INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.
The effects of learner variables, pacing, and types of adjunct questions in computer-assisted reading practice on a recall measure of reading comprehension in intermediate college Japanese

Tabuse, Motoko, Ph.D.

The Ohio State University, 1992

Copyright ©1992 by Tabuse, Motoko. All rights reserved.
THE EFFECTS OF LEARNER VARIABLES, PACING, AND TYPES OF
ADJUNCT QUESTIONS IN COMPUTER-ASSISTED READING
PRACTICE ON A RECALL MEASURE OF READING
COMPREHENSION IN INTERMEDIATE
COLLEGE JAPANESE

DISSERTATION

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

By

Motoko Tabuse, B.A., M.A.

The Ohio State University
1992

Dissertation Committee:
Gilbert A. Jarvis
John Belland
Keiko K. Samimy

Approved by
Adviser
College of Education
This dissertation is dedicated to my parents,
Torao and Yasuko Tabuse,
who taught me about life.
ACKNOWLEDGEMENTS

It is with my greatest respect and sincere gratitude that I acknowledge the following people:

To my adviser, Professor Gilbert Jarvis, for his instruction at an academic level, advice at a professional level, and guidance throughout this challenging endeavor.

To Professor Keiko Komiya Samimy, for her exemplary strength, kindness, and professionalism.

To Professor John Belland, for his instruction at an academic level, advice on computer-assisted language learning, and kindness.

To my colleagues, Kyoko Tokashiki and Yoshiko Uchida, who competently assisted in the creation of idea units and scoring recall protocol.

To Jean Ippolito and Bob Miskell, who gave useful advice about computer programming and software.

To Fred Ruland for his sound advice and guidance in statistical analyses of the data.

To my older sister and my brother-in-law, Sachiko and Haruo Kito, for their generosity to provide me with a computer.

To my younger sister and my brother-in-law, Naoko and Naoya Fujita, for stimulating my thoughts in research.

To my mother, Yasuko Tabuse, for never doubting my ability to achieve a goal and for supporting me in everything.
To my father, Torao Tabuse, who demonstrated to me what a studious scholar should be.

To my parents-in-law, Yvonne and Andre Couasnon, for their kindness and encouragement.

To my daughter, Mari, for giving me the meaning of life, and providing me with wonderful smile which became the guiding light to accomplish this challenge.

Finally, to my dearest husband, Charles G. Couasnon, for his never-ending support, constant encouragement, and his thoughtfulness.
VITA

December 1, 1955. Born - Osaka, Japan

1979. B.A., Tezukayama Gakuin University
Osaka, Japan

1982-1983. Graduate Teaching Assistant,
Department of Linguistics,
Ohio University, Athens, Ohio

1983. M.A., Linguistics, Ohio University
University, Athens, Ohio

1983 - 1984. Japanese Language Instructor,
Soko Gakuen Japanese Language School
San Francisco, CA

1983 - 1986. Translator, Leo Kanner Associates,
Palo Alto, CA

Language Institute, Monterey, CA

1986 - 1987. Chairman, Japanese Department,
Defense Language Institute, Monterey, CA

1987 - 1989. Graduate Teaching Assistant, Department
of East Asian Languages and Literatures,
The Ohio State University

1989 - 1990. Graduate Research Assistant,
Department of Educational Studies,
The Ohio State University

1990 - 1992. Lecturer, Department of East Asian
Languages and Literatures,
The Ohio State University
PUBLICATIONS


FIELDS OF STUDY

Major Field: Education


Studies in Affective Variables and Teaching Culture. Professor Keiko K. Samimy

Minor Field: Instructional Technology

Studies in Instructional Systems Development, Instructional Materials and Media, and Research in Instructional Design. Professor John Belland
# TABLE OF CONTENTS

**DEDICATION** .................................................................................................. ii  
**ACKNOWLEDGEMENT** ................................................................................ iii  
**VITA** ................................................................................................................. v  
**LIST OF TABLES** ........................................................................................... x  
**LIST OF FIGURES** ........................................................................................ xi

## CHAPTER

### I. THE PROBLEM .............................................................................. 1  
  
  **Introduction** ......................................................................................... 1  
  **Statement of the Problem** ............................................................... 3  
  **Significance of the Problem** .......................................................... 6  
  **The Purpose of the Study** ............................................................... 8  
  **Definition of Terms** ......................................................................... 11  
  **Assumptions** ................................................................................... 16  
  **Limitations** ..................................................................................... 17  
  **Theoretical Bases** ........................................................................... 17  
  **Salomon’s Theory** ........................................................................... 17  
  **The Reading Model** ......................................................................... 19  
  **Reading Comprehension** ............................................................... 20  

### II. REVIEW OF RELATED LITERATURE ....................................... 22  
  
  **Experimental Research on CALL** .................................................. 22  
  **Reading Research with Japanese and English Subjects** .............. 28  
  **Review of the Studies on Learner’s Affective Variables** .......... 38
Difference on Comprehension
Scores by Sex ........................................... 95

V. SUMMARY, RECOMMENDATIONS,
IMPLICATIONS AND LIMITATIONS .................. 97
  Overview of the Study ................................ 97
  Summary of Findings ................................ 99
  Recommendations for Further Research ........ 103
  Pedagogical Implications ......................... 106
  Limitations of the Study ......................... 108

LIST OF REFERENCES .......................................... 110

APPENDICES

A. Language Class Discomfort ....................... 122
B. Language Class Risktaking ....................... 124
C. Language Class Sociability ....................... 126
D. Language Questionnaire ......................... 128
E. Computer-Assisted Language Learning
   with Low-Level Adjunct Questions .............. 134
F. Computer-Assisted Language Learning
   with High-Level Adjunct Questions .............. 157
G. The Experimental Text ............................ 180
H. The Sample Reading Text ......................... 184
I. Idea Units Scoring Template ..................... 186
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hypothesis and Treatments Used in Robinson's Empirical Research.</td>
</tr>
<tr>
<td>2</td>
<td>Observed Means and Standard Deviations of Recall Protocol as a Function of Learner's Affective Characteristics.</td>
</tr>
<tr>
<td>3</td>
<td>Observed Means and Standard Deviations of Affective Characteristics Scores in Each Experimental Condition.</td>
</tr>
<tr>
<td>4</td>
<td>Omnibus Analysis of Covariance.</td>
</tr>
<tr>
<td>5</td>
<td>Analysis of Covariance Parameter Estimates for Immediate Recall Protocol Score.</td>
</tr>
<tr>
<td>6</td>
<td>Additional Analyses of Covariance by the Low-Level Adjunct Question.</td>
</tr>
<tr>
<td>7</td>
<td>Analysis of Covariance Parameter Estimates for Immediate Recall Protocol Score in the Low-Level Adjunct Question Condition.</td>
</tr>
<tr>
<td>8</td>
<td>Observed Least Square Means and Standard Errors of Recall Protocol Scores in the Low-Level Adjunct Question Condition.</td>
</tr>
<tr>
<td>9</td>
<td>Responses to Extraneous Questions.</td>
</tr>
<tr>
<td>10</td>
<td>Comprehension Score Range and Average Comprehension Score According to Native Language.</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figures</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Two-way Interaction between Affective Characteristics and Types of Pacing.</td>
</tr>
<tr>
<td>2</td>
<td>Interaction of Affective Characteristics, Types of Questions, and Types of pacing on Immediate Recall Protocol Score.</td>
</tr>
<tr>
<td>3</td>
<td>Range of Scores.</td>
</tr>
</tbody>
</table>
CHAPTER I

