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The relationship between analyzed knowledge of grammar and reading comprehension of authentic text at four levels of secondary school French

Berry, Mary Therese, Ph.D.
The Ohio State University, 1990
THE RELATIONSHIP BETWEEN
ANALYZED KNOWLEDGE OF GRAMMAR AND READING COMPREHENSION
OF AUTHENTIC TEXT AT FOUR LEVELS OF
SECONDARY SCHOOL FRENCH

DISSERTATION
Presented in Partial Fulfillment of the Requirements for
the Doctor of Philosophy in the Graduate
School of the Ohio State University

By

Mary Therese Berry, H.M., B.A., M.A.

* * * *

The Ohio State University
1990

Dissertation Committee: 
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Charles R. Hancock
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Approved by
Advisor
College of Education
In memory of my father,

Thomas F. Berry,

and

in gratitude to my mother,

Florence C. Berry,

who has understood the demands of this work, and has selflessly endured my absence from Cleveland.
ACKNOWLEDGEMENTS

The dissertation process is far from a solo accomplishment. It is a team project, the first stages of which may originate outside of one's own consciousness. It is a fragile, tenuous, undertaking, needing constant encouragement and support. The individual who first suggested that I consider pursuing a doctorate was Jean Carduner, then Director of the Middlebury College French Summer School. Not only did he express this verbally, he took the time to send his thoughts to me on paper. It is solely because of the confidence he placed in me and the academic stature of his person, that I gradually began to believe that a doctorate might be possible.

When, after ten years, I was finally ready to take up the suggestion, he directed me to contact Dr. Edward Allen at Ohio State and wrote a recommendation that, I am certain, was largely responsible for my acceptance into the Foreign Language Education program.

If Dr. Carduner was the initiator of the project, then Dr. Edward Allen is unquestionably the long-term sustainer of my efforts. His constant encouragement and support, as my advisor in the first two years of the program, offset
painful moments of cognitive dissonance induced by tortuous Ausubelian syntax and esoteric statistical constructs at a time when I was decidedly not yet on the verge of insight.

It is difficult to express within a few sentences, the personal attention Dr. Allen gave to his doctoral students. His welcome to Ohio State was a personal one. Somehow he managed to give new advisees a campus tour that usually extended to an orientation to the entire city.

He made time each year, during the busy opening days of the fall quarter, to schedule a meeting of the qualitative research class at his own home. The class meeting was the prelude to a welcome dinner, the thoughtfulness of which did not fail to impress both American and international students.

As is the custom in academia, I would like to reference my readers to another source, the acknowledgements section of Dr. C. Allen Honeycutt's dissertation (1982). For the past four years I have been attempting to formulate something to add to what Dr. Honeycutt has already expressed concerning Dr. Allen. Perhaps my contribution is to reinforce what has already been stated.

I believe that the mind functions best when the human spirit is properly nourished through love and acceptance. Dr. Allen operationalized this wisdom in his dealings with
advisees. He stood beside and walked along with his
doctoral students, pointing out paths to investigate as
well as obstacles to be avoided. He not only advised, he
facilitated progress. It is within this personal and
professional rapport that seventy doctorates in Foreign
Language Education were accomplished under his guidance at
Ohio State.

Upon Dr. Allen's retirement, the completion of this
dissertation was made possible through the skilled advice
of Dr. Elisabeth Bernhardt. Her laser-like concentration
has been a source of awe and inspiration. To her has
fallen the role of patient endurance of, and advisor to the
revision process. She has read numerous drafts, many of
which were substantively abandoned, in an attempt to
identify the most solid research foundation for this work.
She has seen the kaleidoscopic pages of my vision shift
into new patterns. She has consecrated valuable time to
assess this work in progress.

A work in progress quickly becomes feral. It reverts
to a wild state overnight. It is barely domesticated,
(a mustang on which you one day fastened a halter, but
which now you cannot catch. It is a lion you cage in
your study. As the work grows, it gets harder to
control: it is a lion growing in strength. You must
visit it every day and reassert your mastery over it.
If you skip a day, you are, quite rightly, afraid to
open the door to its room. You enter the room with
bravura, holding a chair at the thing and shouting,
"Simba!" (Dillard, 1989, p. 52)
This quotation from The Writing Life, by Annie Dillard is an apt description of the dissertation process. There were times when obligations, external to the dissertation, forced me to shut the door on this work. Dr. Bernhardt has sustained me through my terror at this dissertation in its more feral stages. It is through the sagacity of her comments and the acuity of her researcher's intuition that this work eventually assumed its present form.

Untold thanks is also due to Dr. Charles Hancock. Dr. Hancock has been an encouragement and has helped me to gain perspective at times when complications have delayed progress. I have learned much from his organization and the privilege of teaching undergraduate students under his direction and guidance. He has read parts of this work in the skies, flying to and from conferences. I am indebted to him for his willingness to serve on my committee.

Dr. Jarvis is, for me, the model of the imperturbable researcher. His clarity and consistency have been an inspiration. While cautioning concerning risks, he simultaneously helps to inform decisions. His gift is one of being truly present whenever you walk into his office. It has been a privilege to be in his classes and to have him serve on the committee for this dissertation.

No progress on Chapter IV would have been possible without numerous statistical consultation sessions with Fred Ruland and his assistants. Fred’s buoyant approach to

v1
statistics is marvelous to witness and a reassurance for neophytes entering the elusive and sometimes unmanageable world of numbers. He sees alternate approaches to seeming impasses. Through his competent guidance and instruction, you leave with a renewed spirit and the confidence that there is someone to lead you through statistical mazes. He is a teacher par excellence.

No words would have ever been printed had it not been for the invaluable assistance of Joel Kallman, former student, friend, software designer, and troubleshooter par excellence. Joel was responsible for operationalizing the software for this dissertation and has taken the time to untangle mind-boggling printing problems. His willingness to be on-call during this dissertation has provided both moral as well as technical support.

Thanks is also due to the many friends who offered support. A "dissertation survival kit" conceived in New York, transported from Cairo, and mailed at the propitious moment provided a much-needed lift to my spirit from my good friend Nimet Habachy. Marie Damukaitis, who has shared many moments of my progress as well as moments of prayer, has also been a source of faith in the accomplishment of this work.

The largest debt of gratitude is owed to the many members of the Sisters of the Humility of Mary, my religious community, who supported me with their prayer,
their confidence in me, and often with technical advice.
Sr. Carol Anne Smith was kind enough to come to Columbus to
talk me through the beginning stages of this work at a time
when I was perched on a high ledge surveying the research,
unable to plunge into the writing process. My longtime
friend since the first grade, Sr. Helen Jean Novy, has been
a constant source of intellectual stimulation throughout
this dissertation process. She has listened to tales of
woe and has pointed out avenues of recourse. She has lent
editorial skills to early drafts. Sisters Jeannette Abi-
Nader of Gonzaga University and Barbara Sitko of Washington
State University have offered invaluable critical advice.

Finally, I owe a debt of gratitude the retired sisters
at Villa Maria Community Center who have kept in touch and
have shared in the completion of this work through their
prayer support.

Lastly, an eternal debt of gratitude is owed to the
Lord, the real enabler of this work.
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FIELDS OF STUDY

Major Field: Foreign Language Education


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CHAPTER I

THE PROBLEM

Introduction

Recent attempts to understand the reading process have involved an interdisciplinary effort drawing upon psychology, linguistics, artificial intelligence, and education. Current findings concerning the influence of background knowledge, text structure, word recognition, and syntactic and semantic processing provide a valuable source of information for decision making in today's proficiency-oriented classroom. Unfortunately, there is a gap between what is known and what is practiced. The intensity of the current quest for communicative competence is, in a sense, an admission of the failure of previous methodological approaches to provide learners with functional language proficiency. More importantly, the current focus on communicative competence highlights the eagerness of foreign language professionals to achieve a balance between knowledge of language structures and functional control of these structures.

Kramsch (1987) points to a discrepancy between the process of language acquisition and what is practiced in
classrooms in the name of language acquisition. In short, "the erroneous belief that conscious learning of the linguistic structures of language will automatically translate into their correct and socially appropriate use in communicative situations has led many teachers to continue to drill grammatical forms . . . and correct every linguistic error" (pp. 243-244).

That a similar discontinuity may exist between the primacy accorded to grammar in the teaching/learning process and the primacy of comprehension processes in understanding written text serves as the point of departure for this study. More specifically, the question posed is the extent to which conscious knowledge of grammar rules correlates with a functional task such as reading comprehension.

Grammar and the Receptive Skills

In speech, the physical context of an exchange serves to fill in gaps that are made explicit through syntax and grammatical relations in written text. A requirement of the initial stage of the reading process is "the ability to bring to conscious awareness the structural categories and relations in language" (Menyuk, 1984, p. 111). Eventually this awareness becomes automatic.

Traditionally, the productive skills of speaking and writing that have been associated with the teaching of grammar. As Rutherford (1987) points out, when the purpose
of teaching grammar is to effect mastery of an inventory of grammatical constructs, the logical evidence for this mastery lies in "the appearance of the (correctly formed) constructs in the learner's production" (p. 173).

From what is now known about the language learning process, particularly through studies of interlanguage, it becomes apparent that there are two fallacies inherent in the traditional conceptualization of language teaching. One fallacy is the belief that language learning consists in a steady accumulation of sets of discrete grammatical entities. The second is the belief that the characteristics of, or rules for the formation of these entities can be directly taught (Rutherford, 1987).

In contrast to the "accumulated entities" view of language acquisition is the grammatical consciousness-raising route. Compelling evidence for the efficacy of this more indirect approach to mastery of the receptive skills is found in a study by Elley and Mangubhai (1983). Results of this study in English as a Second Language (ESL) showed that "pupils exposed to a rich supply of books were improving their general reading comprehension skill at over twice the normal rate" (p. 61). In addition, these students performed significantly better (p < .0001) in the test of English structures than did students in the control groups who were given traditional grammar instruction.
Thus, in order to decide which pedagogical emphasis, product or process is more facilitative of reading, there is a need to determine which type of knowledge is actually used. The question to be answered is the extent to which knowledge of grammar constructs correlates with reading measures.

Comprehension and the Teaching of Grammar

Attainment of increasingly higher degrees of grammatical competence and control is implicit in current goals of successful language acquisition. The teaching of grammar, however, is not an end in itself. As Arie (1982) observes, the ability to recite a rule is irrelevant to its functional application. Knowledge of a rule does not ensure that it will be applied as warranted by the linguistic context. The current tacit assumption of many teachers is that explicit instruction in grammar is directly related to comprehension. Therefore, in many classrooms, the major portion of time is devoted to the explanation and practice of grammatical constructs. Grammar activities were found to occupy .56 percent of classroom time at beginning levels of university instruction in Spanish (Long, 1986).

Moreover, the grammatical agenda of the teacher is often openly proclaimed. Higgs (1979) describes a scenario in which the teacher announces: "Today you're going to learn how to use the subjunctive," as if the student knew
what the subjunctive was and what it was good for, and
needed only to learn how to use it” (p. 340). Higgs
questions why students would want to learn something that
has no reality whatsoever for them. The critical issue
here is whether grammar should be treated as “an
independent object of study” (Ariew, 1982, p. 24).

In spite of the lack of interest in grammar manifested
by students as well as the lack of transfer of the
grammatical knowledge demonstrated on ten-point quizzes to
functional situations, primacy is accorded to grammar in
the majority of classrooms. There are at least three
principal reasons why teachers focus instruction on
grammar. The first reason derives from teachers’ own
previous learning experience, the second from the format of
textbooks, and the third from the nature of testing.

The Primacy of Grammar: Tradition

Until the mid-1960s, the teaching of modern languages
reflected the objectives of the Latin class: the study of
grammar and an emphasis on reading (Guntermann, 1987;
Kramsch, 1987). Often, too, a teacher’s pedagogical
emphasis is rooted in personal experience of language
acquisition in a grammar-oriented setting. There is indeed
something to be said for the popular dictum that “we teach
as we have been taught.”

The central position of grammar in language learning
and teaching—a position it has held for virtually 25
centuries--is now being rethought. A new understanding of the nature of language acquisition is already evidenced in the literature. Emphasis on grammar concepts no longer undergirds this newer conceptualization of language acquisition.

Schultz (1986) provides an outline of points of consensus reached by psycholinguists and language educators at a recent Symposium on Receptive Language Skills sponsored by the American Council on the Teaching of Foreign Languages. Concerning the content of the foreign language curriculum, vocabulary input within meaningful contexts was considered more important than analysis of grammar. In addition, grammatical sequencing and grading was deemed nonessential for language acquisition. This new shift in emphasis, away from the traditional hegemony of grammar, was then contrasted with current beliefs and practices.

Presentation and practice of grammatical structures, arranged and graded in a sequential manner, constitute language teaching and learning in many classrooms. The implicit message given to teachers within this traditional paradigm is that patterns that have not yet been taught are to be avoided (Schultz, 1986, p. 375). Yet, current knowledge of discourse analysis and schema theory indicate that knowledge of the grammatical structure of text is but one of several paths to meaning. According to Swaffar
(1989), language teachers are currently experiencing a paradigm shift. She describes this transition as one of "trying to construct a new, learner-centered model with the old sentential grammar, when we should be working with a text-based, suprasentential grammar (p. 308)."

The Primacy of Grammar: Textbooks

The content, emphasis, and organization of textbooks also contribute to the perpetuation of the grammatical syllabus. Ariew (1982) suggests that typical texts use a grammatical organization that fallaciously assumes knowledge of the grammar of the target language, "using its internal relationships as the organizing principle for the material (p. 6)." Assuming the "logic" of the target language is, according to Ariew, the precise fallacy that robs the students of any organizing principle at all, because the grammar of the target language is both what is assumed as well as what they are trying to learn.

Statements of comparison in French, for example, are often treated under an abstract grammatical rubric such as "uses of the definite article". Comparison of two objects will require the use of the definite article before each of the two nouns in the comparison as in, "Le billet de théâtre coûte plus cher que l'entrée au musée" (Theater tickets are more expensive than the entrance price for a museum). The suggestion is that rather than rely on an abstract grammatical construct as the organizing principle,
it would be better to link structures to functions. Students, for example, are already familiar with making broad generalizations (Ariew, 1982).

Whereas syllabus organization in Europe began to reflect a functional/notional orientation in the 1970s, only in recent years have American textbooks begun to respond to the challenge of reorganization of content and objectives. Unfortunately, "most popular texts are not only structured according to extrinsic grammatical concepts, but also . . . most of their exercises deal with forms: linguistic calisthenics involving the morphological or syntactic aspects of the language" (Ariew, 1982, p. 24).

A basic assumption behind the grammatically organized textbook is the "accumulated entities" view of language learning (Rutherford, 1987). In this conceptualization, the steady mastery of ever-increasing quantities of the phonological, lexical, and grammatical properties of the target language is equated with a particular level of proficiency. Rutherford points to the number of commercially produced textbooks whose design is supported by a constituent approach as evidence for the predominance of this view of language learning. The organization of a very popular high school French text, French for Mastery (Valette & Valette, 1985a, 1985b), is tied to a grammatical progression. Even though contexts in which language can be used for communicative purposes are suggested, the table of
contents reveals the overt dominance of the grammatical syllabus.

Regardless of what the teacher's beliefs about language acquisition may be, the influence of the textbook cannot be overestimated. That teachers rely heavily on texts is almost a foregone conclusion given the enormous amount of work that preparation of original materials requires. Ariew (1982) claims that "the text's sequence, methodology, pacing, and vocabulary usage are followed almost to the letter by most teachers" (p. 17). In these situations, the textbook often determines the curriculum.

The Primacy of Grammar: Testing

Finally, factors less directly related to beliefs about the foreign language acquisition process also covertly support the grammatical syllabus. The movement toward accountability in education has contributed toward the supremacy of grammar in the teaching-learning process. In an attempt to have a basis on which to demonstrate accountability for student progress, the more difficult-to-measure integrated language tasks are often neglected in favor of that aspect of linguistic knowledge most amenable to testing--grammar. Whereas communicative competence is both difficult and time-consuming to test, knowledge of grammatical features is relatively easy to assess. Because of the ease of administration of discrete-point grammar
tests, a student's progress in language learning is often equated with grades on easily scored tests and quizzes.

**Process Versus Product Conceptualizations of Grammar**

Clearly, teachers believe that grammar is important and demonstrate that belief through the amount of class time devoted to explanation and practice of grammar rules. Grammatical constructs are associated with a view of language in which overt reference to language form is seen as a way to grasp how the individual grammatical entities or constructs can be assembled into a language product. "It is ostensibly the behavior of the language constructs that collectively determines the workings of the formal language system as a whole, or so we are often lead to believe" (Rutherford, 1987, p. 57). Analysis of a language product into its constituent parts provides an inventory of language constructs which are "taught" in an attempt to facilitate the learner's output of a language product.

In contrast, grammaticization or grammatical consciousness-raising is a process that cannot yield a convenient inventory of parts that can be filled into blanks, manipulated, transformed, or otherwise operated upon as does the product view of language with its grammatical entities (Rutherford, 1987). This organic perception of language is, therefore, pedagogically more elusive. It is obviously more difficult to engage a learner in a process than to manipulate product components.
The identification of grammatical entities undoubtedly facilitates the teaching of language form. What is unclear, however, is the role that explicit knowledge of language form or grammar rules plays in the total comprehension process. Language can be conceptualized as both product and process. Language tasks appear to involve some degree of awareness of both. Knowledge of grammar, however, is a metalinguistic skill, that is, a "knowing-about" language rather than a "knowing-how-to" with language.

Assessment of Knowledge of Grammar in Research

Grammatical awareness is one manifestation of metalinguistic awareness. In research studies, metalinguistic abilities are each measured by different tasks, each of which in turn requires different component skills, making the results difficult to interpret across studies. A step toward providing a common framework within which language tasks can be studied is provided in studies undertaken by Bialystok. Bialystok (1985) considers language tasks and development in terms of two underlying skill components: "the ability to analyze knowledge into explicit structured categories, thus revealing relational as well as structural properties of the knowledge, and the ability to select and apply information in the solution to specific problems" (p. 256).
There is clearly a need to explore more fully the relationship between degree of formal or analyzed knowledge of grammar as evidenced in explicit knowledge of grammar rules, and reading comprehension of natural text. As Bialystok states "there are few studies that relate specific aspects of linguistic awareness to reading" (p. 137). The present study is designed to provide second language (L2) evidence concerning the relationship between one aspect of metalinguistic awareness of knowledge about language, the degree of analyzed knowledge of grammar, and the ability to use this knowledge functionally in the comprehension of an unedited foreign language text. No research has been conducted thus far concerning the relationship between high school subjects' knowledge of grammar rules and comprehension of natural text in a foreign language.

**Statement of the Problem**

The majority of data-based studies on the effects of knowledge of linguistic structures have been conducted in first language (L1) research. Siegel and Ryan (1988); Ryan and Ledger, 1984; Tunmer and Grieve, 1984; Ehri, 1979, among others, review general findings related to syntactic and linguistic awareness. Whereas numerous L2 studies have utilized grammaticality judgment tasks of one form or another (Chaudron, 1983), no study has attempted to address
the relationship between a specific degree of grammatical awareness and its functional effect on reading comprehension.

Previous research provides some direction for anticipated relationships between analyzed or explicit knowledge of grammar and reading comprehension. Studies in L1 research have already linked children's metalinguistic development with reading (Downing & Valtin, 1984; Ryan & Ledger, 1984; Tunmer & Bowey, 1984).

In a study of L2 learner strategies, Bialystok (1979b) found that for grade 12 students, "formal practice after a particular point no longer facilitates performance" (p. 390). Results of a regression analysis suggest that the additional effort expended by the grade 12 students in formal practice such as grammar exercises might have been better spent in functional practice.

The strategy most highly associated with achievement on all tasks was functional practice for which no ceiling effect was found. "Neither formal nor functional practice differentiated . . . tasks in terms of their formal or functional requirements" (p. 390). Formal practice involved use of the language code for the purpose of mastery of the rule system. Activities such as filling in the blanks in sentences with the proper grammatical form and memorization of verb endings fall into the category of activities designed to reinforce knowledge of the explicit
rule system. Functional practice, however, involved any use of language requiring a focus on communication as opposed to focus on the structure of language. Reading, talking with native speakers and watching television or movies in the target language would be examples of functional language use. Formal practice, such as doing written grammar exercises, was not particularly facilitative for formal tasks, nor was functional practice for communicative tasks. The expectation was that functional practice would exercise a greater influence on functional tasks. Rather, functional practice was essential to achievement on all tasks. Thus, in terms of reading, the expectation would be that formal knowledge of grammar would be facilitative of comprehension only to a point.

Comprehension of written text requires not only the recognition of grammatical cues, but also identification of lexical, semantic and pragmatic factors as well. The relationship of analyzed or explicit knowledge of grammar to reading is but one among many factors contributing to the construction of meaning. Instruction in explicit language rules can increase the degree of analyzed knowledge of learners. The effect of instruction, however, will depend on the cognitive maturity of the learner as well as the degree to which the learner's knowledge base is already structured. Instruction concerning knowledge
structures "is effective only for learners on the verge of insight" just as instructional methods are effective when suited to the Piagetian stages of development of learners (Bialystok & Ryan, 1985a, p. 213).

