school year with similar English competencies and were from comparable socioeconomic groups, by the end of the year their academic achievement

varied considerably. Several variables were examined to determine the causes of this result, including oral proficiency, home-language influence, personality, and attitude. The subjects were nineteen children attending ESL and content area classes at the elementary school level. Tests show little correlation between subjects' spoken grammaticality and academic achievement. The one oral feature which did match achievement is "the number of different vocabulary items each child used" in the interviews (p. 207). Tapings of ESL sessions throughout the year reveal that the childrens' expressions were often ungrammatical, yet "grammar was never corrected when real communication was at stake" (p. 211).

Saville-Troike concludes that if teachers are most concerned about students' school achievement, then they must know that vocabulary is paramount for content learning. Spoken practice, grammar exercises, and social interaction may not be as valuable as learning the appropriate content terms for L2 reading and listening. Furthermore, the subjects who learned the most had the chance to talk about what they were learning in their native language, which suggests a strong need for a bilingual approach whenever feasible.

Why Vocabulary Has Been Underrated

Carter's review (1987) generalizes that "for many years vocabulary has been the poor relation of language teaching. Its neglect is in part due to a specialization

in linguistic research on syntax and phonology" (p. 3).
Especially in Great Britain, however, there is something of
a revival of interest in vocabulary teaching. Direct
learning is appropriate for beginners, but after learning
the core 2-3,000 words, the learner must use indirect,
context-based, inferential strategies to learn the vast
range of infrequently encountered items. Lexical cohesion,
the relations between surface features in the text, and
coherence, the relationship of ideas represented in the
text, have been distinguished. Also, cloze is being
extended to the level of discourse by the deletion of
communicative units. Although some work is being done in
vocabulary studies, much more remains before it will reach
the level of sophistication of other areas of linguistic
research. Thus, it is likely that L2 studies will continue
to highlight variables other than vocabulary in the reading
process.

On the basis of his own research, Diller (1978)
contends that college students recognize more than 240,000
words. He finds that a base vocabulary of 10,000 words
forms an adequate matrix for learning new vocabulary in
context. An advocate of direct methods of language
learning (and a critic of structural methods), Diller
believes that vocabulary can be taught and learned. He
proposes that too much time is devoted to developing
sentence patterns and too little attention is given to
learning vocabulary in meaningful and grammatical context.

Eskey (1988) also has taken note of the disproportionate interest in top-down rather than bottom-up processing in L2 reading studies. This researcher supports the psycholinguistic model, but believes its advocates have gone too far in deemphasizing "the perceptual and decoding dimensions of that process" (p. 93). Although encouraged by the appearance of the interactive model, Eskey has been equally disappointed in the practical implications of this position. Once again, the proponents of this model emphasize the role of top-down processing to the exclusion of any investigation of bottom-up processing. Eskey notes that "language is a major problem in second language reading, and . . . even educated guessing at meaning is no substitute for accurate decoding" (p. 97).

REVIEW SUMMARY

Although second-language reading teachers probably have maintained their interest in bottom-up processing, most recent research has highlighted top-down processing. The terms have changed from the Psycholinguistic Model to Schema-theory to Interactive Reading, but the basic emphasis on reading as educated guessing has not. Of course, L2 readers process text "behind the eyeball". Cultural background information as well as knowledge of text structure are undeniably useful to the reader. The good second-language reader, similar to the good first-language reader, uses several cues to process text.

The Compensative Theory, however, lacks support.

Because background information may be pretaught successfully, it has been assumed that prior knowledge enables readers to overcome linguistic deficiencies. Repeated attempts to find evidence of L1 readers' making up for linguistic limitations by recourse to top-down processing strengths have failed. There is no evidence of interaction between vocabulary and either cohesion or schemata. Furthermore, preteaching content information does not enable L1 readers to overcome problems in comprehending text with difficult vocabulary. No such studies have been conducted in L2 reading.

There is evidence for a linguistic "short-circuit" in L2 reading. Readers who lack sufficient bottom-up processing skills may be unable to read even texts about which they possess topical knowledge. Vocabulary comprehension in the target language has been correlated to both reading comprehension and overall academic success. The popularity of educated guessing over accurate decoding, however, has resulted in the devaluation of vocabulary as a cue in L2 reading.

Purpose of the Study

There is a gap in L2 reading research as to whether the activation of topical knowledge enables readers to comprehend text with difficult vocabulary. Although researchers (Swaffar, 1988; Hudson, 1982; Barnitz, 1986) have supposed that strengths in top-down processing may compensate for weaknesses in bottom-up processing, there

have been no investigations of this hypothesis. It is the purpose of the present study to investigate the effects of schema-activation and difficult vocabulary on reading comprehension in a second language. Schema-activation is believed to facilitate L2 reading comprehension (Taglieber, Johnson, and Yarbrough, 1988). Difficult vocabulary may disrupt the processing of L2 texts (Barnitz, 1986; Carter, 1987). In this study, it is assumed that both schema-activation and a lack of difficult vocabulary facilitate L2 reading. The following hypotheses regarding the relationship between schema-activation and difficult vocabulary in L2 reading were formulated:

1. L2 readers who receive schema-activation will achieve significantly higher reading comprehension scores than readers who do not receive schema-activation.

2. L2 readers who process passages with difficult vocabulary will attain significantly lower reading comprehension scores than readers who process passages without difficult vocabulary.

3. L2 readers who receive schema-activation and read passages without difficult vocabulary will achieve significantly higher reading comprehension scores than readers who process texts under all other conditions (with schema-activation and with difficult vocabulary; without schema-activation and without difficult vocabulary; without schema-activation and with difficult vocabulary).

CHAPTER THREE

METHOD

It is the purpose of the study to investigate the
effects of schema-activation and difficult vocabulary on
reading comprehension in a second language. Previous
thinking suggests that schema-activation via pre-reading
activities may facilitate L2 reading comprehension. It also
has been thought that texts with difficult vocabulary may
"short-circuit" the reading process. To probe these
assumptions, a study with a Repeated Measures, two-way
design (subjects by experimental treatments) was used to
compensate for the relatively low number (twelve) of
subjects in the study. In this method, all experimental
treatments are administered to all subjects. The four
variables in this study are with or without schema-
activation (warm or cold) and with or without difficult
vocabulary (difficult or easy). The subjects read passages
under four treatment conditions: (1) Easy/Warm, (2)
Easy/Cold, (3) Difficult/Warm, and (4) Difficult/Cold.

SUBJECTS

The subjects in the study comprised the entire
population of an advanced-level ESL reading class in a
small Midwestern university. Their TOEFL scores ranged
between 450 and 500. Advanced-level L2 subjects were

selected purposely to examine the use (or disuse) of
bottom-up and top-down processing by good readers. It has
been supposed that beginning and intermediate-level L2
learners rely heavily on bottom-up processing. Advanced
learners, however, are thought to depend more on top-down
processing (Swaffar, 1988). All subjects had been admitted
into the university on the basis of their English
proficiency scores and other qualifications. Each of the
students was taking both ESL and content area courses in the
university, either at the undergraduate or graduate level.
As in many other intensive ESL classes in a college
environment, members represented a variety of linguistic and
cultural groups. A subject who spoke French came from
Haiti. There were two speakers of Spanish: one from Puerto
Rico, the other from Mexico. Six of the subjects hailed
from Japan. The three Portuguese-speaking subjects were
Brazilians. The subjects had been in the United States less
than two years. The shortest period of stay was just four
months. Most of the students had been living in America for
at least seven months at the time of the study. All
subjects had taken at least one intensive, ten-week session
of ESL at the university previous to the time of this
study. Although there were 18 class members in all, the
scores of those subjects who did not attend all four
sessions connected with the study were dropped. Thus, the
number of subjects in the final data analysis was twelve, as
indicated above in the nationality information.

Subjects ranged in age from eighteen to twenty-seven. There were four males and eight females in the final count. In the opinion of the classroom instructor, none of the students had a "reading problem". All were judged to be competent ESL readers. The subjects were aware that they were volunteering for a research project. None, however, knew the exact nature of the study, or of the research hypotheses until after all data had been gathered.

READING MATERIALS

The nature of the study required that both difficult- and easy-vocabulary versions of all reading materials be available. It was determined to adapt materials from existing ESL reading passages. The general procedure followed was modeled on the procedure used by Stahl, Jacobsen, Davis, and Davis (1989) with native speakers. To control for vocabulary differences alone, it was necessary to adapt content-identical versions of one text. It would be advisable also that the reading passages be taken from an ESL reading textbook, because such materials would be at approximately a suitable linguistic and conceptual level for the typical ESL reading student. To this end, four passages from Between the Lines (Zukowski/Faust et al, 1983), a commonly used, intermediate-advanced level ESL reading text, were selected. This text had previously been used with success with intensive ESL classes at the advanced reading level; it was assumed that the material would present no special problems to the readers.

Adaptation of the Reading Passages

Without special vocabulary training, the passages in the particular units selected might be difficult for the subjects because these materials were used as a basis for learning advanced vocabulary. Because the vocabulary exercises found in the text were not included, it was expected that the original passages would provide a suitable starting point for the creation of a difficult vocabulary reading version. To control for topical knowledge, passages about which prior classes of students had displayed little background knowledge were chosen. As expected, students' comments during the course of the study revealed that they had little prior knowledge of the topics of each of the four passages. The passages were technical, rather than general or narrative. Topics included the structure of the earth, earthquake prediction, deforestation, and the social consequences of overpopulation. It was believed that such topics would engage the young adult readers' attentions, and permit a valuable check of their reading comprehension potential. Similar previous first-language studies had used selections from social studies also. This area of study had been chosen to control for prior knowledge. In the L1 studies, however, the materials had not been consciously created to teach vocabulary. Both the selection of reading materials and the manner of their adaptation were patterned after the earlier study, despite the slight differences noted.

The original passages were judged to be somewhat
lengthier than appropriate to the time constraints involved
in the study. Since several steps had to be executed within
the time-space of a fifty-minute class period on each of the
four days needed in the study, the passages needed to be
short enough to be read in twenty minutes or less.
Therefore, the original texts were condensed to fill one
single-spaced page, and contained approximately 400 to 500
words each. The language, basic structure and style of the
originals were maintained in general. Nevertheless, some
syntactic and rhetorical simplification inevitably resulted
from the summarizing process. The number of paragraphs per
passage was reduced from as many as eleven to a maximum of
six; the goal being to produce a comprehenisible
five-paragraph essay. Paragraphs in the adapted version
were limited to no more than seven sentences. At times,
complex sentences were made simple by the deletion of
dependent clauses. All the same, the adapted versions of
the original texts retained much the same style and even
wording as the original. To ensure that the adapted texts
maintained overall coherence, the passages were checked for
coherence and overall readability by a native ESL
professional.

Vocabulary Pretests

After the four passages had been condensed, they were
scanned for apparently difficult words. The vocabulary in
the original text were assumed to be difficult, as were any

other items which had been found troublesome in previous
instructional use of the text. Next, an objective
instrument was developed to verify assumptions regarding
difficult (unknown) and easy (known) vocabulary. The two
pretests were both multiple-choice vocabulary measures. The
first multiple-choice examination contained vocabulary from
the "Earth Structure" and "Earthquake" reading passages.
The second vocabulary test measured the subjects' knowledge
of difficult lexical items in the "Deforestation" and
"Overpopulation" selections. On the tests, subjects were
required to read sentences in which the word in question had
been underlined. Next, students were to select the
equivalent word from among the four alternatives listed
below it. The underlined item was believed to be a
difficult vocabulary term, but the correct alternative was a
common vocabulary item which the subjects would be likely to
be familiar with.

The twelve subjects completed both vocabulary measures.
Analysis of results from the vocabulary pretest showed that
over 50% of the responses were incorrect matches for
vocabulary items which had been assumed to be difficult.
This low rate of correct matches was interpreted as support
that these vocabulary items were difficult for the
subjects. Easy vocabulary items were verified by correct
matches of at least 60% of responses. This higher rate of
correct responses was taken as an indication that these
vocabulary items were less difficult for the subjects.

Only three of the items assumed to be difficult (unknown) were found not to be so on the objective measure. Where differences occurred between the researcher's judgements and testing, the objective measure was assumed to be correct. Experience suggests that L2 subjects at times possess knowledge of uncommon words, yet exhibit complete unfamiliarity with words common to native speakers. Thus, the vocabulary items identified as "difficult" are simply the words which the subjects in this study did not know. No attempt was made to find why one word was known while another word was not known.