THE PROBLEM

Introduction

In the 1980s, computer-assisted language learning (CALL) gained considerable attention and popularity in the field of second and foreign language teaching. Rapid technological advancements and the easy access that the general public and educators have to relatively inexpensive and surprisingly powerful microcomputers have made a great impact on language teaching and have contributed to the tremendous increase in computer literacy among the teaching professionals (Hackenberg, 1986). Teichert (1985) asserts that becoming computer literate and incorporating CALL into the curriculum is a matter of professional survival.

Despite the interest in incorporating CALL into language teaching, surveys on CALL materials indicate that language teachers are generally dissatisfied with the software available and are convinced that we have not fully exploited the potential for computer-aided instruction (Culley & Mulford, 1983; Fought et al., 1986; Harrison, 1983). This phenomenon has been well observed in a number of CALL publications (e.g., Ahmed et al., 1985; Higgins & Johns, 1983; Walker & Hess, 1984). Underwood (1983) and Fought et al. (1986) deplore the fact that many commercially available CALL materials
are written by computer experts who have no training in language pedagogy. It is no wonder that most of the teachers who have reviewed CALL programs are disappointed by them. Some efforts have been made to create and design CALL materials by teachers themselves, but these efforts are at the trial-and-error stage. Pederson (1986) relates our experience with the language laboratory of the late 1950s and the 1960s to the current CALL enthusiasm and points out an important parallel: "There is still little research on effective pedagogical manipulations of the medium to guide the instructional designer, author, or practitioner" (p. 102). In order to make CALL truly effective, we need to have sophisticated principles of instruction based on an empirically validated theory of meaningful learning (Ausubel et al., 1978). Nevertheless, assumptions abound about the value and the potential of the computer as a teaching tool.

In addition to CALL, the growing emphasis on communication—the use of language for purposes beyond merely getting the right answer—has caught the attention of language teachers. Communicative language teaching aims at incorporating a continuous process of expression, interpretation, and negotiation (Savignon, 1983), and at concentrating on the genuine exchange of information. Practice no longer means mindless repetitions of isolated sentences. The emphasis of practice is not on its quantity but on its quality. Research on meaningful practice has revealed that the meaningful use of language with carefully graduated practice results in both better attitudes toward instruction (Ommaggio, 1982) and better achievement (Jarvis & Hatfield, 1971; Savignon, 1972; Schaefer, 1979).
In the communicative classroom, however, most of the attention appears to have been given to meaningful practice opportunities in listening and speaking. Pederson (1985) stipulates that the reason for this imbalance is that reading is covert and private by nature, and thus many language teachers find that 'intervening' in the reading process is difficult and time-consuming (p. 2). Omaggio (1986) also states that "the reading task often becomes a laborious decoding process, mainly because they lack knowledge of the code, as well as knowledge of the cultural context of the reading material, which can often be as foreign as the language in which they are reading" (p. 150). This tendency seems especially salient in the case of languages that have different orthographies than English, such as Japanese.

Taking advantage of the computer's specific coding system, we can facilitate this private and individual practice in reading by the use of CALL. The display of the text can be manipulated to guide the reader to a specific paragraph or sentence. When a reading task includes recognizing different orthographies, a low-level processing exercise such as letter recognition and word recognition with immediate feedback can facilitate the automatic recognition process. Pederson (1985), for example, asked high-level adjunct questions during CALL reading practice in French to facilitate overall reading comprehension.

Statement of the Problem

The majority of CALL studies have compared CALL programs to other methods of instruction or have simply evaluated the effectiveness of CALL
programs (e.g., Adams & Rosenbaum, 1969; Barrutia, 1970; Dursky, 1984; Lozano et al., 1985; Mellgren, 1983; Schrupp et al., 1985; Teichert, 1985). Mellgren (1983) investigated the effect of computer practice on the achievement of junior high school students of Spanish. He found no difference between the treatment group that completed written tasks with paper and pencil and the experimental group that performed all assignments on the computer. Schrupp et al. (1983), attempted to show learning gains from the use of the interactive video (IAV) and claimed that IAV treatment increases learning. The generalizability of the results of their study, however, is questionable because the same comprehension questions were used for practice in diverse treatments and reused as the dependent variable. Because the experiment was seriously skewed in favor of the IAV treatment group, its internal validity is questionable. Lozano et al. (1985) compared CALL with the language laboratory in the study of Spanish at the college level and concluded that the CALL group performed better than the language laboratory group only in writing skills. Although great effort was made to keep the two treatment conditions identical except for the differences in media, the mode of practice was not delimited, and thus, the results cannot be generalized.

These comparative studies have serious limitations. First of all, there is no way to replicate the conditions of the experiments, and the results therefore lack reliability. Secondly, the cause-and-effect relationships that many of the researchers were looking for could not be established for the very reason that their research efforts focused on the comparison of two different methods or media of instruction.
Pederson (1987) contends that "CALL, in and of itself, does not result in more and better learning; rather, it is the specific way instruction is coded in CALL software that has the potential of affecting learning positively, for specific learners in specific contexts" (p. 107). This opinion is supported by several other researchers (e.g., Clark, 1983; Salomon, 1979; Schramm, 1977). What is important is the content of the software and the particular codes or code systems facilitated by a medium, not the medium used in instruction.

Evaluative research attempts to achieve practical objectives such as the selection of CALL materials for a specific school curriculum. It includes creating guidelines for establishing the validity of software packages (Steffin, 1983), conducting surveys on CALL software (Hope, 1982; Moore, 1983; Simonsen, 1985) and analyzing CALL software needs (Fought et al., 1986). Although the importance of evaluative research should not be diminished, it does not add to our knowledge base of existing theories of language learning.