The extent to which reading requires analyzed knowledge of rules is not clear. Alternative routes to meaning are available so far as "language is redundant with the concrete or conceptual context" (p. 212). Unanalyzed knowledge was found to be sufficient for decisions concerning correct items in conditions requiring location of the form class containing an error as well as the identification of the rule violated. Analyzed knowledge intervened only when detailed knowledge about errors was required (Bialystok, 1979a).

The purpose of this study is to determine whether there is any relationship between the grammar rules that students memorize and manipulate in numerous drills and exercises, and the ability to use this knowledge in the functional task of reading. In order to elucidate the relationship between analyzed knowledge of grammar and reading comprehension, the focus of this study will be the following research question:

What is the relationship between the unanalyzed/analyzed dimension of knowledge of grammar, and comprehension of an unedited French text by high school learners at four levels of instruction?
Any learning experience may serve to stimulate both analyzed as well as unanalyzed dimensions of knowledge. Although passing a test requires that information be accessible in an analyzed form, a more functional task such as reading would be expected to tap both analyzed and unanalyzed dimensions of knowledge. Formal instruction, as has been indicated, emphasizes analyzed knowledge. The extent to which reading comprehension is supported by analyzed knowledge is unknown. The degree to which analyzed knowledge functions in reading comprehension at various levels of language instruction is the major area of interest in this study.

Significance of the Problem

The current belief of prominent psycholinguists and foreign language educators is that a focus on grammatical instruction no longer serves the purposes of today's proficiency-based goals (Schultz, 1986, pp. 374-375). Previous L2 studies have attempted to shed light on the contributions of syntactic as distinct from lexical guidance in reading (Hatch, Polin & Part, 1974; Ulijn, 1980). These studies research the relative attention directed to either syntax or lexis. Neither study, however, examined the contribution of either syntax or lexis to comprehension.
Information concerning the extent to which readers of secondary school age rely on explicit knowledge of grammar rules in reading comprehension would help expand knowledge of the relationship of metalinguistic skills to literacy in the L2. In addition, several pedagogical purposes would be served.

First, the foreign language profession clearly remains in a confused state about how best to help students become proficient. It may well be that an exploration of language-use domains (reading, writing, speaking, and listening) examined from a common perspective would shed more light on proficiency issues than do methodologies focusing on task performance. The development of the separate skills, which in combination lead to language mastery, can best be described in terms of two general constituents of cognition: analyzed (explicit) knowledge and cognitive control (automatic, fluent use of language).

Second, information concerning the extent to which reading comprehension is influenced by analyzed knowledge of grammar has implications for pedagogical decisions. Reading comprehension may depend more on unanalyzed than analyzed knowledge. If it is possible to begin to uncover the relationship between analyzed knowledge of grammar rules and functional use of such knowledge in reading comprehension, this relationship will add to the body of
knowledge concerning the development of reading proficiency.

For example, if learners are able to understand text largely through reliance on an intuitive sense of grammar, language experiences need to be structured to develop learners' intuitions about language. Data concerning the ability of secondary learners to comprehend the same unedited text across four levels of instruction would provide teachers with a more informed basis from which to select reading materials.

The differential role of intuitive and formal (unanalyzed and analyzed) knowledge in language judgment tasks has already been established (Bialystok, 1979a). The degree of analyzed knowledge of grammar associated with a measure of reading comprehension in a foreign language has not yet been empirically tested.

In summary, the rationale for conducting a study of the relationship between analyzed knowledge of grammar and reading comprehension is threefold:

1. To provide insight into the foreign language reading process;
2. To generate information related to the nature of proficiency via the unanalyzed/analyzed dimension of cognition, and;
3. To offer research evidence concerning the appropriateness of the grammatical content of
reading materials provided for secondary students at various levels of instruction.

**Purpose of the Study**

The purpose of this study is to investigate the relationship between the degree of analyzed knowledge of grammar and a measure of reading comprehension of secondary learners of French at the first- through fourth-year levels of instruction. Results of L1 reading studies have found specific manifestations of metalinguistic awareness (that is, syntactic and phonological awareness) to be more essential to the development of reading than pragmatic awareness, or the ability to recognize inconsistencies in a text (Tunmer, Herriman & Nesdale, 1988). Semantic and syntactic sensitivity was also found to be significantly related to level of reading skill (Willows and Ryan, 1986).

This study sheds light on the relationship between one aspect of metalinguistic awareness, analyzed knowledge of linguistic structures, and reading comprehension. When the task demands shift from the level of degree of analysis of grammatical knowledge to an application of that knowledge, an apparent difference in mastery may result.
The Construct of Unanalyzed/analyzed Knowledge

Much of what is known about language remains outside mental examination; the existence of this knowledge of language, however, is demonstrated in the production of correctly formed intelligible utterances. Such information is unanalyzed linguistic knowledge to the extent that it is largely intuitive, relates to a specific context, and remains vaguely defined. It is a tacit, unconscious "knowing-how" type of knowledge.

It is possible, however, to understand information at a more analytic level at which the structures underlying linguistic information are made apparent. To the extent that information is analyzed, it is freed from its specific context and "can be understood as systematic, organized information in its own right" (Bialystok, 1981a, p. 34). This analyzed information is explicit linguistic knowledge. Explicit linguistic knowledge is analytic, structurally identifiable, and abstract, that is, independent of a specific context. It is a formal, conscious, "knowing-about" type of knowledge.

Analyzed knowledge is knowledge that is given a propositional representation consisting of a predicate-argument structure (cf. Miller & Johnson-Laird, 1976). A proposition is defined as "the smallest unit of knowledge that can stand as a separate assertion, i.e., the smallest
unit about which it makes sense to make the judgment true or false" (Anderson, 1985, pp. 114-115). The propositional representation of knowledge is the most widely accepted theory of how meaning is represented in memory and most clearly applies to linguistic information (Anderson, 1985).

Propositionally-based representations are meaning-based representations, as opposed to perception-based knowledge representations such as spatial and linear representations. Because the structure of propositional knowledge is apparent, a learner can operate on this knowledge by transformations, comparisons, and problem solving (Piaget, 1954).

The content of both unanalyzed and analyzed propositional knowledge is the same; that is, knowledge of subject-verb correspondence. The distinction between the unanalyzed/analyzed ends of the continuum lies in the learner's access to the structure of the proposition, that is, the ability to identify the predicate, the arguments, and so forth. It is this ability to isolate the structure that enables the detection of incorrect subject-verb agreement, the statement of rules, and, in general, the examination of the relationships between form and meaning so that this knowledge can be used for specific ends. For example, knowledge of the structured regularity of language enables a learner to apply the structure in new contexts, decipher written forms that make use of that structure, and
consciously manipulate it to achieve literary or rhetorical goals. In contrast, unanalyzed knowledge is understood merely as a routine or pattern (Hakuta, 1974) with only "limited application to new contexts or new purposes (Bialystok & Ryan, 1985a, p. 211).

Certain tasks, such as those related to literacy or other formal uses of language, can only be solved through use of analyzed knowledge (Bialystok, 1982a). Unanalyzed knowledge, however, is how most things are generally known without awareness of the structure of that knowledge. Although analyzed and unanalyzed (intuitive) knowledge are both structured, the distinguishing feature between them is access. There is no access to the structure of unanalyzed knowledge within mental representation.

Grammar and the Construct of Metalinguistic Awareness

Part of the information a reader brings to a text is knowledge of the grammatical structure of sentences. This is "the knowledge which people must have in order to speak and understand language" (Slobin, 1971, p. 2). From a psycholinguistic perspective, grammar can be defined as "an attempt to characterize the kind of knowledge or competence human beings must have in order to use language" (Slobin, 1971, p. 6). Chomsky (1965, 1968) proposed the existence of "language universals" to account for the seemingly innate restrictions that the form of a grammar can take. Grammatical competence can thus be further defined in terms
of linguistic intuitions including knowledge of grammaticality, grammatical relations, sentence relations, ambiguity, and so forth.

Researchers in LI have attempted to explain difficulties in learning to read by studying interconnections between awareness of certain aspects of spoken language and the acquisition of reading skills, particularly the relationship between metalinguistic awareness and reading. Metalinguistic awareness is defined as "the ability to make language forms opaque and attend to them in and for themselves" (Cazden, 1974, p. 29). Explicit knowledge of grammar is an expression of metalinguistic awareness.

Whether aspects of metalinguistic awareness are prerequisites for reading or whether the reading process itself fosters language awareness remains a moot issue. Vygotsky (1934/1962) and Donaldson (1978) are partisans of the latter opinion. In contrast, studies focusing on aspects such as awareness of sounds, words, grammatical terminology, and so forth, have typically shown that an increase in these aspects of metalinguistic awareness occurs around the time children learn to read (Pratt & Grieve, 1984, p. 8) and would, thus, give the impression of being prerequisites.

An alternative view proposed by Ehri (1979) is that certain aspects of metalinguistic awareness may be both a
consequence of reading as well as a facilitator of the reading process. It is evident, therefore, that the direction of causality between reading and metalinguistic awareness is not sufficiently established, nor is the nature of the role metalinguistic awareness plays in reading comprehension.

Because there is a general lack of agreement in psychology concerning the nature of awareness and consciousness, metalinguistic awareness can only be defined in general terms, such as an “ability to think about and reflect upon the nature and functions of language” (Pratt & Grieve, 1984, p. 2). The ability to perform a task involving metalinguistic awareness is generally assumed to be an indication of this awareness (Tunmer & Herriman, 1984). Performance of metalinguistic tasks, such as the ability to reflect upon and manipulate the structural features of language, does not, therefore, imply awareness of the grammatical labels for such features.

**A framework for Understanding the Demands of Language Tasks**

Bialystok and Ryan (1985a) present a metacognitive framework in which the two skill dimensions, degree of analysis and degree of control, can be used to form a matrix on which various language tasks can be situated. In the Bialystok research program (Bialystok, 1978, 1979a, 1979b, 1981a, 1981b, 1982b, 1985, 1986, 1987, 1988; Bialystok & Frohlich, 1978a; Bialystok & Ryan, 1985a;
language skill or proficiency is conceptualized within a framework consisting of two underlying processing skill components that are theoretically independent, but are in practice interrelated (Bialystok, 1988; Bialystok & Ryan, 1985a). The assumption is that "a minimal but common set of underlying cognitive skills constitutes the mental underpinnings of language proficiency" (Bialystok & Ryan, 1985a).

The two skill dimensions are: (a) analysis of linguistic knowledge into structured categories, and; (b) control of attentional procedures to select and process linguistic information (Bialystok, 1986). Progress along these two dimensions is considered congruent with the growth of metalinguistic awareness (see Figure 1).
Figure 1. "A Metacognitive Model of Language Skills" (Bialystok, 1985a, 218).
The approach of Bialystok is to avoid focusing on descriptions and compilations of tasks that might be classified as metalinguistic. Rather, given the existing array of tasks currently used in research to assess metalinguistic abilities (Downing & Valtin, 1984; Hakes, 1980; Sinclair, Jarvella & Levelt, 1978; Tunmer, Pratt & Herriman, 1984), effort is directed toward a description of language proficiency that will remain valid across a variety of situations and task demands. Elements considered common to the completion of all language tasks are: (1) the degree of analysis of knowledge necessary to complete the task and; (2) the degree of control of that knowledge.

A recent elaboration of the above framework compares the analysis component to the memory base, network, or schemata of information processing models. The control component is compared to executive processes or metacomponents (Bialystok, 1986). The basis of cognitive control is an ability similar to what Piaget describes as "decentering," where a salient attribute is ignored in order to direct attention toward the elements of a problem more directly related to its solution (Bialystok & Ryan, 1985a). These two dimensions of analysis and control are conceptualized as a coordinate system into which language tasks can be situated and related to one another.
An investigation of these skill components would provide clearer direction to teachers for selecting activities to foster mastery of specific tasks within each language domain. If a higher degree of analyzed knowledge is needed for some skills but not for others, instruction could be more precisely tailored to meet specific task requirements. For example, students might understand passive constructions without having either the degree of analyzed knowledge necessary to identify a given construction as an example of the passive voice or to produce a passive construction.

The extent to which the analyzed/unanalyzed dimension of knowledge of grammar contributes to reading comprehension is unknown. Due to the differential demands various tasks place on analyzed knowledge as well as access or control of this knowledge, it would be illogical to assume that proficiency in one language task situation indicates proficiency in another (Bialystok, 1981a). Specifically, performance in tasks requiring a high degree of analysis of grammar, such as the ability of a skilled writer to deliberately manipulate syntax in order to emphasize theme and mood, may be predicted to be independent of a reader's ability to comprehend the theme and mood the writer has established.

This study will be concerned only with the degree of analyzed knowledge necessary for reading comprehension.
The prediction concerning the development of proficiency is that unanalyzed knowledge precedes analyzed knowledge. The extent to which specific knowledge of grammar rules (analyzed knowledge) relates to reading comprehension is the focus of the present study.

**Assumptions**

1. Performance in one situation is not necessarily an indicator of performance in another; analyzed or explicit knowledge of grammar is not necessarily an index of comprehension.

2. Subjects are expected to understand that reading involves the integration and relation of textual elements as opposed to recall of isolated lexical items.

3. Subjects' free written recall protocols are expected to provide an accurate reflection of the text they have read and therefore be a valid measure of reading comprehension.

4. It is expected that grammar rules concerning the formation and use of adjectives, pronouns and verbs form part of the core learning of secondary French courses.

5. The adaptation of the Bialystok test is expected to adequately reflect students' degree of
analyzed knowledge of the grammatical elements featured.

6 High school French students at the first- through fourth-year of instruction are expected to have a sufficient reading knowledge of French to glean some level of meaning from the research passage.

**Definition of Terms**

**Unanalyzed knowledge**: Knowledge that, although structured, does not include a mental representation equipped with access to that structure. The dimension of unanalyzed knowledge contains knowledge of language that the learner is unable to articulate as evidenced in the ability to make linguistic judgments.

**Analyzed knowledge**: Knowledge that has been assigned a propositional mental representation. The structure of such knowledge is apparent and therefore available for transformation, problem solving, literacy tasks, and other formal uses of language requiring analyzed knowledge as evidenced in the ability to supply the rule governing a linguistic operation.

**Unanalyzed knowledge of grammar**: Knowledge that is not sufficiently structured to be called upon for application. For example, unanalyzed grammatical knowledge is sufficient for judging the correctness of a sentence but insufficient
to make the necessary correction in the case of a deviant sentence.

**Analyzed knowledge of grammar**: Explicit knowledge of formal grammar; ability to manipulate grammatical structure to achieve specific literary or pragmatic goals; grammatical awareness that is structured significantly enough to be called upon for application in correction of deviant sentences.

**Grammar**: Linguistic elements other than lexical aspects that: (a) give meaning, such as tense, gender, and case signifiers; and (b) function within established constraints of a linguistic system (that is, position of adjectives, sequence of object pronouns, and so forth).

**Comprehension**: What is recalled from reading through "the process of using the cues provided by the author and one's prior knowledge to infer the author's intended meaning" (Johnston, 1983).

**Free-recall protocol**: Comprehension measure for which subjects are instructed to write as much as they can remember from the passage read.

**Recall units**: Content and relationship units that can be scored as present in a specific free-recall protocol (Meyer, 1975a).

**Authentic text**: A text whose primary intent is to communicate meaning to native speakers of the language as opposed to contrived texts whose intent is to teach
language rather than to communicate information (Swaffar, 1985).

**Limitations of the Study**

1. This study will use an expository text following the conventional format of news reporting. These results, therefore, pertain only to similarly constructed texts and can be generalized to other texts only with circumspection.

2. This study focuses on the dimension of cognitive skill known as degree of analyzed knowledge. A more complete picture of the task demands related to comprehension would need to include the dimension of cognitive control, that is, the extent to which language use is fluent or automatic. Both dimensions, analyzed knowledge and cognitive control, are postulated to be common to all linguistic tasks.
CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

This review of literature examines the question of metalinguistic awareness as manifested in explicit knowledge and/or application of linguistic rules and the relationship of this knowledge to reading comprehension in L1 and L2. Research is identified that might illuminate the extent to which explicit knowledge of grammar rules function in reading comprehension.

Explicit knowledge of grammar rules is a form of metalinguistic awareness. The relationship between knowledge of grammar rules and successful or unsuccessful reading is unclear. The issue is whether explicit rules are consulted or, in other words, determination of the degree of explicitation necessary for comprehension.

L1 Research Related to Rule Knowledge

The facet of metalinguistic awareness that has been of primary interest to researchers in L1 has been phonemic awareness as a facilitator of the sound-symbol correspondence necessary for beginning reading (Downing &
Valtin, 1984; Gough & Hillinger, 1980; Hakes, 1982; Stanovich, 1982). If a prediction were to be made concerning the factor most responsible for success in beginning reading, current research would point to phonemic segmentation ability (Bradley & Bryant, 1983; Perfetti & Hogoboam, 1975; Stanovich, 1982; Williams, 1980).

An interesting issue is the extent to which explicit knowledge of phonemic segmentation is necessary for reading acquisition. The fact that 26 letters serve to encipher over 40 phonemes is itself an indication of the complexity of the relationship of the orthographic cipher to the phonemic representation of English. Attempts to build reading machines for the blind have resulted in programs incorporating up to 577+ rules that still prove insufficient to cover the pronunciation of some very common English words (Gough & Hillinger, 1980). The obvious conclusion is that it is virtually impossible to give a child 577+ rules. Thus, explicitly taught phonics rules can only serve as a "starter-kit" to enable a child to begin to crack the code. The point to be made is that the rules internalized by a fluent reader must be unconscious and implicit. In fact, the speed at which unknown words are recognized by fluent readers is only about 20 milliseconds (msec.) longer than for familiar words (Theios & Muse, 1977). Such speed would preclude consultation of an explicit rule system.
The relationship between knowledge of rules and their functional application in L1 is addressed in studies of phonemic segmentation abilities and success in reading. Knowledge of the rules of language has also traditionally been investigated in L1 studies through the ability to make grammaticality judgments (Chaudron, 1983; de Villiers & de Villiers, 1974; Gleitman & Gleitman, 1979; Gleitman, Gleitman & Shipley, 1972; Schachter, Tyson & Diffley, 1976).

Another manifestation of rule consciousness implies conscious attention to the form of language. Research in first language syntactic awareness suggests that poor readers are developmentally delayed in syntactic awareness and grammatical well-formedness (Bowey, 1986a, 1986b; Tunmer, Nesdale & Wright, 1987). The degree and type of metalinguistic awareness necessary for successful reading comprehension is subject to task variables as well as multiple interpretations of results. It is clear that insights derived from L1 research on metalinguistic awareness and the reading process cannot be generalized to an L2 situation without much caution and specific research.

**Sound-Symbol Correspondence Rules in LI**

Much of the L1 literature relates to knowledge of sound-symbol correspondence rules. Because of the complexity of the English orthographic code and the virtual impossibility for a beginning reader to sustain fluent
reading based on an accumulation of sight words alone, the only recourse is to internalize the cipher of English. Comprehension problems in reading have been identified as dependent on a more basic lack of fluency in word recognition (Manis & Morrison, 1985).

In order to determine whether knowledge of the sound-symbol correspondence rules could serve to distinguish between good and poor readers, Guthrie and Seifert (1977) compared disabled readers with first-, second-, and third-grade readers equated on reading achievement. Both groups were found to acquire simple correspondences before complex ones, that is, short vowels were acquired before long vowels and vowel digraphs. Reading level rather than reader-ability group appeared to determine the rate of acquisition. The authors concluded that disabled readers did not have a primary problem acquiring correspondence rules. Rather, good and poor readers evidenced similar developmental patterns. Rule complexity was found to be the determining factor governing the sequence of acquisition of letter-sound correspondence rules.

Moreover, the researchers speculate that the low degree of conformity of the poor readers to the acquisition sequence might be due to disruptions in cognitive processing. Slow decoding skills, inadequate memory abilities, and reduced psycholinguistic processing are among possible sources of disruption that may have
differentiated the poor readers from good readers rather than ability to learn letter-sound correspondence.

In the above study, eight of ten tasks involved pronunciation of real words but not pseudowords. Because of the possibility that subjects might resort to visual recognition rather than spelling-to-sound translation, the results could not be attributed solely to the application of rules. Performance on a pseudoword pronunciation was studied by Manis and reported by Manis and Morrison (1985). This dissertation research involved performance of normal and disabled readers in grades three through six on a pseudoword pronunciation task. Both disabled and normal readers were of the same age and scored in the normal range on an individual intelligence test (IQ). Disabled readers, however, were significantly retarded in reading comprehension and word recognition. A group of reading-age controls (second-grade normal readers who scored at the same level as sixth-grade disabled readers) was also included in the study.

The task tested knowledge of 35 rules, each tapped twice, in the pronunciation of fifty pseudowords. Disabled readers were found to be less accurate in pronouncing the pseudowords at all age levels. The most important finding was that the accuracy of pronunciation of the reading age controls reached statistical significance and was higher than that of the disabled readers, who were four years
older. Thus, differences in general reading achievement or experience could not account for the observed group differences in rule knowledge.