Easy- and Difficult-Vocabulary Versions of Passages

Having thus identified difficult vocabulary items, it remained to design both easy- and difficult-vocabulary versions of all four reading passages. Because the original passage was written to teach difficult vocabulary and was at a high vocabulary level, the first condensed version served as the difficult-vocabulary form, with very minor adjustments to ensure the pre-selected spacing of difficult vocabulary items. The difficult-vocabulary version was found to contain an unknown vocabulary item at about every sixth content word. This condition closely paralleled that of the difficult-vocabulary version in previous L1 studies, although some researchers had not found significant effects for vocabulary difficulty at less than a one-in-three ratio (Freebody and Anderson, 1983a). Unknown words for L1 readers may be technical as well. It

was determined to use unknown, but not necessarily technical
vocabulary in this study. Such items were selected so as to
create a check which was not dependent on a narrow-range of
vocabulary. Whereas some difficult words were technical
("plate tectonics" and "deforestation"), in most cases the
difficult word could be classified as general ("transpire"
and "bountiful"). Moreover, the passages themselves had
been written with a general rather than a technical audience
in mind. The design of the non-difficult vocabulary
versions was accomplished by substituting words rated as
commonly-used in place of most of the difficult words.
Words which were intuitively rated as "difficult" by the
agreement of two ESL professionals were counted as
difficult. Subsequently, a weak mixture of difficult
vocabulary words (one in fifteen) was inserted into the
"easy"-vocabulary versions, and a somewhat higher proportion
of difficult words (one in six) was utilized in the
difficult-vocabulary versions. The resulting
easy-vocabulary version differed from the difficult version
in that it had a difficult vocabulary item at intervals of
fifteen content words, as opposed to the difficult version's
ratio of one-to-six. Easy- vocabulary versions thus had a
lower density of low-frequency (unknown) lexical items than
did the difficult-vocabulary forms. Thus, two
content-identical, but lexically variant forms of each
reading passage were developed. Each easy- vocabulary
passage was matched with a difficult-vocabulary version.

Each set of passages contained an identical number of thought or pausal units, and indeed had much the same wording overall. The differences between the paired passages were due to vocabulary alterations only; no other changes were made. In their final form, the reading materials consisted of four pairs of (or eight) reading passages on four different topics.

POSTTESTS

Three tests were developed to measure reading various aspects of reading comprehension in a second language. The first was a cloze measure. The cloze was created by selecting two or three of the body paragraphs from all four passages. The subjects who had read the easy version might score higher due to better reading comprehension. But it was not believed that such advantage would be substantial, since both versions contained identical content. To guard against giving readers of either version an advantage, cloze deletions were selected from items which appeared on both versions. In all cases, deleted cloze items were content words. The purpose of the study was to measure the effect of difficult vocabulary on L2 reading comprehension. Therefore, it was not intended that the cloze test itself should be an intrinsically "difficult" exercise. A "difficult" cloze bearing a deletion ratio of one-word-in-five was not used. On the other hand, using a blank ratio of one-word-in-ten might lengthen the measure, and the time consumed, unnecessarily. Cloze deletions were

made at every seventh content word as this frequency
mediates between the normal boundary rates of one-in-five
and one-in-ten. The cloze instrument had been found useful
especially in measuring sentence-level comprehension in L1
studies (Stahl and Jacobsen, 1986; Freebody and Anderson,
1983b), and was expected to serve the same purpose in this
study. To control for judgement disagreements, only the
words listed in the text (exact matches) were accepted as
correct on the cloze tests. Nevertheless, mis-spelled words
were allowed if they were decipherable.

The Written-Recall Measure

The second posttest was a written-recall measure.
Whereas it was believed that the cloze would provide a very
particular measure of the subjects' recall at the sentence
level, the written recall was intended as a more global
check of comprehension of main propositions and of
details. To this end, students were specifically enjoined
to write what they deemed to be central to the passages, as
well as pertinent supporting information as time would
allow. No particular length of written recall was
prescribed, but the proctor, who was also the classroom
instructor, asked the subjects to write as much as possible
during the allotted time. Ten minutes were allowed for the
written recall. Apart from these conditions, the written
recalls were open-ended measures of reading comprehension.

To prepare to judge the written recalls, it was
necessary to evaluate first the four passages to

distinguish main ideas from supporting details. Using a
procedure suggested by Omanson (1982), two readers
independently divided the passages into pausal units, and
then rated the units as main ideas or supporting details.
Differences were reconciled by the decision of a third
rater. When the two raters disagreed as to the nature of
the pausal unit, the case was sent to arbitration. The
third rater's opinion was then matched with that of another
judge, and the case was decided. Next, the subjects'
protocols were examined. The protocols also were divided
into pausal units, which in turn were rated similarly to
the reading passages. Besides identifying main ideas and
details in the protocols, however, the raters also found
irrelevant information due to incorrect recall or schematic
reconstruction.

The Oral-Recall Measure

The third posttest consisted of an oral-recall
measure. In this case, subjects were instructed to recall
once more any main ideas or supporting information from the
reading passages. The subjects readily responded to this
prompt. Yet, after offering from two to four pieces of
information, most of the subjects abruptly stopped. The
non-verbal message of the subjects at this point seemed to
indicate that they were uncertain whether they had
"fulfilled" the requirements of the study. It seemed that
the subjects were following ordinary oral-discourse
patterns in which a single question does not elicit

numerous or extended responses. As the subjects' store of information did not appear to be exhausted, students next were prompted to supply more data. Every attempt was made to avoid turning the student's answer in any particular direction. Prompts were made purposely vague, such as "Can you remember anything else?" and "What do you think was important in the passage?" At times the prompter repeated the subject's last statement, and asked what else might be recalled. It was noticed repeatedly during these oral-recall sessions that the subjects seemed to be attempting to please or satisfy the prompter by giving just enough, without seriously stretching the subjects' memories. Whereas the writer may pause to think after writing a sentence, oral respondents took little time in formulating answers to prompts.

An oral-recall measure had been included in the research design because subjects are known to respond variously to written and oral testing. It was supposed that subjects who supplied little information on one measure might provide more and better data on the other. Obviously, some L2 subjects would possess better spoken proficiency than written, whereas others would have an opposite combination of skills. The use of these forms of recall represented a deliberate attempt to permit subjects to exhibit comprehension by any means possible. In any event, some comparison of written and oral responses thus would be possible. Oral recalls were reduced to transcriptions,

which in turn were analyzed using the same procedure as had the written recalls. Thus, both oral and written recalls were divided into pausal units, compared to the reading passages, and then rated as to number of main ideas, details, and irrelevancies.

PROCEDURES

As this study represents an attempt to analyze the effects of vocabulary and prior knowledge on second-language reading comprehension, it was not only necessary to control for vocabulary difficulty, but also for amount of background information. This was partly accounted for by the use of non-general reading materials, with which the reader likely would be unfamiliar. To further control for prior information, it was determined to supply the experimental group with preteaching, while denying the control group any special warm-up to the topic. This design tests as well the possible effect of the widely practiced technique, in either a first or a second language, of introducing a topic prior to reading .

Accordingly, a script intended to introduce the reading topic was written for each passage. Scripts contained fifty to sixty words relevant to the main ideas in each reading. The preteaching information was scripted so that the researcher could replicate the study, and to control the amount and nature of the warm-up. Approximately three minutes were devoted to the reading of the script at the beginning of each day. Brief explanations of the scripted

material were provided at the subjects' request.

Schema Activation

Upon the completion of this first-phase of the warm-up,
subjects were directed to explore the topic by engaging in
a writing exercise for the remaining seven minutes of the
preteaching period. Without the help of the proctor,
subjects wrote anything which seemed pertinent to the topic
in these prereading exercises. It was expected that the
brief remarks prior to the writing activity would be
adequate to activate the subjects' schema-processors. As
the students contemplated the topic, however, it was
anticipated that some irrelevant information would appear
in the writing samples. Although irrelevant ideas were not
introduced in the warm-up script, it was believed that some
writers would include distracting information inadvertently
in their warm-up essays. These writing samples were
collected promptly at the expiration of the ten-minutes
allotted, and were analyzed later in the same manner as the
written and oral recalls had been. Pausal units were
judged as representing main ideas or details predicting
what would be in the reading passages, as well as
irrelevant to (or not contained in) the reading materials.

While the randomly-assigned experimental group of six
subjects were participating in this pre-reading warm-up
activity, the control group of six subjects were told to
meet outside and were permitted to engage in conversation
in the hall outside the classroom. The control group was

informed that the group in the classroom was receiving
information about the reading topic. Despite the obvious
curiousity of the control subjects, they were not given any
information regarding the nature of the reading passage.

The Treatment Conditions

Each day, each subject read a difficult version without
a warm-up, a difficult version with a warm-up, an easy
version without a warm-up, or a difficult version with a
warm-up. This schedule is represented in Figure 2 below.

FIGURE 2
SCHEDULE OF READING CONDITIONS

	Group One	Group Two
Day One	Easy Vocabulary with Warm-Up	Difficult Vocabulary without Warm-Up
Day Two	Difficult Vocabulary without Warm-Up	Easy Vocabulary with Warm-Up
Day Three	Easy Vocabulary without Warm-Up	Difficult Vocabulary with Warm-Up
Day Four	Difficult Vocabulary with Warm-Up	Easy Vocabulary without Warm-Up

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On various days, the populations of the experimental
and control groups were altered. As noted in Figure 2, the
six subjects in Group One served as the experimental group
by receiving pre-instruction on Days One and Four. This
same population served as the control group by not
receiving the warm-up activity on Days Two and Three.
Similarly, Group Two functioned as the control group on
Days One and Four, but assumed the role of experimental

group on Days Two and Three. To control further for possible differences between the abilities of the groups, the composition of the subjects in the groups was altered after Day Two. That is, half of the subjects in Group One entered Group Two, and three of the subjects of Group Two joined Group One, beginning on the third day of the experiment.

OVERVIEW OF THE PROCEDURE

Apart from the vocabulary pretesting, the experimental design required that the subjects attend four fifty-minute class periods meeting twice weekly for two weeks. Each day, the following procedure was used. First, the class was divided into a control and an experimental group, which division was varied so that all subjects would have participated under all treatments by the end of the study. For ten minutes, the control group idled in the hallway adjacent to the room while the experimental subjects for that day experienced the warm-up activity. Next, the control group re-entered the classroom. The classroom instructor collected all warm-up papers, and passed out the reading passage for the day. One group of subjects received either the easy- or the difficult-vocabulary version as the other student group received the alternate version of the reading passage. Twenty minutes were allowed for reading. No dictionaries or other reference materials were permitted. Proctors were not permitted to give the subjects any help other than testing directions.

The time schedule followed on the four days of the study is
outlined below in Figure 3.

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-------------------------------------------------------------
                         FIGURE 3
               THE TIME SCHEDULE OF THE STUDY
-------------------------------------------------------------
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DAY/ACTIVITIY		1	2	3	4
1.	Group One:	Warm-Up	Easy Reading	Cloze	Written
	Group Two:	None	Diff Reading	Cloze	Written
2.	Group One:	None	Diff Reading	Written	Cloze
	Group Two:	Warm-Up	Easy Reading	Written	Cloze
3.	Group One:	None	Easy Reading	Written	Cloze
	Group Two:	Warm-Up	Diff Reading	Written	Cloze
4.	Group One:	Warm-Up	Diff Reading	Cloze	Written
	Group Two:	None	Easy Reading	Cloze	Written

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```

After the passages were collected, the posttests were
administered. The cloze measure was given first on days
one and four, but the written recall was administered first
on days two and three to test whether the order would
affect recall. The cloze and written-recall tests were
allowed ten minutes each. The oral-recall measure was
conducted simultaneously to the written-recall procedure.
Subjects were taken one at a time from the classroom to
complete the oral-recall procedure. Between three and five
minutes were required to perform each oral recall. To
compensate for the students' consequent loss of time to do
the oral recall, subjects were permitted five extra minutes
after class to complete their written recalls.

CHAPTER FOUR

RESULTS

The data gathered in the study were subjected to three forms of analyses. This initial discussion overviews the more detailed explanation provided hereafter. First, the data from the cloze and written posttests were exposed to a Repeated Measures Analysis of Variance. The ANOVA of both the cloze and written test data reflected that there were indeed significant differences between treatment populations. Further analysis of the data was required, however, in order to ascertain the direction of the treatment variances.

Therefore, a second measurement of the cloze and written test data was employed. The Newman-Keuls Multiple Comparisons Test was used as it enables the identification of several possible differences between combinations of mean scores. This measure yielded the existence of separate treatment populations in both the cloze and written test data. Specifically, the Newman-Keuls test supported that the "easy" vocabulary variable, whether with or without schema-activation, resulted in higher mean scores for reading comprehension on both the cloze and the written posttests. The data of the pretest and the oral recall

63

64

were insufficient for either the ANOVA or the Newman-Keuls analyses.

RESULTS OF THE ANALYSES OF VARIANCE

The mean scores and standard deviations of the pretest, cloze, written-recall, and oral-recall measures are presented below in Table 1. The apparent trend for subjects to score higher in the easy-vocabulary treatment, regardless of the presence or absence of schema-activation, will be discussed in connection with the various following analyses.