In the field of Japanese as a Foreign Language, more and more CALL software has been made commercially available as the popularity of Japanese increases. Many of these CALL Japanese programs are related to reading instruction in Japanese (e.g., Ariadne Language Link, Japan, 1992; Ayumi software, 1992; Hadamitzky with Spahn, 1992; Hirata, 1990 & 1992; Hyperglot Software, 1992). CALL basic reading research in Japanese is, however, almost non-existent. The disturbing fact is that these programs have been developed with little CALL basic reading research background and theoretical, pedagogical reading research background in Japanese. Diamond (1980) postulates that instructional design throughout its history has based its success
on hunches and personal experience.

In sum, comparative research that attempts to show the superiority of computers over other forms of media for the delivery of instructional materials should be abandoned. There is an urgent need for basic CALL research that provides explanatory data and adds to the existing knowledge of theoretical bases for second and foreign language learning. The nature of the learners, their perception of the task, and the way the learning material is delivered to them by the computer are important variables in determining the outcome of learning. These three variables must be investigated in a variety of contexts in future CALL basic studies. The CALL materials developed with little research evidence and pedagogical background need to be examined and evaluated carefully.

Significance of the Problem

Regardless of the considerable technological advances in recent years and the enthusiasm to incorporate CALL in the second and foreign language teaching curriculum, little basic CALL research has been conducted (Johansen & Tennyson, 1983; Pederson, 1986; Robinson et al., 1985; Schaeffer, 1979). Basic CALL research needs to include the investigation of the way students best learn a second or foreign language. The lack of empirical theoretical support for foreign language pedagogy has long been a criticism of language teaching practice and has contributed to the infamous pendulum swing from one methodology or medium to another. As Jarvis (1983) postulates, basic research needs to integrate what is already known about language learning
into the discussion of how this new knowledge supports, refutes, or elaborates the existing theoretical base.

One of the most important, yet least investigated variables in CALL research is the realm of learner variables (Goodman, 1978). The study of individual learner variables is complex, and the results of this research are not entirely satisfactory. This is partly because of the vagueness of many of the concepts that have been investigated (Ellis, 1986). This difficulty is reflected by a common thread in the research literature which indicates that the tests or instruments chosen to measure a particular construct may not be valid. Another reason lies in the inter-relatedness of various factors. It is difficult, for example, to distinguish variables relating to self-esteem and personality or even age and motivation. Individual learner variables, however, must be incorporated in basic CALL research because different learners are affected in different ways by the use of a given coding element, and by their perceptions of the task expectations related to the use of instruction that is transmitted via a given coding element (Salomon, 1979). Again, little CALL research has been conducted to provide a support for Salomon’s hypothesis.

The present study focuses on the effects of a learner’s affective variables such as discomfort and risk-taking in the second or foreign language classroom, the effects of types of CALL adjunct questions, and the effects of CALL pacing on the reading comprehension of intermediate learners of Japanese. Despite the rapidly growing popularity of Japanese in the United States in the past several years, few crosslingual research efforts have examined the reading behaviors of native and nonnative learners (Harada, 1988; Koda, 1988; Tabuse,
1991). Several studies have examined reading processes in Japanese, but these studies are generally limited to clinical observation (e.g., Sakamoto et al., 1968; Sasamura, 1974; Sasamura & Fujimura, 1971; Yamadori et al., 1983), psychological experiments (e.g., Morikawa, 1981; Muraishi et al., 1963; Nomura, 1981; Rai, 1967), or first language acquisition studies (e.g., Hatano, 1986; Muraishi, 1976; Stenberg & Yamada, 1979; Takagi, 1980). In the case of CALL studies on reading Japanese, research-related literature is even more scarce, although some effort has been made to introduce CALL programs using certain authoring languages (Ashworth & Stelovsky, 1989; Hirata, 1990; Nakajima, 1988). The need, therefore, for inquiry into the reading process is urgent.

The Purpose of the Study

This study has three purposes. The first is to investigate the effects of a learner's affective variable characteristics (e.g., discomfort felt in class and risk-taking characteristics) on reading comprehension in Japanese with different types of adjunct questions and pacing. A considerable number of studies have investigated the relationship between language learning and affective variables (e.g., Bailey, 1983; Beebe, 1983; Brown, 1980; Ely, 1988; Kleinmann, 1977; Guiora et al., 1972; Samimy, 1984; Samimy & Tabuse, forthcoming). There is no research evidence that suggests a direct relationship between the learner's affective variable characteristics and the learner's reading performance. It is hypothesized, however, based on Salomon predictions, that the learner's reading performance reflects the learner's affective variable characteristics with
the two CALL experimental conditions (i.e., the types of adjunct questions and the pacing), and the types of CALL adjunct questions and CALL pacing will interact with the related learner differences and related learning tasks. The relationship between the learner's affective characteristics and the learner's performance on reading comprehension may become closer when classroom reading instruction is conducted in the oral form in the target language. Reading instruction in the oral form is a fairly common practice among languages where learners have to switch orthographies. In these classrooms the teachers often check the learner's knowledge of reading at various levels such as at the letter level, word level, sentence level, and so forth. Understanding the pronunciation of a word or Kanji compound is assumed to be important for the memorization and retention of the word or compound (Ogawa, 1991). The proposed research is the first study to investigate relationships among the learners' affective variables, different types of CALL adjunct questions, and different types of CALL pacing. The first research question therefore concerns the learner's affective variable characteristics:

Is there a significant difference due to the extent of the learner's affective variable characteristics on the reading recall measure of intermediate Japanese readers with different types of CALL adjunct questions and CALL pacing?

The second purpose is to investigate the effect of different types of adjunct questions: high-level questions versus low-level questions on reading comprehension in Japanese with CALL. High-level adjunct questions tap certain ideas of more central importance to the text than others. Low-level adjunct questions tap certain ideas of less central importance to the text than others. This viewpoint is based on the concept of "idea units" (Bernhardt, 1983;
Meyer, 1975) which postulates that “texts have internal structures and can therefore be broken down into idea units” (Bernhardt, 1983). Some evidence already exists in research with CALL in French as a foreign language indicating that high-level adjunct questions indeed facilitate reading comprehension (Pederson, 1985). “The higher-level questions during reading practice may very well serve to inform students what they are to look for as they read (process at a high-level: insertion by the author) rather than for discrete bits of information” (Pederson, 1985, p. 3). The proposed study will be the first to investigate the effect of the types of adjunct questions on reading comprehension among nonnative intermediate-level readers of Japanese using CALL. The second research question is as follows:

Is there a significant difference between high-level adjunct questions and low-level adjunct questions in CALL reading material on the reading comprehension of intermediate Japanese readers?

