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The relationship between some syntactically related reading strategies and ESL readers' reading rate

Ni Hou
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The relationship between some syntactically related reading strategies and ESL readers' reading rate

by

Ni Hou

A Thesis Submitted to the Graduate Faculty in Partial Fulfillment of the Requirements for the Degree of

MASTER OF ARTS

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Signatures have been redacted for privacy

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CHAPTER I INTRODUCTION

Background

The topic of reading strategies has been a major issue especially in English as a second language (ESL) research, reflected in a multitude of literature covering reading strategies from the effect of context on guessing the word meaning (Fischler, & Bloom, 1979; Stanovich, & West, 1979; Swinney, & Hake, 1976) to the role of textual organization identification in reading comprehension (Carrell, 1984; Irwin, & Pulver, 1984; Meyer, & Brandt, 1981). Much less emphasis, however, has been placed on research on the relationship between reading and syntactically related reading strategies (Bhatia, 1984; Tullius, 1971; Wisher, 1976). Research on the relationship between the reading rate and syntactic reading strategies is even rarer in the ESL reading research area.

While research in ESL has ignored the connection between reading and syntactically related reading strategies, it can be argued that syntactic reading strategies have an important role in the reading process of ESL readers. This argument is substantiated by the following work.

1. Empirical evidence (Barnett, 1986; Bean, Potter, & Clark, 1980; Guarino, & Perkins, 1986; Sim, & Bensoussan, 1979) indicates that ESL readers rely heavily on syntactic means.

In an experiment implemented by Hatch, Polin, and Part, (1974) on the effect of syntax on native and ESL readers, they asked the subjects...
to cross out every letter e on a page and found ESL students were highly successful at the task. Natives marked letters mostly when they appeared in content words but not in function words, while the ESL students marked them everywhere, indicating that they paid as much attention to letters in words which show grammatical relationships as they did to letters in content words. A possible explanation is that native readers have more resources to turn to, such as cultural knowledge, automaticity in word and sentence pattern recognition (Coady, 1979; Hatch, 1979; Yorio, 1971), so in some cases they can pick up words minimally needed to form concepts without even attending to sentence structure (Hatch, 1979; Schlesinger, 1968). In the face of "unfamiliar cues" ESL readers, owing to their "imperfect knowledge of the language" (Yorio, 1971, p. 110), may often feel their semantic or pragmatic knowledge insufficient in processing information, so sentence structure knowledge is evoked to compensate for the deficiency in other aspects. In fact this supplementary function of syntax also works for natives when they encounter complex sentences which can not be decoded without syntactic analysis. The difference is that such cases may be more common among ESL students as they are inherently deficient in the target language.

Another reason that may account for ESL readers' inclination to use syntactic means in reading lies in the grammatical focus of most ESL programs. It seems reasonable to expect that the effect of instruction may be displayed in ESL readers' strategies for processing information. In other words, influenced by methods of grammar
instruction, they may consciously or subconsciously attend to sentence structure while reading.

2. A noted problem with L2 readers is their slow reading speed (Coady, 1979; Hatch, 1979; Macnamara, 1966), which may be partly caused by their less efficient processing of sentence structure.

Macnamara (1966) found that his Ss took 3.9 seconds per 20 words longer to read in their second language than in their first. He argued that one of the reasons for the slower speed in L2 was that students were not able to use their knowledge of L2 syntax for prediction in the same way that they used their L1 syntactic knowledge. Tullius (1971) conducted an eye movement study with university-level ESL students and found that the duration of each fixation was almost three times that of L1 students. Reasons for this slow speed of reading can be varied; problems in syntactic processing may be part of them. Further evidence in support of this claim was provided by Graesser, Hoffman, and Clark (1980) who suggested that "Reading speed was determined by the speed of performing linguistic analysis within sentences, such as accessing lexical items, forming syntactic constituents, and organizing words into proposition units" (p. 142). In their study they found "the slow readers required 1.74 times as much time to process a word, 2.55 times as much time to process a proposition, and nearly 15 times as much time to perform syntactic analyses" (p. 142).

Prompted by the evidence of ESL readers' heavy reliance on syntactic means in reading, and their less efficient processing of
sentence components, questions arise: What can be done to increase L2 readers' sentence processing efficiency? Is their trouble in sentence processing caused by their lack of grammatical knowledge or their inappropriate ways of processing syntactic components?

Considering the large amount of grammar instruction given to ESL readers, and the paradox that though syntactic knowledge is admittedly an important factor in information processing, many native readers who do not know a subject from an object can read much more efficiently than some ESL students who can talk like grammarians, a possible argument is that it is not explicit knowledge of sentence structure but a strategic application of this knowledge that really counts in the reading process. In fact this phenomenon has long been observed by Coady (1979) who claimed "... alarming numbers of students have a great deal of proficiency in English and yet read very slowly and with poor comprehension. ... these students are using a poor combination of process strategies in their reading. In other words, we have a reading problem and not a language problem" (p. 9).

Just as "reading can be thought of as parasitic on language but not identical to it" (Coady, 1979, p. 9), so grammar proficiency is not an absolute synonym of grammar application proficiency. Language competency is not equivalent to language performance (Chomsky, 1980). Therefore, in addition to rules of grammar, we must have ways of applying the rules to particular cases.
Need for This Study

In view of the rarity of research on syntactically related reading strategies on the one hand, and the empirical evidence of ESL readers' heavy reliance on syntactic means in reading and their less efficient processing of sentence components, there is an urgent need for more research on the effect of the application of syntactic knowledge on the reading rate and reading comprehension.

Design of This Study

In recognition of this need, this study aims to explore the relationships of some syntactically related reading strategies and the reading rate. The exploration is conducted by selecting four syntactically related reading strategies, and examining the relationship between the selected reading strategies and the reading rate using a multiple regressional model designed so that the reading rate is predicated by the four selected reading strategies.

The following are the four selected syntactically related reading strategies, some of which can be found in many ESL reading or grammar exercise books (Neufeld & Webb, 1984):
1. using syntactic cue words to predict
2. locating main components of the sentence
3. identifying sentence relationships
4. recognizing sentence patterns composed of discontinuous components
The assumptions underpinning the selection of the investigated syntactic reading strategies

The selection of these strategies is made basically on the following assumptions:

1. Syntactic cue words like conjunctions usually signal certain syntactic and semantic relationships between clauses or phrases, so it can be expected that sometimes the reader can infer from these words the information contained in the subsequent phrases or clauses without necessarily reading them. The ability to make predictions from syntactic cue words, conceivably, will enable the reader to skip what can be predicted without reducing reading comprehension.

2. As sentence structure is the frame of information organization, giving primary attention to the main syntactic constituents or, in other words, the higher level syntactic nodes, will help the reader locate and retain important information. For example, as the subject and the predicate normally contain the gist of the sentence, locating them first may accelerate the reader's grasp of the main idea of the sentence. Especially in the case of embedded sentences, subordinate modifiers between the subject, predicate, and object can be conveniently skipped over if only "who does what" kind of information is needed. Besides, the reader, limited in short working memory capacity, when confronted with too much information, has to sift part of the information (Graesser, Hoffman, & Clark, 1980). Giving primary attention first to the main syntactic constituents helps retain important information.

3. Awareness of sentence relationships may accommodate the reading process too because connecting individual words in conceptual
relationship helps retain information and a global understanding of the text (Geva, 1992). Additionally with a sense of relationships within the sentence, the reader can locate information needed faster since he/she knows where to look for it. For instance, if several parallel phrases are modifying a verb, the reader can simply skip over the phrases if he/she is only interested in the action described by the verb.

4. Knowledge of sentence patterns composed of discontinuous constituents such as: so... that, not only... but also. accuse... of, contribute... to may facilitate reading comprehension and the reading rate as well. With this knowledge, the reader, primed or activated by the stimulus of the first part of the discontinuous components, may give a quicker response in the recognition of the second part. Therefore, in the presence of these sentence patterns, the reader who is aware of the connection between the discontinuous components may process sentences faster.

Theoretically, the selection of these reading strategies is partially based on Goodman's proposition that "reading is a selective process. It involves partial use of available minimal language cues selected from perceptual input on the basis of the reader's expectation" (Goodman, 1970, p. 108). This study is an investigation of this selectively attentional reading process in terms of using syntactic knowledge.
Purpose of This Study

The purpose of this study is 1) to investigate the relationships of the selected syntactically related reading strategies and the reading rate and 2) to obtain findings that may have pedagogical implications in reading instruction.

Research Questions

1. What is the relationship between the overall selected syntactic reading strategies and the reading rate of ESL readers?
2. What is the relationship between each strategy and the reading rate of ESL readers?
3. Is there any difference between fast and slow readers' ability in using the investigated reading strategies?
4. What factors may affect ESL readers' ability in using the investigated reading strategies?
CHAPTER II  REVIEW OF LITERATURE CONCERNING SYNTAX AND READING

This chapter includes a review of related literature. It is organized into the following sections: 1) reflection on the literature concerning the role of syntax in reading, 2) research on syntactically related reading strategies, 3) summary of literature review and characteristics of this study.