TABLE 1
Means (and Standard Deviations) for PreTest,
Cloze, Written, and Oral Recalls

Code: Easy=Easy Vocabulary; Difficult=Difficult Vocabulary;
     Warm=With Schema Activated; Cold=No Schema-activation

Measure	Main Idea	Detail	Irrelevant
PreTest	1.08 (1.00)	2.75 (1.06)	2.67(1.92)
Cloze Test			
Easy/Warm	15.42 (2.71)	(no categories available)	
Difficult/Cold	12.33 (2.06)		
Easy/Cold	16.50 (2.39)		
Difficult/Warm	12.50 (2.24)		
Written Recall			
Easy/Warm	1.50 (1.17)	3.08 (1.68)	0.25(0.62)
Difficult/Cold	0.67 (0.65)	3.58 (1.73)	0.08(0.29)
Easy/Cold	3.50 (1.78)	2.92 (1.68)	0.25(0.62)
Difficult/Warm	2.08 (1.62)	2.58 (1.73)	0.58(1.00)
Oral Recall			
Easy/Warm	2.00 (1.00)	3.00 (0.00)	0.33(0.66)
Difficult/Cold	2.67 (0.58)	2.33 (1.58)	0.67(0.33)
Easy/Cold	1.67 (1.53)	2.67 (1.53)	2.67(1.53)
Difficult/Warm	1.67 (0.58)	1.33(0.58)	1.00(0.00)

Analysis of the Cloze Data

In order to test the hypotheses of the study, the data in Table 1 was subjected to several analyses. First, a Repeated Measures Analysis of Variance was applied to the cloze data. This form of analysis was selected as most appropriate for an experiment in which all of the subjects are administered all of the experimental treatments (Willemsen, 1974). The data from this measure are reported in Table 2 below. If the analysis performed had been a common analysis of variance, the relatively high sum of squares score within groups and the lower sum of squares score for between groups would be interpreted as supporting the null hypothesis. However, in a repeated measures experiment, such individual differences have little meaning (Willemsen, 1974). The critical scores in this case are the very high F score, which is well above the .05 significance level of 2.53, and the very robust probability indication of 0.00.

TABLE 2
Repeated Measures of Analysis of Variance of Cloze Data

Source	Sum of Squares	D.F.	M.S.	F	p
Between Groups	48.56	11			
Within Groups	354.75	36			
Repeated Factor	157.73	3	52.58	8.81	0.00
Error	197.02	33	5.97		

This analysis of the cloze test data strongly rejects the null hypothesis. All the same, it does not of itself

reject the various alternate hypotheses in that it merely establishes that statistically significant differences occur between the treatment populations. The Repeated Measures of Analysis of Variance alone does not distinguish the particular direction of the treatments, or which variables are more important. Thus, it was necessary to follow up on the initial analysis by performing a test of multiple comparisons.

The Newman-Keuls Multiple Comparisons Test of Cloze Data

The Newman-Keuls Multiple Comparisons measure was selected as a conservative procedure. Newman-Keuls is recognized as facilitating the identification of several possible differences between combinations of mean scores (Willemsen, 1974). The procedure is particularly useful in accounting for the rank order of means. The Newman-Keuls test was used in order to identify the separate treatment populations in the study. In fact, the measure reflected that there were identifiable differences between the treatment populations. The comparisons of the cloze means of the four treatments is summarized below in Table 3.

TABLE 3
A Newman-Keuls Multiple Comparisons of Cloze data

Mean		p	Q	q value (.05)
Mean (3) - Mean (2) =	4.16	4	5.91	3.83
Mean (3) - Mean (4) =	4.00	3	5.67	3.47
Mean (3) - Mean (1) =	1.08	2	1.54	2.88
Mean (1) - Mean (2) =	3.08	3	4.37	3.47
Mean (1) - Mean (4) =	2.92	2	4.14	2.88
Mean (4) - Mean (2) =	0.17	2	0.24	2.88

The result of the Newman-Keuls procedure is that groups 2 and 4 are found to be significantly different (at .05) from groups 1 and 3. The Easy/Warm and Easy/Cold treatment groups ranked as homogenous and separate populations from the Difficult/Cold and Difficult/Warm treatment groups. It is noteworthy that regardless of preinstruction, it was the treatment involving the easy-vocabulary version which yielded the highest mean scores on the cloze test. The relative rankings of the mean scores on the cloze test are particularly telling.

Figure 4 reflects the strong differences among the mean scores of the treatment groups. The Easy/Cold treatment yielded the highest means. There is little difference between the means for the Easy/Cold and Easy/Warm treatments. Yet it was the group without a warm-up which scored higher. The means for both difficult-vocabulary treatments are nearly equal, again regardless of schema-activation. This result supports that, at least in this

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FIGURE 4
Cloze Test Mean Scores

16.5	Ü		
16.0	Ü		
15.5	Ü	Ü	
15.0	Ü	Ü	
14.5	Ü	Ü	
14.0	Ü	Ü	
13.5	Ü	Ü	
13.0	Ü	Ü	
12.5	Ü	Ü	
12.0	Ü	Ü	Ü	Ü

Means	Easy/Cold	Easy/Warm	Diff/Warm	Diff/Cold

study, the self-activated schema-activation had no positive effect on reading comprehension as measured by the cloze test. The data are not in full agreement with the hypotheses. Especially, it does not support the prediction that the warm-up activity would facilitate reading comprehension. The differences between variables were significant only for vocabulary. This measure indicates that whereas vocabulary has a significant effect on reading comprehension, schema-activation has none. Analyses were performed on other measures to examine this result.

Analysis of the Written-Recall Data

The second measure performed on the data was another Repeated Measures Analysis of Variance. In this case, the data analyzed was the combined mean score of the main ideas and details from the written posttest. This combined mean score was realized by adding each main idea and detail score, and then treating the combined score as a score of the number of "correct" responses made by each subject. Because there was less variance in the means between the treatment groups on the written than on the cloze test, the reliability of the written test is uncertain. This contrast is reflected in Figure 4. The results of this procedure differed from those of the measure of the cloze means. The analysis found the Easy/Cold reading group to belong to a different population from the other three groups. The Easy/Warm treatment again ranked second, but the difference between the means on the two treatments was

much greater. The mean scores from the written posttest are
presented below in Figure 5.

```
------------------------------------------------------------
                          FIGURE 5
                 Mean Scores on the Written Test
------------------------------------------------------------
7.00
6.75
6.50           Ü
6.25           Ü
6.00           Ü
5.75           Ü
5.50           Ü
5.25           Ü
5.00           Ü
4.75           Ü
4.50           Ü            Ü
4.25           Ü            Ü            Ü
4.00           Ü            Ü            Ü            Ü
------------------------------------------------------------
Means     Easy/Cold     Easy/Warm    Diff/Warm  Diff/Cold
------------------------------------------------------------
```
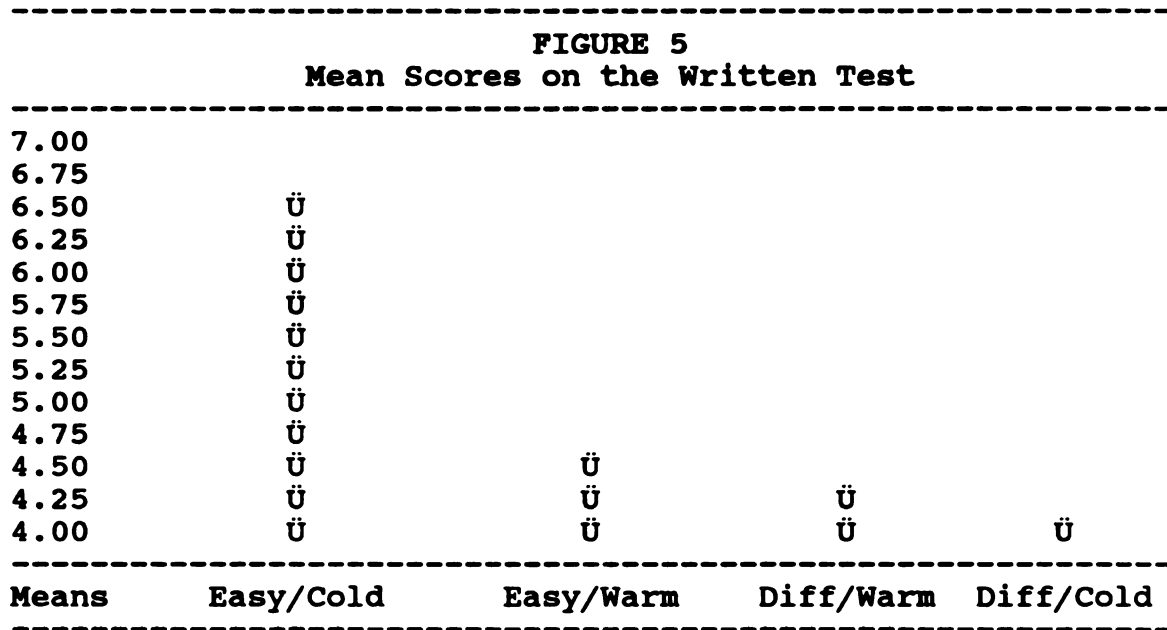
Comparison of the Cloze and Written Data

The result of the analysis of the mean scores on the
written test was significant. The mean scores of the
Easy/Cold treatment were varied significantly (at .05) from
the mean scores for the other treatments. In both tests,
the highest mean scores were obtained by the readers in the
Easy/Cold condition. The Easy/Warm scores ranked second
once again, although the contrast between this group and
the third ranked group was less marked in the written test
data than in the cloze data. The mean scores from the
Difficult/Warm treatment also were slightly above those
from the Difficult/Cold condition on both the cloze and
written measures. A similar rank-order of scores by
treatment can be established readily for both posttests.

This similarity is summarized in the formulas below:

$$\text{Cloze: } \text{mean}_2 > \text{mean}_1 > \text{mean}_3 > \text{mean}_4$$
$$\text{Written: } \text{mean}_2 > \text{mean}_1 > \text{mean}_3 > \text{mean}_4$$

The rank order of the four treatments is identical on both the cloze and the combined written measures. While this result may be ascribed to happenstance, the probability of this particular result occurring by mere chance is less than one in one hundred (.01). In both tests, the treatment which is optimal for reading appears to be Easy/Cold, followed by Easy/Warm. This result supports hypothesis 2 (that difficult vocabulary impairs reading comprehension). In contrast, it supports neither hypothesis 1 (that schema-activation improves comprehension) nor hypothesis 3 (that schema-activation and easy-vocabulary text result in better comprehension).

Analysis of the Written Test Data in the Main Idea Category

As a significant difference was found between the mean combined scores of the treatment groups on the written recall, the data were subjected to an additional analysis. The data from the main ideas and the details were analyzed separately to provide a closer look at the results. A Repeated Measures Analysis of Variance on the mean scores of only the main ideas of the written recall yielded a significant difference between the Easy/Cold and all other groups, as found in the prior combined analysis. A much higher F score (8.16) than that of the combined measure,

and one very similar to that of the Cloze was produced.
The p<.01 was also identical to that of the Cloze test.
The distribution of the mean scores in this analysis are
represented graphically below in Figure 6.

These results broadly parallel, but do not replicate,
those of the previous measures. As before, the mean scores
of the Easy/Cold treatment are superior. The treatment
groups occupying rankings 2 and 3 have been exchanged.
Still, the differences between the Difficult/Warm and
Easy/Warm conditions are negligible. No special advantage
is shown to have been gained by subjects receiving
preinstruction, and the only significant treatment again
includes the easy-vocabulary variable. This result as well
supports hypothesis 2, but not hypotheses 1 and 3.
Although difficult vocabulary may impede reading
comprehension, there is little positive effect for
schema-activation.

FIGURE 6
Mean Scores of the Main Ideas on the Written Recall

```
4.0
3.5          Ü
3.0          Ü
2.5          Ü
2.0          Ü                    Ü
1.5          Ü         Ü          Ü
1.0          Ü         Ü          Ü
0.5          Ü         Ü          Ü              Ü
    -----------------------------------------------------------
          Easy/Cold  Easy/Warm  Diff/Warm  Diff/Cold
    -----------------------------------------------------------
```
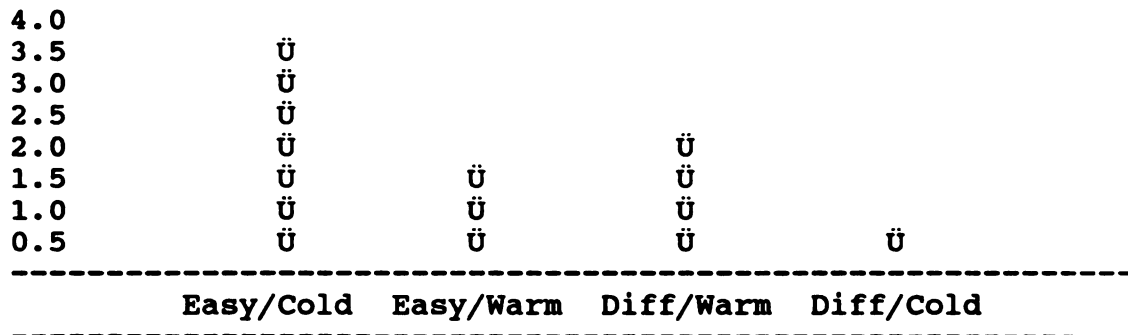
Analysis of the Written-Recall Data in the Detail Category

Having completed the analyis of the main idea category of the written recall, a subsequent analysis of the data gathered in the category of "details" on the written recall was performed. This analysis, however, produced no significant results as the mean scores for all treatments ranged between 3.08 for the Easy/Warm condition and 2.58 for the Difficult/Warm condition. The F score of 0.67 and the approximate probability of 0.58 indicate that, on this analyis, all four groups can be regarded as parts of a homogenous population. The results of a Repeated Measures of Analysis of Variance of the written irrelevant data also proved insignificant. Very similar mean scores resulted in an F score of just 1.13 and a low probability factor (p=.35) in this case. No analyis was performed on the data from the oral recalls due to an inadequate number of subjects. The lack of control group data for the pretest ruled out the use of a Repeated Measures of Analysis of Variance for this measure as well.