The third purpose of this study is to investigate the effect of pacing: a moderate amount of external pacing versus learner controlled pacing. One of the canons that guides the design of microcomputer-based instructional programs is the use of a self-paced instructional method. However, some studies have shown that when students control the amount of instruction they receive, they often quit too soon and fail to learn what they should (Stevens, 1982). Kadesch (1981) introduces the notion of self-pacing as opposed to instructor-imposed constraints on pacing, and suggests that self-pacing is unimportant if not detrimental to learning.

Belland, et al. (1985) have investigated the effectiveness of self-paced instructional methods in learning about the function of the heart and have found
that moderate levels of external pacing are more effective for overall learning in terms of amount of content acquired and level of competency achieved with that content. In the field of second and foreign language learning, theory would also favor a mid-way position that allows both learner control and program control (Robinson et al., 1986). The proposed study will be the first to investigate the effect of pacing in the form of program-controlled text display time on reading comprehension of Japanese using CALL. The third research question is:

Is there a significant difference between external pacing and self-pacing of reading texts in CALL reading material on the reading comprehension of intermediate Japanese readers?

**Definition of Terms**

**Affective Variables:** Variables related to feelings and emotion: attitudinal, motivational and personality factors in second and foreign language acquisition. This research specifically focuses on task-specific affective variables of intermediate level Japanese learners. The degree of anxiety, self-consciousness, or embarrassment felt in the classroom will be assessed by *Language Class Discomfort* (Samimy & Tabuse, forthcoming) based on the instrument developed by Ely (1986), and *Language Class Risktaking* (Samimy and Tabuse, 1992) based on the instrument developed by Ely (1986), and *Language Class Sociability* (Samimy & Tabuse, forthcoming) based on the instrument developed by Ely (1986).

**Adjunct Questions:** Questions designed to appear after each paragraph on the CALL reading program to induce the reader's response, and thus to stimulate
the reader's thinking process. There are both high-level adjunct questions and low-level adjunct questions. High-level adjunct questions tap ideas that are high in the hierarchy of idea units. In this study they are the paragraph-level questions that ask the main idea of the paragraph in the form of "What was this paragraph about?" Low-level adjunct questions tap ideas that are low in the hierarchy of idea units. In this study they are the word-level questions that ask the meaning of a word in the paragraph. The method and procedure of breaking the reading text into idea units follows the guidelines established by Bernhardt & James (1987).

**Computer-Assisted Language Learning (CALL):** Instruction that uses various media that a computer can generate and is interactive (i.e., the software provides instruction or stimuli, the subjects responds, and the software provides feedback to the subject concerning his or her response.) In this study, the subject read a paragraph in Japanese followed by an adjunct question, the subject responded to the question, and the computer provided brief feedback to the subject's response. A Macintosh llsi was used as the hardware, and Authorware interfaced with KanjiTalk and Super Paint was used as the software to create the CALL reading practice program.

**Experimental Text:** A text selected from a collection of reading material for the intermediate-level readers of Japanese created by Japanese instructors at The Ohio State University. The topic of the text was "school lunch." The text was divided into three paragraphs. There were 69 words in the first paragraph, 80

**Foreign Language Reading Comprehension Ability:** The subject's ability to comprehend a reading passage in the second or foreign language. This ability was determined by the subject's score on the immediate recall protocol. The scoring procedure follows the guidelines established by Bernhardt and James (1987).

**High-level Adjunct Question:** High-level adjunct questions tap certain ideas of more central importance to the text than others. (See Idea Units for a detailed explanation.) In this experiment the high-level questions used were paragraph-level questions. One high-level question was asked after each paragraph of the experimental text in this condition.

**Hiragana:** One of the orthographies used in Japanese reading texts. One Hiragana letter represents one mora (i.e., the shortest independent sound unit in Japanese). Hiragana is used to write both grammatical morphemes and words when Kanji is not used. Hiragana used in the experimental reading text in this study are selected from all 107 syllables including contracted sounds, and numerous combinations of double consonants.
**Idea Units:** Units that constitute different levels of ideas in texts. Bernhardt (1983) and Meyer (1975) state that texts have internal structures and can be divided into a hierarchy of ideas with certain ideas of more central importance to the text than others. In this study each paragraph was divided into idea units and numbers from “1” to “4” were assigned to each unit; “4” being the most important unit and “1” being the least important unit to comprehend the passage. Three linguists scored the idea units and the inter-rater reliability was 93%.

**Immediate Recall Protocol:** A measure of the student’s comprehension of an expository Japanese text they have read. The subjects write down in their native language (or the language in which they feel confident) everything they can remember about the text immediately after reading it.

**Kana:** A written character (derived and simplified from Chinese writing) used to represent Japanese syllables. Each mora has a one-to-one correspondence to a grapheme. Kana includes both Hiragana and Katakana.

**Kanji:** An idiographic character of Chinese origin representing a lexical morpheme of Japanese. The number of Kanji is said to be around 50,000 (Nippon by Shin Nippon Steel, 1982). In this research, approximately 34 carefully selected Kanji are used in the reading texts.

**Katakana:** One of the orthographies used in written Japanese. Katakana is
used to transcribe foreign words, names, and Japanese onomatopoetic expressions. Katakana used in the reading texts in this study are selected from all 107 syllables including contracted sounds and numerous combinations of double consonants.

*Language Class Discomfort*: This instrument is designed to measure the degree of anxiety, self-consciousness or embarrassment felt when learners speak Japanese in the classroom. The scale consists of five items, each of which is followed by a six-point Likert response scale, with the alternatives labeled: "strongly disagree," "moderately disagree," "slightly disagree," "slightly agree," "moderately agree," and "strongly agree." Neutral choices such as "No opinion" and "Don't know" were not included in the scale to avoid the ambiguity these choices create as well as the possible abuse of these items by the subjects.

*Language Class Sociability*: This instrument is designed to measure the degree of willingness to interact with others in the Japanese language class by means of Japanese. The scale consists of five items, each of which is followed by a six-point Likert response scale, as in the case of *Language Class Discomfort*. Neutral choices such as "No opinion" and "Don't know" were not included in the scale for the same reason described in *Language Class Discomfort*.

*Language Class Risktaking*: This instrument is designed to measure a
student's tendency to assume risks in using Japanese in the Japanese language class. The scale consists of six items, each of which is followed by a six-point Likert response scale. Neutral choices such as "No opinion" and "Don't know" were not included for the same reason stated in Language Class Discomfort.