In order more specifically to determine the source of disabled readers' difficulties, an additional set of data was collected concerning the subjects' accuracy in pronouncing unconditional and conditional correspondences. Unconditional correspondences involved arbitrary one-to-one correspondences of the orthographic and phonemic units. Pronunciation of conditional correspondences depended on the graphemic environment of position in a word. For example, the pronunciation of long and short vowels was considered conditional because environment determines their pronunciation. The resulting data showed that the difference in accuracy between unconditional and conditional correspondences was larger for disabled readers than for normal readers, and the difference increased at every age for disabled readers.

The conclusion reached was that disabled readers experience greater difficulty learning conditional correspondences. This difficulty with the more complex rules provided evidence of a specific rule-learning difficulty among disabled readers. Most significant of all was the finding that when reading level was controlled through comparison of sixth-grade disabled readers with reading-age controls, differences were eliminated on the
unconditional correspondences but not on the conditional correspondences. This finding again points to the difficulty experienced by disabled readers in following conditional rules that appear to lie beyond their level of reading achievement.

An unresolved question concerns whether knowledge of the rule system affects the ability to recognize words. The assumption is that new words or pseudowords should pose difficulty for a child ignorant of the correspondence rule system even if these words occur in a meaningful context. The difficulty that disabled readers experience with correspondence rules may impede their progress toward automatic word-decoding processes.

Perfetti and Hogaboam (1975) studied vocalization latencies of skilled and less skilled third- and fifth-grade comprehenders for low and high frequency printed words and pseudowords. The first ten words from the oral reading list of the Wide Range Achievement Test were classified as a common set of known words. A second variable set of 20 words was chosen from the vocabulary subtest of the elementary level Metropolitan Achievement Test so that some of the meanings of the set would be known, but not necessarily all, for any given subject.

Results suggested that for skilled comprehenders, the difference between known and unknown words is small. Slower vocalization latencies for unknown words were,
however, characteristic of less skilled comprehenders. The advantage of the skilled reader is greater for pronunciation of pseudowords and low frequency real words than for familiar words. The researchers assert that because only real words whose meanings were known to a child were included in the analysis of the vocalization latencies, differences between skilled and less skilled comprehenders cannot be attributed to vocabulary differences.

This study, therefore, appears to support an assumption that knowledge of correspondence rules may contribute toward the differences in decoding skill. The Perfetti and Hogoboam study, however, was not specifically designed to assess sensitivity to the correspondence rule system, but only to the differences between readers in the decoding of known and unknown words and pseudowords.

In order to assess the relationship between rule usage and speeded decoding, Manis and Morrison (1985) report a study undertaken by Morris of fifth- and sixth-grade normal and disabled readers' pronunciation of unfamiliar words of varying rule complexity. Low and high complexity sets of unfamiliar words were chosen. High complexity words contained rules requiring processing of conditional features. A familiar set of words was also included at the reading level of subjects in the disabled reader group.

Subjects were trained on the meaning of unfamiliar
words through presentations of pictures and verbal definitions. Words were only presented orally until the end of the training when they were finally presented on index cards for pronunciation. The training sessions were intended to simulate early reading acquisition wherein the meaning of words is typically known prior to encountering a word in print and attempts at decoding. Following the training, subjects were required to pronounce each word as it was displayed on a video screen. Latency and accuracy scores were gathered across three sessions.

Normal readers' trials were only somewhat lower on decoding of words based on low-complexity and high-complexity rules than they were on familiar words. They were significantly slower, however, on high-complexity words in relation to low-complexity words in the first two sessions. In contrast, disabled readers experienced great difficulty in decoding unfamiliar words in every session. The effects for complexity were also significantly larger for disabled readers in all but the third session. In the second trial, for example, the difference between the decoding of low-complexity and high-complexity words was 558 msec. for disabled readers as compared with 74 msec. for normal readers.

Knowledge of correspondence rules, therefore, appears to influence the speed of decoding among both normal and disabled readers. Disabled readers also demonstrate
greater difficulty acquiring rules involving complex, conditional relationships between orthographic patterns and speech.

Evidence of a causal link between phonological awareness and reading was provided in a study by Bradley and Bryant (1983) that combined longitudinal methodology as well as intensive training in sound categorization for a subsample of the larger group. It was reasoned that the strengths and weaknesses of the two methods would complement one another. A measure was taken of 403 four- and five-year-old children's skills in sound categorization before beginning to read. Children were asked to detect the one word out of three or four per trial that did not share a common phoneme with the others. There were 30 trials in all. Memory and verbal intelligence were controlled. Results of these measures were related to their progress over the next four years. At the conclusion of the project, standardized tests of reading and spelling were administered as well as intelligence (IQ) in order to exclude the effects of IQ differences. A standardized math test was also included to establish that the results were specific to reading and spelling rather than to general achievement.

High correlations were obtained between initial sound categorization scores and reading and spelling over three years later. In stepwise multiple regressions, these
relationships remained strong even when intellectual level at the time of initial and final tests, and differences of memory were removed. In all instances, sound categorization skill accounted for a significant portion of the variance with other factors controlled. The percent of total variance on reading scores accounted for by sound categorization for subjects first tested at age four was 9.84 and 6.24 (p < .001). For those first tested at age five it was 4.06 and 4.56 (p < .001). A relationship exists between skill in categorizing sounds and success in reading.

In the second part of the Bradley and Bryant study, 65 children from the sample were selected and divided into groups matched for age, verbal intelligence and sound categorization scores at least two standard deviations below the mean. Two of the groups were given intensive training in sound categorization over a two year period. In addition, one of these groups was also taught the graphemic representation for each sound through the use of plastic letters. A third group was taught how to categorize conceptually, that is, the same word could be classified under different concepts. The fourth group received no training.

At the conclusion of the project, the group that received training on sound categorization only showed a three to four month advantage in reading and spelling over
the group trained on conceptual categorization. The group that received both sound-categorization training as well as training with the alphabetic representations of these sounds surpassed the group trained in sound-categorization-only in reading and particularly in spelling. Thus, training involving an explicit connection with the alphabet was more effective.

An analysis of covariance, where final IQ scores and age at the end of testing were covariates, established that the group differences were significant in the case of both reading and spelling but not in the case of mathematics. On Tukey’s HSD test, the group receiving the combined sound categorization and alphabetic training was shown to be significantly better than both control groups in reading and spelling. No significant difference was found between the first two groups in the two reading tests, but the group receiving the additional alphabetic correspondence training did surpass the sound-correspondence-only group in spelling. Although the scores of the first group trained in sound-correspondence-only were always higher than those of the third or conceptual categorization group, post-hoc tests did not reveal a significant difference. Nevertheless, the consistent three to four month advantage of the first group over the third group suggests that sound categorization training influences reading and spelling progress. The first group was also significantly better
than the group receiving no training. No significant differences were found between the group receiving conceptual training only and the group receiving no training.

The previously cited studies of knowledge of sound-symbol-correspondence rules and their relationship to reading comprehension provide evidence for the importance of rule knowledge; however, the degree of analysis of this knowledge is not specifically addressed in the research. The extent to which explicit knowledge is necessary remains unclear.

With the evolution of writing systems toward abstract phonemic script, the learner of an alphabetic system is required to recognize consciously and attend to the phonological and syntactic substrata of language. Gleitman and Gleitman (1979) reason that "success ought not be correlated with the ability to give phonological judgments" (p. 116). The evidence provided above supports this claim. Kattingly (1984) suggests that "linguistic awareness is not a matter of consciousness, but of access, "and the access may be unconscious" (p. 9).

The ultimate goal of phonics instruction is automatic decoding which, by definition, is not subject to conscious control. As Gough and Hillinger (1980) remark, an implicit cipher that is too fast for phonics appears to operate in fluent decoding where the speed is such that it could not
be done "by consulting the rule that when two vowels go walking the first does the talking" (p. 187).

The deeper issue may be whether metalinguistic functions enter into the process of learning a first language at all. Language functions seem developmentally to precede metalinguistic functions. Gleitman and Gleitman (1979) suggest that:

Judgmental functions in language are separate from the language functions both on descriptive grounds (the data of linguistic judgments do not organize the findings for speech and comprehension in real time) and on developmental grounds (the presumed metafunctions are developmentally late to appear (p. 122).

Although some form of rule awareness is necessary, the degree of explicitation of this awareness and the conditions under which it is operative in comprehension remain to be clarified as does the role of linguistic awareness.

Linguistic Awareness and Reading Comprehension

Ryan (1980) and Ryan and Ledger (1984) review a number of LI studies in which various sentence-processing tasks such as grammaticality judgment, correction, repetition, and oral cloze were found to demonstrate a relationship to early reading achievement. Similar evidence is provided by

On logical grounds alone, it would appear that success in beginning reading would depend on the basic insight that graphic representations on a page correspond in some rule-governed pattern to the sounds that constitute the words of spoken discourse. Gough and Hillinger (1980) maintain that the crucial learning experience in the decoding process occurs when "the child perceives (or thinks of) a printed word at the same time he perceives (or thinks of) its spoken counterpart" (p. 192). Not surprisingly, success in early reading achievement has been found to correlate with skill in decoding.

In comparison with the number of studies dealing with grapheme-phoneme correspondence, fewer studies have dealt with the relationship between syntactic awareness and reading. Tunmer and Bowey (1984) review a number of studies linking syntactic awareness with text integration processes. In a more recent study of first- through third-grade readers, Willows and Ryan (1986) investigated grammatical sensitivity through oral measures involving error location, error correction, sentence repetition, and an oral close task. These measures were then correlated with four reading measures: the Peabody Individual Achievement (PIAT) reading comprehension subtest, a reading
close developed from a parallel set of oral reading passages of the Durrell Analysis of Reading Difficulty, the Oral Reading subtest of the Durrell (reading time), and a nonstandardized word recognition/decoding task. Results showed that a substantial portion of reading variance is accounted for by each measure of grammatical sensitivity in grades one through three.

Multiple regression analyses were also performed on the data with the four reading measures used as dependent variables. Other variables entered were age in months, followed by three cognitive development measures and lastly, the four measures of grammatical sensitivity. The grammatical sensitivity measures produced a significant change on all of the reading measures. Results of a factor analysis provided additional substantiation for the interrelationships among measures of grammatical sensitivity and reading (87.5% of the variance). Separate analyses of variance performed on the three oral language measures of grammatical sensitivity revealed powerful grade effects on each measure of grammatical sensitivity, thus indicating a developmental pattern across the primary grades.

The ability to perform tasks requiring awareness of the form of language, as distinct from its function, may reflect developmental processes. The Willows and Ryan (1986) study points to growth in grammatical sensitivity
over the first three years of school. It is suggested that success in reading may be a function of linguistic development. In contrast with the above study, Willows and Ryan (1981) failed to find significant improvements in the sensitivity of skilled and less skilled fourth-, fifth- and sixth-grade readers to semantic and syntactic information across grade levels.

The ability to attend to the structure of sentences seems to emerge in middle childhood (Tunmer & Bowey, 1984) and appears to be a developmentally distinct kind of functioning (Tunmer, Nesdale & Wright, 1987). For example, when good second-grade readers were matched with poor fourth-grade readers on comprehension level and verbal intelligence, the younger readers were found to score significantly better than their older counterparts on measures of syntactic awareness: oral cloze and an oral correction task (Tunmer, Nesdale, and Wright, 1987). "The analysis revealed significant differences between the two groups for both the oral correction task (t = 5.24, d.f. = 18, p < 0.05)" (p. 30). The restriction of the task to the oral mode was intended to bypass any differences in decoding abilities of the two reader groups. The findings suggest a developmental lag in syntactic awareness on the part of the older, but weaker, readers.

Additional support for the existence of a developmental lag in grammatical awareness is found in a
study by Siegel and Ryan (1988), in which the development of grammatical sensitivity and phonological skills was studied in normally-achieving, reading-disabled, arithmetic-disabled, and attention-deficit-disordered children. Children with reading disability demonstrated sensitivity to grammatical structures significantly later than normal readers. Children with attention deficit disorders and arithmetic disabilities, however, did not appear to experience particular difficulties with the syntactic aspects of language. Correlations between reading measures and grammatical sensitivity measures were found to be in the moderate range (.41 to -.59).

A recent finding is a correlation of syntactic control with decoding skill. Bowey (1986a) reports a significant correlation between syntactic awareness and decoding skill among first- to fifth-grade children with statistical controls used for verbal ability and age effects. The common element that both decoding skill and syntactic awareness share is metalinguistic skill; therefore, the correlation between these two abilities is not unexpected.

What is not treated in these L1 studies is the relationship between explicit knowledge of grammar rules and reading comprehension. Studies involving children’s L1 metalinguistic development must necessarily infer awareness of rules on the basis of the ability to perform functional tasks rather than from the ability to state a rule.
The major difficulty in studies attempting to examine the relationship between children's use of grammatical features and their judgments of these features in a testing situation is the inability of young children to focus on form. Young children tend to base linguistic judgments on meaning rather than on form and "judgments of appropriateness, complexity, and form are next to impossible to elicit from very young children" (Clark, 1978, p. 37). Children also achieve syntactic control well before they notice syntactic irregularities.

In a study applying the bidimensional model formed by the coordinate system of the degree of analysis and degree of control of knowledge to the reading comprehension of third-grade L1 subjects, Bialystok (1988) found that "level of reading comprehension could be predicted by the level of the child's analysis of knowledge" (p. 136). Bialystok measured reading comprehension through an integrative task involving comprehension of short prose passages in the Gates-MacGinitie test of reading comprehension.

It was hypothesized that reading comprehension based on simple texts would be better predicted by analysis of knowledge rather than by control of processing. Control of processing was anticipated to be more relevant for reading under conditions where fluency and rapid integration of information are required, or where attention is directed to specific goals such as reading for technical details, for
the gist, or to sort out misleading information. Simple interpretation of short passages would, therefore, be expected to rely primarily on the degree of analysis of knowledge represented in the mastery of sound-symbol correspondence, knowledge of syntax, and knowledge of discourse structure.

The reading text contained 22 passages, each followed by two questions. The questions required either selection of a paraphrase of information explicitly stated, or an inference concerning something not directly stated. Degree of analysis of knowledge was determined by a grammaticality judgment task requiring subjects to judge syntactic acceptability independently of meaningfulness. Sentences contained either grammatical errors, semantic errors, both grammatical and semantic errors, or no error. Subjects were instructed to identify whether a sentence was said "the right way or the wrong way, even if it is a silly thing to say" (Bialystok, 1988) p. 129). In addition to the reading and grammaticality judgment tasks, measures of general intelligence (Block design and Digit span), and additional tests of analysis (a form-meaning judgment task) were included in the test battery.

Results of a series of multiple regression analyses to determine the relationship between the various test scores and the reading comprehension measure provided support for the hypothesis that analyzed knowledge of language was the
most important aspect for reading comprehension based on simple texts. In the first set of analyses in which general intelligence measures were entered first into the model, followed by the tests of analysis, tests of control, and baseline tasks, 14.9 percent of the variance was explained by the analysis tasks with the complete model accounting for 38.1 percent of total variance.

In a second set of analyses, Block design was reinterpreted as showing processing components with analysis and was, therefore, entered into the regression equation first along with the grammaticality judgment tasks and the "no context" condition of the form-meaning task. This second model accounted for 25.1 percent of the variance in the Gates-MacGinitie reading comprehension test scores.

The Bialystok (1988) study provides evidence for the relationship between analyzed knowledge of grammar and reading comprehension of simple texts in the L1. Specifically, analyzed knowledge of language was the most important aspect of reading comprehension with control of processing becoming relevant only after sufficient analysis of knowledge was manifest. Level of reading comprehension could thus be predicted by the level of analysis of knowledge. What is needed is more specific evidence concerning the relationship between knowledge of grammar rules and reading comprehension. The Bialystok study
addressed the analysis versus control dimension rather than the relationship of the degree of analysis to comprehension.

**An L2 Perspective on Rule Knowledge and Its Application**

In contrast to the number of L1 studies concerning the relationship between knowledge of phonics rules and their application in reading, only one L2 study directly relates to the relationship between rule knowledge and application. Seliger (1979) provides some evidence concerning the relationship between knowledge of a grammar rule and application of the rule in the L2. More specifically, the goal was "to examine the relationship between the external explanations (verbalized language rules) that learners give for their language behavior, and actual language performance" (p. 360). The study involved testing of three groups: 29 monolingual English-speaking children ranging from three to ten years of age; eleven bilingual children who spoke different home languages as well as English, ranging from four to ten years of age; and 15 adult ESL learners of various proficiency levels, language backgrounds, and exposure to English. In studying these subjects' ability to state the rule for the use of the indefinite articles "a" and "an," Seliger found no relationship between the ability to state the rule and performance on the task.
The task required both native and nonnative speakers of English to name pictures of objects such as "an apple," "a pear," "a book," and so forth. After noting whether speakers used the correct form of the indefinite articles, subjects were then asked to give the rule for choosing between "a" and "an." The researcher reported that no correlation was found between the ability to state the rule and the ability to apply the rule correctly for either nonnative or native speakers. In other words, the ability to state the rule is no assurance of correct performance just as inability to state a rule does not necessarily imply poor performance. Two tables are included in the article. One displays the mean scores for children, and the other reports the relationship between having a rule and performance. No information is provided for performances where subjects failed to give a rule. Only raw data are presented for the study and no statistical procedures are reported.

The relationship between knowledge of grammar rules and reading is not directly treated in the L2 literature. Rather, grammar knowledge is considered under the more general rubric of metalinguistic ability in relation to the performance of specific linguistic tasks. One inherent complication in any investigation of the relationship between analyzed knowledge and reading is the difficulty posed by the classification of various tasks used to assess
grammatical awareness. Tasks can be said to vary along the unanalyzed/analyzed dimension, that is, in the degree to which high to low demands are placed upon analyzed knowledge. For example, judgment, error location, correction, and statement of a rule are tasks ranging from low to very high demands for analyzed knowledge. Within this framework, therefore, reading and listening tasks would be expected to require less grammatical knowledge than would writing or location of an error.

The Use of Linguistic Judgments in Research

One means of assessing knowledge of a particular grammar point is through linguistic judgments. The interest in linguistic awareness can ultimately be traced to Chomsky's competence/performance distinction. It is the "competence" of the native speaker that constitutes the basis for the linguistic theory of any language (Chomsky, 1957, 1964, 1965). The methodology for tapping a speaker's competence has consisted of various types of language judgments. However, the variability in judgments evidenced by native speakers has prompted caveats concerning the suitability of judgments of intuitions as indicators of linguistic structure (Bever, 1970; Labov, 1975; Levelt, 1974). Actual performance data, rather than linguistic judgment, were proposed to be a more viable indication of

Despite the debate concerning the suitability of linguistic judgments as indirect indications of underlying language structure (Bever, 1970; Labov, 1975; Levelt, 1974), they have continued to play an important role in confirming data for theories of language acquisition and learning (Chaudron, 1983). Additionally, metalinguistic judgments have been used to assess an individual's degree of metalinguistic awareness or ability "to abstract from language use" (p. 346). One such study (Schachter, Tyson & Diffley, 1976) attempted to respond to cautions concerning the use of intuitional data by both Selinker (1972) and Corder (1972). Selinker pointed out that learner judgments would only provide distorted information concerning the target language, whereas Corder (1972) posited that grammatical judgments would necessarily be based on an interlanguage grammar.

The approach of Schachter et al. (1976) was to make a distinction between sentences for which a learner had internalized rules (determinate strings) and those for which the learner had no knowledge (indeterminate strings). The logic of their approach was to differentiate between these types of sentences based on: (1) the predisposition of each language group to identify relative clause structures patterned after their own LI structure as
grammatical; (2) identification of sentences with target language clauses as grammatical, and; (3) identification of sentences based on language group forms other than the subjects' own L1 as grammatical. The study involved elicitation of intuitions of grammaticality from ESL students of Arabic, Chinese, Japanese, Persian, and Spanish native language backgrounds.

While a discernible pattern evolved in that four of the groups predictably responded randomly to sentences containing other nonnative relative clauses, the Japanese group departed from the expected pattern and, therefore, further investigation with this latter group was suggested. Results also indicated that in the Persian and Arabic groups "knowledge of English differed in a very specific way from that of native speakers and the knowledge of other language groups" (Schachter et al., 1976, p. 75).

Although this study raises many questions and clearly points to a need for continued investigation along these lines, it also provides evidence for the underlying systematicity of interlanguage structures within language groups upon which grammaticality judgments are based. The authors conclude that the use of intuitional data "is revealing and must be pursued" (p. 67).

Chaudron (1983) has provided an extensive review of the use of intuitional data with adults and children in 16 L1 studies and 23 L2 studies. Comparisons across studies
are difficult due to differences in statistical procedures, time allotted for the task, and criteria for determination of proficiency groupings of subjects. The variety of judgment tasks and criterion measures employed also render comparisons difficult. Nevertheless, some general statements can be made about metalinguistic judgments based on the findings of studies reviewed. The following generalizations are based on Chaudron's review (1983).