Summary of the Analyses of Variance

The salient result of the Repeated Measures Analysis of Variance and the Newman-Keuls Multiple Comparisons on the data is that on the cloze and written measures, the Easy vocabulary variable stands out as separate. The data analysis does not align with hypotheses 1 and 3, but supports hypothesis 2. In general, the results show that when even advanced-level ESL readers process text with as

few as one low-frequency vocabulary item per six content
words, reading comprehension suffers. There is no
indication, however, that schema-activation improves reading
comprehension scores. Furthermore, vocabulary and
schema-activation were not found to interact as variables.
That is, neither strengths in vocabulary nor schemata serve
to compensate for corresponding weaknesses. These results
challenge the predictions made at the outset of the study
regarding the effect of schema-activation. Nevertheless,
the anticipated effect of difficult vocabulary was
supported. The significance and implications of these
results will be discussed in the forthcoming chapter.

THE RESULTS OF CORRELATIONAL STUDIES

In addition to the preceding analyses intended to
investigate the effect of the several treatments on second-
language reading comprehension, another series of
measurements were performed on the data. The analyses
performed thus far on the data facilitated an objective
assessment of the value of the three primary hypotheses in
the study. It also was speculated, however, that certain
comparisons between the various types of evaluation
instruments might be made possible. It was speculated
prior to the study whether the subjects' reponses would
vary not only according to the reading treatment, but also
depending on the evaluative measure administered. Several
comprehension checks, including pretests, cloze, written,
and oral posttests, were employed. Would subjects score

similarly on all measures? Or would scores for cloze
markedly differ from scores for pretests, for example? Or
would oral and written posttest scores be consistent due to
their open-ended nature?

To obtain at least tentative answers to such questions,
a series of correlational studies was performed on the
data. Correlational analyses permit a determination of the
extent to which scores on one test are associated with
another. Such measures point out whether a subject who
scores low on one test also scores low on another. The
findings from these comparative analyses will be expressed
in the commonly-used Pearson's Correlation Coefficient (R).
The magnitude for R ranges from -1 to +1.

Negative Correlations Between Cloze and PreTest

The overall results from the comparison of the data
imply a slightly negative relationship between the pretest
and the cloze measure. Subjects who performed better on
the warm-up may have become over-confident of their
comprhension of the topic. As a result, such readers may
have processed the text less carefully than other subjects.

The overall negative correlation between cloze and
pretest scores is quite low (r= -.11). Nevertheless, the
negative correlation between the two measures also is
consistent in nine out of the twelve subcategories. In the
Difficult/Cold treatment, for example, the correlation of
main idea mean scores between the cloze and the pretest is
markedly negative (r= -.64). This result is not surprising

because subjects in the "cold" condition do not receive schema-activation. Hence, their mean scores would be expected to be lower than those who participated in the PreTest, and who received schema-activation. The negative correlation (r= -.50) between pretest and cloze detail mean scores in the Easy/Warm treatment, however, is not explained easily. In general, schema-activation did not promote higher scores on the cloze. This result is supported not only by the negative correlations between the mean scores of the cloze and preTtst, but also by the Repeated Measures of Analyses of Variance reported above.

Correlations Between Cloze and Written Tests

Correlational studies of the pretest to written test data also resulted in several negative scores, although not so many as in the pretest to cloze analyses. These results suggest that subjects who scored high on one measure tended not to score high on the other test. As in the pretest to cloze comparison study, all correlations between the pretest and the main ideas section of the written test were negative. As before, the highest single negative correlation (r= -.65) was shared by the written main idea and the pretest main idea response sections in the Difficult/Cold treatment. Positive correlations were once more made in the detail section, but in this case only when the written test treatment was difficult. Irregularities in correlational scores may be due to the small number of subjects in the study.

Correlations Between the Pretest and the Oral Recall

The pretest data was compared next to the results of the oral recall. The outcome of these correlational studies was mixed. There was a zero correlation (r= 0) between the pretest and the main ideas of the oral test. A comparison of the pretest to the details of the oral test, however, produced a notable positive correlation (r= .59). The positive correlations between the pretest and other tests in the category of details seems to represent a trend. It may be that schema-activation enables the comprehension of details. Conversely, schema-activation does not correlate to improved comprehension of main ideas in this study. In the final comparison in this category, there was a negative score (r= .28) between the pretest and the oral test irrelevancies as well.

Summary of Correlations Between Pretest and Other Measures

This series of correlations concluded the comparisons between the pretest and the other three tests. In general, the relationship between these measures appears to be weakly negative. Certain of the r scores were relatively high. There was a tendency for the stronger negative scores to occur in connection with the main ideas category. Most positive scores were found in the details and irrelevant idea sections. Because correlational studies merely indicate relationships, no cause-and-effect condition can be claimed. When combined with the results from several analyses, however, the trends in the data

appear more weighty. The results of the analyses of
variance as well as of the correlational studies between
the pretest and other measures support that schema-
activation was ineffective in improving reading
comprehension scores.

Correlations Between Cloze and Written Tests

Further correlational analyses were performed to
determine whether relationships exist between the subjects'
scores on other measures. A series of correlational
studies was conducted to compare cloze to written test
scores. The scores were found to be weakly positive
overall. Five r scores were positive, and three were
negative. As in the previous results, the Difficult/Cold
correlation proved notably positive (r= .57). The trend
for negative scores in the detail category was also
followed. Scores in this classification were all positive,
except for a very weak (r= -.15) score in the
Difficult/Cold treatment. In fact, the single highest
correlation (r= .81) in all the data occurred in this
section under the Easy/Warm treatment. These results
support that the subjects with high mean scores on the
cloze tended to have high mean scores on the written recall
as well.

Correlations Between Cloze and Oral Tests

The data from the cloze and oral tests were compared
next. These findings are generally inconsistent with those

previously examined. A positive relationship was found to
exist overall between these two measures. In this case,
four robustly positive scores (of at least .50), and just
two negative scores were discovered. The minimally positive
section of this correlation study was the main ideas, which
had been found to be negative in the main in other
categories. Certain consistencies did, however, emerge in
this study. Most notably, the Difficult/Cold treatment
again produced the highest negative score (r= -.50) in a
comparison of main idea scores. The detail category yielded
three positive correlations, too. Overall, it seems that
the subjects who scored well on the cloze also scored well
on the oral recall. This result is somewhat surprising. It
had been supposed that subjects who were stronger in oral
than in written skills would weaken correlations between
these two measures.

Correlations Between Written and Oral Recalls

The remaining correlational study was performed to
compare the written to the oral recalls. The results of
these analyses were varied. Both the detail-to-detail and
the irrelevant-to-irrelevant categories yielded zero (r= 0)
correlation scores. A positive correlation (r= .42) was
found for the main ideas classification. Thus, there was a
tendency for subjects to score either high or low on both
measures in supplying main ideas. No such pattern,
however, was evident among detail and irrelevant
responses. The mixed results in this correlation make

generalizing difficult. It is unclear whether subjects with strong oral skills scored higher on the oral recall than on the written recall. Similarly, it is not certain whether subjects who possess better writing abilities scored higher on the written recall than on the oral recall.

CHAPTER SUMMARY

The results of the analyses utilized in this study support hypothesis 2. It seems that difficult vocabulary, even when introduced at a rate of just one-item-per-six-content-words, negatively affects second-language reading comprehension. Hypotheses 1 and 3, however, were not supported in this study. Schema-activation was not found to improve reading comprehension scores. Neither did a combination of schema-activation and "easy"-vocabulary text produce better reading comprehension. The results of the analyses of variance strongly supported hypothesis 2, and served to reject hypotheses 1 and 3.

The results of the correlational studies, however, were less clear. In general, correlations were weak, or non-existent. A tenuously negative relationship between the pretest and the other tests may reflect also that schema-activation does not facilitate reading comprehension. Nor did the results support that students score better on measures which utilize their better writing or oral skills.

CHAPTER FIVE

DISCUSSION

There is a general assumption in second-language studies that readers may use background knowledge to overcome vocabulary problems. To be sure, ESL teachers have long recognized that limited language proficiency and vocabulary deficiencies can "short-circuit" the reading process (Clarke, 1979; Eskey, 1987). It has, however, become unpopular in L2 research to attend to bottom-up processing in general, and to vocabulary in particular (Carter, 1987). As bottom-up processing and vocabulary have been devalued, top-down processing has become emphasized increasingly in models of reading in a second language. The recent introduction of the term "interactive reading" may be seen as bearing promise to restore a balance between top-down and bottom-up processing in reading theory. Unfortunately, although the expression itself may be accurate, it is not yet being rigorously applied. In practice, however, the interactive model seems to favor heavily top-down schematizing and to belittle bottom-up processing (Eskey, 1988).

Schema theorists have improved our knowledge of reading by showing that reading comprehension depends on knowledge of rhetorical patterns, the topic, and the target language.

The benefits of top-down processing are so impressive that it has been supposed that L2 readers who possess superior schematic knowledge may compensate for linguistic deficiencies (Barnitz, 1986; Swaffar, 1988).

There is no research, however, which bears out this compensative theory. Despite repeated attempts, first-language researchers have been unable to find interaction between schemata and vocabulary (Freebody and Anderson, 1983b; Stahl and Jacobson, 1986; Stahl et al, 1989). Neither has schemata been found to compensate for vocabulary deficiencies in L2 reading, although such an effect has been supposed (Hudson, 1982). The obvious question to be answered by L2 reading researchers is: "Do L2 readers in fact use schemata to overcome problems in processing text with difficult vocabulary?"

THE PURPOSE OF THE STUDY

It is the purpose of the present study to fill this gap in second-language reading knowledge by investigating the effect of activating schemata and of introducing difficult vocabulary in L2 reading. In this study, it is assumed that whereas schema-activation facilitates L2 reading, the introduction of difficult (unknown) vocabulary to passages negatively affects reading comprehension. It is supposed also that the "optimal" L2 reading condition occurs when the reader's schemata has been activated and when the text has little or no difficult vocabulary. The following hypotheses regarding the relationship between

schema-activation and difficult vocabulary in second-language reading were formulated:

Hypotheses Regarding Schema-activation and Vocabulary

1. L2 readers who receive schema-activation will achieve significantly higher reading comprehension scores than readers who do not receive schema-activation.

2. L2 readers who process passages with difficult vocabulary will attain significantly lower reading comprehension scores than readers who process passages without difficult vocabulary.

3. L2 readers who receive schema-activation and read passages without difficult vocabulary will achieve significantly higher reading comprehension scores than readers who process texts under all other conditions (with schema-activation and with difficult vocabulary; without schema-activation and without difficult vocabulary; without schema-activation and with difficult vocabulary).

THE STUDY

In order to test these hypotheses, four reading treatments were designed for a two-way, Repeated Measures study. The reading treatments were with or without schema-activation, and with or without difficult vocabulary. Twelve advanced-level ESL students read and were tested for their comprehension of four reading passages on four separate days in January, 1989. The four "difficult"-vocabulary versions were adapted by substituting unknown vocabulary items for every sixth content word. Parallel "easy"-vocabulary versions utilized known words at intervals of every 15th content word. Half of the subjects received daily schema-activation and read either difficult or easy vocabulary-passages, whereas the alternate group

did not receive schema-activation and read text in the
opposite (whether difficult or easy) treatment. Thus, all
subjects had performed in all treatments by the end of the
four days.

In order to measure the subjects' performance, four
measures were taken. After the experimental group for the
day had listened to a brief introduction to the reading,
they were asked to engage in prewriting on the topic. When
the subjects had finished reading the passage for the day,
they were administered a cloze test, a written recall, and
then an oral recall. Multiple measurements of the subjects'
anticipation and recall of the passages were utilized in the
analysis. The use of multiple measures (pretest, cloze,
written recall, and oral recall) also made possible a
comparison of the different measures themselves.

Using a procedure suggested by Omanson (1982), the
reading passages and all measures (pretest, cloze, written
and oral recall) were analyzed to identify main ideas,
supporting details, and distracting or irrelevant
information. This analysis was used to make a quantitative
measurement of the subjects' responses possible.

RESULTS

The data in the study were subjected to three forms of
analyses. First, the data from the cloze and written
posttests were exposed to Repeated Measures Analysis of
Variance. The MANOVA of both the cloze and written test

data reflected that there were indeed significant
differences between treatment populations. Further analysis
of the data was required, however, in order to ascertain the
direction of the treatment variances.

The Newman-Keuls Multiple Comparisons Test yielded the
existence of separate treatment populations in both the
cloze and written test data. Specifically, the Newman-Keuls
test supported that the "easy"-vocabulary variable, whether
with or without schema-activation, resulted in higher mean
scores for reading comprehension on both the cloze and the
written posttests. The data of the pretest and the oral
recall were insufficient for either the ANOVA or the
Newman-Keuls analyses.