Reflection on the Literature Concerning the Role of Syntax in Reading

The effect of syntactic knowledge on reading was a focus of research during the 50's and 60's. According to Orasanu (1986), "[I]t was Chomsky who shifted the focus of language research from lower units, like morphemes and words, to the level of sentences, by initiating the large-scale study of syntax (grammar)" (p. 17). With the impact of Chomsky's transformational grammar, the role of grammar in language was once so enormously overestimated that "[l]anguage comprehension was considered to operate as an analogy to the same kind of formal structural analysis performed by linguists" (Beaugrande, 1984, p. 9). Strong claims in support of the importance of sentence structure were made. McNeill (1970) acknowledged "[v]irtually everything that occurs in language acquisition depends on prior knowledge of the basic aspects of sentence structure" (p. 2). A primary interest then was the psychological effect of syntactic complexity (Miller, 1962; Miller, & Isard, 1963), which was largely determined by
the degree of sentence embedding or nesting, or the difference between deep structure and surface structure based on Chomsky’s transformational grammar (Miller, 1962; Schlesinger, 1968). For example, Miller (1962) conducted experiments to test the hypothesis that the linguistic structures and processes described by transformational linguistics had psychological reality. He found that left and center branching structures were more difficult to process than right branching ones, and he attributed this difficulty to a greater strain the former imposed on the short-term memory.

The rise of cognitive psychology shifted the focus of reading research to the effect of background knowledge and word perception. Among a multitude of research on this topic, Goodman's proposition that reading is a psycholinguistic guessing game (Goodman, 1970) was especially influential. Along this direction, theories of top-down vs. bottom-up gained access into the reading research area and became predominantly popular in place of the reading research focused on sentence structure.

Recently, after a period in which grammar instruction was downplayed and sentence structure knowledge was deemed to be of a minor role in reading, "it is again credible to think that comprehension depends in part on processes that are essentially syntactic" (Perfetti, 1990, p. 205). Along with this recognition, a renewed interest in syntactic processing has become evident.

A reflection of this trend is in the research of parsing---"constructing a syntactic representation indicating the relationship of
grammatical constituents to one another" (Taraban, & McClelland, 1990, p. 26). Just and Thibadeau, in agreement with Fodor, Bever, and Garrett (1974), Kimball (1973), and Marcus (1980), purported that "A central aspect of comprehension is the parsing process---determining the syntactic and semantic roles and boundaries of sentence constituents. One major approach to parsing both in psychology and in artificial intelligence has been a syntactically oriented one, in which determining the syntactic roles of the words in a sentence constituted the core of comprehension.... In English, this approach often focuses on word order, particularly function words, suggesting that these words narrow the range of possible roles that an upcoming content word may play" (Just, & Thibadeau, 1984, p. 358). A glance at artificial intelligence studies of natural language parsing reveals that syntactic means including word order and function words play a crucial role in various models simulating human comprehension process (Kaplan, 1973; Woods, 1970).

A point worth noting is that different from older research concerning reading and syntax, parsing research does not just merely discuss what type of sentences may be difficult for the readers; it probes directly into the readers, into their deployment of syntactic knowledge in the reading process by examining the possibilities the readers match one component with the other chiefly through syntactic means. For instance, it does not only address the problem of what structure may pose ambiguity but also the problem of what possible routes the readers will take in processing the ambiguous structure.
Therefore, it can be said that parsing research goes a step further than the traditional research on the relationship of syntax and reading in that it brings the reader into account, establishing a nexus of syntax, the reading process, and the reader. Though, at this stage, most of this research is more theoretical than practical, and little has been done in the area of ESL reading, an increasing interest in integrating theories and practice (Dejone, 1979) is sending a message that syntax is again entering the limelight in reading research.

Research on the Effect of Syntactically Related Reading Strategies on the Reading Rate or Reading Comprehension

In terms of the reading process, for a long period "syntactic processes typically were assumed to be either inscrutable or irrelevant" (Perfetti, 1990, p. 205), while the higher level textual processes became closely identified with "top-down", and the low level word processes were aligned with "bottom-up". The result is, in spite of numerous studies done in the area concerning reading or syntax, not much research has been conducted in the area of syntactic reading strategies. A review of the limited research in this area revealed the following as the most researched syntactic reading strategies:

- Using function words to identify new constitutes
- Anticipating content words using function words
- Using affixes to decide the word speech of a word
- Using verbs to find the number and kind of arguments attached to the verbs
- Attaching new words to the constituent that came before
• Using the first word (or major constituent) of a clause to identify the function of that clause in the current sentence
• Using syntactic marks, such as subordinate conjunctions, relative pronouns, to distinguish main from non-main clauses (Clark, & Clark, 1977)

In a more synthetic way, these strategies can be categorized as: a) reading in chunks, b) anticipating or predicting based on syntactic clues, c) reading with awareness of sentence relationships, d) decoding using sentence structure knowledge.

Reading in chunks

According to Coots and David (1984), "the ideal unit of surface analysis is a major phrase or clause because these units satisfy two requirements of a short-term store: they correspond to a meaningful grouping capable of semantic representation; grouping words into constituent units is important in comprehension because it facilitates the transfer of information from surface to semantic presentation via the limited capacity of a short-term memory processor." Based on this rationale, reading in chunks will benefit the reading process since it smoothes the transfer from linguistic forms to conceptual representation. Some previous studies have substantiated this hypothesis.

In their probe-latency studies, Steward and Gough (1967) used the two word probe technique to investigate the effects of reading in constituent structure on sentence process. In sentences such as the
following:

1) [The presidents of large corporations ] NP [pay millions of dollars in taxes each year] VP

2) [When profits are large ] ADV [corporations ] NP [pay millions of dollars in taxes each year] VP

a two-word test probe, large corporations, is contained. In sentence 1), the two-word probe is a NP constituent, but it crosses a major boundary in sentence 2). If information is processed in constituents, the adjacent test words should be more difficult to be recognized in 2) than in 1). The latency results confirmed this prediction, demonstrating that words in a constituent structure were processed faster than words not in a constituent structure. The implication of this study is that reading in chunks may help the readers achieve a greater reading speed.

Schlesinger (1968) used eye-voice-span to investigate the probability of reading in chunks. According to him, decoding proceeds in chunks rather than in units of single words, and these chunks correspond to the syntactic units of a sentence. To test this hypothesis, he investigated the relationship of the eye voice-span to syntactic structure by asking the subjects to read aloud a number of sentences and tell which word they had seen in addition to those they had read aloud when the light was turned off at predetermined places. It was predicted that the eye-span of proficient readers would reach the end of a syntactic constituent when the light was off because their syntactic expectancy based on their knowledge of phrase structure
would enable them to do so. His findings confirmed the hypothesis and suggested that the reading process may be facilitated by arranging the printed words in groups corresponding to the syntactic constituents.

Smith (1978) reported that the amount of material that could be processed in a single fixation depended on its syntactic organization. Subjects could perceive only 4-5 letters at a time in a single fixation when they were unordered, 2-3 words when letters were organized into random string or words, 5 words if words were organized into short, meaningful clauses. The amount of information perceivable in a single exposure increases when words are chunked in meaningful syntactic constituents.

These findings indicate that reading using phrasal structure knowledge expands the capacity of information processing and helps the reader arrive more rapidly at a correct sentence comprehension.

Reading with anticipation based on syntactic clues

The positive effect of syntactic expectancy on reading is also reflected in its role in assisting the readers to predict syntactic relationship and sentence structure.

Stevens and Rumelhart (1975) observed that "following each word in the sentence there is an explicitly ordered set of expectations with respect to the syntactic class and other characteristics of the next word" (p. 138). In compliance with Stevens and Rumelhart, Clark and Clark (1977) pointed out that function words should help listeners anticipate content words: "For example, since the marks the beginning
of a noun phrase, it should lead listeners to expect a noun that "heads" the noun phrase, e.g., man "in the old man" (p. 62). The role of function words in anticipation can be well illustrated by Lewis Carroll's famous verse "Jabberwocky": *Twas brillig, and the slithy toves did gyre and gimble in the wabe; all mimsy were the borogoves, and the mome raths outgrabe* (cited by Clark, & Clark, 1977, p. 63). Without knowing the semantic meaning of those words, a reader has little difficulty figuring out the relationships between the phrases simply from the function words.