First, metalinguistic judgments appear to be idiosyncratically linked with linguistic development and experiences. Researchers consistently report high variation between subjects. Justifications for judgments often involve seemingly irrelevant, but comprehensible reasoning. There appears to be a lack of uniformity of the concepts of grammaticality and meaningfulness; there is some bias, however, toward orthodoxy in judgment with respect to grammaticality.

Secondly, ability to identify target language grammatical norms increases as learner proficiency increases. Finally, metalinguistic judgments appear to be validated by: (a) correlations between judgments and performance measures of native speakers; and (b) consistency in judgment and production as well as correlation between judgments of nonnative speakers.

The general conclusion reached by Maratsos (1983) with regard to the use of grammaticality judgments is that
"children's ability to judge and explain what they unconsciously know may lag behind conscious knowledge for years or never catch up" (p. 774). In contrast, although adults' understanding of the functional relationships of grammar is also very meager, they can make judgments about sentences. Judgment tasks cannot, therefore, be considered "systematically unusable" (p. 774).

**Metalinguistic Judgments Involving Rule Consciousness**

With regard to judgments involving consciousness of rules, time constraints, and cognitive variables, only three studies summarized by Chaudron (1983) investigated these variables. Two of the studies (Ioup & Kruse, 1977; Ritchie, 1978) were primarily intended to identify conformity of learner judgments with universal language constraints.

In the third study, Bialystok (1979a), the focus was on knowledge of specific grammar rules involving adjectives, pronouns, and verbs encountered by beginning students of French. Correct judgments of subjects were found to be associated with implicit (unanalyzed) knowledge unless there was a "focus on form" and sufficient time to access explicit (analyzed) information. Two time conditions (spontaneous and delay) and three task conditions (grammaticality judgment, identification of the
form class of errors, and identification of the rule violated) were employed in the design.

The delay condition proved an advantage to locating errors and identifying specific rules violated, but not in judging the correctness of items. Correct items appear to be readily recognized in spite of time constraints. Both correct and incorrect sentences in the grammaticality condition and the correct items in the form class and rule conditions were solved through reliance on implicit (unanalyzed) knowledge and were not affected by the amount of time available.

Bialystok concluded that grammaticality judgments are made on an intuitive basis independently of the subjects' explicit (analyzed) knowledge of the structure involved. Explicit knowledge, however, intervened for incorrect sentences requiring identification of the rule violated. Bialystok's conclusion supports Labov's contention that "the existence of explicit knowledge is . . . not a necessary condition for errorless performance" (Labov, 1975, p. 60). In order for a subject to access more detailed information about errors, time is required. Detailed information relies on explicit (analyzed) knowledge which is "stored in a structured, articulated manner" (Bialystok, 1979a, p. 98). On the basis of the findings concerning the role of implicit knowledge in judging correct sentences, it might be anticipated that
reading, which does not require identification of a rule as a prerequisite to processing, might be closely identified with the unanalyzed dimension of knowledge.

Another important finding of the above study is that tenth-grade learners outperformed twelfth-grade subjects. Learners at a higher level of study would normally be expected to score better on all items. The twelfth-grade students were not found to be disadvantaged in the least detailed condition and may perhaps have been overconfident in their intuitive judgments and, therefore, may not have taken full advantage of explicit knowledge.

The pedagogical interest of the above study lies in the identification of the role of intuitive (unanalyzed) and formal (analyzed) information in learner performance. An implication offered by the researcher is that learner intuitions need to be developed along with training in strategies for consulting explicit (analyzed) knowledge. "Concentration on only the formal aspects of the language and rule formation not only precludes important aspects of the language but ignores as well the use of the learners' great intuitive resource" (Bialystok, 1979a, p. 101).

**Conclusion**

As evidenced in this review of literature and the description of the teaching practices in Chapter I, a gap exists between current understanding of the role of
explicit knowledge of grammar rules evidenced in L1 and L2 research and the importance placed on explicit knowledge of rules in the teaching-learning process. The present study attempts to bridge this gap. The study investigates the extent to which L2 students' reading comprehension is affected by their explicit knowledge of grammar rules.
CHAPTER III
PROCEDURES

Population and Sample

The population from which the sample for this study was drawn consisted of a college-bound group of students enrolled in first- through fourth-year French classes in a four-year girls' college-preparatory school located in a residential suburb of Cleveland. Students enrolled in the school come from 27 communities with approximately 60 percent of students located in five adjacent communities.

The student population of 930 is a stable one with approximately 94 percent of the 1987 graduating class having spent all four years at the school. The students are generally above average in academic ability and consistently score above national norms in annual testing programs. Since 1980 the school has had 40 National Merit Finalists and 77 students who have received Letters of Commendation. Of the Class of 1986, 97 percent went on to a four-year college or university. The college preparatory curriculum includes Advanced Placement and honors courses as well as a basic program for students with special academic needs. Fifty-seven percent of the faculty hold MA
degrees. In 1984, the school was a recipient of the National Exemplary Private School Award from the U.S. Department of Education.

The parents of students are middle to upper-middle class in background and represent a wide range of professional and non-professional occupations. Almost three fourths of the students' fathers and one third of their mothers are in professional or managerial positions. Higher education is a value in this community: 70 percent of the fathers of current students and 47 percent of the mothers have college educations. Half of the fathers who are college graduates and one third of the mothers also have advanced degrees. According to school records, 88 percent of the students live in a traditional home situation with both parents. All but three percent of the students share a common religious and moral background.

In comparison with national norms on the Science Research Associates Placement and Counseling Test, 209 of 216 ninth grade students ranked above the 50th percentile. On the Differential Aptitude Test, 190 of 225 tenth grade students scored above the 50th percentile. For the eleventh grade students, the number of students scoring above the 50th percentile on the Preliminary Scholastic Aptitude test was not on file although all eleventh grade students participated in the testing. A comparison with national averages was, however, available. On the verbal
score, the national average was 41 in comparison with 42.9 for this population. The national average for math was 44 in comparison with 43.7 for this population. For twelfth grade students, 228 of 244 students scored above the 50th percentile on the Science Research Associates Achievement Series, Level H, Form 1.

Although the percentile ranking for the total population is high, there are students within the population scoring at the 30th percentile as well as those ranked at the 98th percentile and above. Some of these latter students are also ranked among the top five percent of students nationally as evidenced by their status as recipients of National Merit Scholarship Letters of Commendation or the status of National Merit Finalist.

Although admission to the school is through the SRA entrance examination, an average of less than five students are rejected in any given year for academic reasons. The curriculum is described in school brochures as a college preparatory curriculum with four curriculum offerings: Honors College Preparatory, College Preparatory, College Preparatory/Business, and College Preparatory/General. Course requirements meet the recommendations made by the Advisory Commission on Articulation Between Secondary Education and Ohio Colleges for unconditional admission to four-year colleges in Ohio. The general requirements of the school are: four years of English, three years of
mathematics including algebra II, three years of history and social science, two years of science with a strong recommendation to take three years, one year of the arts, and three years of a modern language. In instances where a students' academic ability proves the modern language expectation to be unrealistic, the requirement is waived. After the first two years, minimum state requirements are met by most students, although requirements may be fulfilled at different levels of difficulty. For example, incoming students might take introduction to Algebra, Algebra I, Honors Algebra, or Advanced Algebra II as the first unit of the math requirement.

This description of the population suggests that the ability range may be restricted in this study. Observations of the quality of foreign language teaching at this testing site in comparison with that of the sites used in the Allen, Bernhardt, Berry, & Demel (1988) study, however, attest to a similarity of foreign language methodology with the exception of the course offered at the Advanced Placement level for the population described in the present study.

In general, teaching methodology at the testing site of this study did not depart from the general norm practiced in most classrooms. The focus of the syllabus at the beginning levels was mastery of the grammar presented in the first- and second-year texts. While there was an
increasing awareness of the need to provide opportunities for communicative use of language, class size and the background experience of teachers circumscribed full implementation of communicative teaching practices although such strategies were in no way neglected.

Four years of instruction in French and Spanish are offered with two years of either French or Spanish required of all students. Special first-year classes are offered for students who experience difficulty mastering the material taught in the regular first-year classes. The fourth level of French consisted of one Advanced Placement class. No regular fourth-year class was offered during the year of this study.

This population was selected for the study because of the willingness on the part of both the administration and the foreign language department to cooperate with the researcher. The professional status of parents was similar to that found in the two school systems used in the Allen, Bernhardt et al. study (1988) with which the present study draws comparisons. The population was also large enough to ensure a sufficient number of students in the fourth-year Advanced Placement course.

The subjects participating in this study were students enrolled in French I, II, III, and the Advanced Placement French course that constituted the fourth-year option. Textbooks used for the first two years of instruction were
French for Mastery (Valette & Valette, 1985b). The third-year text was French for Fluency (1985a) by the same authors. Core texts for the Advanced Placement course were Le Passé Vivant de la France (Palmer, 1970) and the Troisième Livre and Cours Supérieur, all published by Amsco (1970). Conversational themes and pronunciation activities were adapted by the teachers from several other texts as well as French newspapers and magazines.

All classes met five times a week for forty-seven minute sessions. The focus of instruction during the first two years of French was on mastery of elementary grammatical concepts presented in the text, development of basic communication skills, and an introduction to French culture. The emphasis in third-year French was on building conversational skills together with expansion and review of grammatical constructs. According to the teachers' self-report, about 70 percent of class time was devoted to grammar-related activities in the first year. During the second year, an estimated 60-70 percent of class time was spent on grammar related activities. In the third year, the amount of time devoted to grammar decreased to about half of the class time.

In the Advanced Placement course, about 60 percent of class time was devoted to mastery of grammar. The remainder of the time was divided among speaking, listening, writing, reading and culture as well as cultural
informal discussions. Classroom activities included discussion of readings and cultural topics, presentation and review of grammar and vocabulary, listening and speaking activities, correction of homework exercises, pronunciation practice, audio-visual presentations, occasional guest speakers and spontaneous conversation. Homework included a weekly written composition on an assigned topic, listening comprehension activities and translation of recorded passages in the language laboratory as well as the reading of literary works and completion of grammar exercises.

Research Design and Variables

The research question investigated the relationship between three stages of analyzed knowledge of grammar, year of instruction, and comprehension as measured by recall scores. Analysis of covariance (ANCOVA) was used to determine the influence of specific conditions (year of instruction and degree of analyzed knowledge) on reading comprehension. The decision to consider year as a categorical variable led to the selection of analysis of covariance rather than multiple regression in order to fit regressions in the context of multiple classifications, that is, both quantitative and qualitative independent variables (Wildt & Ahtola, 1978).
A rationale might be advanced to use multiple regression and thereby consider year of instruction as a continuous variable representing an underlying continuum of proficiency. If year of instruction were to be treated as a continuous variable, this would imply a linear progression in the underlying continuum of proficiency. Thus, the second year of instruction would therefore represent twice as much proficiency in reading comprehension as the first year and so on. This assumption could not be maintained upon inspection of the means for year of instruction in this study. Furthermore, previous studies had demonstrated a nonhierarchical progression among years of instruction in reading comprehension (Allen & Bernhardt, 1987; Bernhardt & Berkemeyer, 1988; Lee & Musumeci, 1988).

ANCOVA and multiple regression are related statistical techniques that both involve regression. They are virtually identical when used for purposes of group comparison. Both analyze the variance in scores accounted for by other measures (Kamil, Langer & Shanahan, 1985). Both multiple regression and ANCOVA rely on the F test as a test of statistical significance.

Three separate quantitatively measured continuous independent variables were used to investigate the degree of analyzed knowledge. These variables represent the two extremes and the midpoint on the continuum between the
unanalyzed/analyzed dimension of linguistic awareness. A tripartite test was administered in order to tap the analyzed knowledge dimension at three distinct points: (a) ability to make a grammaticality judgment (b) ability to detect the form class containing the error, and (c) ability to select the rule governing the error from among three choices for each rule. Thus, three variables were measured, one in each section. Although three variables were measured, the three sections combined can be considered as measuring an underlying continuum of analyzed knowledge.

Level of instruction is a categorical independent variable quantified as one, two, three, or four years of formal high school instruction in French.

**Independent Variables:**

1. unanalyzed knowledge of grammar (grammaticality judgment);
2. intermediate stage of analysis (identification of the form class of errors);
3. explicit stage of analysis (identification of the rule violated);
4. year of instruction (four levels: YRS 1, 2, 3, 4).
The dependent variable in the study consists of a reading comprehension score obtained through application of the Meyer protocol scoring system (1975a, 1975b, 1985). 

**Dependent Variable:** Reading comprehension score on a free-recall protocol.

**Instrumentation**

The test used to assess grammatical sensitivity is an adaptation of the Aural Grammar Test used by Bialystok (1979a) with some modifications in administration procedures. The test requires subjects to perform a grammaticality judgment task that incorporates both formal (analyzed) and intuitional (unanalyzed) information. In the Bialystok study, two sets of isolated French sentences were necessary because the research design incorporated a delayed testing condition. Only the sentences in Set A were used in the present study because the design did not incorporate a delay condition.

The 24 sentences in Set A of the Bialystok study (1979a) were constructed in order to incorporate errors in three grammatical form classes: adjectives, pronouns, and verbs. The selection of these particular errors was based on results of an elicited imitation task measuring the productive competence of English-speaking elementary and high school students learning French as a second language. These three types of errors, selected by Bialystok and
Frohlich (1978a) as the basis for the Aural Grammar Test, were reported by Swain (1976) to be frequently present in oral data elicited from subjects. These errors were found to discriminate subjects according to their oral proficiency.

Each sentence is 15 syllables in length and is controlled for syntactic and semantic complexity (Bialystok, 1979a). Of the 24 sentences, 6 contain no error. Of the 18 remaining sentences, each of the three form class errors are incorporated in 6 sentences so that there are 6 sentences containing errors in the adjective, 6 with errors in the pronoun, and 6 with errors in the verb. Within each form class, two sentences illustrate each of three rules governing the form class.

In the Aural Grammar Test (Bialystok & Frohlich, 1978a), the degree of explicitness with which students identified the errors was measured by a certainty score. Subjects indicated the degree of their certainty for each response by marking one of the alternatives: "sure," "unsure," or "certain." In the Bialystok (1979a) adaptation of the test, degree of certainty or explicitness was ascertained in three consecutive stages of judgment tasks. The latter format was selected for this investigation.

Whereas Bialystok's analysis was a between-subjects analysis, subjects in this study were exposed to all three
levels of detail required by the three consecutive stages of the task condition. It was thus possible to analyze data in the present study to provide a composite profile of degree of analyzed knowledge for each year of instruction that in turn could be compared with the reading comprehension data for that specific year.

The adaptation of the Bialystok test used in the present study involved the presentation of the sentences in a written format (Appendix A). In the Bialystok study, only the aural mode was used. The exclusive use of the aural presentation was questioned by d'Anglejan (1981) as inconsistent with "any real language processing situation encountered in or outside the classroom by second language learners" (p. 79). The criticism centers on the fact that aural presentations are generally not accompanied with lists of grammatical rules. By presenting the sentences in a written format in the present study, the task was brought more in line with common classroom experiences. The tripartite test was used to obtain an index of overall grammatical knowledge based on assessment of a subset of this knowledge concerning adjectives, pronouns, and verbs.

The statistical reliability of the Aural Grammar Test was established through a modification of the split-half reliability procedure. Because items on the test could not be assumed to be of equal difficulty, that is, detection of an adjective error might be more easily accomplished than
detection of a verb error, the following modification of the split-half reliability test was devised by Bialystok and Frohlich (1978a). "The first three times each of the categories appeared constituted the 12 items for one half; their last three appearances constituted the other half. Calculated in this way, the reliability coefficient obtained exceeded the criterion of acceptability, $r = 0.72, p < .001$" (p. 20).

The French passage selected to assess reading comprehension in the present study was the newspaper account of an airplane crash used by Allen et al. (1988). In searching for an appropriate article to use for the comprehension measure, the aim was to find a complete text of not more than 250 words in order not to place too great a strain on memory. A newspaper article was selected as representative of a reading task that would provide an index of students' ability to glean information from an authentic French text as well as engage students' curiosity and desire to read.

The airplane crash article was selected as being well within the background knowledge of students. Lack of background knowledge would not, therefore, be expected to bias the results of testing. This French newspaper article from Le Figaro was an unedited account of an airplane collision that had occurred within the United States (Appendix G). References to unfamiliar geographical
locations would not, therefore, be a hindrance to comprehension.

Because the incident had not been highly reported, students were not expected to be familiar with the details and were therefore presumed to rely on reading skill to gain specific information from the text. The airplane text afforded a complete account within approximately 225 words. The content of the article was also seen as an advantage in that students at all levels were expected to possess the necessary disaster schema within their experience. This passage was, therefore, judged to offer enough of a challenge for the advanced levels without proving too frustrating for beginners. In the Allen et al. study (1988), the newspaper article received the second highest comprehension score of the four texts analyzed for the French group.

**Experimental Procedures**

**Grammatical Awareness Tasks**

**Stage I.** In Stage I, or TOTA (grammaticality judgment), of the present study, subjects listened to a tape recording of the directions (Appendix B), followed by a sample item, and the 24 sentences. The sentences were recorded by an individual with a native-like French pronunciation and intonation. While listening to the recorded sentences, subjects had access to the test form
consisting of the 24 typed sentences. Each sentence was read once, followed by a ten-second delay during which subjects were directed to reread the sentence silently before marking whether they judged the sentence to be correct or to contain an error.

The time spent on TOTA was controlled by the pacing of the tape in order to ensure primary reliance on intuitive knowledge. Students were directed not to change previously marked items or to leave any item unanswered. If students were uncertain whether or not a sentence contained an error, they were encouraged to guess.

Stage II. In Stage II, TOTB (identification of the form class of errors), only the directions were recorded (Appendix C). Students proceeded at their own pace during this section as well as in the last test, TOTC. At this point, subjects were told that errors in incorrect sentences occurred in either the adjective, pronoun, or verb categories and that no sentence contained more than one error. They were then directed to reread each sentence at their own rate. They were told that decisions made in TOTA might be reviewed and changed, but that changes could only be indicated in TOTB. Subjects were cautioned not to change any previous responses in TOTA. The recorded instructions directed students to turn their papers over when finished with TOTB and to await directions for the final section, TOTC.
Stage III. When all students had completed TOTB, they were given a sheet containing the written directions for TOTC (identification of the rule violated). Students listened to the recorded version of the directions while simultaneously following the written text. The sheet with the directions also contained the French grammar rules used to construct the test (Appendix D).

In the directions, they were told that for each sentence judged to contain an error, they were to mark the specific rule violated by darkening the number under the appropriate category in the right hand margin corresponding to the number of the rule on the answer sheet. The directions cautioned subjects to refrain from returning to make changes in TOTB.

Marking a rule number under a grammatical category other than what was selected in TOTB or TOTA indicated that a change of decision had occurred. The three successive stages of the test thus reveal the grammatical decisions made at each stage. Changes made from one stage to the next were apparent. It was thus possible to determine how grammatical intuitions based on implicit knowledge change with additional time for reflection as well as the increased information provided during TOTB and TOTC.

The progression of factors promoting explicit knowledge signaled by Bialystok are: (1) amount of formal detail required, (2) specific linguistic structure
contained in the response, and (3) the length of time allowed for response (Bialystok, 1979a). As students progressed from Stage I through Stage III, increased recourse to explicit knowledge was anticipated because each successive stage required more formal detail and afforded more time to consider the sentences.

Following the pattern established by Bialystok, it was possible to trace the performance of subjects at each successive stage (Stage I: grammaticality judgment; Stage II: identification of the form class of errors; Stage III: rule identification). The degree of explicit knowledge for each stage was then charted for each year of instruction.

**Reading Comprehension**

The instrument selected to assess reading comprehension was the immediate free-recall protocol. Bernhardt (1983) suggests that the free-recall protocol is more compatible with the current communicative focus of classroom instruction. It is particularly unbiased as a measure of comprehension in that it reflects the integrated comprehension product of the student rather than features of the text selected by the teacher. In contrast to traditional multiple-choice comprehension tests or the cloze procedure, focus on precise grammatical relationships is avoided.
In this study, directions to the students closely followed those described by Carrell (1984). Recorded directions accompanying the text asked students to imagine that they had come upon a French article on a topic of interest to them (Appendix E). They were instructed to read at their own pace to find out what was said about the topic. They were told that after they finished reading, they would be asked to hand in the text and then to write down everything they could remember from their reading using their own words or words from the text.

Instructions asked students to write in complete sentences and to avoid just listing isolated words or ideas in order to try to show in their writing how ideas from the text were related to each other. If students recalled an idea, but not how it related to other information in the text, they were asked to state this and not simply list isolated words or ideas. Students were told that they could retain the article and reread it as often as they wished; however, once they indicated they were ready to write, the article was collected and they were given a blank piece of paper on which to write as much as they could recall from their reading. A copy of the newspaper article was then distributed (Appendix G).
The Scoring Template

Advantages of the Meyer scoring system (1975a, 1975b, 1985) are that it identifies the structural characteristics as well as the content units of texts. The organization of the scoring template also makes it possible to identify the level of the structure at which lexical and relational units are recalled. Thus, the Meyer scoring template lists content items as well as the case relationships of these items (Appendix P). Ideas belonging to the macrostructure representing the top-level rhetorical relationships of the text are assigned a higher score value than subordinate details.