TABLE 4
Means (and Standard Deviations) for PreTest,
Cloze, Written, and Oral Recalls

Code: Easy=Easy Vocabulary; Difficult=Difficult Vocabulary;
Warm=With Schema Activated; Cold=No Schema-activation

Measure	Main Idea	Detail	Irrelevant
PreTest	1.08 (1.00)	2.75 (1.06)	2.67(1.92)
Cloze Test			
Easy/Warm	15.42 (2.71)	(no categories available)	
Difficult/Cold	12.33 (2.06)		
Easy/Cold	16.50 (2.39)		
Difficult/Warm	12.50 (2.24)		
Written Recall			
Easy/Warm	1.50 (1.17)	3.08 (1.68)	0.25(0.62)
Difficult/Cold	0.67 (0.65)	3.58 (1.73)	0.08(0.29)
Easy/Cold	3.50 (1.78)	2.92 (1.68)	0.25(0.62)
Difficult/Warm	2.08 (1.62)	2.58 (1.73)	0.58(1.00)
Oral Recall			
Easy/Warm	2.00 (1.00)	3.00 (0.00)	0.33(0.66)
Difficult/Cold	2.67 (0.58)	2.33 (1.58)	0.67(0.33)
Easy/Cold	1.67 (1.53)	2.67 (1.53)	2.67(1.53)
Difficult/Warm	1.67 (0.58)	1.33(0.58)	1.00(0.00)

Analysis of the Cloze Data

In order to test the hypotheses of the study, the data in Table 1 was subjected to several analyses. First, a Repeated Measures Analysis of Variance was applied to the cloze data. The critical scores in this case are the very high F score, which is well above the .05 significance level of 2.53, and the very robust probability indication of 0.00. This analysis of the cloze test data strongly rejects the null hypothesis, but does not distinguish the particular direction of the treatments, or which variables are more important.

TABLE 5
Repeated Measures of Analysis of Variance of Cloze Data

Source	Sum of Squares	D.F.	M.S.	F	p
Between Groups	48.56	11			
Within Groups	354.75	36			
Repeated Factor	157.73	3	52.58	8.81	0.00
Error	197.02	33	5.97		

The Newman-Keuls measure was applied to the results of the MANOVA because it is recognized as facilitating the identification of several possible differences between combinations of mean scores (Willemsen, 1974). The result of the Newman-Keuls procedure is that groups 2 and 4 are found to be significantly different (at .05) from groups 1 and 3. The Easy/Warm and Easy/Cold treatment groups ranked as homogenous populations, and the Difficult/Cold and Difficult/Warm treatment groups ranked as a separate

population. Regardless of preinstruction, it was the
treatment involving the less difficult vocabulary version
which yielded the highest mean scores on the cloze test.
The relative rankings of the mean scores on the cloze test
are particularly telling. An analysis of the cloze means is
summarized below in Table 6.

TABLE 6
A Newman-Keuls Multiple Comparisons of Cloze data

Mean	p	Q	q value (.05)
Mean (3) - Mean (2) =	4.16	4	5.91	3.83
Mean (3) - Mean (4) =	4.00	3	5.67	3.47
Mean (3) - Mean (1) =	1.08	2	1.54	2.88
Mean (1) - Mean (2) =	3.08	3	4.37	3.47
Mean (1) - Mean (4) =	2.92	2	4.14	2.88
Mean (4) - Mean (2) =	0.17	2	0.24	2.88

Analysis of the Written Recall Data

The result of this analysis was significant. The F score
in this case was significant at 3.39, and p=.029. This
data analysis may be seen as comparative to that of the
cloze. In both cases, the highest mean scores were
obtained by the readers in the Easy/Cold condition. The
Easy/Warm scores ranked second once again, although the
scores were not equidistant from other rankings. The mean
scores from the Difficult/Warm treatment also were slightly
above those from the Difficult/Cold condition on both the
cloze and written measures. Thus, a similar relationship
of scores by rank-order for treatment can be established
for the cloze and written posttests.

The salient result of the Repeated Measures Analysis of Variance and the Newman-Keuls Multiple Comparisons on the data is that on the cloze and written measures, the easy-vocabulary variable stands out as separate. The data analysis does not align with hypotheses 1 and 3, but supports hypothesis 2. In general, the results show that when even advanced-level ESL readers process text with as few as one low-frequency vocabulary item per six content words, reading comprehension suffers. There is no indication, however, that schema-activation improves reading comprehension scores. Furthermore, vocabulary and schema-activation were not found to interact as variables. That is, neither strengths in vocabulary nor in schemata serve to compensate for corresponding weaknesses. These results overthrow the predictions made at the outset of the study regarding the effect of schema-activation. Nevertheless, the anticipated effect of difficult vocabulary was supported.

Correlational Studies

The data were subjected to a series of correlational studies to determine what relationships exist between the various measures utilized in the study. The overall results of these studies were unclear and tenuous. As might be expected, the correlation between the cloze and written posttests yielded a weakly positive score ($r = .32$), indicating that students who scored well on one measure tended to score well on the other also.

The result of correlational study between the written and oral posttests seems to be rather unusual. Students who excell at writing, for example, but who possess weaker oral skills might be supposed to score differently on these two measures. The results, however, indicate rather low correlations between these two measures. In fact, there is a positive correlation ($r=$ .42) between the mean scores of the main idea category of the two tests. Students apparently are able to communicate at least their main ideas, whether orally or in print, regardless of their particular strengths and weaknesses.

The results of the several correlational studies between the mean scores of the pretest and the various posttests are noteworthy as well. It had been predicted that students who received schema-activation would produce better reading comprehension scores. No such result, however, is indicated in the data. The correlations between the pretest and the posttests are insignificant, and negative generally. The most noteworthy correlations ($r=$ -.31 and -.33) were found to exist between the pretest and main idea category of both the cloze and written posttests.

CONCLUSIONS

The findings of this study do not confirm that schema activation is most important to L2 reading comprehension. Neither does schema-activation appear to overwhelm problems with comprehending passages which have difficult,

unknown vocabulary items. In fact, difficult vocabulary appears to trouble second-language readers much more than it has been supposed. At least in this study, readers comprehended easy-vocabulary passages significantly better than difficult-vocabulary versions, whether or not schemata was activated. The three hypotheses of the study will be discussed in light of the results.

Why Schema Activation May Prove Ineffective

Hypothesis 1, predicting that schema-activation would facilitate better reading comprehension, is not supported by the data. Indeed, none of the analyses performed on the data uphold this hypothesis. Truly, this is an astounding, yet clearly revealed conclusion in this study. Although common sense and prior research (Taglieber et al, 1988) suggest that schema-activation facilitates improved reading comprehension, in this research there is no such evidence.

Schema-activation may be ineffective for several reasons. First, it is always possible for a warm-up activity to be flawed, and for schemata not to be activated. Second, inappropriate information may be triggered inadvertently during schema-activation. Such irrelevant information may serve to "derail" comprehension. Finally, even successful schema-activation may not be sufficient to enable the L2 reader to process text laden with difficult vocabulary. These potential stumbling blocks to schema-activation will be examined in view of the present study.

Schemata may be more difficult to activate properly than it appears. The students' background information must be estimated. If students lack adequate topical knowledge, it must be learned. (It was the purpose of this study to test only the effectiveness of schema-activation, and not the results of teaching schemata.) Schema-activation might have been blocked in this study by the particular nature of the passages themselves. At least in some cases, the students knew little or nothing about the reading topic. Reading 1, "A Theory of Earth's Structure," may serve as an example. When required to prewrite about the topic, the six students in the experimental group produced more irrelevant than pertinent information. The students wrote twenty-four pausal units in all. Fourteen of these units were classified as "irrelevant" to the topic, and just ten units were deemed to be on the topic. One of the student's prewriting samples exemplifies the groups' apparent lack of knowledge regarding plate techtonics: "The earth is not round completely. It has artic and antarctic." Another ESL student produced five pausal units, four of which were inapplicable to this topic. In addition to the earth's being round, this student offered that it "goes around the sun." Obviously, the schema-activation did not work for this subject. Nor were these responses exceptional: only four of the main ideas in the passage were anticipated in this set of prewriting samples.

The prewriting results from the second day were not

much better. Although the topic was less specialized,
nearly half of the responses were not relevant to the
reading passage. One of the students offered that
earthquakes come due to a "lack of rain." Another
(non-Japanese) wrote, "I don't know nothing about the
phenomenon [because] it's not in the news." Merely three
main ideas related to the "earthquake" passage were found in
the samples of these six subjects.

The students found it difficult to provide much
appropriate information regarding the two remaining reading
passages as well. A Japanese subject observed that
deforestation is a problem because "human life concerns
animal life." This information was judged irrelevant
because the passage does not discuss animal habitats. Thus,
the student was contemplating an issue which was not
contained in the reading passage itself, and thus was judged
irrelevant. The prewriting samples for the fourth topic,
overpopulation, contain many details, but more irrelevant
pausal units than main ideas.

Why Schema-activation May "Short-circuit" Reading

Throughout the prewritings, it is evident that the
students sometimes were able to anticipate certain of the
forthcoming details in the passages. Very often, however,
the schema-activation exercise triggered irrelevant
information as well. Whether this irrelevant information
"short-circuited" subsequent reading comprehension is
unknown, but this would account for the lower mean scores

realized by subjects who received schema-activation and yet performed worse than those without a warm-up.

It is difficult to determine whether the students supplied irrelevant information in the prewriting samples because of a lack of appropriate information or because of their erroneous beliefs. Every writer is aware that tangentially-related ideas slip altogether too easily into one's paragraphs. The student who offered that the earth is round may have only partly grasped the significance of the topic concerning plate techtonics. Additionally, the subject may have supplied the information due to an oversight.

Regardless of how irrelevant information entered the prewriting samples, such information may have had a detrimental effect on the students' comprehension of the reading passages. The reader does not process cues in L2 text as well as in the first language. When the reader who has activated irrelevant information approaches a foreign-language passage, certain distortions may creep into the reader's re-creation of the text as reading comprehension is impeded. The reader who offered that the earth goes around the sun, for example, produced just two pausal units in the post-writing sample. Interestingly, both clauses concerned the movement of the earth as well: "The earth is alive and moving [and] the ground is moving." This student's cloze results were among the lowest also. This subject wrote several (four) irrelevant units on the

pretest, and just one correct detail. The weakly negative correlations (r= -.32 and -.22) between the mean scores of the pretest irrelevant category and both the cloze and the written posttest mean scores suggest that irrelevant information in the prewriting samples may have negatively affected reading comprehension. It probably operated as merely one among many factors in the reading process, however.

Can Schema-activation Overcome L2 Language Difficulties?

According to the results of this study, schema-activation does not overwhelm, and may be of little help in solving the problems of processing difficult-vocabulary texts. It is especially remarakable that students who participated in schema-activation did not achieve higher mean scores for reading comprehension on any of the posttests. Especially on the cloze test, students in the treatment condition scored notably lower than those who did not participate in the activation of schemata.

This result is frankly puzzling. Should not readers perform better when they have been cued in to the topic? Why would not L2 readers benefit from schema-activation, and be able to "read around" difficult vocabulary? Perhaps the problem can be explained by noting that information is organized differently by various cultures. The schemata which actually is activated in a warm-up activity vary from the intended schemata. In addition, it may be difficult for L2 readers to apply schemata activated in an L2

context. Regardless of the cause, however, schema-activation has not been shown to overcome problems in comprehending L2 text with difficult vocabulary.

Difficult Vocabulary Strongly Affects Reading Comprehension

Anyone who has attempted to read in a foreign language appreciates the impasse created by difficult vocabulary items in a second-language passage. Despite one's best intentions to "read around" these obstacles, such "road blocks" are difficult to ignore. It is as though one were wearing dark sunglasses while driving through a forest on a moonless night. The cues are there, but they are not at all easy to pick up. All systems operate at reduced-power, depending on the L2 proficiency of the reader.

The units of the language do not "flow". Often the reader's attention is caught up in the word-by-word chase after meaning. It is troublesome to consider the global implications of the passage when the words themselves are intractable. Whereas the reader of native-language material usually can predict the next word, phrase, or even development in the plot, such anticipation is treacherous in foreign-language passages. Under such conditions, one word appears to count as much as the next, and word-skipping may lead the reader into one of countless dead-ends. The reader simply does not know what requires the most attention. Hence, the L2 reader's preoccupation with difficult vocabulary is very much a practical consideration.

Apart from the reader's interest in difficult vocabulary, there is the inherent importance of the words themselves to consider. Low-frequency vocabulary are not retrieved and used unless they are required. These words tend to bear considerable significance, often carrying the meaning of whole phrases in one term. Of course, this is the great tease of vocabulary. The words which are most common are quite devoid of content: they are function words such as articles and prepositions. Thus, the very words which the reader most needs to know are the ones which are least likely to be known. And the vocabulary which are known may not carry the critical meanings which the irksome ones do.