The hypothesis that syntactic cue words, namely the function words, make prediction possible has been evidenced by numerous studies. Wisher (1976) believed that "[a]n expectation guides the mapping from grapheme to meaning, developing hypotheses that are tested against incoming visual data. Such interaction permits the reader to consider only those words compatible with either a syntactic class or a particular meaning" (p. 597). To confirm this assumption, he conducted an experiment with the effects of syntactic expectations. His experiment showed that prior knowledge of the syntactic structure of a sentence allows a sentence to be read faster because the reader can use syntactic knowledge to anticipate, parsing word strings into convenient processing units. In his study, the subjects who knew beforehand the structural description of a sentence either read with less effort or read faster than those who did not. He concluded that "The ability to anticipate structure and meaning is vital to reading. For
reading to be most efficient, the reader must profit from all the cues the language offers" (Wisher, 1976, p. 601).

In Graesser, Hoffman, and Clark's study of structural components of reading time (1980), they reported the effect of sentence predictability on the reading rate. It took 923 more milliseconds to process a 12-word sentence in which the syntactic classes of all words in the sentence were not predicted, compared to a sentence in which the syntactic classes of all words could be predicted by an ATN (Augmented Transition Network, a computational algorithm) parser. In other words it took 77 more milliseconds to process a word whose syntactic class was not predicted on the basis of previous words in the sentence. Their measure of syntactic predictability indexes the likelihood of predicting the syntactic class of word n+1 given that word n.

These studies and many others have lent support for the possibility of predicting from the expectancy of syntax and its conducive effect on the reading rate.

**Reading with awareness of sentence relationship**

Another area in reading strategies research relates to studies of text organization. In their studies of the effect of text organization on reading, Meyer, Brandt, and Bluth (1981), as well as Geva and Ryan (1985), found that signaling connectives facilitated reading comprehension or recall among less skilled readers. An implication of their findings is that a better understanding of sentence rhetoric
relationships may beneficially affect the reading process. In a study conducted by Fodor and Garrett (1967), they read people sentences such as the following:

\[ \text{The pen which the author whom the editor liked used was new.} \]
\[ \text{The pen the author the editor liked used was new.} \]

In the second sentence the relative pronouns \textit{which} and \textit{whom} have been deleted. Fodor and Garrett argued that this deletion should impair comprehension because in such cases listeners would delay identification of the clauses and the construction of their interpretation. Their experiment showed that sentences with the relative pronoun were paraphrased more quickly and accurately than those without.

Irwin and Pulver (1984) investigated the effects of explicitness, clause order, and reversibility on children's comprehension of causal relationships. Having the subjects read passages different in explicitness, clause order, and reversibility and answer comprehension questions about the passages, they came to the finding that 5th and 8th grade students were more likely to comprehend a causal relationship when it was stated explicitly. This means causal conjunctions facilitate understanding of causal relationships, thus leading to a better understanding of the text.

Carrell (1984) further explored the importance of sentence relationship identification to reading comprehension for ESL readers. She looked into the effect of the logic sentence relationships expressed explicitly, namely, by using signaling words such as conjunctions, or
implicitly, e.g. in the absence of syntactic triggers. Her findings, consistent with Fodor and Garrett's, indicated that the subjects performed better with the presence of signaling words. Apparently, the use of syntactic cue words helps reading comprehension, making it easier to identify sentence relationships.

As for the importance of identifying sentence relationships, Geva (1992), in her article investigating the role of conjunctions in ESL readers' reading process, maintained that those who "become aware of subtle cues from signaling main and subordinate clauses, and who can determine the logical relationships in connected discourse and select the appropriate linguistic mean for expressing these relationships are able to successfully integrate and comprehend textual information in academic discourse" (p. 744).

A similar claim was made earlier by O'Reilly (1990). In his study he found that poor college readers spent an appreciably longer time than good readers processing words, propositions, and especially syntactic units, and he attributed it to the difficulty they had in determining relationships within and among these units.

The implication of these studies is that syntactic cue words help reading comprehension because they help readers identify sentence relationships. It appears then that sentence relationship awareness enhances reading comprehension.
Decoding using sentence structure knowledge

The function of sentence structure knowledge in decoding has long been admitted. Previous research looked into this area chiefly through nesting or embedded sentences. The syntactic decoding hypothesis purported by Schlesinger (1968) holds that the difficulty in the syntactic decoding of sentences increases with the degree of nesting and the length of nested parts. Nevertheless, judging from his experiments, which did not render support to this hypothesis, he asserted, "In ordinary reading situations nesting has practically no effect on reading rates and comprehension" (p. 106), conceding, however, that "Conceivably, nested constructions may be an impediment to fluent reading with people of lesser intelligence, or those who know the language less well" (p. 107). As to how sentence complexity will affect the decoding process, and what strategies "those who know the language less well" will take in decoding, he did not explore this issue.

A plausible explanation for the difficulty in decoding sentences of complexity is tentatively offered by parsing theories. For example an ATN (Kaplan, 1973; Woods, 1970), explains why a right-branching construction like 1) is much easier to understand than a center-embedded sentence like 2).

1) The cat chased the mouse that lived in the house that Jack built.
2) The house the mouse the cat chased lived in was built by Jack.

The center-embedded sentence requires the ATN to repeatedly call and interrupt the noun-phrases and then to pair appropriately the
stack of noun phrases with a stack of verb phrases (Bower, & Cirilo, 1985). Additionally, a look at the principal parsing strategies of later closure and minimal attachment may also render some clues as to why it is more difficult to comprehend sentence 2) than sentence 1). In parsing syntactic components readers tend to use strategies that may reduce memory load. Among them the strategies of later closure and minimal attachment are most often used. Later closure refers to immediate assignment of words being processed to certain nodes; minimal attachment means attaching words being processed to the fewest possible nodes. Apparently, sentence 1) can be processed using these two strategies while in sentence 2) the words being processed can not be immediately assigned to a higher level node but have to be held in memory in a floating state until the right noun is parsed with the right verb. The result is an increase in memory load, which in turn distracts the reader's attention from comprehending the incoming information.

In cases such as sentence 2) when "comprehension may include early stages of parsing in which some attachments are created tentatively and perhaps probabilistically and in which structures are sometimes left at floating momentarily unattached" (Perfetti, 1990, p. 206), it is evident that applying locally and immediately the strategies of later closure or minimal attachment would be misleading, resulting in garden path errors, namely, "incorrect parsing decisions" (Perfetti, 1990, p. 207).

An example of such garden path errors incurred by applying later
closure or minimal attachment strategies to local ranges of information being processed could be found in Bhatia's study (1984), in which he examined the adverse effects of syntactic discontinuity on the reading process of L2 readers. The materials for the experiment consisted of sixteen specially written self-contained sentences, containing fairly long qualificational insertions. In eight of these sentences, the qualificational insertions were embedded within the constituents such as the verb group, or the nominal group, thus rendering them discontinuous. In the remaining eight sentences, these qualifications were placed either initially or finally so that there were no such syntactic discontinuities of any kind. The result showed the subjects comprehended significantly better in the second eight sentences, indicating that a number of participants sought information solely from either what immediately precedes or follows the gap. This strategy worked for the second eight sentences but not for the first eight sentences in which the inserted qualifications made parsing between the segregated verb group or the nominal group go beyond local ranges.

As can be seen from this example, though the two parsing strategies of later closure and minimal assignment offer considerable processing advantages such as minimizing processing load and maximizing processing efficiency, in processing constituents which have been rendered discontinuous by the insertion of long qualificational sequences, the readers can not apply them with convenient immediacy within local ranges.
If it is true that node assignment is a necessary part of reading comprehension, in the cases where local range chunking has been proved unworkable, alternative approaches need to be explored.

Summary of the Literature and Characteristics of This Study

A review of research in the relationships of syntax and reading reveals that syntax has long been recognized as an important component in reading; for L2 learners it is especially so. Previous research on syntactic reading strategies has corroborated the possibility and advantages of a strategic use of syntactic knowledge in terms of reading. This strategic use of syntactic knowledge includes using knowledge of phrasal structure, function words, or sentence structure to read in meaningful groups, to predict, to identify sentence relationships, and to decode complicated sentences.

Based on the previous research, this study attempts to explore further the effect of syntactically related reading strategies specifically on the reading rate. Basically the reading strategies investigated in this study are similar to the ones discussed above except for some modifications and expansions.

Instead of focusing on the effect of reading in contiguous phrases on the reading rate, this study deals with the relationship between the reading rate and the ability to recognize phrases or sentence patterns of discontinuous components. It is believed just as reading in chunks that are contiguous and continuous may facilitate the reading process, reading in phrases or sentence patterns that are discontinuous but are
semantically or syntactically connected may also promote the reading process. This is because similar to contiguous chunks, discontinuous phrases or sentence patterns may also be stored in mind "as a stimulus pattern or sequence that the memory system recognizes as a familiar single unit for which an internal code already exist in memory" (Bower, & Cirilo, 1985, p. 75). While the reader can anticipate the types of syntactic components in chunks of contiguous components, he/she knows exactly the word(s) following the first component of discontinuous components of sentence patterns or phrases since those patterned discontinuous components have a high probability of corresponding appearances. Consequently, to those in the habit of reading sentence patterns, one component in a sentence pattern may be suggestive of the existence of another. Such syntactic expectancy activated by the knowledge of sentence patterns may function similarly to that activated by phrasal structure knowledge.