In essence, the scoring templates are tree diagrams, the lexical items of which have been typed sequentially and vertically from top to bottom on graph paper to indicate the subordination of some ideas to those listed at higher levels. Scoring procedures followed are those detailed in Meyer (1975a, 1975b, 1985). For the purpose of this study, however, scoring of the top-level structure was omitted because the focus of the study does not concern the hierarchical organization of text. Moreover, the newspaper layout of the text was readily apparent in the Xerox copy. It was thus assumed that most students would achieve similar scores on the hierarchical structure were it to have been scored.
The scoring template used for this study was the one previously developed for the airplane passage in the Allen et al. (1988) study. In that study, interrater reliability was reported as .98. For this study, interrater reliability of .96 was established on a random sample of 24 protocols, approximately ten percent of the sample. The rater with whom reliability was established had previous experience using the Meyer scoring system at another university. Recall protocols were then scored by the researcher.

In addition to the quantitative assessment of recall derived from application of the scoring template, a qualitative analysis was also undertaken on fifty-six protocols drawn from across the four levels. All fourth-year protocols were examined, whereas a random sample of fourteen protocols was drawn from years one through three. The purpose of the qualitative analysis was to uncover differences in recall among the four years of instruction not captured by the quantitative score. Sources of miscomprehension due to deficiencies in specific grammatical or extratext-based features were traced in each protocol and described in a detailed prose summary for each of the four levels.
Pilot Study

A pilot study was undertaken with 29 subjects in two area high schools in order to test the clarity of the directions and the format of the answer sheet. It was not deemed necessary to pilot-test the reading passage because the same passage had been successfully used in another study (Allen et al., 1988). At the first testing site, students were directed to read each sentence in the grammaticality judgment test (TOTA) only twice, decide whether the sentence was correct or not, and then mark their answer. Once the choice was marked, subjects were told not to go back to change items.

As subjects were completing the first section of the test, some students skipped items to return to complete them later despite directions to the contrary. This breach of testing protocol shifted the nature of the response from an intuitive one, to one based on analysis and reflection.

In order to control this practice as well as the amount of time devoted to each response, it was decided to record the first section of the test on tape before proceeding to the second testing site. Students would then hear each sentence read once, followed by a ten-second pause, during which they would only have time to reread the sentence, decide whether it contained an error, and mark their response. The decision to record all testing directions for the two testing days was a result of the
experience gained in the pilot study. (See Appendices B, C, & D for testing directions.)

Test reliability was established through the same split-half adaptation devised by Bialystok and Frohlich (1978a). Items in the tests are not assumed to be of equal difficulty. Adjective errors are, for example, easier to detect than errors in the pronoun or verb. Each split-half was, therefore, comprised of the first three occurrences of each of the form class/rule categories and correct items. The last three occurrences comprised the other half. Using the Guttman formula, reliability coefficients of .61, .41, and .70 were obtained for TOTA, TOTB, and TOTC respectively.

Data Collection

Data were collected on two consecutive days, approximately three weeks prior to the end of the school year. A meeting was held with all of the French teachers prior to testing as well as on the morning of testing in order to explain the testing procedures.

All directions to students were recorded on tape and the investigator personally administered tests in the first class section of each of the teachers' schedules. After observing the first section of testing administered to their own classes, teachers expressed confidence in continuing on their own during periods when the researcher
was occupied with other sections. Students were told that their performances on the two days of testing would not affect their grades in any way and that the researcher, not their teacher, would be scoring the tests.

During the first day of testing, students took Parts A, B, and C of the grammar test. All three parts of the test were administered within a period of approximately 23 minutes. On the following day, the reading comprehension test was administered. This second day of testing permitted students to proceed at their own pace and to spend as much time as necessary reading the article before turning it over to the examiner and beginning the writing of the protocol. First-year students spent the least amount of time reading and writing, whereas, a few third- and fourth-year students used practically the entire two modules or 46 minutes of class time. Most students, however, completed the task within half an hour.

**Instrument Reliability and Scoring**

Data from each of the two-page student test forms were manually transferred to a general purpose NCS answer sheet for computer scoring. Item 24 was eliminated from the data analysis in TOTA, TOTB, and TOTC due to an undetected mistake in a verb on the test forms that would have complicated subjects' identification of the targeted error. Scoring was thus based on 23 items for each test instead of
24. The elimination of the last item from TOTA, TOTB, and TOTC in this study necessitated the elimination of an equivalent form class/rule item in order to balance the items in each half for the reliability formula. Reliability was consequently based on 22 items for each test instead of 24. Using the Guttman formula, reliability coefficients of .46, .57, and .84 were obtained for TOTA, TOTB, and TOTC respectively.

Items in TOTA, TOTB, and TOTC were intended to provide a means of sampling a larger body of analyzed knowledge. In a production level test in a nonexperimental situation, where there is one opportunity to assess the level of a variable that covers a broad area such as analyzed knowledge of grammar with a small number of items, it is difficult to obtain a high correlation coefficient. The larger the area to be sampled, the more difficult it is to obtain a high correlation coefficient. The interest of this study was to obtain a general index of the degree of analyzed knowledge, rather than to isolate the degree of analysis of specific grammatical items.

An additional factor affecting reliability was test length. Only 22 items were entered into the reliability formula and therefore reliability coefficients were lower than would be expected in situations where, for example, 100 items might be entered. Taking into consideration the factors influencing the reliability coefficients in this
study, lower coefficients were deemed acceptable. Ary Jacobs, and Razavieh (1985) state that "for making a decision about a group or even for research purposes, a lower reliability coefficient (in the range of .30 to .50) might be acceptable" (p. 237).

Comprehension (COMP), the dependent variable, was scored through points assigned for recall of idea units. The units were expressed as content items appearing on a free-recall protocol of the newspaper account of the airplane crash (Appendix F). Points were also awarded for accurate assignment of case relationships to these content units.

The scoring template, following Meyer (1975a, 1975b, 1985), was derived from an initial tree structure diagram of the passage and then retyped on graph paper into a sequential representation of content units. The case relationships for each content item in the tree structure appear in lowercase letters above each lexical item in uppercase letters (Appendix F). Because there were only 14 usable protocols for fourth-year students due to absenteeism on one or the other testing day, and a decision to eliminate data from one French Canadian student, a random sample of 14 protocols from each of the other three years was used for the qualitative analysis. The number of usable protocols from which the random sample was drawn was: YR 1, $n = 95$; YR 2, $n = 87$; YR 3, $n = 64$. Each of
these free-recall protocols was then scored for the number of valid idea units and role relationships accurately represented. The sum of the idea units and role relationships constituted the comprehension score. An analysis of covariance was computed using the Generalized Linear Model procedure (PROC GLM) of the Statistical Analysis System (SAS) at The Ohio State University.

A qualitative analysis of the recall protocols was also undertaken in order to determine the extent to which lack of familiarity with grammar rules might prove detrimental to comprehension at each year of instruction. The qualitative analysis also provided additional insight into potential differences between readers at different levels of instruction who achieved similar comprehension scores on the recall measure. Miscomprehensions of a sample of readers were noted and traced to lack of knowledge of grammar, vocabulary or an extratext-based source such as faulty schema instantiation.

Data Analysis

Regression equations were constructed to determine the relationship between the dependent variable, comprehension, and the degree of analyzed knowledge as represented by scores for each of the three independent variables, Part A, Part B, and Part C, obtained through the three tests measuring degree of analyzed knowledge. In order to
accommodate the mixture of quantitative (degree of analyzed knowledge) and qualitative (year of instruction) variables, analysis of covariance was used to fit regressions in the context of multiple classifications. Data were subjected to post-hoc procedures to test for significant differences.

Summary of Null Hypotheses

The following null hypotheses were tested at each year of instruction.

\( H_0^1 \): There will be no relationship between unanalyzed knowledge of grammar, as measured by the ability to make linguistic judgments, and reading comprehension as measured by a recall protocol score.

\( H_0^2 \): There will be no relationship between an intermediate stage of analyzed knowledge of grammar, as measured by the ability to identify the form class containing an error, and reading comprehension as measured by a recall protocol score.

\( H_0^3 \): There will be no relationship between analyzed knowledge of grammar as measured by the ability to identify the rule violated, and reading comprehension as measured by a recall protocol score.
$H_0 4$: There will be no significant differences among mean comprehension scores across levels of instruction.
CHAPTER IV

RESULTS AND DISCUSSION

Introduction

Ample research evidence in L1 reading supports the notion that specific knowledge of letter-sound correspondence rules is necessary for success in the initial stages of reading. Additional evidence suggests that analyzed knowledge of grammar may be the most important aspect of reading comprehension based on simple texts where no specific demand is placed on fluency, control, or integration of a variety of information (Bialystok, 1988). In one L2 study, however, Seliger (1979) found no relationship between the ability to state a rule (analyzed knowledge) and performance. In an investigation of grammaticality judgments (Bialystok, 1979a), subjects were found to make judgments on an intuitive basis, independently of explicit knowledge of the structures involved. Accuracy of performance was not found to be a function of explicit knowledge.

The purpose of the present study was to explore the relationship between explicit knowledge of grammar rules and performance in a reading comprehension task in L2.
More specifically, this study investigated the relationship between the unanalyzed/analyzed dimension of knowledge of grammar, year of instruction, and reading comprehension in a population of secondary school students of French. The unanalyzed/analyzed dimension of grammatical knowledge involved three measures, each representing an independent variable. The three scores resulted from examination of 23 sentences in three successive stages involving: (1) a grammaticality judgment task (TOTA); (2) identification of the form class containing the error (TOTB); (3) and identification of the rule violated from one of three options for each form class (TOTC). The three tests (TOTA, TOTB, & TOTC) used to tap analyzed knowledge at three specific stages, are considered to share an underlying common dimension referred to as degree of analyzed knowledge. Year (YR) of instruction in French 1 through 4, was treated as a categorical independent variable rather than as a continuous variable because of the previously demonstrated nonhierarchial progression of reading comprehension scores across years of instruction (Allen & Bernhardt, 1987; Bernhardt & Berkemeyer, 1988; Lee & Musumeci, 1988).

**Results**

Comprehension

In comparing comprehension scores across the four years of instruction (Table 1 & Figure 2), YR 4 achieved
the highest mean of 71.64, whereas the YR 1 mean of 25.93 was the lowest. The second highest mean of 52.01 was attained by YR 2, with YR 3 scoring 48.03. No statistical difference was found between the means for YR 2 and YR 3 ($p < .05$). YR 4 and YR 1 were different from each other as well as from all other years.

It is of interest to note that the departure of YR 2 and YR 3 from the anticipated hierarchical ordering of scores according to year of instruction is not unique to this study. Allen and Bernhardt (1987), and Lee and Musumeci (1988) also report similar reversals of a hierarchy of scores according to level of instruction. Similarly, Bernhardt and Berkemeyer (1988), reporting on the German students in the larger Allen et al., study (1988), find no significant differences on Tukey's Studentized Range (HSD) Test among German readers for the following groupings: (YRs 1 & 2), (YRs 3 & 5), and (YR 4).
<table>
<thead>
<tr>
<th></th>
<th>YR 1</th>
<th>YR 2</th>
<th>YR 3</th>
<th>YR 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>(260)</td>
<td>(95)</td>
<td>(87)</td>
<td>(64)</td>
</tr>
<tr>
<td>COMP  Mean</td>
<td>25.93</td>
<td>52.01</td>
<td>48.03</td>
<td>71.64</td>
</tr>
<tr>
<td>S.D.</td>
<td>9.69</td>
<td>15.47</td>
<td>17.30</td>
<td>15.37</td>
</tr>
</tbody>
</table>
Figure 2. Mean Comprehension Score by Year

Year 1: 25.93
Year 2: 52.01
Year 3: 48.03
Year 4: 71.64
In considering the progression of analyzed knowledge from the least explicit degree to the most explicit level across years, the pattern that emerges for both YR 1 and YR 3 is a decrease in score from TOTA to TOTB to TOTC (Table 2). For YR 1 there is almost a four point drop from TOTA to TOTC. The YR 3 pattern, however, is more stable, evidencing less than one unit of variation across degrees of analyzed knowledge. Only YR 4 manifests an increase of approximately one point from TOTA to TOTB to TOTC. YR 2 reverses direction, that is, it decreases by approximately one point from TOTA to TOTB and then increases, but only by .70 from TOTB to TOTC. Of the four years, the pattern for YR 1 is the least stable, evidencing the greatest variation in score among degrees of analyzed knowledge of grammar (Figure 3).

In a quantitative comparison of scores by year on the three tests of degree of analyzed knowledge of grammar, the means of YRs 2 and 3 are very close with YR 3 scoring slightly higher than YR 2. YR 3 achieved less than a one point advantage over YR 2 for each of the three degrees of analyzed knowledge of grammar.
Table 2

Descriptive Statistics for Degree of Analyzed Knowledge

<table>
<thead>
<tr>
<th></th>
<th>YR 1</th>
<th>YR 2</th>
<th>YR 3</th>
<th>YR 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>(260)</td>
<td>(95)</td>
<td>(87)</td>
<td>(64)</td>
</tr>
<tr>
<td>TOTA  Mean</td>
<td>10.63</td>
<td>12.18</td>
<td>12.97</td>
<td>17.14</td>
</tr>
<tr>
<td>S.D.</td>
<td>2.30</td>
<td>2.58</td>
<td>2.44</td>
<td>2.35</td>
</tr>
<tr>
<td>TOTB  Mean</td>
<td>7.14</td>
<td>11.17</td>
<td>12.14</td>
<td>18.21</td>
</tr>
<tr>
<td>S.D.</td>
<td>2.04</td>
<td>3.26</td>
<td>3.45</td>
<td>2.64</td>
</tr>
<tr>
<td>TOTC  Mean</td>
<td>6.57</td>
<td>11.87</td>
<td>12.06</td>
<td>19.00</td>
</tr>
<tr>
<td>S.D.</td>
<td>2.19</td>
<td>3.81</td>
<td>3.58</td>
<td>3.09</td>
</tr>
</tbody>
</table>

Setting aside the comparison between YR 3 and YR 2, the increase in mean score from YR 1 to YR 2 on the lowest degree of analyzed knowledge, TOTA, is less than two points. The increase from YR 3 to YR 4, however, is a little over four points. For TOTB the increase from YR 1 to YR 2 is approximately four points. The increase from YR 3 to YR 4, however, is approximately six points.

The TOTB scores for both YR 1 and YR 2 represent a decrease in relation to the TOTA scores of these same students. The decrease at YR 1 of approximately 3.5 points is greater than the decrease of approximately one point for YR 2. At YR 3, performance from TOTA to TOTB likewise
decreases but by less than one point. In contrast, at YR 4 there is an increase of slightly more than 1 point from TOTA to TOTB. Overall, the mean scores on TOTA, TOTB and TOTC for YR 4 students are approximately five to seven points higher than scores for YR 3, whereas the increase in the interval between YRs 2 and 3 is less than one point. The distance between YR 1 and YR 2 for the three degrees of analyzed knowledge ranges from less than two points for TOTA to slightly more than five points for TOTC. The interval between these scores, however, reflects a decrease in YR 1 means TOTA to TOTB to TOTC. The three means for YR 2, however, remain within a one point range of each other, evidencing a slight decrease from TOTA to TOTB, followed by a partial gain from TOTB to TOTC.
Figure 3. Mean Scores for TOTA, TOTB, and TOTC.
Due to a lack of homogeneity of variance among years of instruction on the COMP score, a natural log transformation was computed for the COMP variable as a variance stabilizing technique. Because all phases of analysis, with or without the transformed scores, yielded a similar pattern of results, only the nontransformed scores were retained for data analysis, reporting, and interpretation.

As a first step to determine which variable, TOTA, TOTB, TOTC, or YR, might be the best single predictor of the COMP score, four separate analyses were run with COMP as the dependent variable. The analysis with YR as a categorical variable was an analysis of variance (ANOVA), whereas, analyses computed with the other variables were simple linear regressions.

The results of these four separate analyses reveal that YR ($R^2 = .482175, p < .0001$) and TOTC ($R^2 = .466655, p < .0001$) are similar in the amount of variance accounted for on the dependent variable COMP when each are considered in isolation (Table 3). TOTA accounts for the least amount of variance explained ($R^2 = .133231, p < .0001$), with TOTB being the next largest predictor ($R^2 = .398473, p < .0001$). After considering the contribution of each of these variables in isolation, TOTC, the variable accounting for the most variance explained, was then combined with each of the remaining independent variables in an attempt to
determine which combination of variables would account for
the greatest amount of variance in COMP scores (Table 4).

TOTC in combination with YR in the ANOVA model,
accounted for the most variance explained \((R^2 = .559708)\).
The regression equations computed for the remaining
combinations of variables yielded similar results: \(R^2 =
.467692\) for TOTC and TOTA; \(R^2 = .471539\) for TOTC and TOTB.
All three combinations reached significance.
<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
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<th>F</th>
<th>PR &gt; F</th>
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</thead>
<tbody>
<tr>
<td>Year</td>
<td>3</td>
<td>200.58</td>
<td>79.46</td>
<td>.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(R² = .402175)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTA</td>
<td>1</td>
<td>333.14</td>
<td>39.66</td>
<td>.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(R² = .133231)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTB</td>
<td>1</td>
<td>231.20</td>
<td>170.91</td>
<td>.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(R² = .398473)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTC</td>
<td>1</td>
<td>204.99</td>
<td>225.74</td>
<td>.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(R² = .466655)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4

Three Separate Analyses Considering the Independent Variables in Various Combinations with Comprehension

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>PR &gt; F</th>
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</thead>
<tbody>
<tr>
<td>TOTC</td>
<td>1</td>
<td>13875.46</td>
<td>44.90</td>
<td>.0001</td>
</tr>
<tr>
<td>YR</td>
<td>3</td>
<td>17.96</td>
<td>.0001</td>
<td></td>
</tr>
<tr>
<td>(R² = .559708)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| TOTC   | 1  | 23188.65 | 161.48 | .0001  |
| TOTA   | 1  | .50     | .4799  |        |
| (R² = .467692) |

| TOTC   | 1  | 23379.41 | 35.53  | .0001  |
| TOTB   | 1  | 2.38    | .1245  |        |
| (R² = .4715339) |
Table 5

Analyses of Covariance Combining TOTC and YR
Separately with either TOTA or TOTB

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>PR &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTC</td>
<td>1</td>
<td>11163.41</td>
<td>45.73</td>
<td>.0001</td>
</tr>
<tr>
<td>YR</td>
<td>3</td>
<td>18.44</td>
<td>.0001</td>
<td></td>
</tr>
<tr>
<td>TOTA</td>
<td>1</td>
<td>1.85</td>
<td>.1753</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(R^2 = .562887)</td>
<td>F for model: 61.64</td>
<td>.0001</td>
</tr>
<tr>
<td>TOTC</td>
<td>1</td>
<td>11123.33</td>
<td>14.33</td>
<td>.0001</td>
</tr>
<tr>
<td>YR</td>
<td>3</td>
<td>17.22</td>
<td>.0001</td>
<td></td>
</tr>
<tr>
<td>TOTB</td>
<td>1</td>
<td>.67</td>
<td>.4141</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(R^2 = .560865)</td>
<td>F for model: 64.88</td>
<td>.0001</td>
</tr>
</tbody>
</table>
Because the combination of TOTC and YR explained the greatest amount of variance ($R^2 = .559708$), these two variables were then incorporated in two additional models with either TOTA or TOTB. These additional models were an attempt to determine which of the remaining two variables might offer the greater increase in variance explained (Table 5). Both models yielded similar $R^2$ results. The combination of TOTC and YR with TOTA accounted for .562887 of the variance and the competing model with TOTB accounted for .560865.

Lastly, in order to determine the additional variance explained with all variables included in the model simultaneously, a final analysis of covariance (ANCOVA) was conducted (Table 6). The variance explained for this most comprehensive model ($R^2 = .565395$), was only slightly greater than that for the previous models with either TOTA or TOTB.