The result from the L2 reader's perspective can be a very grammatical text of uncertain meaning rather akin to the following nonsense: "The very large <u>fromkin</u> slowly <u>aarged</u> a pair of <u>klotches</u> by means of his handy <u>reehaz</u>." The pieces are there, but even the best guesses do not add up to anything substantial. Difficult vocabulary poses a thorny problem to reading comprehension, especially in a second language. Not only do difficult vocabulary items distract the reader, they also leave the reader at a definite loss for important information. Surely, at times the reader is able to discover the meaning of the word without intervention. But difficult words are not frequently encountered, so it takes time to learn them. Also, when the reader does manage to guess the intended

meaning of a passage despite difficult vocabulary, the reader may well realize that such gained information is merely tentative as the language itself was not processed thoroughly. Difficult vocabulary, then, presents to the L2 reader a formidable task.

Do Schema-activation and Vocabulary Interact?

The results of this (or any other) study do not support that schema-activation and vocabulary are interactive variables. The highest mean scores were attained by readers who read easy-vocabulary versions without schema-activation. Comprehension was better when the reading passages had less difficult vocabulary; processing was not improved by schema-activation. No interaction between vocabulary and schema-activation was found.

The current view of reading as an interactive process implies the interaction of more than one variable. A variety of cues are accessed by the reader in making meaning from text. These cues are morphophonemic, lexical, syntactic, and rhetorical. Because there is a surfeit of information, the experienced reader samples only those cues necessary to confirm or modify the reader's expectations. The reader may be reassured by fitting information--or shocked by detours, gaps, or apparent incoherencies.

How the readers in this study utilized the information made available by schema-activation is unknown. The students may have responded to the warm-up activity in any of several ways. It may be that the readers did not

bring the information accessed in the schema-activation to bear on the reading process. Although the prewriting samples contain considerable information judged to be irrelevant to the reading topic, much pertinent information is evident in the prewriting as well. Perhaps the readers later recognized that some of the information accessed in the warm-up activity was irrelevant, and regarded their thoughts prior to reading the passages as useless or even suspect. Or the reading task itself may have proven so laborious as to preclude the synthesis of prior knowledge and textual features. The reader's attention may have been so focused on bottom-up processing that little attention could be devoted to "behind-the-eyeball" operations. Thus, even "advanced" L2 readers may find it impossible to apply top-down processing techniques to difficult L2 reading passages.

Why Schema-activation May Be Over-valued

Studies (Taglieber et al, 1988; Johnson, 1982; Barnitz, 1986) have been performed to show that background information and schema-activation affect L2 reading comprehension. The importance of background information may have been over-emphasized, however, in some cases. The first problem is that the reading materials utilized in these studies were culturally-loaded. Fairy tales, legends, fables, and accounts of holidays and other customs were selected to favor the significance of prior knowledge. Obviously, background knowledge is vital to

understanding such passages. Nevertheless, L2 readers must process many other less culturally-loaded texts as well. To imply that cultural insight or prior knowledge is a considerable part of the L2 reading problem is to beg the question. How is it that information is to be gained? Do not many foreign-language learners acquire cultural and other knowledge by reading? If in fact reading involves learning, then the meaning that the reader extracts from a text primarilly depends on the adaptations which the text itself imposes on the reader's expectations (Britton, 1970).

It also may be questioned whether prereading activities that preteach content actually improve reading comprehension or merely improve comprehension itself because the student knows the content even before reading. Undeniably, prior knowledge facilitates L2 reading. A reader who knows the gospel by heart may read it in a second language with ease. But how much of this process is really reading and how much is simply knowing? To be sure, the reader must have some topical knowledge in order to have suitable expectations. Nevertheless, an over-emphasis upon pre-teaching text tends to devalue the reader's inherent ability to make meaning by means of direct interaction with text. If reading is indeed "guided meaning-making" (Scholes, 1985), then the classroom instructor must avoid substituting oral instruction for private meaning-making.

APPLICATIONS FOR TEACHING AND IMPLICATIONS FOR RESEARCH

Three research hypotheses regarding the nature of reading in a second language were tested in this study. Although it was predicted that schema-activation would improve L2 reading comprehension, the results did not support this prediction. On the contrary, readers who participated in schema-activation received lower mean scores on the posttests than did readers without schema-activation. This result occurred in connection with all four reading passages, and whether the readers processed difficult- or easy-vocabulary versions.

It was predicted as well that readers who participated in schema-activation and read the easy-vocabulary text would achieve comprehension scores superior to readers in all other treatment conditions. This prediction was not upheld by the results. Readers who read easy-vocabulary versions and who did not undergo schema-activation produced the highest mean scores for reading comprehension. The easy-vocabulary and schema-activated treatment group ranked second to the previous treatment on the post-tests.

Notwithstanding the rejection of the two hypotheses regarding schema-activation, one prediction did prove reliable. It was hypothesized that readers who processed passages with difficult vocabulary would attain lower reading comprehension scores than readers who read easy-vocabulary versions. This prediction was supported by the result as the mean scores for readers who processed

easy-vocabulary versions were markedly superior to the
scores for those students who read passages with difficult
(unknown) vocabulary. This result occurred with or without
schema-activation.

The salient result of this study is, then, that
vocabulary difficulties may be far more troublesome to the
second-language reader than has been thought. Even when
the density of low-frequency vocabulary items is no more
than one content word in six, L2 reading comprehension may
be impeded seriously. Further studies regarding the effect
of difficult vocabulary on second-language reading
comprehension are warranted. Relatively little is known
concerning the potential interaction between difficult
vocabulary and the several other cues available to the L2
reader. The precise nature of the reader's trouble in
dealing with difficult vocabulary is little understood as
well.

Besides the implications of difficult vocabulary, this
study also brings into question the usefulness of schema-
activation in second-language reading. Although L2 reading
instructors have assumed that strengths in top-down
processing may compensate for weaknesses in bottom-up
processing, no research supports that background knowledge
and vocabulary are interactive variables. Unquestionably,
schemata play an important role in the reading process.
First- and second-language readers are able to read because
they have both pragmatic and linguistic knowledge. This

does not indicate, however, that readers may compensate for linguistic deficiencies by depending on schematic knowledge. It may be safe to allow that second-language reading is interactive. But it may be imprudent to believe that top-down processing enables readers to process linguistically difficult text.

Language teachers naturally wish to hasten their students' learning process. Learning to read in a second language is a laborious task. Even for "advanced" ESL readers, most unadapted reading materials fairly bristle with difficult vocabulary. The syntax, cohesive devices, rhetorical pattern, and other potential cues as well may appear formidable. Despite the instructor's most earnest desire to expedite learning, students must receive guidance in both bottom-up as well as top-down processing. It is a disservice to second-language students to assume that they will pick up basic linguistic knowledge (such as vocabulary and syntax) on their own, and to suppose that mere pre-teaching will obviate all reading problems. To be effective, L2 readers need to process both schemata and difficult vocabulary.

APPENDICES

APPENDIX A

TABLE 7
Data from the Study

Sub-ject #	Pre M	Pre D	Pre I	Cloze EW	Cloze DC	Cloze EC	Cloze DW	Wr EW M	Wr EW D	Wr EW I	Wr DC M	Wr DC D	Wr DC I	Wr EC M	Wr EC D	Wr EC I	Wr DW M	Wr DW D	Wr DW I	Oral EW M	Oral EW D	Oral EW I	Oral DC M	Oral DC D	Oral DC I	Oral EC M	Oral EC D	Oral EC I	Oral DW M	Oral DW D	Oral DW I
1.	0	1	4	18	12	19	10	2	6	2	1	1	0	1	4	1	5	0	0										1	1	0
2.	3	4	2	12	10	12	11	3	1	0	0	7	0	3	2	2	0	3	1	1	3	0									
3.	2	2	1	17	11	18	09	0	5	1	0	1	0	1	6	0	2	4	0										2	2	0
4.	1	4	1	19	09	18	12	1	4	0	0	5	0	5	4	0	2	4	0							3	3	0			
5.	2	2	1	18	12	15	12	0	5	0	0	2	0	4	4	0	1	2	0							4	4	0			
6.	0	4	7	14	15	15	15	2	2	0	1	4	0	2	3	0	4	5	0	2	3	0									
7.	1	3	4	11	13	13	16	2	2	0	0	5	0	6	1	0	0	1	0	3	3	1									
8.	0	2	4	17	14	15	13	1	4	0	2	4	0	5	1	0	1	3	1							2	1	1			
9.	2	2	1	18	11	18	12	1	3	0	1	3	0	2	0	0	2	0	0										2	1	1
10.	1	4	1	13	11	19	16	4	2	0	1	4	0	3	4	0	3	4	2				3	1	1						
11.	1	3	4	14	15	18	13	1	1	0	1	4	0	6	3	0	1	4	0				2	4	0						
12.	0	2	2	14	15	18	11	1	2	0	1	3	1	4	3	0	4	3	1				3	2	1						

KEY: EC=Easy Vocabulary & No Warm Up; DW=Difficult Vocabulary & Warm Up
EW=Easy Vocabulary Text & Warm Up; DC=Difficult Vocabulary & No Warm Up;
M=Main Idea Category; D=Detail Category; I=Irrelevant Information Class.

APPENDIX B

THE READING PASSAGES

READING PASSAGE 1: A THEORY OF EARTH'S STRUCTURE

Easy-Vocabulary Version

Few people who have experienced an earthquake or
witnessed a volcanic eruption doubt that our planet is
active, alive. When the earth a house stands on begins to
move, when a mountain suddenly swells, then there is proof
that our Earth is a changing place.

Geologists, the scientists who investigate the earth,
have put together a possible explanation of the earth's
structure. Their theory, called plate tectonics, is that
the surface of the earth is hard rock like a crust. This
cool superficies floats on magma that is below the
surface. The surface of the earth moves like ice on
water. Weak places become cracks in the ice; similarly,
there are faults in the Earth's rock. When activity inside
the planet causes mounting pressure, plates of rock move to
cause an earthquake, or the tension is released by a
volcano.

There is bountiful evidence to support the theory of

plate tectonics. Aerial photographs and satellite pictures show profound cuts in the Earth. These trenches are clues for the arrangement of the surface plates. Experts have found places where ground motion is likely to transpire. Along these cracks, they measure the shock waves that are caused by the small tremors from deep underground. The measurements buttress plate tectonics today.

One implication of plate tectonics is that all of the earth was once a single mass. By plate realignment, this mass separated into plates moving in different directions. Before the most recent movement, South America touched Africa just under its western bulge, and North America wrapped around North Africa. Europe and most of Asia were far to the north. Africa's movement into Europe forged the Mediterranean Sea and some mountains: the Alps and the Atlas range. The Himalaya range came from the movement of the subcontinent of India away from southeast Africa and into Asia. The westward drift of America accounts for the mountain regions of the Sierras and Andes.

This theory also foreshadows a changing arrangement of continents. California will separate from the mainland. North and South America will at some point disengage. Africa, Australia, Japan, and India will continue to drift toward varying points. While the Atlantic Ocean widens, the Pacific will narrow.

Difficult-Vocabulary Version

Few people who have experienced an earthquake or
witnessed a volcanic eruption doubt that our planet is
active, alive. When the terra firma a house stands on
begins to move, when a mountain suddenly swells, then there
is proof that our Earth is a changing place.

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This theory also foreshadows a changing arrangement of continents. California will dislodge from the mainland. North and South America will at some point disengage. Africa, Australia, Japan, and India will continue to drift toward varying points. While the Atlantic Ocean widens, the Pacific will shrink.

READING PASSAGE 2: LEARNING ABOUT EARTHQUAKES

Easy-Vocabulary Version

Earthquakes occur along the lines of the flaws in the Earth's crust. Scientists have known this for a long time. Of late, however, the study of earthquakes-- especially predicting them--has changed.

The Chinese study earthquakes because they have suffered some of the world's most horrific earthquakes.

Two times in Chinese history, in 1556 and 1976, more than half a million people died in quakes. Because of their success in forecasting quakes, many lives have also been saved. In the terrible winter of 1974 and 1975, there were signs that could be read on two separate occaisions. In December, 1974, the experts posted a warning in the Liaoning Pennisula. All the people left the cities, but the earthquake did not happen. Two months later, ominous events were predicted again. Some were unwilling to leave their homes. They thought it was another blunder. However, the police cleared the dangerous areas. This time a severe earthquake did occur. Because the cities had been emptied, thousands of lives were saved. Before the catastrophic 1976 earthquake, there were readable, but unclear signs, so a warning was not given.

The way that the Chinese learned about the warning signs was engaging. They tried to record everything. They noted as much information as they could. Then, after a quake, the information was studied. They looked for changes that occured just before the quake. They found some novel and unusual facts. The Chinese noted that animals behave strangely before an earthquake. Chickens, which usually roost at night, keep both feet on the ground. Snakes, which usually hid in holes, come up out of the ground. Dogs, even those that are usually quiet, bark incessantly.

American scientists are noticing earthquakes signs,

too. A Colorado expert found that diminutive earthquakes happened when water was forced into a deep well. Engineers were trying to remove oil by using water. Each time they pushed water into the well a little quake transpired. This action led to experiments with water. By pushing water into cracks, they hope to control the increase in pressure. Weak earthquakes can reduce the stress between the plates that agitate the surface of the earth. Less pressure means fewer quakes.