The cited literature concerning decoding complicated sentences has manifested that immediate node assignment may not be a practicable policy in certain cases such as decoding sentences of syntactic discontinuity. To explore an alternative approach, this study turns to a selective process of sentence main components and attempts to prove the effectiveness of this strategy.

While most previous studies were concerned with one or two of the syntactic reading strategies, this study aims to make an evaluation of the relationship of four selected syntactic reading strategies and the reading rate by using a multiple regression model.
It is hoped that an examination of the correlation between the selected reading strategies and the reading rate may render some implications as to what syntactic reading strategies should be taught in ESL reading programs.
CHAPTER III MATERIALS AND METHODS

The research questions addressed in this study are:

1. What is the relationship between the overall selected syntactic reading strategies and ESL readers' reading rate?
2. What is the relationship between each of the reading strategies and ESL readers' reading rate?
3. Is there any difference between fast and slow readers' ability in using the investigated reading strategies?
4. What factors may affect ESL readers' ability in using the investigated reading strategies?

To address these questions I am comparing the subjects' performance on a reading strategies test and a reading rate test using a multiple regression model.

**Materials**

The materials used to collect data consist of two tests: the Reading Strategies Test (see Appendix A) designed to assess the subjects' ability to use the selected syntactic reading strategies, and the Reading Rate Test (see Appendix B) used to measure the subjects' reading speed. The Reading Rate Test is a standardized test taken from Timed Reading (Spargo, 1989), and the Reading Strategies Test composes forms and items taken from various sources (a detailed
explanation is given below).

The purpose of giving the Reading Rate Test and the Reading Strategies Test is to discover the relationships between the subjects' reading speeds and their scores in the Reading Strategies Test.

**Reading Strategies Test (see Appendix A)**

The Reading Strategies Test is made up of four sections, each having 10 items targeted at one of the above mentioned strategies: 1) prediction skill, 2) sentence main component location skill, 3) sentence relationship identification skill, 4) sentence pattern recognition skill.

The design of the four sections: the sources of the test forms and test items, the tasks for the subjects, and the underlying assumptions

**Section I: Prediction Skill (see Appendix A, pp. 66-67)**

All the 10 items in section I are in the form of a book reviewer's comments about a new book. They were taken from *Reading Improvement Exercises for Students of English as a Second Language* (Harris, 1966, p. 49), but only the first part of the sentence was retained. For example, the main clause was taken off from the original sentence:

*Although I have the highest personal regard for Professor Baker,*

*I must confess that I find few major points in this book upon which he and I agree.*

The students were asked to predict if the book reviewer approves
or disapproves of the book from the retained clause:

*Although I have the highest personal regard for Professor Baker,...*

Assumption:

Good syntactic reading strategies users will be able to predict the message contained in the omitted main clause from the syntactic cue words in the context, such as *although* in the above clause.

Section II: Sentence main component location skill (see Appendix A, pp. 67-69)

The form of Section II was adopted from *Exercise on Subject and Predicates* in Neufeld and Webb's 25 *Strategies: Reading Skills for Intermediate-Advanced Students of English as a Second Language* (Neufeld, & Webb, 1984, p. 110); some of the sentences in this section were taken from other authentic materials. All the items contain embedded parts between the components to be matched. The students were asked to match the verb with the given subject or the object with the given verb.

The following is an example of the questions in this section:

*The years during which the American colonies were fighting to establish their freedom from England produced an important change in their way of thinking.*

(subject)  (predicate)

*The years*  __________

Assumption:

Good syntactic reading strategies users will attend selectively to
the components conveying the main message of the sentence, which are normally the subject, the verb, and the object while the poor syntactic strategies users will read linearly, processing word by word. In the case of embedded sentences, they, distracted by subordinate modifiers between the main sentence structure components, tend to lose track of sentence structure which in many cases is essential for reading comprehension.

Section III: Sentence relationship identification skill (see Appendix A. pp. 69-71)

The four types of sentence relationships: collection of descriptions, causation, problem/solution, and comparison, were adopted from Carrell's study (1984); the sentences were taken from different sources of authentic texts. To make the terms understandable to the subjects, the term, collection of description, was changed to parallelism in the test. The subjects were asked to identify the sentence relationships of the underlined parts of the 10 items in the section following the given examples of the sentence relationships. Below is an example of the items:

They show that he learned a little Latin, that he acquired some of the basic elements of good conduct, and that he read a little English literature.

Assumption:

Good syntactic reading strategies users will read globally and associatively, attending to the overall sentence structure and
transforming linguistic forms into conceptual sentence relationships, so they are more able to identify sentence relationships. In contrast, poor syntactic strategies users will read with attention only to local context, so they are less likely to identify the sentence relationships reflected in associations between phrases or clauses.

Section IV: Sentence pattern recognition skill (see Appendix A, pp. 71-74)

This section is in the commonly used multiple choice form; the items were taken from various sources of authentic materials. According to the design, the first part of a sentence containing the first component of a sentence pattern will be projected on the screen first. Immediately after the screen is cleared, the second part of the sentence, with a blank in it, is to be projected on the screen together with four choices of words for the blanked word(s), the other component of the pattern. The subjects are asked to choose a word or words from the given four choices within a limited time. The following is an example of the items:

So widespread had the habit of reading the Bible in English become

official steps were taken to combat it.

a. which c. that
b. what d. some
Assumption:

It is expected that in this section those who read with more consciousness of sentence patterns will do faster and better when time is constrained because the first component of the pattern may activate the recognition of the second one within a shorter period. Those who do not read in sentence patterns are likely to spend a longer time performing the task owing to their neglect of the association between the discontinuous components.

Reading Rate Test (see Appendix B)

The Reading Rate Test is a 400-word passage, *The Drinker's Dilemma*, taken from Spargo's *Timed Reading* (1989). Attached to it are 10 reading comprehension questions which are given as a part of the reading test to avoid the problem of reading without understanding. This passage was chosen because it is a standardized test validated by repeated use in reading programs; it approximates the subjects' language proficiency level; the length is appropriate so that the reading comprehension questions can reflect the students' reading ability, not their information retaining ability; it contains some linguistic features tested in the Reading Strategies Test, such as embedded discontinuous components.

Subjects and Methods

Subjects

Twenty three students of high and advanced level classes in
Intensive English Orientation Program (IEOP) at Iowa States University were used for this study. They were mostly from Asia and South America, and had been in the United States less than a year. Their English proficiency level, as measured by the Michigan English Placement Test (Michigan University, 1978), ranged from 60 to 90. This relatively wide range of proficiency was designed to elicit more heterogeneous data.

Methods

Pilot test

In order to decide on a proper period of time for the field test and to assess the appropriateness of the test in its difficulty level and its validity in reflecting the goal of the test, a pilot test of the Reading Strategies Test was given in March 1994 to a non-native graduate of Iowa State University whose English proficiency, estimated by his TOEFL score of 597, is at a higher level than most of the IEOP students' in the study.

He spent 28 minutes doing the other three sections of the Reading Strategies Test, and for Section IV, 35 seconds was given for each item. After the test, an interview was given, and his response was roughly consistent with the design of the test.

In Section I, he used the syntactic clues to predict the subsequent text. As for the three wrong choices he made: item 3, 9, 10 (see Appendix A, pp. 66-67), he explained that, attracted by the positive tone of the given text of item 3, he did not pay much
attention to the syntactic clue, *yet*; for item 9, as the sentence is long, consisting of more than two contrasting parts, the syntactic clue, *although*, did not catch his attention.

In locating the main components of the sentence in Section II, his primary attention was on the structure of the main sentence components in neglect of the subordinate parts. Using this strategy, he succeeded in locating correctly almost all the required components except one in which he said he mistook the word *object* as *subject*, and, therefore, made the wrong decision.

In identifying the sentence relationships in Section III, he relied much on the syntactic and semantic cues such as conjunctions, prepositional phrases, or words clearly signaling sentence rhetoric relationships. He made the wrong decisions with item 4 and 5 (see Appendix A, pp. 70-71), which do not have explicit sentence relationship signals.

In doing Section IV, sentence pattern recognition, he said he used his knowledge of sentence patterns to predict the missing words; this strategy corresponds with the design of the test. The two items in which he made the wrong choices were item 2 and 10 (see Appendix A, pp. 72, 74). For item 2, he said he was so perplexed by the complexity of the sentence that he did not recognize the analogy relationship expressed by *just as ... so*. For item 10, he explained he did not know the collocation of the verbal phrase *apply...to*; therefore, he chose the word *with*. With stereotyped phrases denoting syntactic relationships such as *not only...but also, so...that* he seemed to have little difficulty.
Judging from the results of the pilot test, the test is believed to be proper in its difficulty level, test content, and test form.