What became apparent from the sequence of analyses is that TOTC and YR alone account for .559708 of the variability (Table 4). The added explanatory power of the more complete model with TOTA, TOTB and TOTC included, yielding an $R^2$ of .565395 is, therefore, negligible (Table 6). An additional model, testing for the possible interaction of TOTA, TOTB, and TOTC with YR, yielded an $R^2$ of .579499 and revealed no interactions even close to significance.
It is clear from these results that the variables TOTC and YR are more highly correlated with COMP, and account for the greatest proportion of variance explained. The scores on TOTA and TOTB effect only a negligible increase in variability as evidenced by the minimal increase in the coefficient of determination ($R^2$) attained in the most complete model where TOTA and TOTB are included. The contributions of these two variables cannot, however, be discounted due to the high correlations among TOTA, TOTB and TOTC (Table 7). In sum, in the final ANCOVA model (Table 6), both YR and TOTC accounted for a significant ($p < .0001$) amount of variance in the comprehension score, whereas, TOTA and TOTB, although not statistically significant, cannot be judged to be without practical significance.
Table 6  
Analysis of Covariance for the Comprehension Measure

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>PR &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>YR</td>
<td>3</td>
<td>9344.30</td>
<td>17.60</td>
<td>.0001</td>
</tr>
<tr>
<td>TOTA</td>
<td>1</td>
<td>&quot;</td>
<td>2.64</td>
<td>.1056</td>
</tr>
<tr>
<td>TOTB</td>
<td>1</td>
<td>&quot;</td>
<td>1.46</td>
<td>.2280</td>
</tr>
<tr>
<td>TOTC</td>
<td>1</td>
<td>&quot;</td>
<td>15.07</td>
<td>.0001</td>
</tr>
</tbody>
</table>

F for model 54.86  .0001

\( R^2 = .565395 \)

Table 7  
Correlations Among TOTA, TOTB, and TOTC

<table>
<thead>
<tr>
<th></th>
<th>TOTA</th>
<th>TOTB</th>
<th>TOTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTA</td>
<td>1.000</td>
<td>.622*</td>
<td>.573*</td>
</tr>
<tr>
<td>TOTB</td>
<td>.622*</td>
<td>1.000</td>
<td>.874*</td>
</tr>
<tr>
<td>TOTC</td>
<td>.573*</td>
<td>.874*</td>
<td>1.000</td>
</tr>
</tbody>
</table>

* \( p < .0001 \)
The Effect of Year of Instruction

Because there were no interactions found for the three degrees of analyzed knowledge, homogeneity of regression was assumed. Although the contribution of each year of instruction toward the comprehension score was not directly available through analysis of covariance, this information was obtained by fitting the data to a regression line in order to predict the mean comprehension score for each year based on performance in TOTA, TOTB, and TOTC.

The mean comprehension score for YR 4 was 43.61. Approximate decreases for the remaining years are: YR 1, -24; YR 2, -8; YR 3, -12. Following are the anticipated scores calculated according to this prediction formula:

<table>
<thead>
<tr>
<th>YR</th>
<th>Estimated Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>43.61</td>
</tr>
<tr>
<td>3</td>
<td>31.18</td>
</tr>
<tr>
<td>2</td>
<td>35.49</td>
</tr>
<tr>
<td>1</td>
<td>18.61</td>
</tr>
</tbody>
</table>

An estimate of the effect of the relationship between the three degrees of analyzed knowledge of grammar and the COMP score, can likewise be obtained by determining the mathematical relationship among these scores. For each point scored on TOTA, the COMP score is predicted to decrease by .60. For each point on TOTB, the COMP score is predicted to increase by .54. However, for each point on TOTC, the COMP score would be predicted to increase by 1.5. It is, therefore, performance on TOTC or the most explicit
knowledge of the rule violated that predicted the highest increase on the COMP score.

In summary, only TOTC and YR of instruction reached statistical significance \((p < .0001)\) in the most complete model. The degree of correlation between TOTA, TOTB, and TOTC, would partially clarify why TOTC, accounting for the highest amount of variance explained in the separate analyses with COMP, reached significance, whereas, TOTA and TOTB did not.

Post-hoc Testing

In order to determine which years of instruction differed significantly from each other, a series of post-hoc t-tests was performed on the adjusted means for comprehension. The results (Table 8) show that YR 1 differs from all other years, whereas YRs 2, 3, and 4 are not significantly different from each other. The probabilities of larger absolute values of \(t\) under the null hypothesis that one mean is equal to the other, are shown in Table 8.
Table 8

Observed Means, Adjusted Means, and Significant Differences for Comprehension

<table>
<thead>
<tr>
<th>Year</th>
<th>Observed Mean</th>
<th>Grouping *</th>
<th>Adjusted</th>
<th>Grouping *</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25.93</td>
<td>A</td>
<td>32.47</td>
<td>A</td>
</tr>
<tr>
<td>2</td>
<td>52.01</td>
<td>B</td>
<td>49.35</td>
<td>B</td>
</tr>
<tr>
<td>3</td>
<td>48.03</td>
<td>B</td>
<td>45.04</td>
<td>B</td>
</tr>
<tr>
<td>4</td>
<td>71.64</td>
<td>C</td>
<td>57.47</td>
<td>B</td>
</tr>
</tbody>
</table>

* Means with the same letter are not significantly different (p < 0.05).

Table 9

Probabilities of a Larger Absolute Value of T for Each Combination of Means

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.</td>
<td>.0001</td>
<td>.0001</td>
<td>.0126</td>
</tr>
<tr>
<td>2</td>
<td>.0001</td>
<td>.</td>
<td>.2000</td>
<td>.2529</td>
</tr>
<tr>
<td>3</td>
<td>.0001</td>
<td>.2000</td>
<td>.</td>
<td>.1643</td>
</tr>
<tr>
<td>4</td>
<td>.0126</td>
<td>.2529</td>
<td>.1643</td>
<td>.</td>
</tr>
</tbody>
</table>
A similar pattern of nonindependence of years was found in data reported by Allen and Bernhardt (1987). When high school students across five years of instruction in French, Spanish, and German were tested, the five years were found to form three groups: (1 & 2), (3 & 4), and (5). Among German learners in the study, three groupings emerged, but with a slightly different pattern: (1 & 2), (3), and (5 & 4) (Bernhardt & Berkemeyer, 1988). Thus, the grouping pattern of levels of instruction appears to be rather unstable for comprehension level among high school learners.

Results of the Statistical Hypotheses

Following are the specific results for each null hypothesis tested in this study:

\( H_0^1: \) There will be no relationship between unanalyzed knowledge of grammar, as measured by the ability to make linguistic judgments, and reading comprehension as measured by a recall protocol score. In comparing the four separate analyses of YR, TOTA, TOTB and TOTC with the comprehension measure (Table 3), TOTA captured the least amount of variance explained \( (R^2 = .133231) \); however, the level of significance attained was .0001. The null hypothesis is, therefore, rejected.

\( H_0^2: \) There will be no relationship between an intermediate stage of analyzed knowledge of grammar, as
measured by the ability to identify the form class containing an error, and reading comprehension as measured by a recall protocol score. In comparing the four separate models constructed to test YR, TOTA, TOTB, and TOTC with the comprehension measure, TOTB attained a level of significance for that model (p < .0001). Therefore, the null hypothesis is rejected.

\( H_0^3: \) There will be no relationship between analyzed knowledge of grammar, as measured by the ability to identify the rule violated, and reading comprehension as measured by a recall protocol score. TOTC and Year were the only variables to reach a level of significance (p > F = .0001) in the analysis of covariance model. In the four separate regression analyses, YR obtained the highest \( R^2 \) (.482175) with TOTC accounting for a slightly smaller amount of variance (\( R^2 = .482175 \)) when considered in isolation. Therefore, the null hypothesis is rejected.

\( H_0^4: \) There will be no significant differences among mean comprehension scores across levels of instruction. When subjected to a one-way analysis of variance with COMP as the dependent variable, YR reached a level of significance (p < .0001, \( R^2 = .482175 \)). Results of a series of post hoc t-tests at the .05 level of significance indicate that YR 1 is significantly different from YRs 2, 3, and 4. YRs 2 and 3, however, are not significantly
different from each other. Therefore, the null hypothesis is rejected.

**Discussion**

When all of the variables (TOTA, TOTB, TOTC, & YR) are taken into consideration simultaneously and statistically controlled, the relationship found between each of them and comprehension in the ANOVA and simple linear regression models in Table 3 is attenuated. Under the statistical control of the more complete ANCOVA model (Table 6), where each variable is tested for its effect on COMP over and above the effects of all of the remaining variables, only YR and TOTC (rule identification) achieve statistical significance ($p < .0001$). It is impossible, however, to discount the practical significance of TOTA and TOTB because of the significant correlations ($p < .0001$) among TOTA, TOTB, and TOTC (Table 6). They, in effect, depend on each other.

Another approach to conceptualizing the import of TOTA (grammaticality judgment), TOTB (identification of the form class of errors), and TOTC (rule identification) scores lies in considering the mathematical relationship between the COMP scores and the scores on these variables. When all other variables are held constant, for a given unit increase on TOTC, students would be expected, on the average, to increase about 1.5 points on the COMP score. For TOTB, the increase in COMP would only be .54, whereas.
for TOTA, the COMP score would be predicted to decrease by .60. Therefore, the significance level attained by TOTA and TOTB, when isolated in simple linear regression equations with COMP (Table 3), is somewhat misleading. When all variables are considered in consort, the effect of both TOTA and TOTB diminishes. In the ANCOVA analysis (Table 6), neither TOTA nor TOTB reach the .05 level of significance. TOTA only approaches marginal significance ($p > F = .1056$), while TOTB is not within any acceptable range of significance ($p > F = .2280$).

In addressing differences in COMP across years of instruction, the adjusted means yield a slightly different picture from the observed means. The grouping pattern for significant differences ($p < .05$) among the observed means is: YR 1, YRs 2 and 3, and YR 4. When the means are adjusted for scores on TOTA, TOTB, and TOTC in order to focus on the contribution of YR, the grouping pattern changes. The associations now become: YR 1, and YRs 2, 3 and 4). The differences among years are attenuated when the means on TOTA, TOTB, and TOTC are adjusted relative to YR.

**Qualitative Analysis**

A qualitative analysis was undertaken in order to complement the quantitative findings and to provide a richer perspective on the grammar-related comprehension
processes of readers. Qualitative differences in comprehension traceable to the presence or absence of grammatical knowledge were addressed. A comparison was also made of protocols of students at different levels of instruction who received similar quantitative comprehension scores in order to identify qualitative differences across levels.

What became apparent in reviewing potential texts for the study was that natural texts can and do occur without instances of one or more of these rules. The newspaper article, for example, did not contain even one example of either a direct or an indirect object pronoun. The placement of object pronouns and their grammatical gender, however, have traditionally been accorded significant amounts of instructional time.

The airplane collision article was considered to be representative of the level of grammatical complexity that native French speakers would encounter in the daily popular press. Following is an English translation of the airplane collision article.

Airplane Collision Over New York

Two small planes, a Piper Cherokee single-engine and a Mystery Falcon tri-jet crashed Sunday evening over the suburbs of New York and fell on apartment buildings in Cliffside Park and in Fairview (New Jersey) to which they set fire. Five people, the two
pilots and the three passengers of the Falcon, died in this catastrophe. Authorities feared the toll would be higher because the planes fell like fire bombs into a heavily populated area situated across from Manhattan, on the other side of the Hudson River. The spectacular collision—the planes immediately burst into flames—made witnesses who had not seen the accident believe that it was a nuclear explosion, or even a "third world war."

It took four hours for firemen to extinguish the fires in the five small apartment buildings touched by the flaming Falcon at Cliffside Park. In that respect, the catastrophe could have been more serious because there were only eight wounded out of the 90 inhabitants of these buildings.

The two planes were flying at low altitude very close to each other and their pilots did not seem to react to the warnings from the control tower of the neighboring airport. It was an absurd accident which would not implicate the air traffic controllers who did their job, according to the Federal Civil Aeronautics Administration.

Following are the analyses of miscomprehension attributable to grammatical difficulties for each year of instruction. Comparisons were made across years to the
extent that this was possible. Miscomprehensions stemming from other sources are also addressed.

**Year 4**

Grammatical feature recognition did not, in general, prove to be a stumbling block to comprehension for the 14 YR 4 students. The last paragraph of the plane crash account, however, was problematic. It contained a negation from which the customary second element, "pas" had been omitted. The verb "savoir" (to know), when used in the conditional, can take on an attenuated sense of the verb "pouvoir" (can, to be able) in which case it is used in the negative without "pas" or "point" (Thomas, 1956). Exposure to this particular point of grammar might constitute an embellishment for a fourth-year course, but it would not be part of the grammatical core that students automatically encounter.

This sentence also evoked issues frequently addressed by journalists: oversights and errors in the control tower and pilot error. Three of the 14 protocols erroneously placed the blame on the controllers, with an additional subject questioning whether it might well be the fault of the controllers. While four protocols correctly exonerated the controllers, four made no mention of the controllers, and two identified some form of pilot error as the cause of the crash. Clearly, this portion of the sentence, "qui ne saurait remettre en cause les contrôleurs aériens qui ont
fait leur travail" (which would not implicate the air traffic controllers who did their work), provoked much ambiguity and was grammatically beyond the reach of most students.

It appears that the mere mention of air traffic controllers was sufficient to prompt students unfamiliar with this low-frequency negative structure, to attribute fault to them based on prior knowledge of instances where they were to blame. In so doing, students select an inappropriate schema by default through inability to extract information from the grammatical features of the text.

There were no instances of miscomprehension due to phonemic/graphemic features. One potential problem was simply avoided in 13 of the 14 protocols. The problematic verb phrase, "se sont immédiatement embrasés" (immediately burst into flame), was signaled by one of the subjects who translated the adverb, but stated that she didn't understand the verb associated with it. None of the other protocols made reference to the verb "embraser" which means "to burst into flames." However, when the verb is spelled with a double "s", it means "to embrace." The collision of the two planes could logically be conceptualized as an embrace. It is, therefore, likely that the semantic content of the erroneously translated verb was simply transformed into the notion of collision by the majority of
subjects. With this transformation, they lost the information that the planes immediately burst into flame upon impact.

A misconception that can be attributed to lack of familiarity with vocabulary, involved the word "bilan" which translates as "toll." This word refers to the number of casualties specified at the beginning of a lengthy compound sentence joined by a semicolon. The beginning of the second part of the sentence reads: "les autorités craignaient un bilan plus lourd car les appareils sont tombés comme des bombes incendiaires" (authorities feared a much heavier toll because the planes fell like fire bombs).

In one instance, the adjective, "lourd" (heavy) in association with the verb "to fall" in the same sentence, caused subject #7 to assume that "something heavy fell on the plane". For subject #3, "bilan" was translated as "load." The protocol reads: "the planes fell very fast, the authorities believe, because of too heavy loads."

Several subjects also misconstrued the location of the accident because they apparently misread "au-dessus" (above) as "au-dessous" (below). Consequently, subjects #4 and #8 reported that the planes fell "at the bottom of New York" and "in the lower regions of New York" respectively.

One subject's comprehension was disrupted by engaging the wrong semantic content for a polysemantic word. When the feminine determiner is used, "tour" is translated as
"tower;" however, if the masculine determinant is used, the French and English words are cognates. Thus, subject #5 stated that "the two pilots were apparently giving a guided tour of the city to the passengers and were flying at a low altitude."

Two subjects were unfamiliar with the verbal expression "tenir compte de" (to take into account). Subject #9 reported that "the pilots couldn't hold count or something." The article states that: "the pilots didn't seem to take into account the warnings of the control tower of the neighboring airport." Subject #6 simply acknowledges that she does not know this verbal expression as she attempts to situate the verb within the context of the original sentence.

In summary, the miscomprehension of subjects at YR 4 occurs as a result of unfamiliarity with nuances of vocabulary, particularly verbal expressions. High frequency grammar rules, particularly those explicitly elicited in the test of analyzed knowledge of grammar do not appear to be sources of miscomprehension. The background knowledge of students at this level can be activated to override the necessity for attention to syntactic features. This can be both a help and a hindrance. The latter is the case in situations where grammatical features lead the text in a direction that is incongruous with the background information a subject
possesses, as, for example, in the erroneous attribution of blame to the air traffic controllers. Fourth-year students are often prone to make the logical inferences required of any good reader a part of their recall. In so doing, they stray from the scoring template and consequently fail to accumulate points for such inferences under the scoring system. The general tendency of fourth-year students is to respect and attempt to replicate the journalistic genre and the sequence of content of the original text rather than focus on retelling fragments of information recalled.

**Year 3**

Among the 14 YR 3 protocols analyzed out of a total of 64, there was obvious confusion resulting from the inability of most students to comprehend the final sentence in which the air traffic controllers are exonerated from blame. Seven protocols either explicitly or implicitly attribute blame to the controllers. Three correctly state that the controllers were not to blame, while three protocols make no mention of the issue.

There are numerous instances of miscomprehension based on faulty word recognition that might have been avoided were there a greater grammatical sensitivity on the part of readers. One French sentence, "l'on compte huit blessés sur les 90 personnes habitant ces maisons" (eight injured were counted among the 90 inhabitants of these buildings) was recalled as "the 90 citizens of the closest town
counted their blessings (#10)." In this instance, "blessés" (injured) appears to have been falsely associated with English "blessings," based solely on the similarity of the initial letters. The reader glosses over "huit" (eight), a modifier of "blessés," that might prompt a more grammatically sensitive reader to account for these two words in relation to each other. This reader may also have been strongly influenced by a desire to fill in slots in a run-away schema.

What may appear on the surface to be a problem of word recognition may also be a lack of familiarity with related word forms, that is, the nominal, adjectival, and verbal forms of French words. Instead of "eight injured [people]" one reader comprehends that there is "something about eight cuts" (#56). This time "blessés" was translated as "cuts," no doubt due to the similarity of the French word for cut or wound, "blessure". In this instance, recognition of the past participle and knowledge of its ability to function as a noun might have forewarned a grammatically more sophisticated reader of a potential misreading.

One student, apparently driven by the need to instantiate available slots in a growing pollution schema, translated the French "population," identical in both form and meaning to the English word population, as "pollution". The resulting sentence became: "After studying the accident it was discovered that the explosion was elevated
because it occurred in a highly polluted area" (#44). The tension between attending to lexical items and attending to schema instantiation is apparent.

Narrow semantic interpretation caused difficulties for another reader (#5) who was familiar with "appareil" as "camera" but did not realize that the word referred to the airplanes in this account. The concept of "camera" was then reconciled with other information in the text, resulting in: "Pictures taken look like a nuclear bomb explosion."

In general, readers comprehend the "who-what-where-when" information at the beginning of the article. They no doubt rely on their familiarity with the news feature genre of reporting, as well as with the content of articles dealing with plane crashes. Subjects usually recall accurately the essential information regarding the crash: the location, the planes involved and the number of victims. There are no significant comprehension problems at this level that can be directly attributed to lack of specific grammar rules. There is, however, a general lack of grammatical sensitivity. Students ignore grammatical cues in favor of a more compelling semantic attraction or in order to add to a growing schema they have established.

Most comprehension problems that occur appear to be generated by run-away schemata. Students exposed to the news media are aware of reports of near-misses attributed
to overworked air traffic controllers. Consequently, for a
number of readers, reference to the controllers in the
article seems to set in motion a chain of assumptions.
Some elements of information appearing in the text are then
merged into an elaboration evoked by prior knowledge.

Protocol #52 is a clear example of the influence of
such prior knowledge. "The two planes were flying at about
the same altitude and were relying on the air traffic
controllers at the New York airport. Because of this
accident it seems that the controllers will be under
investigation by the Federal Air Investigators." Another
protocol (#8) is quite similar. "The authorities claim
that it was the air tower aviators [sic] fault. They were
not paying attention to the planes and the [sic] were not
doing their work. It is going to be under investigation."

Selected textual features, misguided inferences, and
overreliance on background knowledge often combine to
create plausible but erroneous recalls. An example from
protocol #15 is: "The airport administer [sic] feels as
though it was the control towers [sic] fault for not paying
attention to the flight patterns. He said that this will
never happen again."

In summary, YR 3 protocols are less accurate and
generally do not include details from as many levels of the
scoring template as do the YR 4 protocols. The protocols
are also somewhat shorter than those of the fourth-year
students, and there are significant miscomprehensions due to faulty word recognition, overextended inferences, and the generation of extraneous schemata. Grammatical and syntactic cues are too often ignored as carriers of semantic content in favor of more salient lexical items.

Year 2

YR 2 students comprehend the major events, that is, a collision involving two planes, the number of fatalities, and varying amounts of detail concerning incidents linked to the accident. They usually succeed in identifying the topics of sentences, but the comments are often subject to a number of embellishments and seeming fabrications. Usually, the information intruded into the account forms part of a schema anticipated to be found in journalistic reports of disasters.

The role of the FAA is a case in point. Students often state that the FAA is investigating the collision. While this is a legitimate assumption, it is only an inference. The text surrounding the reference to the FAA indicates only that the FAA commented on the absurd nature of the accident and indicated that the controllers had done their job.

Another example of logical attempts to reconstruct text according to a typical schema is the statement from protocol #32 that "the authorities were trying to discover the identities of the five who were killed." A further
elaboration from the same protocol is: "the Federal Administration of Civil Air Travel stated that one of the pilots were [sic] disregarding the air traffic controllers . . . . They don't know which of the pilots caused the accident." The information provided in the article is: (a) the pilots seemed not to take the warnings of the control tower into account, (b) five people died, and (c) the FAA was reported as commenting that it was an absurd accident and that the controllers could not be implicated because they were doing their job.

Protocol #18 offers a similar example of an attempt to reconcile the known elements of the text with an anticipated scenario. "It took 4 hours to remove or find the 5 bodies . . . . The 2 planes violated the lowest altitude. Neither of them called in to the nearest airport to report where they were. Both pilots had been experienced flyers."

While the above information provides a cohesive account of a disaster, it nonetheless departs from the facts given in the text. The reference to "four hours" is taken from a sentence stating that it took four hours for the firemen to put out the fires in five small apartment buildings hit by the flaming Falcon at Cliffside Park. The text also states that the two planes were flying at a low altitude very near each other. The additional information concerning the experience of the pilots and their failure
to report their positions to the nearest airport cannot be traced to any text-based features.