Another theory of earthquakes is intertwined with the moon. Reid A. Bryson of Wisconsin says the Earth's tides have been stronger recently; that is, the levels of the ocean's high and low watercycles have been higher and lower. One result of the moon's stronger tug on the earth could be an increase in volcanic activity.

The Smithstonian observatory in Arizona set out that the Earth's crust reacts to the moon's pull. The liquid, molten rock may be contracted like the water in the oceans. If the pull becomes imposing, the weakest places in the surface are likely to break. The results would be a surge in volcanos and more earthquakes.

Difficult-Vocabulary Version

Earthquakes occur along the lines of the flaws in the Earth's crust. Scientists have known this for a long time. Of late, however, the study of earthquakes—especially predicting them—has been refined.

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READING PASSAGE 3: OVERPOPULATION AND SOCIAL BEHAVIOR

Easy-Vocabulary Version

A classic series of experiments to determine the effects of overpopulation on communities of rats was

reported in February of 1962 in <u>Scientific</u> <u>American</u>. The experiments were conducted by a psychologist, John Calhoun, and his associates. In each of these experiments, an equal number of male and female adult rats were placed in an enclosure and given an adequate supply of food, water, and other necessities. The rat populations were allowed to increase. Calhoun knew from experience approximately how many rats could live in the spaces without experiencing stress due to overcrowding. He allowed the population to increase to approximately twice this number. Then he stabilized the population by removing babies that were not dependent on their mothers. He and his associates then carefully observed and recorded behavior in these overpopulated communities. At the end of their experiments, Calhoun and his associates were able to see that overcrowding causes a breakdown in the normal social ways among rats.

The females in the rat population were the most seriously affected by the population. They showed deviant behavior. In fact, many of the babies died as a result of poor maternal care. For example, mothers sometimes abandoned their babies to die. However, the experiments verified that in overpopulation communities, mother rats' behavior may be considered pathological.

The dominant males in the rat population were the least affected by the overpopulation. Each claimed an area of his own. Therefore, these individuals did not experience

the same degree of overcrowding. Since the dominant males had adequate space, they were not as seriously affected. However, dominant males did behave oddly at times. Their vexatious behavior consisted of attacks on weaker male, female, and immature rats.

Nondominant males in the experimental rat communities also exhibited deviant social behavior. Some moved very little and ate and drank at times when the other rats were sleeping in order to shun contact with them. Other nondominant males were hyperactive, chasing other rats and fighting each other. This segment of the rat population, like all other parts, was affected by overpopulation.

The behavior of the nondominant males and of the other parts of the rat population has similarities to human behavior. People in densely populated areas exhibit odd behavior similar to that of the rats in Calhoun's experiments. In large urban areas such as New York City, London, and Mexico City, there are abandoned children as well as mean, powerful individuals. There are also people who withdraw and people who become hyperactive. The quantity of other social problems such as murder, rape, and robbery also frequently occur in densely populated communities. Is the principal cause overpopulation? Calhoun's experiments suggest that it might be. In any case, social scientists and city planners have been influenced by the results of this series of experiments.

Difficult-Vocabulary Version

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effects of overpopulation on communities of rats was
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conclude that overcrowding causes a breakdown in the normal
social routines among rats.

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deviant maternal behavior. In fact, many of the pups died
as a result of poor maternal care. For example, mothers
sometimes abandoned their babies to die. However, the
experiments verified that in overpopulation communities,
mother rats' behavior may be considered pathological.

The dominant males in the rat population were the least affected by the overpopulation. Each claimed an area of the enclosure as his own. Therefore, these individuals did not experience the same degree of overcrowding. Since the dominant males had adequate space, they were not as seriously affected. However, dominant males did behave oddly at times. Their vexatious behavior consisted of attacks on weaker male, female, and immature rats.

Nondominant males in the experimental rat communities also exhibited deviant social behavior. Some withdrew completely; they moved very little and ate and drank at times when the other rats were sleeping in order to shun contact with them. Other nondominant males were hyperactive, chasing other rats and fighting each other. This segment of the rat population, like all other parts, was affected by overpopulation.

The behavior of the nondominant males and of the other components of the rat population has similarities to human behavior. People in densely populated areas exhibit deviant behavior parallel to that of the rats in Calhoun's experiments. In large urban areas such as New York City, London, and Mexico City, there are abandoned children as well as cruel, powerful individuals. There are also people who withdraw and people who become hyperactive. The quantity of other social pathology such as murder, rape, and robbery also frequently occur in densely populated communities. Is the principal cause of these dilemmas

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might be. In any case, social scientists and city planners
have been influenced by the results of this series of
experiments.

READING PASSAGE 4: DEFORESTATION

Easy-Vocabulary Version

Deforestation has only recently been recognized as a
global problem. But the tropical regions are where it is
occuring most rapidly. This is because most forests in
other regions have already been reduced centuries ago.
Jungles are being cut down today, however, because of the
increased use of machinery and the surging demand for wood
products.

Tropical forests produce a nearly endless variety of
plants. People often do not realize that the jungle has a
very fragile balance of nature. The soil is very rich in
nutrients, but only because of the decaying plants and
animals. When the plants and animals disappear, the earth
quickly loses its richness. For example, in the Amazon
region of Brazil called Bragantina, the forest was cleared
around 1900. By 1940, the earth there had turned into a
hard, useless surface. Bragantina was left as a wasteland
reminder of the danger of meddling with the balance of
nature.

Besides losing productive earth, another reason to keep

tropical forests is the abundance of plants and animals they support. Many of these life forms have not been scientifically analyzed yet. Scientists wish to gain as much information as possible before they are destroyed. This information can be valuable. For instance, many drugs are manufactured from the raw materials found in these forests. Quinine for malaria and Dioscorea for birth control are tropical forest products. Scientist are convinced that these forests hold many other secrets, such as the key to natural pesticides.

The third argument for keeping tropical forests concerns their effect on worldwide climate patterns. Plants give off water vapor into the air, which becomes rain. Plants also take in carbon dioxide and give off oxygen. If the forests are cut down, then there will be less good air to breathe. And because the carbon dioxide blanket over the earth tends to warm the environment, and increase in this gas would create a warming effect. Without large rainforests, our world faces foul, hot, dry earth and air.

The rainforests are disappearing at lightening speed. Every second hundreds of trees fall before saws. Of course, there is some good news. In countries such as Korea and Australia, wise forest management provides for planting trees and for the setting aside of protected forests. Some trees should not be cut because they take hundreds of years to reach maturity. Finally, something

must be done about poverty, for it is the very poor who cut down so many of the trees for land, homes, and fuel. It is necessary that we act now to make sure that the world will be hospitable in the future.

Difficult-Vocabulary Version

Deforestation has only recently been recognized as a global problem. But the tropical regions are where it is occuring most rapidly. This is because most forests in other regions have already been decimated centuries ago. Jungles are being cut down today, however, because of the increased use of machinery and the surging demand for wood products.

Tropical forests produce a nearly interminable variety of plants. People often do not realize that the jungle has a very fragile ecosystem. The soil is very rich in nutrients, but only because of the decaying plants and animals. When the plants and animals disappear, the earth quickly loses its fertility. For example, in the Amazon region of Brazil called Bragantina, the forest was cleared around 1900. By 1940, the earth there had turned into a hard, useless surface. Bragantina was abandoned as a wasteland reminder of the danger of meddling with the balance of nature.

Besides losing productive earth, another reason to keep tropical forests is the cornucopia of plants and animals they support. Many of these life forms have not been

scientifically categorized yet. Scientists wish to garner as much information as possible before they are destroyed. This information can be invaluable. For instance, many drugs are manufactured from the raw materials found in these forests. Quinine for malaria and Dioscorea for birth control are tropical forest products. Scientist are convinced that these forests hold many other secrets, such as the key to natural pesticides.

The third argument for conserving tropical forests concerns their effect on worldwide climate patterns. Plants give off water vapor into the atmosphere becomes rain. Plants also take in carbon dioxide and give off oxygen. If the forests are cut down, then there will be less good air to breathe. And because the carbon dioxide blanket over the earth tends to warm the environment, a surge in this gas would create a warming effect. Without large rainforests, our world faces foul, hot, parched earth and air.

Nevertheless, the rainforests are disappearing at lightening speed. Every second scores of trees fall before saws. Of course, there is some good news. In countries such as Korea and Australia, wise forest management provisions provide for planting trees and for the designation of protected forests. Some trees should not be cut because they take hundreds of years to reach maturity. Finally, something must be done about pauperism, for it is the very poor who cut down so many of the trees for land,

homes, and fuel. It is necessary that we act now to ensure that the world will be hospitable in the future.

THE VOCABULARY TESTS

Vocabulary Test 1

Score_____   VOCABULARY CHECK UP   Name_____

Directions: Put the letter representing the appropriate answer in the blank at left.

___1.   Newspapers are filled with
        a. newshype, b. articles, c. people, d. incidenary
        information.

___2.   _____ work with each other.
        a. sexists, b. racists, c. associates, d. rivals.

___3.   Prisons are composed of many small
        a. playpens, b. enclosures, c. intellects, d. jokes.

___4.   The pilot _____ the falling airplane.
         a. pulled out, b. ejected, c. exploded,
         d. stabilized.

___5.   All parents have human
        a. neuroses, b. psychoses, c. offspring, d. torture.

___6.   From the data, we can _____ several things.
        a. involve, b. conclude, c. impress, d. confine.

___7.   How thick is it? What is its
        a. overlap, b. proton, c. resistance, d. density?

___8.   Those who react unusually are considered
        a. pliant, b. rigid, c. deviant, d. resilient.

___9.   We believe in the _____ care of children.
        a. maternal, b. patterned, c. indigent, d. prorated.

___10. All systems are up and their proper functions have
        been _____ by the support team.
        a. verified, b. spiked, c. detonated, d. undone.

___11. The dog licked its
        a. pups, b. up, c. collar, d. servant.

___12. This man is not just mentally sick, he is
        a. conformist, b. individualistic, c. scholarly,
        d. pathological.

___13. Leaders tend to be _____ in personality.
        a. dominant, b. bizarre, c. impolite, d. weak.

___14. Did the patient ____ any signs of recovery?
        a. discern, b. exhibit, c. create, d. face.

___15. The weak and fearful man ____ to the corner.
        a. extracted, b. withdrew, c. collapsed, d. drank.

___16. This kid isn't just moving around, he's
        a. superordinate, b. conductive, c. loudly,
        d. hyperactive.

___17. How many _____ is this machine made of?
        a. components, b. glasses, c. tips, d. puffs.

___18. This man is mean and
        a. kind, b. obscure, c. cruel, d. beneficial.

___19. Who did the criminal _____ sexually?
        a. gripe, b. obfuscate, c. regress, d. rape.

___20. This is a problem, but the ____ cause is that.
        a. disputing, b. royal, c. principal, d. outrage.

___21. This is a very bad, _____ problem.
        a. horrible, b. OK, c. concentrated, d. resolved.

___22. He is wrong; he made a
        a. observation, b. tremor, c. blunder, d. go.

___23. This is very bad. It's
        a. catatonic, b. capable, c. catastrophic, d. it.

___24. When a bird comes down, it
        a. expires, b. roosts, c. flies, d. soars.

___25. What happened? What _____ over there?
        a. transpired, b. related, c. obscured, d. did.

___26. He causes trouble by ____ them into a riot.
        a. agitating, b. retelling, c. serving, d. knowing.

___27. These things are _____ together.
        a. touched, b. separated, c. indolent,
        d. intertwined.

___28. When the _____ comes in, the water rises.
        a. tide, b. whale, c. ride, d. sun.

___29. Pull it; Give it a a. put, b. rip, c. sip, d. tug.

___30. He's very big and
a. immaculate, b. weak, c. imposing, d. inferior.

___31. The space travelers are now back on
a. terra firma, b. the tree, c. the map, d. air.

___32. What _____ are you using to make the house?
a. shower, b. convex, c. framework, d. show.

___33. The sailboat _____ lightly over the water.
a. glides, b. plows, c. squats, d. stows.

___34. The mean dog has been ____ on the robber.
a. relished, b. fed, c. unleashed, d. true.

___35. The diggers have _____ the lost treasure.
a. lost, b. resurfaced, c. shot, d. unearthed.

___36. The workers are _____ the weak walls with wood.
a. sounding, b. buttressing, c. going, d. pithing.

___37. The boy ____ the girl to get her attention.
a. nudged, b. killed, c. shouted, d. scaled.

___38. The mountains are sharp and
a. devastated, b. ripped, c. cropped, d. craggy.

___39. We are _____ the bear from the house right now.
a. killing, b. snapping, c. dislodging, d. doing.

___40. If you put pure cotton in water, it
a. dirties, b. outs, c. regrets, d. shrinks.

___41. Rats, mice, and beaver are called
a. mealtickets, b. rodents, c. vulgar, d. down.

___42. There's not much, but it will be
a. sufficient, b. gone, c. large, d. leaden.

___43. He does the same thing everyday according to his
a. rutting, b. plane, c. level, d. routine.

___44. The two men exhibit _____ , or similar behavior.
a. parallel, b. deviant, c. obvious, d. dumb.

___45. The _____ of the world are too many to solve.
a. dopes, b. cracks, c. vitals, d. dilemmas.

___46. The method was bad but now has been
a. defined, b. clarified, c. refined, d. done.

___47. The poor children in the disaster all
a. flourished, b. perished, c. ate, d. got out.

Vocabulary Test 2

Score_____   Vocabulary Check Up   Name_____

Directions: Put the letter representing the appropriate
answer in the blank at left.