Field test

On the basis of the pilot study, a field test of the Reading Strategies Test was conducted on April 1, 1994. As the Reading Strategies Test contains items unfamiliar to the subjects, half an hour was spent explaining the directions and answering questions. Then Section IV (see Appendix, pp. 71-74) was first given on the overhead, 40 seconds for each item. The rest of the three sections (see Appendix A, pp. 66-71) started from 9:35 and ended at 10:10, altogether 35 minutes.

The Reading Rate Test (see Appendix B) was given three weeks later and administered by two native experienced ESL teachers in a self-paced reading method recommended by Harris and Sipay (1990, p. 204). The subjects started to read at the same time and wrote down their finishing time for the passage while the administrators wrote every 10 seconds on the blackboard. After subjects finished the passages, they put their papers face down. Administrators then handed out comprehension questions, asking subjects not to look back at the passage while doing the reading comprehension questions and telling them to work as fast as they could but to be careful enough to prepare for the reading comprehension questions to be given later.
CHAPTER IV DATA ANALYSES AND DISCUSSION

To address the research questions the following areas were examined: 1) the relationship between the overall selected reading strategies and the reading rate, 2) the relationship between each of the strategies and the reading rate, 3) the difference between fast and slow readers’ ability in using the reading strategies, and 4) the item difficulty index of the four sections in the Reading Strategies Test.

Analysis of the Relationship Between the Overall Selected Reading Strategies and the Reading Rate

A multiple regression model was adopted to investigate the relationship between the selected reading strategies and the reading rate. The reading rate was the dependent variable predicted by four independent variables of the selected syntactically related reading strategies: 1) prediction skill, 2) main component location, 3) sentence relationship identification, and 4) sentence pattern recognition.

The results of Correlation Matrix, Analysis of Variance, and Parameter Estimates of the regression model were examined to assess the relationship between the overall selected reading strategies and the reading rate. The results of the Correlation Matrix (see Table 1) reveal a relative high correlation, 0.79 (p<0.01) between two variables: sentence main component location and sentence relationship identification. In addition, none of the significance levels of the four components are satisfactory, all larger than 0.05 (see Table 2) though the multiple r square, 0.44 (see Table 3), is at a significant level
judging by the F value, 3.51. Considering the high correlation between
the two predictor variables and the insignificant T values for the
individual predictor variables—the indications of interaction
between predictor variables, some modifications need to be made to
the model.

Table 1. Correlation matrix for reading rate and four reading strategies

<table>
<thead>
<tr>
<th>Variable</th>
<th>x1</th>
<th>x2</th>
<th>x3</th>
<th>x4</th>
<th>Reading rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>x1: prediction</td>
<td>0.11</td>
<td>0.21</td>
<td>0.39</td>
<td>0.24</td>
<td></td>
</tr>
<tr>
<td>x2: main component location</td>
<td>0.79</td>
<td>0.23</td>
<td>0.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x3: sen. relationship identification</td>
<td>0.09</td>
<td></td>
<td>0.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x4: sen. pattern recognition</td>
<td></td>
<td></td>
<td>0.46</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Multiple regression analysis (parameter estimates)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Slope</th>
<th>Prob &gt;T</th>
</tr>
</thead>
<tbody>
<tr>
<td>x1: prediction</td>
<td>0.66</td>
<td>0.8817</td>
</tr>
<tr>
<td>x2: main component location</td>
<td>3.37</td>
<td>0.2988</td>
</tr>
<tr>
<td>x3: sen. relationship identification</td>
<td>3.33</td>
<td>0.5642</td>
</tr>
<tr>
<td>x4: sen. pattern recognition</td>
<td>7.16</td>
<td>0.098</td>
</tr>
</tbody>
</table>
To reduce the effect of interaction between predictor variables, instead of four components, three components were adopted: 1) prediction skill, 2) the combination of main component location skill and sentence relationship identification skill, and 3) sentence pattern recognition skill. Besides, two sets of data which may not have actually reflected the two subjects' true scores in the Reading Strategies Test were deleted. One of them scored zero in Section IV because she was late for the test, arriving after this section was already done; the other scored zero in Section II and Section III because she said she did not understand the directions. With the new model, the results were satisfactory. Table 3 is a comparison of part of the results of the old and the new model.

The F value, 12.40, reflects the overall fitness of the new model; the r square in the new model is much improved too, from 0.44 to 0.69. That is to say, statistically speaking, the model can account for 69% of the total reading speed variance; in other words, the statistical results from this study indicate that the selected reading strategies appear to have a positive and fairly close relationship with the reading rate.

Besides these changes, the results of Parameter Estimates of the new model (see Table 5) render further evidence for the fitness of the new model. Except for the variable, prediction, the other variables are all significantly correlated with the dependent variable, the reading rate. The results in Parameter Estimates will be discussed in detail in the next section.
Table 3. Analysis of variance (above: four predictors; below three predictors)

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of square</th>
<th>Mean square</th>
<th>F Value</th>
<th>Prob&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>4</td>
<td>16705.45</td>
<td>4176.36</td>
<td>3.51</td>
<td>0.0277</td>
</tr>
<tr>
<td>Error</td>
<td>18</td>
<td>21438.14</td>
<td>1191.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C Total</td>
<td>22</td>
<td>38143.59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Root MSE</td>
<td></td>
<td>34.51</td>
<td>R-square</td>
<td></td>
<td>0.44</td>
</tr>
<tr>
<td>Dep Mean</td>
<td></td>
<td>149.35</td>
<td>Adj R-squ</td>
<td></td>
<td>0.31</td>
</tr>
<tr>
<td>C.V.</td>
<td></td>
<td>23.11</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of square</th>
<th>Mean square</th>
<th>F Value</th>
<th>Prob&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>3</td>
<td>22220.21</td>
<td>7406.74</td>
<td>12.40</td>
<td>0.0002</td>
</tr>
<tr>
<td>Error</td>
<td>17</td>
<td>10157.27</td>
<td>597.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C Total</td>
<td>20</td>
<td>32380.47</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Root MSE</td>
<td>24.44</td>
<td>R-square</td>
<td>0.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dep Mean</td>
<td>151.75</td>
<td>Adj R-squ</td>
<td>0.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C.V.</td>
<td>16.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Analysis of the Relationship Between Each of the Reading Strategies and the Reading Rate

The relationship between each of the reading strategies and the reading rate was examined by looking into: 1) the simple correlation between the reading rate and each of the reading strategies, 2) the parameter estimates values and their significant levels, and 3) the standardized coefficients of the predictors.

Table 4 is the correlation between the reading rate and each of the reading strategies. As can be seen from the table, the simple correlation between sentence pattern recognition and the reading rate is high (r= 0.65) while the correlation between prediction and the reading rate is fairly low (r= 0.47).

Table 4. Correlation matrix for the reading rate and three predictors

<table>
<thead>
<tr>
<th>Variable</th>
<th>x1</th>
<th>x2x3</th>
<th>x4</th>
<th>Reading rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>x1: prediction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x2x3: main component location</td>
<td>0.31</td>
<td>0.23</td>
<td></td>
<td>0.47</td>
</tr>
<tr>
<td>/sen. relationship identification</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x4: sen. pattern recognition</td>
<td></td>
<td></td>
<td></td>
<td>0.65</td>
</tr>
</tbody>
</table>
Nevertheless, a simple correlation is not a satisfactory index of the relationship between the reading rate and any particular component of the reading strategies, since a given component may be correlated with other components of the reading strategies to some extent.

To assess the independent relationship of the three predictor variables and the reading rate, standard multiple regression analyses were performed. Table 5 shows the contribution of each component to the reading rate. The directions of all the slopes are positive, consistent with the expectations that these reading strategies will positively relate to the reading rate. The significant levels for the variable of the combination of main component location and sentence relationship identification, and the variable of sentence pattern recognition are below 0.01 (0.0097, 0.0011), implying that these two variables are significantly related to the reading rate. Though the significant level for prediction skill, 0.1567, renders no strong support for the relationship between prediction skill and the reading rate, one reason may be the small sample size. Apart from the unsatisfactory significance level of the variable, the direction of the slope is positive, just as anticipated, and its correlation with the reading rate is 0.47 (p<0.05), indicating that the ability to predict using syntactic clues may be positively related to the reading rate.

A further analysis of the relationship of each of the reading strategies and the reading rate was conducted by calculating the standardized coefficients of the independent variables (see Table 6). Judging from the magnitude of the Beta and T values of the three
variables, sentence pattern recognition is most closely related to the reading rate, prediction skill the least, and between the two is the combination of main component location and sentence relationship identification.