Low-level Adjunct Questions: Low-level adjunct questions ask questions about certain ideas of less central importance to the text. (See Idea Units for more details.) In this experiment low-level adjunct questions are equivalent to word-level questions. One low-level adjunct question was asked after each paragraph of the experimental text in this condition.

Assumptions

1 The Japanese CALL reading program developed by the researcher is a valid means of investigating the subject's reading comprehension.

2 The students' ability to write a free-recall protocol about an expository text is a valid way to measure their ability to comprehend that text.

3 The subjects possess basic reading skills in Japanese including the ability to read in Japanese orthographies (i.e., Hiragana, Katakana, and Kanji).

4 The students will complete the recall protocols to the best of their ability.

5 The students will complete the questionnaires concerning affective variables honestly and to the best of their ability.
Limitations

1. This study is designed to provide additional information about the effects of types of adjunct question, pacing, and learner characteristics on reading comprehension in a foreign language using CALL. Although no definitive conclusions can be made on the basis of one study alone, types of adjunct questions and pacing can be manipulated in many different ways.

2. Because the expository text to be used will be selected by the investigator, the results can be generalized only to texts that have similar characteristics.

Theoretical Bases

Salomon's Theory

The theoretical base of this study is Salomon's model (1979). This model takes into account the three important variables in mediated instruction: the learner, the learning task, and the coding elements. Salomon (1979) defines a medium as "cultural apparatus for selecting, gathering, storing, and conveying knowledge in representational forms" (p. 3). A medium is made up of many symbol systems and a symbol system consists of coding elements. One of the computer's symbol systems, for example, is the display. The computer's display consists of such coding elements as color, print size, graphics, format, and clarity. The effect of an attribute of a medium on learning can be operationalized when individual attributes are isolated. The subcategories of a
medium's symbol system (i.e., coding elements) are not invariant. A coding element such as "random access," for example, can be utilized in such media applications as videodisc, slide presentation or flash cards. No coding element can be attributed solely to one medium.

The learner's perception of what is supposed to be learned will determine the effect of a given coding element. Salomon (1979) asserts that students have selective attentions and that they assume that the ways in which CALL is presented deserves special attention. Then they extract the information from CALL materials in such a way that the task will be completed in the best way possible. Effective CALL instructional materials, therefore, utilize the coding elements that learners perceive and that help more in the task they perform.

Two assumptions are made about learner variables. First of all, because learners vary in their ability and willingness to adapt to task and coding demands, a specific use of any coding element will not be the best for all language learners. Secondly, some interaction will appear among aptitude, task, and coding elements. Salomon advocates, in the research design, the choice of a coding element that seems to correspond to the mode of internal representation that an individual can utilize.

Pederson (1987) lists five basic tenets of Salomon's theory:

1. The ways a medium stores and delivers instruction (its coding elements) rather than the medium itself stand the best chance of affecting cognition.

2. These coding elements often mirror or activate a cognitive subskill in human learners (focusing, organizing, highlighting). These subskills are
often those most affected in students as a result of the use of the coding element.

3 Different learners are affected in different ways by the use of a given coding element.

4 Different learners are affected in different ways by their perceptions of the task expectations related to the use of instruction that is transmitted via a given coding element.

5 A medium's coding elements often will interact with related learner differences and related learning tasks (p. 111-112).

The Reading Model

The reading model that is the basis of the proposed research is the bottom-up, reader-based model proposed by LaBerge and Samuels (1974). The model denotes that reading involves two subtasks: decoding and comprehension, and both of them require attention. The decoding process requires much attention for beginners, which leaves little to be devoted to comprehension (Kamil, 1986). Through ample practice this decoding skill becomes automated and more attention is available for comprehension. This model posits three stages that are linear and hierarchical. The first stage involves visual memory. The readers need to be able to identify and differentiate among letters. For example, the readers need to know the difference between 'p' and 'q,' or in the case of Japanese Hiragana '㇏ (ha)' and '㇐ (ho). The difference between the two Hiragana is one upper right hand stroke. If this difference is not clear, the reader will have difficulty differentiating
between はる (haru--meaning "to paste," "spring," or "stretch," among others) and はる (horu--meaning "to dig," "to carve," among others). The second stage involves the rapid identification between groups of letters such as さけ (sake--meaning "rice wine" or "salmon") and けさ (kesa--meaning "this morning" or "surplice"). The third stage denotes the reader's ability to recognize larger clusters at a time, ignoring certain words when the context dictates meaning.

Perceptual, linear models of the reading process seem to be simplistic and do not account for many more interacting factors involved in the reading process. Perceptual questions are, however, "particularly relevant to research with readers who must switch orthographic or logographic systems in acquiring reading skills. A credible hypothesis is that the apparent inherent difficulties in the learning of non-Western languages and of languages in non-Roman alphabets may be due partially to a set of developmental, perceptual stages through which readers must progress in order to reach a level of preparation for comprehension" (Bernhardt, 1986: p. 97).

Reading Comprehension

The reading material that will be designed and used in the proposed experiment is based on the viewpoint that reading comprehension is an active and constructive process (Anderson & Pearson, 1984; Bernhardt, 1987; Rumelhart, 1980; Schank, 1984). The reader relates new or incoming information to that which is already stored in his memory (Anderson & Pearson, 1984).
The viewpoint held by generative-transformational theory, i.e., that reading comprehension is a process of breaking down complex language units into simpler ones (Chomsky, 1965), is disavowed, because "meaning does not reside in words, sentences, paragraphs, or even entire passages considered in isolation" (Spiro, 1980, p. 245).

Comprehension is also viewed as a process of taking multiple units of language and building them into a cohesive conceptual representation (Bransford & Franks, 1981; Bernhardt, 1987). A reader's comprehension will depend on how he is able to restructure the information in the text with his conceptual representation, known as a discourse model (Bernhardt, 1986).
CHAPTER II
LITERATURE REVIEW

Experimental Research on CALL

Several research efforts have investigated the effects of learning tasks using the computer as an instructional medium on second or foreign language acquisition. Robinson et al. (1985) postulated several hypotheses concerning the ways in which the computer's coding variables may affect the students' learning gains in Spanish. The purpose of the study was to investigate the relative effectiveness of varying methods of foreign language content presentation and error feedback to students. Differences among pedagogical methods were examined in order to clarify the specific research question, “What does meaningful language instruction mean?” (p. 32). Six pedagogical, content hypotheses and four feedback hypotheses are described in Table 1.