In contrast, protocol #9 provides an elaboration that is clearly attributable to the misinterpretation of one word in the text, followed by an attempt to reconcile the entire text in the light of this initial false assumption.

An accident occurred involving a nuclear reactor in New York. Five people were found dead and others were injured. The authorities were particularly worried about the accident and if it would endanger the large population of New York. The federal administration of civic aviation [sic] was being brought in to investigate. Many civilians were taken from their homes in case of an emergency and put into shelters. (§9)

The assumption that the accident involved a nuclear reactor can be referenced to "un tri-réacteur Mystère Falcon-50" in the first sentence, specifying the type of engine on the Falcon plane. Near the end of the first paragraph, there is also a reference to "une explosion nucléaire". The context is that witnesses who had not seen the accident believed it to be a nuclear explosion or a third world war.

"Réacteur" and "nucléaire" are combined into a single concept and then linked with the word "accident" that appears immediately before the reference to a nuclear
explosion. The reader then embellishes the theme according to a standard disaster schema and incorporates other recognizable nouns: "New York," "five people," "FAA," "authorities," and "homes." It should be noted that these schemata can only be developed by foregrounding lexical items while glossing over grammatical cues.

Another example of miscomprehension triggered by a word in isolation from its context is this statement from protocol #38: "one of the planes carried bombs." The reference to bombs is derived from a comparison in the account of the fall of the burning planes to falling fire bombs. In protocol #75, inattention to grammatical features in favor of lexical items results in the recall of three isolated events: a collision of two planes, a bomb found in a densely populated area, and a nuclear explosion.

Inability to deal with the grammatical context surrounding familiar nouns is certainly a factor contributing to miscomprehension. The problem might also be attributed to a reading process that is "too reader-based." Tierney and Pearson (1985) provide a profile of this type of reader.

Unfortunately, readers with tendencies toward being too reader-based do not know that or what they do not know. They presume they know the material better than they actually do or need to. Particularly when the text deals with a familiar topic, readers assume that
they know what is written. As a result, they often fail to recognize subtle but important text signals. They fail to monitor their interactions with a text.

In the context of many classrooms, these students escape identification, for they might be successful readers in most situations and, furthermore, can "bluff their way through" most teachers' questions (p. 872).

Four of the YR 2 protocols can be identified as primarily "reader-based" whereas the remaining ten are predominantly "text-based." Of the latter group, three are strikingly detailed and accurate. From the 14 protocols analyzed, it appears that students at YR 2 are capable of comprehending authentic text when they encounter a familiar topic.

While there are examples of miscomprehension based on lack of word knowledge, such aberrations often remain isolated tangents that do not interfere with an integrated construction of meaning throughout the text. An clear example of this type of interference is the mistranslation in protocol # 59 of "un bilan plus lourd" (a heavier toll" giving rise to "something fell and landed on a place facing Manhattan."

In some instances, students signaled the uncertainty of their recall for a specific text feature with statements such as: "don't know where this fits in" (#39). Other
departures from the text found at YR 2 resemble those appearing in YRs 3 and 4, as, for example, statements assigning blame to either the pilots or the air traffic controllers.

In summary, accurate schema instantiation appears to be of primary importance for comprehension of this text by most second-year students. Faulty schema instantiation causes some students to embellish certain aspects of the text in order to bring them into line with events anticipated to be found in disaster reporting. Miscomprehension becomes serious in instances where schema instantiation is based on one or two isolated words. Most instances of miscomprehension, however, are sentence-bound and do not seriously detract from overall comprehension. In general, YR 2 readers succeed well in constructing meaning from text but they have a decided tendency to overconstruct. In attending to schema instantiation, they appear to gloss over grammatical cues.

Year 1

First-year students fall into two categories. Those who venture beyond identification of the most salient "who-what-when-where-why" elements in the text, and those who do not. Of the 14 protocols analyzed, two readers (#63 & #56) admit that they are confused or unable to remember. Identification of the most salient elements of the text allows reader #56 to get the gist. This protocol of
approximately 40 words, however, reports only skeletal fragments of text about a Sunday evening collision in Manhattan involving eight people. Beyond recalling that there was something about four hours and a big catastrophe, the student states that she can't remember most of it.

The other writer experiencing confusion admits to it in parentheses at the end of the recall (§63). Apparently the first two words of the article, "deux petits" were read as "douze petits" with "petits" functioning as a noun. In this instance the translation provided by the subject: "12 small kids" would be appropriate. In reality, "deux petits" (two small) modifies "avions" (airplanes).

There are three additional short protocols. Of these, two, §52 and §88, capture accurate information from the first paragraph. In contrast, protocol §71 correctly reports the crash of two planes involving two pilots and three occupants but then states that another plane crash occurred at 4:00 p.m. involving 90 people and the "the 3rd plane crash happened, and hit two planes".

Of the nine remaining protocols, three (§5, §54, & §72) only report information from the first two of the three paragraphs. The other five (§15, §30, §36, §43, §61, & §75) include information from the entire text. The writer of protocol §75 openly reveals the fragility of her comprehension. After referring to an airplane that crashed in New York and the two pilots and three passengers who
were killed, she continues: "I'm not sure what this had to do with, but I thought they were talking about nuclear bombs being tested. They said it took 4 hours for everything to get settled." In the final sentence there is confusion as to the role of the FAA. "In the end they told one of the airport groups--or the group was doing something about it." This protocol provides clear evidence of comprehension difficulties related to a lack of grammatical awareness. The reader is admittedly confused about who is doing what to whom. Relationships among lexical items encoded by the grammar and syntax are clearly just beyond the reach of this reader.

The following protocol (#15) exhibits the greatest number of details. While embroidered into a cohesive account that is not totally accurate, it is definitely inspired by the article read.

Piper Cherokee and the Mysterie Falcon-50 had a collision on Sunday evening between Cliffside Park and Fairview in N. Jersey on their way to N.Y. The 5 people and 2 pilots and the three people on the Falcon were killed.

The people watching thought it was a nuclear explosion. 90 houses were demolished because of the crash.

The accident was a stupid one, for it seems that one of the pilots just lost sight of the airport. The
administration of (I forget the name) is going to investigate further in this dreadful accident (#15).

Typical of the longer protocols is #61 with its juxtaposition of accuracy and astute guessing. A reference to the "guards at the control tower" is a case in point. The notion of guards was obviously suggested by the French "mises en garde" (warnings) and was merged with the concept of tower.

Two small airplanes crashed on Sunday evening. One was a Falcon and the other was a metometer [sic]. Two pilots and 3 passengers aboard the Falcon were involved in the accident. Authorities say they thought it was a bomb exploding in the sky. This accident happened in Fairview N.J. at Cliffside Park [sic]. The accident happened where 90 people lived in their houses. It was said to have occurred [sic] because the pilots did not radio the guards at the control tower. They were not notified of the poor weather conditions, visibility was hard. Now authorities from an airplane business are taking care of it (#61).

Surprisingly, only one subject's recall at YR 1 was so disconnected that it barely conveyed any sense of cohesion. 12 small kids were in an accident, one pilot in New Jersey was involved. It was very embarrassing [sic] to all. It caused quite a few spectators to become
scared. Many people live in the houses. (I'm very confused.) (#63)

In summary, YR 1 protocols manifest a willingness to interact with text that is clearly beyond the grammatical competence and lexical knowledge of the reader. Once students instantiate a schema, they appear to weave details into a coherent whole, although not without significant inaccuracies. Protocols are, for the most part, brief, although some exhibit a surprising amount of detail extracted from points throughout the text. Students unable or unwilling to beat a path through unfamiliar lexical items and grammar remain at the level of the most salient top-level features. In comparison with more advanced levels where there is more evidence of grammatical awareness, YR 1 students are singularly dependent on word recognition to develop the meaning they construct.

Discussion

In reviewing the relationship between grammatical knowledge and comprehension, there appears to be an inverse relationship between knowledge of grammar and the appearance of extraneous schemata. In the protocols analyzed, schemata remain accurate to the extent that they are generated within the lexicogrammatical system. As grammatical knowledge begins to wane, prior knowledge intervenes to fill in the gaps.
Evidence for this interpretation can be traced starting with the close adherence to the original text found in YR 4 where basic grammar is, to a great extent, under automatic control. At YRs 2 and 3, extraneous schemata become frequent. Lack of grammatical sensitivity gives free rein for semantic associations to take control of comprehension. In YR 1, information from various parts of the text is often rearranged to accommodate erroneous schemata. Students frequently admit not knowing how information fits together. Several protocols, however, are comparable in detail to protocols at YR 2 or YR 3.

It is difficult to associate protocols receiving similar COMP scores with year of instruction. Three protocols, one each from YRs 4, 3, and 2, manifesting COMP scores of 70, 71, and 73 respectively, were typed and given to six readers. Four of the readers were the French teachers of the students participating in this study. Each of the remaining readers held PhDs, one in foreign language education, and the other in rhetoric and composition. These readers were both familiar with the recall scoring system and knew French.

Readers were asked to read the three protocols and then to judge the level of the writer by circling either YR 1, YR 2, YR 3, or YR 4 (Appendix H). Results showed the protocols to be indistinguishable by level (Table 9). Only one correct identification was made from among the 18
possible identifications. All four teachers' responses were identical. The fourth-year French teacher (T4) was contacted by mail because she is no longer teaching at the testing site. It is highly unlikely that she would have conferred with teachers at her former school. The fact that the remaining three teachers submitted identical responses may indicate that they consulted with one another. The responses of one of the university level readers, however, matched those of the teachers. For the purpose of this research, lack of independence of response, if it did occur, was not considered essential even though it was assumed.

Table 9

Judgments of YR of Instruction of Protocol Writers

<table>
<thead>
<tr>
<th>KEY</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>YR 4</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>YR 2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>YR 3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3*</td>
</tr>
</tbody>
</table>

* (Correct response)
The conclusion that can be drawn from this mini-survey is that it is indeed difficult to categorize students according to level. The existence of protocols of indistinguishable quality across various levels attests to the need for a multi-level pedagogical approach to reading within the same year of instruction. This finding also challenges a hierarchical notion of proficiency, at least as defined in course sequences, as well as a hierarchical ordering of grammatical features within syllabus design.
CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary of Findings

This study has investigated the relationship between the degree of analyzed knowledge of grammar operationalized at three distinct stages: (a) linguistic judgment (TOTA), (b) identification of the form class of errors (TOTB), and (c) ability to identify the grammatical rule violated (TOTC), and reading comprehension of high school learners of French at the first- through fourth-year levels of instruction. The results of this study reveal that both the highest degree of analyzed knowledge of grammar, that is, identification of the rule violated (TOTC), and year of instruction, explain the greatest amount of variance in the reading comprehension measure. Only these two variables reached a level of significance ($p < .0001$) in the ANCOVA analysis.

Main Effect for Analyzed Knowledge of Grammar

In attempting to address the relationship between comprehension and the unanalyzed/analyzed dimension of knowledge of grammar, it was compelling to assume that a high correlation might obtain between unanalyzed knowledge
of grammar and reading comprehension. If grammar is "not an objectified body of alien knowledge to be mastered . . . but rather a network of systems in which the learner is already enmeshed, the full grammatical implications of which he alone has to work out on the basis of what he comes in contact with" (Rutherford, 1987, p. 153), then analyzed knowledge of grammar rules might not be expected to be particularly essential to a constructive task such as reading.

Support for the unanalyzed nature of the grammatical knowledge necessary for reading would seem to be related to findings concerning grammatical sensitivity. Reading was found to be significantly correlated to the grammatical sensitivity subtest of the Modern Language Aptitude Test ($R^2 = .28$, $p < .01$) (Bialystok & Frohlich, 1978b). It should be noted that the grammatical sensitivity subtest of the MLAT provides an estimate of students' sensitivity to formal grammar rules without requiring explicit knowledge of those rules. Grammatical sensitivity would thus be considered to fall within the realm of unanalyzed knowledge and would therefore appear to be related to processing requirements for TOTA (linguistic judgment).

The prediction concerning unanalyzed knowledge and reading was not, however, manifested in the results of this study. The influence of the intuitive or linguistic judgment degree of analysis (TOTA), as well as the somewhat
more explicit level of ability to state the form class of the grammatical error (TOTB), were not significantly correlated with comprehension in the ANCOVA analysis. One possible explanation lies in the correlation between the three degrees of analyzed knowledge (Table 7). In one sense, intercorrelations among the three stages of analysis encompass an effect for the lowest or intuitive stage. Although the highest degree of analyzed knowledge subsumes previous stages, there appears to be a point at which control of grammatical features at YR 4 differentiates among students. Students who overrely on background knowledge are prone to gloss over grammatical features to the detriment of comprehension and the exclusion of pertinent grammatically encoded information. When syntactic and grammatical features are under control, however, background knowledge enhances, rather than interferes with comprehension. Only at YR 4 is there a consistent and appreciable increase in degree of analyzed knowledge of grammar as evidenced in the means from TOTA through TOTC.

Nonetheless, the relationship between analyzed knowledge of grammar (TOTC) and reading comprehension requires a more nuanced interpretation. Another explanation might emerge in focusing on a more precise understanding of the nature of analyzed knowledge. In discussing linguistic awareness, Mattingly (1984) suggests
that awareness is more a matter of access than of
consciousness and that access may, in fact, be unconscious.
In other words, the same structure of knowledge may
underlie both unanalyzed and analyzed knowledge, the major
difference being the access one has to the knowledge in the
case of analyzed knowledge. According to Bialystok and
Ryan (1985b) "what is analyzed . . . is not the knowledge
per se, but the representation of knowledge; . . . whether
knowledge is analyzed or nonanalyzed, the meanings are the
same" (p. 234). This would seem to clarify the Rutherford
reference to grammar as "a network of systems in which the
learner is already enmeshed" (p. 153). The difference is
that the access to the structure of meanings available
through analyzed knowledge facilitates the use of this
knowledge in specific contexts to achieve particular goals.

In making the initial grammaticality judgment in the
first test condition (TOTA), it cannot be assumed that an
underlying degree of analysis is absent. Unless a student
resorts to guessing, judgment is necessarily made on the
basis of some underlying knowledge structure that may or
may not be tapped for explicitness. Not enough is known
about the structure of intuitive knowledge. In the absence
of such research, it would be premature to discount the
effect of the intuitive stage of analysis.
Main Effect of Year

Of particular interest is the finding that a more advanced level of study is not necessarily associated with a higher comprehension score. Closer scrutiny of the finding of no significant difference between the YR 2, 3, and 4 students may provide further insight into the degree of analysis operative in the comprehension process. The YR 4 students had been exposed to significantly more grammatical terminology and exercises than YR 2 and 3 students. Sixty percent of the YR 4 syllabus was devoted to review, mastery, and manipulation of grammar at an advanced level. This additional grammatical exposure, however, did not appear to be essential for basic comprehension.

All students in this study would appear to have the background knowledge of airplane accidents necessary to understand the top-level structure of the text. Background knowledge, however, can be a hindrance to comprehension rather than an asset when it is relied on at the expense of accurate attention to grammatically encoded textual features that nuance top-level information.

Examination of the protocols of YR 2 subjects reveals that they suffer from overreliance on background knowledge. They are prone to give full rein to whatever background knowledge is evoked upon recognition of familiar lexical items embedded in an otherwise challenging grammatical or
syntactic context. The false sense of security engendered by these familiar words activates schemata associated with similar accounts, the details of which may be at odds with the present text. Students choosing this solution bypass problematic grammatical features that would have provided clarification.

In contrast, miscomprehensions at YR 4 are usually the result of unfamiliarity with a specific low-frequency vocabulary item or grammatical feature. Background knowledge appears to minimize the necessity for close attention to syntactic features. This situation can become detrimental, however, when subjects fail to detect a mismatch between grammatical features and what is actually stated in the text. Such is the case, for example, with the attribution of blame to the air traffic controllers. The reason for this misreading is apparent. The grammatical context in which the air traffic controllers were exonerated from negligence was complex and would be expected to pose a challenge even to advanced students.

Examination of the recall protocols across all levels likewise reveals specific differences. YR 1 and YR 2 students rely heavily on semantic association as well as formatting and conceptual prior knowledge. They know the format of a news article and they are familiar with the content of reports of plane crashes. The words they recognize serve as semantic dots in a textual trace-the-
dots story. These students have the concept, but, it is not yet firmly embedded within cohesive grammatical relationships. What is happening at YR 4 and YR 3 is somewhat different. The more advanced students not only have the concept, they usually remain very close to the original text and convey the content of the text in a more cohesive and accurate manner. The ability of the more advanced students to adhere to the original format may also be conceptualized in information processing terms. The fact that grammatical features are under control means that more attention can be focused on format features of the text. In other words, when grammatical features are under automatic control, attention can be directed to concern for format and genre. In general, YR 4 students adhere more closely to the original structure and sequence of the article than do students at other levels.

**Analyzed Knowledge of Grammar and Comprehension.**

The question of the extent to which analyzed knowledge of grammar functions in comprehension processes across levels is not immediately obvious. One explanation is that YR 4 students' increased exposure and resulting control over grammar may facilitate their recall of more of the text, thus enabling them to focus on reconciliation of problem instances of vocabulary and grammar. In contrast, YR 2 students tend to signal that they do not know how
something fits into the text when the syntax or grammar exceeds their capabilities.

In her study of explicit and implicit grammaticality judgments, Bialystok (1979a) reported a similar unexpected reversal of an anticipated order of results when the performance of grade ten students remained better than that of grade twelve students. Differences in learners attributable to their reliance on unanalyzed and analyzed knowledge, however, were not found. Bialystok concluded that the lack of difference in processing was an indication that the advantaged learners possessed a better developed system for both unanalyzed and analyzed knowledge. In other words, both unanalyzed and analyzed knowledge are used for the same types of items in the same ratio by all learners; however, overall performance was improved for the advantaged learners. This would imply an underlying superiority in the control dimension for the advanced learners. The control dimension was not addressed within the research design of this present study.

Bialystok's research implies that "there is not direct access to the rule, but that it is retrieved via the form class involved in the error" (Bialystok, 1979a, p. 100). Only after a sentence is identified as ungrammatical is information about the form class retrieved. If analyzed knowledge is not immediately accessed in grammaticality judgment tasks, then analyzed knowledge of grammar in
reading may only be called upon at the point where the reader becomes aware of a difficulty. This differential activation of analyzed knowledge would parallel studies of phonological correspondence rules wherein decoding of high complexity words differentiates poor readers from disabled readers as in the Manis and Morrison (1985) findings. This may partially explain why YRs 2, 3, and 4 perform at such comparable levels. Unanalyzed familiarity with the underlying structure of the language may permit them to function in a comparable manner up to the point of difficulty. At that point, analyzed knowledge will assist those who have access to it, whereas erroneous schema instantiation may result for those readers prone to reconcile unknown structures within a reader-fabricated lexicogrammatical framework.

Another factor influencing the results of the YRs 2, 3, and 4 in this study is the diversity within this particular group. The standard deviations for comprehension for these years range between 15 and 17; whereas, the standard deviation for YR 1 is 9 (Table 1). It may be true that beyond the initial stage of language learning, students diverge more widely in their proficiency despite being categorized at the same level of instruction. Magnan (1989) reports this to be true of the oral grammatical control of university students of French: "the apparent discrepancy between material taught and material
mastered was so great that certain students at one instructional level were not easily distinguishable from students at another" (p. 25). Magnan's description of the overlapping of levels is totally consistent with the results of this study, particularly in respect to the quality of the protocols. The standard deviations for analyzed knowledge across years ranges between 2 and 3 (Table 2). This apparent homogeneity of standard deviations for the three degrees of analyzed knowledge contrasts sharply with the standard deviations for comprehension. An explanation for the diversity among students for comprehension at Yrs 2, 3, and 4 may lie in their mastery of formal and functional uses of knowledge. Better students may have achieved the control necessary to bridge the gap between formal knowledge and functional application of that knowledge.

**Conclusions**

The major conclusion stemming from the quantitative findings is that the more explicit the knowledge of rules is, the higher will be the comprehension score. For each point on TOTC (rule identification), comprehension is predicted to increase by 1.5. In light of the intercorrelations among degrees of analyzed knowledge of grammar, this finding does not imply that the lesser degrees of analysis that mathematically appear to cancel
each other out are ineffective. Rather, it appears that students deficient in higher degrees of analyzed knowledge rely on linguistic intuitions (unanalyzed knowledge) and strategies such as semantic association, in order to compensate for deficiencies in degree of analysis. Consultation of both ends of the continuum of analyzed knowledge needs to be encouraged in relation to the demands placed on a reader by a particular text. Year of instruction, although statistically significant in the quantitative analysis, does not serve to distinguish among protocol writers in the practical sense.