Table 5. Multiple regression analysis (parameter estimates)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Slope</th>
<th>Prob &gt;T</th>
</tr>
</thead>
<tbody>
<tr>
<td>x1: prediction</td>
<td>4.98</td>
<td>0.1566</td>
</tr>
<tr>
<td>x2x3: main component location</td>
<td>0.47</td>
<td>0.0097</td>
</tr>
<tr>
<td>/sen. relationship identification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x4: sen. pattern recognition</td>
<td>11.88</td>
<td>0.0011</td>
</tr>
</tbody>
</table>

Table 6. Multiple regression analysis (standardized coefficients)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta coefficient</th>
<th>T Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>x1: prediction</td>
<td>0.22</td>
<td>1.53</td>
</tr>
<tr>
<td>x2x3: main component location</td>
<td>0.42</td>
<td>3.00</td>
</tr>
<tr>
<td>/sen. relationship identification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x4: sen. pattern recognition</td>
<td>0.55</td>
<td>4.03</td>
</tr>
</tbody>
</table>
Fast and Slow Readers' Difference in Ability in Using the Reading Strategies

In order to examine differences between fast and slow readers' ability to use these reading strategies, the six fastest readers were examined in comparison with the six slowest readers. A comparison of the fast and the slow readers' mean reading rates, mean scores in the four sections, and ranges of rate or score distributions is given in Table 7.

Table 7. Fast/slow readers’ mean reading rates and their mean scores in the Reading Strategies Test

<table>
<thead>
<tr>
<th></th>
<th>Fast group</th>
<th>Slow group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mean</td>
<td>range</td>
</tr>
<tr>
<td><strong>Reading rate</strong> (word/minute)</td>
<td>206.03</td>
<td>200-218</td>
</tr>
<tr>
<td><strong>Reading strategies:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>prediction (full score: 10)</td>
<td>8.00</td>
<td>5-10</td>
</tr>
<tr>
<td>main component location</td>
<td>12.17</td>
<td>10-13</td>
</tr>
<tr>
<td>(full score: 13)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sen. relationship identification</td>
<td>7.5</td>
<td>5-9</td>
</tr>
<tr>
<td>(full score: 10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sentence pattern recognition</td>
<td>6.83</td>
<td>6-7</td>
</tr>
</tbody>
</table>
As can be seen from Table 7, the mean reading rate for the fast readers is 206.03 words per minute with a range from 200 to 218. The mean reading rate for the slow readers is 108.06 words per minute ranging from 96 to 120. Thus, the average for fast readers was 1.91 times the average for slow readers. The difference between the fast and the slow readers in the Reading Strategies Test is likewise impressive: the fast readers' mean score in Section I, Section II, Section III, and Section IV is respectively 1.33, 1.70, 1.32, and 1.70 times the slow readers', and the significance levels for the differences in the mean scores of the four sections between the two groups are all below 0.05 except the one for Section I, prediction. On the average the slow readers scored lower than the fast readers in all the sections, especially in Section II, main component location, and Section IV, sentence pattern recognition. The correspondence between their slower reading rate and their lower scores in the Reading Strategies Test shows a correlation of their ability to use these strategies and their reading rate.

The differences in their reading rates and their performance on the Reading Strategies Test are visualized in Figure 1 and Figure 2, which graphically demonstrate the distance between the fast and the slow readers' ability to use the investigated reading strategies.

Despite the marked difference in their reading rate between the subjects who performed well and those who did less well on the Reading Strategies Test, the difference in their reading comprehension is less remarkable. The mean reading comprehension score of the six
Figure 1. Fast and slow readers' mean reading rate
The four sections in Reading Strategies Test

Figure 2. Fast/slow readers’ mean scores on the Reading Strategies Test
fast readers is 8.5, ranging from 8 to 10, while the slow readers’ mean score is 6.83, ranging from 4 to 9. Plotting reading comprehension against the three components (see Table 8): prediction, the combination of main component location /sentence relationship identification, and sentence pattern recognition, using 21 subjects seems to suggest that employing these reading strategies may increase the reading rate but not necessarily reading comprehension. The multiple r square is only 0.21, and the F value, 1.53, is too small to show a significant correlation between the reading strategies and reading comprehension. Reasons for the weak correlation may be varied; one speculation is that while these reading strategies may elevate the reading rate with no reduction of reading comprehension in certain cases, for example, reading for general ideas, or scanning for required information, they may not function equally effectively when details need to be retained to answer questions such as questions 1 and 3 in the Reading Rate Test (see Appendix B, p. 76)

**Reading Strategies Test Item Difficulty Index Analysis**

In addition to the above analyses, an item difficulty index analysis was conducted on the items of the four sections of the Reading Strategies Test in the hope that some findings could be attained as to what types of sentences or what components in the sentences may affect negatively ESL readers’ ability to use the strategies. The results of item difficulty analysis are shown in Figure 3, Figure 4, Figure 5, and Figure 6, which display graphically difficulty degree of each item in the four sections.
### Table 8. Analysis of Variance (dependent variable: reading comprehension)

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of square</th>
<th>Mean square</th>
<th>F Value</th>
<th>Prob&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>3</td>
<td>14.69</td>
<td>4.90</td>
<td>1.53</td>
<td>0.24</td>
</tr>
<tr>
<td>Error</td>
<td>17</td>
<td>54.45</td>
<td>3.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C Total</td>
<td>20</td>
<td>69.14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Root MSE</td>
<td></td>
<td>1.79</td>
<td>R-square</td>
<td>0.21</td>
<td></td>
</tr>
<tr>
<td>Dep Mean</td>
<td></td>
<td>7.43</td>
<td>Adj R-squ</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>C.V.</td>
<td></td>
<td>24.09</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Prediction**

One inference drawn from the subjects' performance in this section is that semantic factors may affect the readers' judgment of prediction. For example, as can be seen from Figure 3, item 3 (see Appendix A, p. 66) poses the greatest difficulty for the subjects. An examination of this item reveals that some subjects made the wrong decision probably because of the semantic influence. The sentence, *Professor Baker always expresses himself in a delightfully amusing manner; yet even...* compared with some other sentences, is simpler in sentence structure and has fewer propositions, but most of the subjects took the overall tone as approving rather than disapproving.
The complimentary words, *delightfully amusing manner*, may have distracted their attention from the syntactic clue, *yet even*, thus leading them to the wrong decision. The same error was committed by the subject in the pilot study, who suggested this explanation.

**Main component location**

This study supports the claim that the reading rate increases as a function of the ability of recognizing the main sentence components. Among nine students who scored the highest in this section, six are also the fastest readers, reading over 200 words per minute.

![Figure 3. Item difficulty index (Section I: Prediction)](image)
Among the items, item 5 and 8 (see Appendix A, p. 68) seem to be the most discriminative items, sifting out only five subjects who gave the correct answers, four of whom are among the fastest readers, reading at more than 200 words per minute. Both items contain highly embedded clauses separating the components to be matched. Making the right choices for these items would seem to require not only a clear sense of sentence structure but also a conscious attention to the main components; otherwise, the reader would feel it difficult to retain the unmatched components in a floating state in the short term memory while being distracted by other supporting modifications.

Figure 4. Item difficulty index (Section II: Main component location)
Sentence relationship identification

Sentences in which explicit sentence relationship signal words are used pose less difficulty for the subjects. For example, sentences 1, 7, 8, and 10 (see Appendix A, pp. 70-71), contain phrases or words: as a result, so...that, although, that, which clearly denote syntactic relationships, and these sentences turned out to be the least difficult to the subjects as can be seen from Figure 5. Sentences or phrases such as the underlined part in sentence 5 and 6, in which the sentence relationships are not clearly specified by stereotyped syntactic function words, tended to be more difficult to the subjects:

Sentence 5:

The large part which war played in English affairs in the Middle Ages, the fact that the control of the army and navy was in the hands of those who spoke French, and the circumstances that much of English fighting was done in France all resulted in the introduction into English of a number of French military terms.

Sentence 6:

Therefore we think of architecture as some vague, learned thing dealing with French cathedrals or Italian palaces of Greek temples, not with New York or Chicago streets or Los Angeles suburbs, and this false doctrine has strengthened in us until our eyes are dulled and our minds are deadened to all the beauty that is being created around us today, and we lose all the fine deep pleasure that we might otherwise experience from our ordinary surrounding.

As suggested by the fairly high correlation between main
component location and sentence relationship identification, there is an interaction between the two variables, which is expected as the prerequisite of sentence relationship identification is knowledge of sentence structure. Knowledge of sentence structure is also the key in locating the main components of the sentence. In this sense, sentence structure knowledge serves as the common basis on which both the tasks are performed.