First-year Spanish students at Montera junior high school (Oakland, California) participated in the experiment as subjects. For two weeks, during the normal 50-minute-period Spanish instruction, students went to the computer laboratory established for the experiment. Students also participated in a large battery of pretests, ongoing tests, and posttests. The tests included measures of language aptitude, language ability, and criterion-referenced achievement. Proficiency was not measured due to the short period of instruction. Text means
were used to compare the difference between the experimental and control groups on overall achievement gain scores. An analysis of covariance was used to investigate the influence of prior knowledge, aptitudes, and attitudes on achievement. They concluded that the experimental group significantly outperformed the control group on the cumulative post achievement test gain scores. They also concluded that the best predictors of achievement for all students, regardless of the treatments, were interest and enjoyment of Spanish in comparison to other subjects (a pre-measure on the students' attitude questionnaire).

The conclusions, however, must be interpreted with caution due to the misleading statistical analysis and inappropriate assumptions. First of all, the report reveals no statistical difference, as measured by a t-test, between the means of the experimental and control groups on overall achievement gain scores ($p>.32$). The experimental treatment, therefore, had no more effect on overall gain than did the control treatment.

Secondly, it is doubtful that this study has clearly isolated and defined the constituents of effective instruction. The subjects went through different treatments everyday for nine days. The carry-on effects of the experiment, however, were not controlled. Thus, one cannot establish the cause-and-effect relationships among variables. Nevertheless, this research emphasized the variables that have strong theoretical bases and provided an important first step in the field of CALL basic research.
<table>
<thead>
<tr>
<th>EXPERIMENTAL GROUP</th>
<th>CONTROL GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Student Discovery of Error Correction</td>
<td>1. Program Disclosure of Error Correction</td>
</tr>
<tr>
<td>error location</td>
<td>correct answer</td>
</tr>
<tr>
<td>error location with hints</td>
<td>correct answer with explanation</td>
</tr>
<tr>
<td>2. Implicit Feedback</td>
<td>2. Overt Feedback</td>
</tr>
<tr>
<td>3. Student Controlled or Combined Help</td>
<td>3. Program Controlled or No Help</td>
</tr>
<tr>
<td>4. Rephrasing and Recycling of Missed Items</td>
<td>4. No Recycling or Repetition at End</td>
</tr>
</tbody>
</table>

Pedagogical, content hypotheses and treatments

| 1. Known Others                                        | 1. Anonymous Characters                           |
| 2. Integrated Material                                 | 2. Non-Integrated Items                            |
| 3. Emotional/Humorous Content                         | 3. Dry Fact                                        |
| 5. Background Content: Student Choice through Menu     | 5. Program Designation                             |
| 6. Problem-Solving Activities                          | 6. Descriptive Activities                          |
Another CALL experiment conducted by Pederson (1986) investigated the effect of passage availability on reading comprehension in French. One of the research hypotheses, which was derived from Salomon’s theory (1979), is that removing the passage would induce a higher-level processing in second-language readers, and thus result in higher retention of the material presented in a reading text. The A x B x C factorial design, each with two different treatments (i.e., passage availability versus passage unavailability, lower-level versus higher-level comprehension question, and low versus high verbal abilities) was used for statistical analysis of the data. All students read the same text but, depending on the random assignment to treatments, answered different types of questions with different passage availability conditions.

The results of the study indicate that passage unavailability during the answering of comprehension questions led to more retention; low verbal ability subjects showed less capacity to derive learning benefits from passage unavailability than did high verbal ability subjects; and those who answered higher-level questions recalled much more than those who practiced lower-level questions.

There was no indication as to whether the students were informed of the recall protocol before they read the passage or not. This may become a threat to the validity of the study. Because the types of adjunct questions asked have a “shaping” effect (Jarvis, 1970; Rivers, 1980), it is naturally expected that the group which received lower-level questions would not obtain high scores when higher-level processing tasks such as recall protocol were used to measure the subject’s reading comprehension ability.
Pederson's experiment is also based on a theory of language learning and it focuses on the important notion of "meaningful practice" using the computer. This study has illustrated that the particular use of a specific computer coding option could result in learning gains that are statistically significant for both high and low verbal ability subjects. It has also provided us with insight and evidence to tap effective instruction using CALL in second or foreign language teaching.

Belland et al., (1985) conducted a study on microcomputer-based instruction on learning about the parts and operation of the human heart with 100 college students as subjects. Their study is based on current learning theories, especially that of Wittrock's (1979) generative learning model based upon cognitive psychology. The model postulates four key factors affecting cognitive information processing: "(1) semantic and abstract processes in memory, such as schemata, rules, and algorithms; (2) distinctive or episodic memories, such as images or verbal memories; (3) attention; and (4) motivation" (p. 9). Belland et al. (1985) state that "two key elements directly affecting learning are attention and motivation. It is likely that locus of control over instructional program pacing will have a direct effect upon attending behavior and motivation. In other words, if moderate external pacing of an instructional program can increase attention and motivation, the learner should acquire more information in less time than he or she would in self-paced instructional program" (p. 186).

The purpose of their study was to test the following three hypotheses: (1) moderate levels of external pacing of a microcomputer instructional program
would result in more effective learning in terms of both the amount learned and level of competency in using the newly learned content; (2) moderate levels of external pacing would improve the overall time efficiency of learning that instructional content; and (3) lower achievers may not select options for more instruction, but may have to be forced into an elaborate feedback loop after making a series of errors. Four levels of the between subjects factor were used to test the first hypothesis: (1) self-paced program, (2) externally-paced program, normal reading speed, plus cognitive processing time, (3) externally-paced program, normal reading speed, no cognitive processing time, and (4) control. The within-subjects factor had five levels: (1) List learning test, (2) spatial learning test, cued-recall, (3) simple concept learning test, (4) complex concept learning test, and (5) spatial learning problem, free recall test. The second hypothesis was tested by measuring the overall time each subject took to complete the instructional program. The third hypothesis was tested by collecting the number of times each subject selected an option for feedback. They found that moderate levels of external pacing in a microcomputer instructional program resulted in more content learned and a higher level of learning than was achieved by subjects using a self-paced instructional program; an externally-paced instructional program allowed for more efficient learning than that yielded by the self-paced program. When an error was made on an activity question during instruction, higher achievers selected elaborate feedback significantly more frequently than low achievers.

The benefits of self-pacing have been the basis of many instructional systems (e.g., Atkinson, 1968; Glaser, 1968; Keller, 1974; Skinner, 1958), and
the idea of self-pacing has been generally accepted as a means to adjust for individual learning differences. The study by Belland et al. (1985), however, refuted the idea that self-pacing is beneficial to learning in general and supported the most current empirical research that stipulates the benefits of external pacing (e.g., Gropper, 1964; Reiser, 1984; Stevens, 1982).