Qualitatively, the findings indicate that the less grammatical competence students possessed, the more they relied on background knowledge. Students at YR 4 had more grammatical exposure as well as higher scores for degree of analyzed knowledge. Consequently, their recalls evidenced less interference from background knowledge than lower level students. While much information can be gleaned from text without the benefit of a high degree of analyzed knowledge of grammar, only students attentive to grammatical cues provided the most accurate and detailed protocols. Although this study did not focus on the extent to which lexical knowledge functions in comprehension, the qualitative analysis revealed inadequate lexical knowledge to be a source of miscomprehension in virtually every protocol.
Grammatical knowledge can also be addressed in relation to the degree of control or access. The control dimension was not, however, a focus of this study. At YR 4, common grammatical features can be assumed to be under automatic control. Less frequent constructions were problematic. Recall protocols of YR 4 students, and protocols of comparable quality across years, demonstrate the coordination of great amounts of detailed information. Such coordination of information would assume a greater reliance on both the analyzed dimension of knowledge as well as the control dimension in order to establish, trace, and maintain accurate grammatical relationships among textual features. In contrast, YR 1 students, and students at other levels lacking a well-developed sense of grammatical correctness, may be biased to rely more on unanalyzed knowledge and therefore evidence less concern for accuracy of information recalled.

Implications of the Study

Theoretical Implications

The results of the qualitative analysis clearly undermine the case for a quantitative notion of proficiency based on course level. From analysis of the lower level protocols, it appears that it is indeed possible for students to comprehend without explicit knowledge of structure. First- and second-year students were quite
adept at utilizing prior knowledge to supplement an inadequate degree of analysis of the lexicogrammatical system. Evidence for an information processing paradigm may also be seen in the results. At the more advanced levels, where grammatical features are subject to greater control, students are free to direct their attention to formatting and genre issues. This may explain the greater adherence of the more advanced subjects to the original text.

The active construction process students engaged in as they read was also strikingly manifest, particularly in the intrusions into the content structure of the original article. Because students were directed to show the interrelationships of information recalled from text in their writing, task perception may have influenced some students to fill in the gaps with extraneous information in order to provide a cohesive recall.

The contribution of unanalyzed knowledge of grammar to reading comprehension is in need of further research. Unanalyzed knowledge may, in fact, be analyzed but inaccessible to conscious awareness. The point at which such knowledge functions is not clear. Further research is necessary on the role of explicit knowledge of language structure in reading comprehension in relation to intuitive or unanalyzed knowledge.
Pedagogical Implications

Bialystok (1982b) asserts that "analyzed knowledge is not more valuable than unanalyzed knowledge: it only has different functions" (p. 205). All three degrees of grammatical analysis must function in consort to some extent. The key to the activation of the highest degree of analyzed knowledge undoubtedly lies in the nature of the task. It would be well to keep in mind the distinction between formal knowledge about language and functional or knowing-how-to knowledge of language when making pedagogical decisions. Occasions and contexts should be provided to practice and develop both aspects of language use.

Reading can proceed without much attention to analyzed knowledge to the extent that the reader has at least unanalyzed knowledge of structure. When difficult syntax or grammar is encountered in a text, a higher degree of analyzed knowledge will aid comprehension, provided that adequate schemata are in place.

According to Garrett (1986), the paradoxical situation facing foreign language teaching today is that while grammatical competence is necessary for communicative competence, learning grammar does not ensure either competence. The resolution of the paradox lies in a reconceptualization of what is meant by grammar.
A definition of grammar as "a concatenation of forms and statements about form--paradigms, lists, word order rules" is not a productive one (p. 134). Neither is it helpful to conceptualize grammar as a collection of "formal descriptors of the final shape of an utterance" (p. 134). Equally unproductive in a practical sense is grammar conceptualized as "a set of 'rules' describing how a language system works" (p. 135). In these conceptualizations, grammar is viewed as form.

The important distinction Garrett makes is that rules concerning grammatical forms are merely generalizations about the functioning of an abstract system of language. These generalizations do not constitute "directions for actually producing or comprehending language" (p. 138). The inadequacy of these conceptualizations stems from the fact that grammatical terminology and traditional grammar rules do not reveal the type of thinking that governs the encoding of meaning. What needs to be developed is a sense of the processing of meaning in the target language. Attention to the surface features of language will not reveal this processing.

An understanding of the grammatical processing system can only be accomplished by putting the learner in contact with language data. It is from contact with language data that the learner is able to form generalizations about the workings of language (Rutherford, 1987). The task of
curriculum organization lies in "an identification of those grammatical properties of target-language lexicon considered of crucial importance for learner 'projection' to well-formed grammatical constructions" (p. 151).

It is obvious that any reconceptualization of grammar threatens the security teachers may feel in faithfully devoting time to "covering" the grammar points included in the textbook with its accompanying exercises and activities. Such an approach will not be enough to effect the type of grammatical consciousness-raising proposed by Rutherford.

In the grammar-centered approach that needs to occur, grammar is not actually taught. Rather, what learners need to be taught is how to manage their own learning. Unfortunately, the prototype for a foreign language curriculum based on grammatical consciousness-raising has yet to be written. What needs to be accomplished is, however, clear. The qualitative results of this study indicate a need to differentiate between grammatical control and comprehension. Comprehension may lie in the students' ability to bridge the gap between knowledge of structures in isolated occurrence and knowledge of these same structures as they are integrated in text. Grammatical consciousness-raising is one way to sensitize students to the nuances structures assume in various text settings.
Rutherford suggests that the parameters within which consciousness-raising techniques would lie are somewhere on the continuum between the "natural appearance of a grammatical phenomenon in 'authentic' text and its contextless explicit formulation" (p. 153). Grammatical consciousness-raising could range from highlighting or giving prominence to grammatical phenomenon, to task-oriented activities in which a learner would perform some type of operation to solve a specific problem. Rutherford provides examples of consciousness-raising activities designed for learners of English as a second language (ESL).

Perhaps it is well for foreign language teachers to heed the warning signs of impending communicative incompetence issued by Higgs and Clifford (1982). Become suspicious of a pattern of high vocabulary and low grammar. A danger is inherent in working for communicative competence without the benefit of grammatical consciousness-raising activities. It is the danger that grammar may be glossed over in an attempt to get students functioning in the language and that consequently, grammatical errors might fossilize and become "learning-proof" in the words of Higgs and Clifford. The results of this study suggest that the development of analyzed knowledge of grammar cannot be ignored. What remains to be clarified is the role that unanalyzed or intuitive
knowledge plays in the development of grammatical
consciousness and subsequent control.

Recommendations for Future Research

In order to support the conclusions of this study, research in other high school settings as well as with language learners at the university level is needed. Equally essential is the use of several research passages within the same research design in order to test for possible effects due to the passage. Comparison with other news articles as well as comparison with other text genres is likewise needed.

Passages selected on the basis of their bias toward either the analyzed or unanalyzed dimension should also be compared. Correlation with course-related grammar tests, rather than with the Bialystok test, might also be undertaken in order to confirm these results and to provide concurrent validation for the measure of analyzed knowledge used in this study.

Both unanalyzed and analyzed knowledge sources are clearly operative in the reading process. Further clarification of the role of the unanalyzed/analyzed continuum of grammatical knowledge as well as the control or access dimension is needed. The control dimension in reading can be tapped by altering the demands placed on a reader as, for example, in reading for the gist as opposed
to reading for details. Text selection can likewise govern the demand placed on analyzed knowledge and control. Text relating multiple hierarchical levels of information in complex sentences would be expected to require a higher degree of both analyzed knowledge and control than reading a simple narrative text where control and coordination of information is not an issue.

The effect of prior knowledge, as opposed to the effect of knowledge of grammar, should also be disentangled. A passage of similar grammatical structure might be constructed specifically for this purpose. The grammatical content of the airplane passage could be mapped and retained, for example, while the lexical content could be shifted to a less familiar topic. Recall of the fabricated text might then be compared with the recall of the airplane passage. Much additional research is needed to assess the extent and the conditions under which formal knowledge of grammar directly influences functional uses of language.

**Limitations**

The choice of a news article dealing with such a highly familiar occurrence as a plane crash may have contributed toward a tendency to rely on prior knowledge rather than focus on grammatical cues. It is hoped that the choice of research passage did not effect this type of
processing, but rather, that the processing revealed in the protocols is characteristic of an active construction process in reading. Another limitation is the fact that only one passage was tested. A recommendation is that in future research, several passages be tested in order to control for passage effects.

Task perception may have influenced the quality of the recalls. Students were asked to attempt to show in their writing how ideas in the text were related to each other rather than to list isolated words or ideas. Students, particularly at the lower levels, may have attempted to write a coherent account by supplying information to fill in the gaps in their own comprehension. If this were the case, the qualitative recalls would provide a somewhat distorted picture of actual recall. The comprehension score might also be affected, but to a lesser degree.

It is possible that the grammatical content of the grammar test is poorly suited for correlation with the airplane passage. From another standpoint, however, it might be reasoned that the grammatical exposure students have in a classroom setting would never be totally congruent with the demands of any authentic text that might be selected. Therefore, it is hoped that the grammar test would be representative of the grammatical rules covered in beginning French courses.
The fact that the population from which the sample of students for this study was drawn ranges above national norms on achievement tests limits the extent to which generalizations may be made. This research needs to be replicated in a variety of school settings to provide adequate confirmation of these results.
APPENDIX A

ADAPTATION OF BIALYSTOK GRAMMAR TEST
1. Il a huit vingt, mais il a onze ans.

2. Il a bien des livres, mais il ne les aime pas.

3. Elle a une amie qui a quatre ans.

4. Avant de partir pour ce voyage, elle a vendu les enfants.

5. J'ai compris que vous parliez d'éléphant.

6. Il a une petite maison.

7. Je ne comprends pas.

8. Le mariage de la petite fille a lieu ce soir.

9. Il est curieux de voir.

10. Il a fait des vacances d'été à la campagne.
14. Pendant les grandes vacances, ma petite sœur ne s'est jamais lavée.

15. Ma mère a perdu ses papiers et elle les trouve dans le miroir.

16. Ma père cherche toujours ses lunettes et il les trouve sur son nez.

17. André a reçu de grandes nouvelles et il leur les a dites.

18. Hier, ma grand-mère m'a raconté une histoire mystérieuse.

19. Il veut acheter une bicyclette blonde, mais il n'a pas d'argent.

20. Le fils de mon ami veut vendre sa vieille voiture.

21. Le chien a mangé de ma viande toute et elle l'a frappé.

22. Il lui a fait un beau dîner, mais elle n'a pas l'air

23. Le professeur d'anglais lui dit qu'il faut souvent de grandes foules.

N° ___________ 1 2 3 4 8
APPENDIX B

DIRECTIONS: PART A
You are going to hear and read some sentences in French and will have to decide if each sentence is CORRECT or contains an ERROR. Each sentence will be read once followed by a pause. No sentence contains more than one error.

If you are not certain whether a sentence contains an error or is correct, you are encouraged to GUESS. Do not skip any items and do not change items once you have marked your initial answer.

SAMPLE SENTENCE FROM PART A

Mark an "X" in the parentheses under "C" in the left hand column if you believe the sentence to be CORRECT or under "Er" if you believe the sentence contains an error.

C   Er
( )  ( )  0. Maman a donné un petit pain à Paul et il a mangé le.

In this example, you would mark an "X" in the "Er" column since "le", an object pronoun, should come before the verb ("...et il l'a mangé").
APPENDIX C

DIRECTIONS: PART B
Sentences in PART A were either correct or contained one error. Incorrect sentences can be classified according to three error types: errors involving adjectives, pronouns, or verbs.

In this section, PART B, you will reread each sentence to identify the type of error contained in incorrect sentences. Indicate your answer by filling in a circle directly on top of the letter corresponding to your answer: A: adjective, P: pronoun, or V: verb. If the sentence is Correct, leave PART B blank. Now look at the right hand column of your test to locate the letters A, P, and V. You will disregard the numbers in this section.

If the answer you select in PART B is different from what you previously indicated in PART A, it will be apparent that you have changed your mind. For example, if you thought there was an ERROR in PART A and now realize that the sentence is correct, leaving PART B blank will indicate that you now think the sentence is correct. Do not skip any items and do not make any changes in PART A.

When you are finished, turn your test over and wait to be given the next set of directions. The examiner will now demonstrate the marking system at the chalkboard and answer any questions. [Illustrate at Board.]

A P V The filled-in circle over "A" indicates an error in the adjective category.
APPENDIX D

PART C: FRENCH GRAMMAR RULES
In the right hand column of the test there are three numbers underneath the "A" (Adjective), "P" (Pronoun), and "V" (Verb), categories. Each number corresponds to one of the rules listed below under ADJECTIVE, PRONOUN, and VERB. If the sentence contains an error, darken the number of the rule violated in the appropriate column. Refer to the rules listed below as you reread each sentence. Be careful to darken over the number directly under the category you have selected.

If you change your mind between the previous section and this section, do not change PART B. Instead, indicate your change of mind as follows:

1) NO MARKS in this section = the item is now considered CORRECT.

2) A mark in a different column from PART B indicates a change. Respond to all items.

ADJECTIVE

A1 Color adjectives always follow the noun.

A2 If the noun is feminine, the adjective which describes it is also feminine.

A3 Adjectives such as "bon(ne)" and "grand(e)" come before the noun they describe.
PRONOUN

P1 The object pronouns come directly before the verb.

P2 The direct object pronouns "le," "la," "les," always come before the indirect object pronouns "lui" and "leur".

P3 The direct object pronoun conforms in number to the noun it replaces.

VERB

V1 The form of the auxiliary verb is determined by the subject.

V2 Reflexive verbs form the "passé composé" with "être".

V3 To form the "passé composé," the past participle of the verb is used with the correct form of "avoir" or "être".

APPENDIX E

DIRECTIONS TO STUDENTS: READING COMPREHENSION
The ability to understand printed material in a foreign language is a valuable skill. You have probably wondered how well you would be able to function if you were to travel to a country where French is spoken and be confronted with texts that native speakers of French would be likely to read. Place yourself in that situation today and imagine that you have come upon an article in French on a topic of interest to you. Read the article to find out what is said about the topic.

Do not become frustrated if there are words or phrases that you do not understand. This is to be expected, particularly if you have been studying French for less than a year to two. Instead, do what you would do in English: continue reading until you have a good idea of what the entire passage is about and then make a logical guess about the meaning. It is not necessary to know the meaning of each word in order to understand the text.

Read the text as often as you like. When you feel confident that you have understood as much of the text as you can, raise your hand and the text will be collected. You will then be given another sheet on which you will write down in English, everything you can remember from your reading. You may use your own words or words from the text.

Write in complete sentences and avoid just listing isolated words or ideas. Try to show in your writing, how
the ideas from the text are related to each other. If you recall an idea but forget how it relates to other information in the text, simply state this rather than listing an isolated word or idea.

The results of this testing will be used to help foreign language teachers learn more about how to assist students learning to read in a foreign language.
APPENDIX F

SCORING TEMPLATE FOR AIRPLANE TEXT
CRASHED

patient

PIANES

description: specific

SMALL

TWO

description: equivalent

PIPER CHEROKEE

description: attribution

SINGLE ENGINE

description: equivalent

FALCON MYSTERE-50

description: attribution

TRI-JET

description: time-setting

SUNDAY EVENING

description: setting location (OVER)

NEW YORK

description: setting location

OUTSKIRTS

Causation covariance, antecedent

FELL ON

patient

APPARTMENT BUILDINGS

description: setting location

CLIFFSIDE PARK

FAIRVIEW

range

NEW JERSEY

Causation: covariance, consequent

SET FIRE

Collection

DIED

force

CATASTROPE

patient

PEOPLE

description: specific

FIVE

collection

PILOTS

description: specific

TWO

PASSENGERS

description: specific

THREE

description: attribution

FALCON

Causation: consequent

FEARED
agent
AUTHORITIES
patient
TOLL WOULD BE HIGHER
Causation: covariance, antecedent
FELL INTO
patient
PLANES
comparison: analogy
FIRE BOMBS
range
HEAVILY POPULATED AREA
description: setting location (ACROSS FROM)
MANHATTAN
description: setting location (ON OTHER
SIDE OF)
HUDSON RIVER
MADE BELIEVE
agent (force)
COLLISION
description: attribution
SPECTACULAR
description: equivalent
HIT EACH OTHER
patient
PLANES
description: manner
INSTANTLY
collection: alternative
NUCLEAR EXPLOSION
"THIRD WORLD WAR"
benefactive
WITNESSES
description: attribution
WHO HAD NOT SEEN ACCIDENT
Description
EXTINGUISH FIRE
agent
FIREMEN
range
FOUR HOURS
description: setting location
BUILDINGS
description: attribution
SMALL
description: specific
FIVE
HIT BY FLAMING FALCON
description: setting location
CLIFFSIDE PARK
Causation: covariance, consequent
COULD HAVE BEEN MORE SERIOUS

patient

CATASTROPHE

Causation: covariance, antecedent

THERE WERE WOUNDED

description: specific

EIGHT

description: attribution

INHABITANTS

description: specific

90

description: setting location

BUILDINGS

Causation: covariance, antecedent

WERE FLYING AT LOW ALTITUDE

patient

PLANES

description: specific

TWO

description: manner

CLOSE TO EACH OTHER

DID NOT SEEM TO REACT TO

agent

PILOTS

patient

WARNINGS

description: attribution

CONTROL TOWER

description: setting location

NEIGHBORING AIRPORT

Causation: covariance, consequent

WAS ABSURD ACCIDENT

description: equivalent

CALL INTO QUESTION

patient

WORK OF AIR TRAFFIC CONTROLLERS

description attribution

WHO PERFORMED THEIR DUTIES

description: manner

NOT

description: evidence

ACCORDING TO THE FAA
APPENDIX G

READING COMPREHENSION TEXT
Les deux appareils volaient à basse altitude très près l'un de l'autre, et leurs pilotes ne semblaient pas avoir tenu compte des mises en garde de la tour de contrôle de l'aéroport voisin. Un accident absurde qui ne saurait remettre en cause les contrôleurs aériens qui ont fait leur travail, a indiqué l'Administration fédérale de l'aviation civile.

Deux petits avions, un monomoteur Piper Cherokee et un tri-réacteur Mystère Falcon 50, sont entrés en collision dimanche soir au-dessus de la banlieue de New York et sont tombés sur des immeubles d'habitation à Cliffside Park et à Fairview (New Jersey) qu'ils ont incendiés. Cinq personnes, les deux pilotes et les trois occupants du Falcon, ont trouvé la mort dans cette catastrophe. Les autorités craignaient un bilan plus lourd car les appareils sont tombés comme des bombes incendiaires dans une zone à population dense, située face à Manhattan, de l'autre côté de la rivière Hudson. La collision spectaculaire — les avions se sont immédiatement embrasés — a fait croire à des témoins n'ayant pas vu l'accident à une explosion nucléaire, voire à une "troisième guerre mondiale".

Il a fallu quatre heures aux pompiers pour éteindre l'incendie de cinq petits immeubles touchés par le Falcon en lieu à Cliffside Park. Là encore, la catastrophe aurait pu être plus grave, puisque l'on compte huit blessés sur les 90 personnes habitant ces maisons.
APPENDIX H

TEACHER SURVEY
Please read the following student recalls and indicate what you believe to be the year of French study of the writer.

Circle: FR 1 2 3 4

Two small planes crashed in New York Saturday night, a small one-motored plane Falcon, and another "Mystère" 3-engined plane. The planes exploded in a suburb of New York, Clifisde Park and Fairview (in New Jersey). Both pilots were found killed, as were the 3 passengers of Falcon. Authorities who had witnessed the accident said it could have been much worse. In fact, the collision seemed like bombs because of the dense population in the area. This area was on the other side of the Hudson from Manhattan.

The accident also harmed 5 small buildings in the area, although only 8 people were wounded out of the 90 inhabitants. The Federal Aviation said the accident occurred because the two planes were flying too close together, and it should not happen again. The pilots should have maintained contact with the neighboring control towers.

Circle: FR 1 2 3 4

Two little planes, a single engine Piper Cherokee and a Mystery Falcon collided above New York Sunday night. They fell into a densely populated area of Clifisde New York and Fairview, New Jersey, on the other side of the Hudson River. Five people were found dead, the two pilots and 3 passengers of the Falcon. There was a spectacular explosion. It was like seeing a ball of fire or World War III.

It took 4 hours to put out the fires in the neighborhood and the Falcon itself. Fortunately, the accident wasn't as serious as it could have been. Only 8 people were injured out of all the inhabitants.

The planes were flying at a high altitude very near to each other. The pilots must not have been paying attention to the air traffic controllers who were doing their job. The incident is now under investigation by the Federal Aviation Association for Civilians.
Sunday night, 2 planes, a Piper Cherokee and a Mystere Falcon-50, crashed in the air outside of New York. 5 people, 2 pilots and 3 passengers, were found dead in the wreck in Cliffside Park in Fairview, New Jersey. 

After studying the accident it was discovered that the explosion was elevated because it occurred in a highly polluted area facing New York on the other side of the Hudson River. People who saw the accident believed it to be the nuclear bomb that would start World War III. Many of the houses in the Cliffside Park area caught on fire because of the crash. 8 people were injured. It took 4 hours to put out the fire. It could have been worse officials noted.

The pilots were flying at a low altitude near one another. Unfortunately they didn't contact, or weren't able to contact, the air traffic controller at a neighboring airport to see who had the right of way.
REFERENCES