Figure 5. Item difficulty index (Section III: Sentence relationship identification)

Sentence pattern recognition

Of the nine students who scored the highest in this section, six had the fastest reading rate as well, so it can be claimed that sentence pattern recognition ability can be an index of the reading rate. The
easiest items in this section are items 8, 1, 9, and 6 (see Appendix A, pp. 72-74); the most difficult one is item 10:

Many government programs can be made more efficient by applying sophisticated computer models and other advanced technology _____ the problems they are designed to solve.

a. with  b. to  c. in  d. for

Only three subjects chose the right word to fill in the blank in the sentence. A possible explanation for this distribution may be that sentence patterns or phrases indicating types of sentence relationships such as clauses of result, comparison, or condition may be of more frequent use and thus are more familiar to the subjects who, therefore, felt it easier to recognize the collocations between the components of these sentence patterns. As for verbal phrases like item 10, they are of more idiosyncratic nature and are less often used. This may account for the fact that item 10 received the highest index of difficulty. An implication may be that words of collocation should be learnt together not only for the sake of facilitating vocabulary learning but also for the sake of increasing the reading rate.
Figure 6. Item difficulty index (Section IV: Sentence pattern recognition)
CHAPTER V CONCLUSIONS AND IMPLICATIONS

The study has rendered some evidence that the ability to use syntactic knowledge strategically is important in terms of the reading rate. Judging from the multiple F score of the second model, 12.40, and the multiple r square, 0.69, the model can account for a large part of the total variance of the reading rate at a significant level. That is to say, the relationship between these reading strategies taken as a whole and the reading rate is fairly strong, though caution needs to be taken in claiming that the use of these investigated reading strategies is largely responsible for the differences in the subjects' reading rate as concession has to be made that it is hard to distinguish between the cause and effect; to put it another way, it is impossible to tell merely from this study whether because the readers can use the strategies, they read faster, or the other way around. Besides, this study only reveals the subjects' ability to use the strategies, but whether they did use these strategies in reading remains unanswered. To address these problems, a qualitative study or eye-movement observations of their reading process may be preferable. In spite of this, the correlation between the reading rate and the reading strategies still implies that the ability to use these strategies may constitute an important part of the reading ability.

Among the abilities to use these strategies, the ability of sentence pattern recognition is most related to the reading rate. This correlation suggests that syntactic expectancy based on sentence
pattern knowledge may be helpful to the reading rate probably because it helps information location, sentence relationship and sentence structure identification. Another reason may be found in the test method of this section: the testing of this section is time constrained. The implication is that a higher degree of automaticity of sentence pattern recognition may be accountable, to some degree, for a faster reading rate. Therefore in ESL reading or grammar instructions, it may be beneficial to learn words in phrases, or to extract frequently used sentence patterns for further practice as has been done in many ESL programs. In other words, the implication for ESL reading instruction is that pattern practice may be advantageous.

In confronting long embedded sentences, some ESL readers may be at a loss, overwhelmed by their complexity. This study has demonstrated that dealing first with the main component of the main sentence may be a practical strategy. In cases of sentence complexity, a reading style of selectively processing the main components of the sentence may be recommendable. By selectively picking up components which carry important information the reader can more effectively acquire the gist of the sentence while not overloading the short term memory.

As evidenced by many studies (Fordor, and Garrett, 1967; Carrell, 1984) including this one, the presence of function words signaling sentence relationships helps sentence relationship identification, and sentence relationship identification helps the reading process. However, more problems arise in identifying sentence relationships
when they are expressed implicitly, for example, when they are expressed without the presence of conjunctions signaling sentence relationships. Therefore, more emphasis needs to be placed on helping ESL readers discern sentence relationships expressed in ways other than stereotyped syntactic patterns.

Though the small sample of this study limits how confident we can be in arguing that the ability to predict from syntactic clues positively correlates with the reading rate, results do suggest that further investigation into the relationship between them is warranted.

As illustrated by the data analysis, the fast and the slow readers differ significantly in their performances on the Reading Strategies Test. Ability to use these reading strategies may be taken as one of the indices of reading ability. To improve their reading ability, measures might be adopted to enhance the ability to use these strategies.

The demonstrated poorer performances of the slow readers may be either due to their deficiency in grammatical knowledge or due to their inability to use strategically the knowledge acquired. The implication is that more than knowledge is necessary: ways to use the knowledge is important. Therefore, in grammar instruction, a mere delivery of knowledge is not enough, more important is integrating knowledge with skills to use it in communicative situations.

Although this study has revealed a weak correlation between the reading strategies and reading comprehension, this does not necessarily mean that these strategies may not help reading comprehension. One of the reasons for the weak correlation may be that
the comprehension questions in the Reading Test are too detailed; therefore, they are not sensitive to the reading strategies investigated in this study which were designed to identify main ideas.

Reading is an interactive process in which the readers should use any cues available to "seek the most direct path to meaning, drawing on prior conceptual and linguistic competence" (McLeod, & Mclaughlin, 1985, p. 119). Among the cues available, this study supports the fact that syntactic cues should not be neglected; the role of strategic use of syntactic knowledge in reading needs to be further assessed. In view of the negligence of previous research in this area, further research is recommended, and effective syntactic reading strategies need to be sorted out, formulated, then introduced into or reinforced in ESL reading programs.
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APPENDIX A

READING STRATEGIES TEST

Section 1

Directions:
In this section you are given incomplete statements of the kind that might appear in reviews of a new book. Put a check mark (X) before each statement which suggests that the reviewer approves of the book. Put a circle (O) before each statement which shows that the reviewer does not approve of the book.

Example:
In the incomplete sentence, Although I have the highest personal regard for Professor Baker,... the conjunction, although, suggests that the part following the incomplete sentence may contain something different from what the incomplete sentence means. Since the given incomplete sentence says positive things about Professor Baker, you can expect what follows will be some negative comments about his book. Therefore, you should put a circle (O) before the sentence:

O Although I have the highest personal regard for Professor Baker,...

----1. In spite of professor Baker’s excellent reputation in his field, ...

---- 2. I had supposed that no one would ever produce a book on this subject with which I would find myself in complete agreement, but...

---- 3. Professor Baker always expresses himself in a delightfully amusing manner; yet even...

---- 4. One cannot quarrel with the nature of the evidence which Professor Baker offers in his latest book, but...

---- 5. It is curious how a writer who was once so careful with his facts and sound in his judgments could...

---- 6. In such a difficult field it is not often that one encounters a
general treatment that is sound in its theory and entertaining in its style, but...

--- 7. Other reviewers, I find, have had some very unkind things to say about this, Professor Baker's most recent book; for my own part, I really cannot imagine how...

--- 8. Professor Baker's publisher has stated that this new book will soon take the place of all the old standard works in this field in view; however, ...

--- 9. There is certainly a great need in this field for a short general survey which combines sound scientific theory with good literary style, but, though no one could find fault with Professor Baker's style,...

--- 10. When I first opened the package containing a copy of Professor Baker's latest book and read its title, I must admit I felt a sudden sinking of the heart; yet ...

Section II

Directions:
After reading the sentences below, in the space provided on the right, give the predicates (main verbs, not participles or infinitives) of the subjects, or the objects of the predicates listed on the left. If the object is a clause, just write the first few words of the clause instead of the whole clause.

Example:

In many cases, relationships that teenagers have with their friends tend to be more important than relationships within the family.

subject
relationship

predicate

In the space you should write "tend", as it is the predicate of the subject, relationship.

1. Carter's own published account and all the dozens, even hundreds
that have described those magical few minutes on November 26, 1922, report that the four discoverers looked into the tomb's first room, which would be called the Antechamber, flashed their light upon one magnificent object after another, and saw, too, on the north wall of the Antechamber the traces of another sealed doorway.

2. The defendant's solicitor demanded, since he knew that the court would not, in view of the attempts to mislead the police officers in the first stages of the inquiry, accept the defendant's statement, that the fact that his client was the head of a large family should be taken into account in giving the verdict.

3. Anyone who feels that many more students we haven't actually admitted are sitting in on the course than those we have is likely to agree that the curriculum needs revision.

4. The years during which the American colonies were fighting to establish their freedom from England produced an important change in their way of thinking.

5. The Worcester dictionary, which soon became far more popular than
those which Webster had produced, included many additional words, brief, clear definitions, full indication of pronunciation, the use of special marks to divide syllables, and lists of synonyms.

\[
\text{subject} \quad \text{predicate}
\]

The Worcester dictionary

6. The British troops won most of the engagements but, finding themselves in an unfriendly region far from their base of supplies, finally evacuated the city.

\[
\text{subject} \quad \text{predicate}
\]

The British troops

Section III

Directions:

In this section, you are asked to identify the type of sentence relationships. First, examples of four types of sentence relationships are provided: a. parallelism, b. cause/effect, c. problem/solution, d. comparison/contrast. These types of relationships are coded as a, b, c, or d. Identify the relationships of the underlined parts of the following sentences in accordance with the examples provided by writing letter a, b, c, or d before each sentence.