Reading Research with Japanese and English Subjects

Koda (1989) replicated the word recognition study by Cunningham and Cunningham (1978) to investigate the consequences of phonological inaccessibility on logographic (meaning-based) readers, such as Chinese readers and Japanese readers with Kanji, reading a second language written in sound-based scripts, such as English and Spanish.

Experimental psychologists (e.g., Lieberman, et al., 1977; Nomura, 1981; Rozin, et al., 1971; Sasamura, 1984; Trenman, et al., 1981) have suggested that readers of meaning-based and sound-based orthographies use different word recognition strategies in their first language because of the different nature of representation in each type of orthography. Short-term memory studies (e.g., Baddeley, 1966; Erickson, et al., 1972; Mou & Anderson, 1981; Yik. 1978), however, revealed the dominance of acoustic encoding regardless of orthographic differences. Koda (1989) postulates "it can be concluded then that the chief difference between readers from differing orthographic background will be in the strategies used for obtaining an acoustic code for lexical items. Specifically, readers of sound-based orthographies will tend to obtain lexical sounds by direct analysis of phonetic elements whereas readers of meaning-
based orthographies will tend to obtain lexical sounds in indirect ways, such as memory search and association" (p. 134).

It is hypothesized that L1 reading strategies are transferred to L2 reading and that readers of meaning-based orthographies reading sound-based scripts as L2 will not obtain lexical sounds through phonetic analysis as extensively as readers of sound-based orthographic backgrounds. Therefore, phonological inaccessibility will not have as much negative impact on logographic readers as sound-based readers.

The study of Cunningham and Cunningham (1978) was conducted with 16 graduate students and 41 5th and 6th graders who were all native readers of English. Each group was divided into two subgroups and each subgroup read a passage containing either a set of pronounceable or unpronounceable words. The age and grouping were two independent variables and reading time, name comprehension scores, and picture comprehension scores were dependent variables. A 2-way MANOVA was used to analyze the data. They found that the main effects were significant for reading time and name comprehension, but no significance was found for the picture comprehension.

Koda replicated this study with 26 Japanese university students who came to the United States to study English. In her study, there was one independent variable, treatment condition (i.e., pronounceable versus unpronounceable words). The results of the study indicate that L1 reading strategies are transferred to L2 reading involving a different orthography. With Japanese readers for whom phonological recoding is not a common strategy, other strategies, such as association, are more typically used to obtain lexical
sounds in their L1 reading, and thus when they read English as a second or foreign language, they will not obtain lexical sounds through phonetic analysis as extensively as native English speakers.

The second language background of the 26 Japanese university students are not revealed in her study. It is, therefore, not certain if the L1 reading strategy transfer occurs with readers at different levels of proficiency. Koda’s study involves word recognition strategy. Studies that investigate the transfer of L1 reading strategies to L2 at different levels of reading (i.e., at a letter recognition level, at a sentence level, at a paragraph levels and at a discourse level) and possibly in longitudinal and cross-sectional contexts need to be conducted to generalize the results of this study. This study has presented a theoretical basis for reading strategies involving different orthographic representations.

Harada (1988) investigated the effects of three different orthographic presentations on the reading behaviors and reading comprehension of native and nonnative readers of Japanese at different proficiency levels using an eye tracking methodology. The three different orthographic representations are: (1) combination of Kana and Kanji without spacing (normal text), (2) Kana only with spacing at both ends of the meaning unit that are in Kanji in the original normal text (both spacing and Kana representation of reading of Kanji, replacing Kanji), and (3) Kana only without spacing. These three different types of orthographic representations and English text constituted four levels of independent variables. Another independent variable was grouping, which had three levels: (1) native group, (2) nonnative intermediate group, and (3) nonnative beginning
group. The dependent variables were (1) fixation frequency, (2) regressive fixation frequency, (3) average fixation duration, and (4) reading comprehension assessed via immediate recall protocol.

The theoretical framework of Harada’s study was the perceptual model offered by LaBerge and Samuels (1974). This model is text dependent, or bottom-up, and relies on notions of perception of print per se. The model posits several linear stages. The first stage involves initial distinction of the features of letters. This stage is termed ‘optimization of attention’ or the rapid distinguishing between groups of letters, and the later state, “increasing economy,” denotes a reader’s ability to ignore certain words when context mandates their presence. This model is “particularly relevant to research with readers who must switch orthographic or logographic systems in acquiring reading skills” (Bernhardt, 1986, p. 97).

The subjects read texts written in three different orthographic representations via an eye tracking device and wrote down everything they could remember. The interval between the first and second reading sessions was two weeks, with three weeks between the second and third reading. In order to control the carry-over effect of repeated readings, the six possible orders of reading three Japanese texts were completely randomized among subjects within each group.

The results of the study suggest that “as L2 readers of Japanese advance in their skill for dealing with the Japanese orthography, Kanji, first functions as semantic codes. As the L2 readers develop more familiarity with the language and its orthography, and as the association between meanings and Kanji
become automatic, Kanji provide another function as visual markers of meaning boundaries until, finally, both function automatically at the same time, as occurs with native readers" (Harada, 1988, p. 127). The eye movement results also suggest that the duration and frequency of fixations differ according to the subject's proficiency. The intermediate group, for example, used more fixations and regressive fixations than the native group, while the beginning group did not show any strategies except for longer fixation duration.

The results of Harada's study must be interpreted with caution. There are two methodological concerns involving each independent variable used in her study. The first methodological concern is the use of space in Text II. It is assumed that the difference between Text II (i.e., the Kana text with spacing at meaning boundaries) and Text III (i.e., the Kana text without spacing) indicates the effect of Kanji as meaning boundary markers. The spacing of the verbal phrases used in Text II, however, includes inflections of the verbs, and therefore represents more than just Kanji boundaries. In order to assess the real effect of Kanji, a space is needed between the Kana that represents Kanji and the Kana that represents the inflection within the verbal phrase. This extra space might affect the reader's reading process significantly because of the possible confusion of the same syllabary indicating different function of the sentence.

The second methodological concern is the grouping of the nonnative subjects. "The undergraduate students were grouped as nonnative beginning readers, and the graduate level students were grouped as nonnative intermediate readers. Each student's recognition knowledge of Kanji was measured, and one subject was re-grouped from beginning group to the
intermediate group" (p. 45). The students' status (i.e., graduate students versus undergraduate students) and the recognition knowledge of Kanji of the subjects may not accurately assess the subjects' reading proficiency in Japanese. A Japanese learner who studied Chinese prior to studying Japanese, for example, is very likely to score high in the Kanji recognition test, because of the fact that Kanji originated from Chinese characters, and there are many Kanji which have the same meanings as in Chinese. The learner, however, may not be a proficient reader in Japanese. Other methods such as the subject's reading proficiency scores and the subject's prior language background might help accurately assess his or her reading level and thus facilitate a more accurate grouping.