___1.   A person's face has many distinctive <u>parts</u>.
        a. eyes, b. features, c. clues, d. bulges.

___2.   A railroad track can <u>separate</u> a town into two parts.
        a. cut, b. move, c. arrange, d. shift.

___3.   There is a deep <u>crack</u> in the earth in the hills.
        a. fault, b. bulge, c. pattern, d. plate.

___4.   The lines and circles on the cloth make a <u>design</u>.
        a. picture, b. crack, c. pattern, d. plate.

___5.   There is one <u>long line of mountains</u>.
        a. peak, b. range, c. valley, d. subcontinent.

___6.   The <u>highest point</u> in the mountains is over there.
        a. peak, b. range, c. valley, d. floor.

___7.   The man found <u>information to solve the mystery</u>.
        a. clues, b. views, c. news, d. dues.

___8.   French bread has a <u>hard surface on the outside</u>.
        a. crack, b. cut, c. crust, d. coast.

___9.   There are many cities along the <u>ocean side</u>.
        a. rail, b. island, c. crust, d. coast.

___10. Dig a <u>long narrow hole</u> to put the wall in.
        a. tension, b. tremor, c. trench, d. tightness.

___11. Ships are able to <u>stay on top of water</u>.
        a. witness, b. float, c. fault, d. fly.

___12. Faucets are <u>things that release water pressure</u>.
        a. valves, b. stems, c. plates, d. drums.

___13. The <u>great land mass</u> actually moves.
        a. part, b. evidence, c. continent, d. shift.

___14. India is <u>part of a larger land mass</u>.
        a. surface, b. subcontinent, c. satellite, d. den.

___15. Taiwan is a <u>land mass surrounded by water</u>.
        a. fault, b. torpedo, c. tropic, d. hot island.

___16. The <u>center</u> of the earth is hot, liquid rock.
        a. core, b. clue, c. cut, d. outside.

___17. This hard job creates <u>pressure</u>.
a. tremor, b. work, c. bulge, d. tension.

___18. The <u>proof</u> is in the book.
a. clue, b. truth, c. lie, d. evidence.

___19. <u>Earth scientists</u> study earthquakes.
a. geologists, b. deists, c. cultists, d. dudes.

___20. The <u>shock waves</u> were strong.
a. cores, b. tremors, c. trenches, d. tensions.

___21. You may <u>see and feel</u> what I have learned.
a. pressure, b. change, c. witness, d. sensitize.

___22. The quake <u>moved to one side</u> the road.
a. shoved, b. shifted, c. cracked, d. resurfaced.

___23. Volcanoes have eruptions.
a. magma, b. heat, c. blow ups, d. dangers.

___24. They believe <u>earth is made up of plates on water</u>.
a. tectonics, b. platonism, c. migranes, d. Budda.

___25. If rocks in get very hot, they become <u>liquid rock</u>.
a. lava, b. magma, c. pumice, d. crack.

___26. That man has a good <u>idea</u>.
a. tendency, b. prototype, c. proton, d. theory.

___27. They took pictures <u>in the air</u>.
a. serially, b. floating, c. aerially, d. now.

___28. The sun is <u>likely</u> to come out tomorrow.
a. fortunate, b. bright, c. probable, d. unknown.

___29. Some <u>indications</u> are that he did it.
a. riots, b. drifts, c. trends, d. implications.

___30. Sailboats may <u>drift</u> when there is no wind.
a. be still, b. arrive, c. spin, d. float about.

___31. After a big meal, your middle may <u>bulge</u>.
a. burn, b. hurt, c. be large, d. float.

___32. The story may <u>account for</u> his story.
a. explain, b. record, c. count, d. emphasize.

___33. I doubt it, but there may be a <u>slight</u> change.
a. radical, b. moderate, c. little, d. surprising.

___34. Despite the tragedy on board, all lives were
a. preserved, b. taken, c. lost, d. put out.

___35. The frightened people all ____ the burning house.
a. ran into, b. went under, c. did, d. forsook.

___36. The police ____ all persons from the waterfront.
a. excited, b. evacuated, c. killed, d. looked.

___37. What good fortune has ____ you that you are rich?
a. befallen, b. totalled, c. hurt, d. tickled.

___38. The drugs were ____ to the sick people.
a. shot, b. drug, c. tugged, d. dispensed.

___39. She has gotten great _____ in the college.
a. fate, b. germs, c. loss, d. erudition.

___40. Chickens, ducks, and geese are all
a. poultry, b. heavy, c. featherless, d. brutal.

___41. Evil persons may _____ in the dark places.
a. float, b. lurk, c. haven, d. replenish.

___42. The army _____ the enemy to go back.
a. helped, b. suggested, c. compelled, d. asked.

___43. The mountain is not smooth, it has many
a. crevices, b. ice spots, c. dollars, d. inches.

___44. His kind speech ____ our fears.
a. increased, b. got to, c. upped, d. diminished.

___45. The woodcutters ____ the trees in the forest.
a. developed, b. decimated, c. polished, d. ate.

___46. The ocean water _____ into the inlet.
a. surged, b. ripped, c. floated, d. compelled.

___47. The wait seemed
a. new, b. old, c. out, d. interminable.

___48. Every animal lives in its own
a. hut, b. hole, c. ecosystem, d. dispensary.

___49. The woman with children has no trouble with
a. money, b. room, c. fertility, d. scores.

___50. There is something for all in the
a. cornucopia, b. ledger, c. anvil, d. cave in.

___51. The scientist _____ all the animals by size.
a. read, b. got, c. categorized, d. detached.

___52. The farmer _____ all the fruit on the trees.
a. ate, b. set out, c. reviled, d. garnered.

____53. The gold and silver are nearly
     a. valuable, b. rich, c. invaluable, d. moldy.

____54. The ground is so dry that my mouth is
     a. parched, b. wet, c. moist, d. pulsating.

____55. It's here. _____, I wonder who brought it.
     a. Then, b. Which, c. Nevertheless, d. Been.

____56. The animals came by handfuls and
     a. scores, b. millions, c. digits, d. drums.

____57. What ____ have you made for the future?
     a. excision, b. delusion, c. guts, d. provision.

____58. The ill have been ____ to the hospital.
     a. split, b. designated, c. replaced, d. done.

____59. The poor suffer from
     a. pauperism, b. nutrition, c. insomnia, d. time.

____60. He tied it to ___ that it wouldn't fall off.
     a. take, b. tough, c. ensure, d. despoil.

CLOZE TESTS

Cloze Test 1

Score_____   Comprehension Check   Name_____

Directions: Use your understanding and memory of the
reading passage to identify the correct word to fill in the
blank below. Write the letter of the word next to the
appropriate number.

A Theory of Earth's Structure

    There is bountiful evidence to support the __1__ of
plate tectonics. Aerial photographs and satellite __2__
show profound trenches in the Earth. These __3__ are clues
for the arrangement of the __4__ plates. Experts have
found places where __5__ motion is likely to transpire.
Along these __6__, they measure the shock pulses that are
__7__ by the small tremors from deep __8__. The
measurements support plate tectonics theory.
    One implication of plate tectonics is that __9__ of the
earth was once a __10__ mass. By plate realignment, this
mass __11__ into plates moving in different directions.
__12__ the most recent movement, South America nudged __13__
just under its western bulge, and __14__ America wrapped
around North Africa. Europe and the __15__ of Asia were far
to the __16__. Africa's movement into Europe forged the
Mediterranean __17__ and some mountains: the Alps and the
__18__ range. The Himalaya range was the __19__ of the
movement of the subcontinent of __20__ away from southeast
Africa and into Asia.

___1.   ___2.   ___3.   ___4.   ___5.   ___6.   ___7.   ___8.

___9.   ___10. ___11. ___12. ___13. ___14. ___15. ___16.

___17. ___18. ___19. ___20.

a. single, b. Sea, c. North, d. South, e. trenches, f. all,
g. India, h. theory, i. ground, j. interior, k. cracks,
l. surface, m. underground, n. bulk, o. issue, p. Atlas,
q. caused, r. Africa, s. north, t. separated, u. before,
v. pictures.

Cloze Test 2

Score_____   Comprehension Check   Name_____

Directions: Select the appropriate word from the list below
to fill in each blank in the passage. Then put the letter
for the word in the blanks on the left below.

Learning About Earthquakes

The Chinese study earthquakes because they have __1__
some of the worst __2__. Two times in Chinese history, in
__3__ and in 1976, more than half of a __4__ people
perished in quakes. Because of their __5__ in forecasting
quakes, many lives have also been __6__. In the winter of
1974-75, there were __7__ signs twice. In December, the
experts __8__ a warning in the Liaoning Peninsula. All the
people __9__ the cities, but the earthquake did not __10__.
Two months later, the __11__ again warned the people. Some
were __12__ to leave their homes. They __13__ it was another
false alarm. However, the __14__ evacuated the dangerous
areas. This time a __15__ earthquake did befall them.
Because the __16__ had been emptied, thousands of __17__ were
saved. Before the terrible 1976 __18__, there were
readable, but unclear signs, so a __19__ was not given until
too __20__.

____1.   a. police

____2.   b. cities

____3.   c. severe

____4.   d. thoughtless

____5.   e. earthquake

____6.   f. million

____7.   g. success

____8.   h. saved

____9.   i. unwilling

____10.   j. occur

____11.   k. lives

____12.   l. sent

____13.   m. thought

____14.   n. left

129

_____15.   o. 1556

_____16.   p. suffered

_____17.   q. readable

_____18.   r. 1776

_____19.   s. good

_____20.   t. posted

                           u. people

                           v. late

                           w. experts

                           x. warning

                           y. quakes

Cloze Test 3

Score_____   Comprehension Check   Name_____

Directions: Select the appropriate word from the list below
to fill in each blank in the passage. Then put the letter
for the word in the blanks on the left below.

Overpopulation and Social Behavior

     The females in the rat population were the most __1__
affected by the population. They showed deviant __2__. In
fact, many of the pups __3__ as a result of poor maternal
__4__. For example, mothers sometimes __5__ their babies
to die. However, the __6__ verified that in overpopulation
communities, __7__ rats' behavior may be considered
pathological.
     The dominant males in the __8__ population were the
least affected by __9__. Each claimed and area of the
enclosure as his won. Therefore, these __10__ did not
experience the __11__ degree of overcrowding. Since the
dominant males did behave oddly at __14__. Their vexatious
behavior consisted of attacks on __15__ male, female, and
immature rats.
     Nondominant males in the experimental rat __16__ also
exhibited deviant social behavior. Some __17__ very little
an ate and __18__ at times when the other rats were __19__ in
order to shun contact with them. Other __20__ males were
hyperactive.

___1.   a. abandoned

___2.   b. behavior

___3.   c. care

___4.   d. died

___5.   e. experiments

___6.   f. affected

___7.   g. nondominant

___8.   h. have

___9.   i. individuals

___10.   j. same

___11.   k. communities

___12.   l. moved

___13.   m. mother

___14.   n. males

___15.   o. overpopulation

___16.   p. order

___17.   q. drank

___18.   r. rat

___19.   s. seriously

___20.   t. times

Cloze Test 4

Score_____   Comprehension Check   Name_____

Directions: Select the appropriate word from the list below to fill in each blank in the passage. Then put the letter for the word in the blanks on the left below.

Deforestation

Besides losing productive earth, another reason to preserve __1__ forests is the abundance of plants and __2__ they support. Many of these life __3__ have not been scientifically categorized yet. __4__ wish to gain as much

information from the tropical ___5__ as they can before
theyh are __6__. This information can be invaluable. For
__7__, many drugs are manufactured from the __8__ materials
found in these forests. Quinine for _9__ and Dioscorea for
birth control are tropical forest _10__. Scientists are
convinced that these forests _11__ many other secrets, such
as the _12__ to natural pesticides.

The third argument for conserving tropical forests _13_
their effect on worldwide climate patterns. _14__ give off
water vapor into the atmosphere, which becomes _15___.
Plants also take in _16__ dioxide and give off _17__. If
the forests are _18__ down, then there will be less good
_19__ to breathe. And because the carbon dioxide _20_
over the earth tends to warm the environment, a surge in
this gas would create a warming effect.

___1.   a. animals

___2.   b. plants

___3.   c. concerns

___4.   d. destroyed

___5.   e. cut

___6.   f. forms

___7.   g. ground

___8.   h. hold

___9.   i. instance

___10.   j. carbon

___11.   k. key

___12.   l. air

___13.   m. malaria

___14.   n. rain

___15.   o. oxygen

___16.   p. products

___17.   q. blanket

___18.   r. raw

___19.   s. scientists

___20.

t. tropical

u. forests

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