Examples of the four types of sentence relationships:

a. Parallelism

Our 25th high school reunion was held last year. We saw many old friends, danced until dawn, and agreed to meet again in five years.

In this sentence, the underlined parts are in the relationship of parallelism because the three phrases are all descriptions of what We did, and their grammatical functions are the same, too. Therefore, you should write letter, a, before the sentence.

b. Cause/effect

Sally wasn't eating well, exercising, or resting enough. As a result,
she felt weak and run-down and never wanted to do anything.

<table>
<thead>
<tr>
<th>cause</th>
<th>effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sally not eat well...</td>
<td>felt weak...</td>
</tr>
</tbody>
</table>

c. Problem/solution

Pollution is a problem; polluted rivers are health hazards and eyesores. One solution is to bar the dumping of industrial wastes.

<table>
<thead>
<tr>
<th>problem</th>
<th>solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollution is a problem</td>
<td>Bar dumping of industrial wastes</td>
</tr>
</tbody>
</table>

d. Comparison

Despite evidence that smoking is harmful, many people claim this is not so. Although smoking has been related to lung and heart disease, for some people smoking may relieve tension.

<table>
<thead>
<tr>
<th>one view</th>
<th>opposing view</th>
</tr>
</thead>
<tbody>
<tr>
<td>smoking harmful, related to lung and heart disease</td>
<td>smoking may relieve tension</td>
</tr>
</tbody>
</table>

1. They show that he learned a little Latin, that he acquired some of the basic elements of good conduct, and that he read a little English literature.

2. Unlike some of the other young Virginia gentlemen of his time, he did not go on to the College of William and Mary in the Virginia capital of Williamsburg.

3. In terms of intellectual preparation and power, Washington is in sharp contrast with some other early American presidents, such as John Adams, Thomas Jefferson, and James Madison.

4. Brought over by the settlers, influenced by new living conditions, changed to reflect another scene and setting, they still show their origins.
5. The large part which war played in English affairs in the Middle Ages, the fact that the control of the army and navy was in the hands of those who spoke French, and the circumstances that much of English fighting was done in France all resulted in the introduction into English of a number of French military terms.

6. Therefore we think of architecture as some vague, learned thing dealing with French cathedrals or Italian palaces of Greek temples, not with New York or Chicago streets or Los Angeles suburbs, and this false doctrine has strengthened in us until our eyes are dulled and our minds are deadened to all the beauty that is being created around us today, and we lose all the fine deep pleasure that we might otherwise experience from our ordinary surrounding.

7. In our daily lives we are so completely surrounded by architecture that we have ceased to see and enjoy it as art.

8. Although some modern architecture is truly art, much of the new building is more useful than it is beautiful.

9. His first expedition, in 1584, brought back glowing reports of the coast of Virginia; a second sent over the following year to plant a colony returned in discouragement; and a third, left isolated on the island of Roanlake, disappeared from history, leaving as the only evidence the word "Croton" carved on a tree.

10. As a result of the War of 1812, Americans began to produce better cloth than they had previously obtained from abroad.

Section IV

Directions:

In this section, you will first be presented with part of a sentence on the screen of the overhead. Immediately after it disappears from the screen, the other part of the sentence will be projected on the screen. In the second part of the sentence, a word or a phrase is taken out, and four choices for the missing word or phrase are provided. Choose the most appropriate word for the missing part.
Transcript of Section IV  (presented on the overhead)

1. So widespread had the habit of reading the Bible in English become

   _____ official steps were taken to combat it.
   a. which
   b. what
   c. that
   d. some

2. Yet just as we see no spatial discontinuity at the point where the separate visual experiences from the two halves of our field of view are brought together,

   _____ we are unaware of the discontinuity over time that occurs faster than a second.
   a. that
   b. and
   c. so
   d. if

3. When we read Johnson's statement that Shakespeare has "small Latin", we must remember that what seemed like little Latin to such a scholar

   _____ Johnson would be a very respectible quantity today.
   a. that
   b. so
4. The art of war has undergone such changes since the battles of Hastings, Lewes, and Agincourt

_____ many words once common are now only in historical use.
   a. so
   b. not
   c. that
   d. as

5. It is the constant nearness of architecture during our entire conscious existence

_____ has blinded us in this way.
   a. that
   b. it
   c. which
   d. almost

6. English literature makes greater use of foreign words

_____ does ordinary conversation.
   a. that
   b. as
   c. nor
   d. than

7. It wasn't until 1991 when a string of operations against Russian went sour
a special interagency task force was formed to look for a Russian penetration agent.
   a. then
   b. and
   c. that
   d. so

8. Not only did the little book have great influence on many generations of school children,

   it also had the effect of turning its author's attention to question of language.
   a. and
   b. but
   c. yet
   d. that

9. Were it not that the story of Leif's voyage, contained in the supposedly more reliable Saga, is almost as amazing,

   I give up Biarni more readily.
   a. would
   b. will
   c. have to
   d. am going to

10. Many government programs can be made more efficient by applying sophisticated computer models and other advanced technology

    the problems they are designed to solve.
    a. with
    b. to
    c. in
    d. for
APPENDIX B

READING RATE TEST

Directions: Read the following passage. You should read as fast as you can, but carefully enough to answer the questions you will be given later. Look up immediately when you finish reading and copy down the time that is written on the board. Turn over your paper when you are done.

The Drinker's Dilemma

Prolonged and excessive use of alcohol can seriously undermine an individual's health. Physical deterioration occurs because large quantities of alcohol can directly damage body tissue and indirectly cause malnutrition. Nutritional deficiencies can result for several reasons. Alcohol contains empty calories and has no significant nutritive value. When consumed in substantial amounts, alcohol curbs one's appetite for more wholesome foods. Excessive alcohol intake can interfere with the proper digestion and absorption of food. Therefore, even the heavy drinker who does eat a well-balanced diet is deprived of some essential nutrients. Maintenance of a drinking habit can deplete economic resources otherwise available for buying good, wholesome food. Malnutrition itself further reduces the body's ability to utilize the nutrients consumed. The results of damaged tissue and malnutrition can be brain injury, heart disease, diabetes, ulcers, cirrhosis or cancer of the liver, and weakened muscle tissue. Untreated alcoholism can reduce one's life span by ten to twelve years.

Heavy alcohol consumption also affects the body's usage of other drugs and medications. The dosages required by excessive drinkers may differ from those required by normal drinkers or non-drinkers. Serious consequences can be incurred unless the prescribing physician is aware of the patient's drinking habits.

Sudden death may result from excessive drinking. It might occur when the individual has ingested such a large amount of alcohol that the brain center controlling breathing and heart action is adversely affected, or when taking some other drugs, particularly sleep preparations, along with alcohol. Death, as a result of excessive drinking, can come during an automobile accident, since over half of all...
fatal traffic accidents involve the use of alcohol. Many self-inflicted deaths, as well as homicides, involve the use of alcohol.

It is important to remember that alcohol is a drug that is potentially addictive. Once the user is hooked on alcohol, withdrawal symptoms occur when it is not sufficiently available to body cells. At the onset of developing alcohol addiction, these symptoms may be relatively mild and include hand tremors, anxiety, nausea, and sweating. As dependency increases, so does the severity of the withdrawal syndrome and the need for medical assistance to cope with it.

In 1956, the American Medical Association supported the growing acceptance of alcoholism as an illness, falling under the treatment jurisdiction of the medical profession. Since then, the medical resources for problems of acute and chronic intoxication have increased and improved.

**Comprehension Questions:**

Directions: Answer these questions.

1. Untreated alcoholism can reduce a person's life by  
   a. 5 years.  
   b. 12 years.  
   c. 22 years.

2. The article points out that heavy drinking can cause  
   a. arthritis.  
   b. muscle debility.  
   c. blindness.

3. What fraction of all fatal traffic accidents results from the abuse of alcohol?  
   a. one-quarter  
   b. one-half  
   c. two-thirds

4. The author refers to alcohol as a  
   a. drug.  
   b. medicinal substance.
c. high calorie beverage.

5. A heavy drinker may suffer from
   a. indigestion.
   b. malnutrition.
   c. excessive thirst.

6. This selections concerned mostly with the
   a. long-term drinker.
   b. person who drinks on a dare.
   c. person who drinks for the first time.

7. A person who drinks to excess must show caution in
   a. having X-rays.
   b. engaging in exercise.
   c. taking drugs.

8. The author develops a correlation between alcohol
   a. use and theft.
   b. absorption and insomnia.
   c. addiction and withdrawal symptoms.

9. In the middle 1950s, the American Medical Association
   a. proved that alcoholism is an act of free choice.
   b. concluded that heredity influenced alcoholism.
   c. accepted alcoholism as an illness.

10. The author suggests that
    a. the American Medical Association once condoned drinking.
    b. drinking alcohol can be an expensive habit.
    c. eating a well-balance diet enables a person to drink more.