Nonetheless, Harada's study has provided valuable baseline eye-movement data from native and nonnative readers of Japanese, and is an important first step toward understanding the effects of different orthographic representations of texts on the reading process in Japanese.

Tabuse (1991) examined the behavioral differences between native readers and nonnative readers of Japanese in reading Japanese text written in Kana. The study focused on two questions: (1) do native readers of Japanese devote more attention to content words than to function words as in the case of English (Carpenter & Just, 1983); and (2) do nonnative readers of Japanese reveal different behaviors than the native readers? These research questions were generated from several reading studies that focused on the reader's attention to content words versus function words. Using an eye-tracking methodology, Carpenter and Just (1983) found that native readers of English
attended to content words more than to function words. Their data suggest that in the case of English, skilled readers pay more attention to content words than to function words. In the case of German, Bernhardt (1986a) found a different trend among German readers. In the gaze duration protocols, native readers of German tended to devote more attention to function words than to the content words in the same phrase. Thus native readers appear to be gaining important information from functional elements. Bernhardt suggests that there are language specific reading behaviors that are not appropriate from language to language. Hatch et al. (1974) conducted three experiments with adult English native speakers and foreign students learning English as a second language to study the acoustic hypothesis and syntactic processing. Subjects in their study performed a crossout task, canceling letters in a text as they read it for comprehension. They found that native English readers marked letters in content words, especially the stressed syllables, while leaving function words unmarked. The nonnative readers, on the other hand, marked an almost equal number of letters in function and content words. Hatch et al. argue that unskilled readers need function words to understand the syntax of the sentence. Skilled readers, on the other hand, may simultaneously set up expectations about the identities of the words and their relationships in the sentence as the letters of the text are identified.

Tabuse's study (1991) is a replication of the study of Hatch et al. (1974). It was hypothesized that native and advanced level readers of Japanese who have mastered the linear stages of reading process will ignore certain words and thus their error rates for a crossout task in the sound-based Kana text will
be significantly higher than nonnative beginning level readers. The independent variable of this study is grouping: native group, nonnative intermediate group and nonnative beginning group. Nonnative subjects were divided into two groups according to their reading proficiency scores on a standardized Japanese proficiency test by the Educational Testing Services.

The subject's reading time, content word error rate (i.e., unmarked syllable), function word error rate (i.e., unmarked syllable), and comprehension score constituted the dependent variable. Data were analyzed using one-way ANOVA. The subjects were instructed to cross out all "💩" ("Kana indicating the syllable, "ni") that appeared in both content words and function words (i.e., particle) in the passage as they read. Their reading time was measured and an immediate recall protocol was used to measure the reading comprehension.

A significant difference between native readers and nonnative readers was obtained for reading time. Native readers required only 1/7 of the total reading time of the nonnative beginning group, and 1/4 of the nonnative intermediate group. The comprehension results among the groups showed no significant differences but indicated a trend. The native group comprehended better than the intermediate group, and the intermediate group comprehended better than the beginning group. The error rate for function words did not show a significant difference among groups but indicated a trend toward higher error rates among more skilled readers. The error rate for content words did not indicate a significant difference or trend, indicating that all the subjects appear to have paid attention to content words.

The results of the study, as in the case of Harada's study, supported the
perceptual reading models offered by LaBerge and Samuels (1974), as well as
the notion of "priming" or expectation described by Adams (1980) and Hatch, et
al. (1974). Native readers who could process Kana sentences automatically
before focusing on the meaning of the text read faster and comprehended
better. Native readers skillfully expected the syntactic and semantic elements in
the text and thus did not have to pay attention to every syllable. Less proficient
nonnative readers, on the other hand, had not yet been able to utilize the
priming processes effectively and efficiently, and thus needed to pay attention to
every mora and word to figure out the relationships between the words in the
text.

The small number of subjects (i.e., N=5) in each cell severely limited the
generalizability of this study. The use of Kana only text as the reading text also
limited its scope because authentic reading texts are usually written with both
Kana and Kanji, and several studies that investigated reading processes of
Japanese (e.g., Nomura, 1981; Saito, 1981; Sasamura, 1974, 1975, 1984)
suggest that different information processing procedures might be required for
Kana (sound-base) and Kanji (meaning-base) reading. Obtaining accurate and
reliable data requires appropriate tasks that tap different reading behaviors or
processes. Tabuse's research, however, provided valuable insights toward
understanding the reading processes of both native and nonnative readers of
Japanese.

Based on the results of recent research on reading comprehension of
Japanese and Chinese, Ogawa (1991) presents a global view to enhance
reading instruction with advanced-level readers. He focuses on the
significance of Harada's study, especially the fact that the Japanese native readers process *bunsetsu* (a clause consisting of combination of Kanji and Kana) as a unit of meaning, and suggests that the advanced-level readers need to be trained to process *bunsetsu* as a unit. As a result of this chunking process, the reading speed should improve. Ogawa also focuses on the importance of the function of sound when reading for comprehension. It is pointed out that when a structurally difficult text is comprehended, the reader has a tendency to depend more on the oral reading of the text than visual analysis of the structure (Conrad, 1972). It is also argued that the sound form of information works more efficiently than the written form in terms of the retention of the information in the memory system (Crowder, 1972; Ong, 1982). Ogawa then expands this superiority of the sound form to the explanation of a commonly shared experience by native and advance-level readers of Japanese. When native and advanced-level readers must process a new Kanji compound word, they are usually able to guess the meaning of the compound word but often feel uncertain about the meaning of the word until they are provided with the sounds for the Kanji compound word. He posits a hypothesis that the knowledge of sound supports the visual chunking process at a subconscious level.

Ogawa, in sum, states that “it is necessary to employ not only a variety of reading materials, but also instruction on reading strategies and processes in order to develop advanced reading ability. Reading strategies require skills such as intensive reading, speed reading, and extensive reading, as well as contextual inference. Reading processes include eye-movement to grasp *bunsetsu* as a unit of meaning, and knowledge of the readings of Kanji
compounds for better reading retention. An advanced reading curriculum should consist of activities to heighten students' awareness of reading strategies and processes, intensive and speed reading, and materials with overlapping vocabulary. Prereading activities also play important roles in generating active interactions between reader and text" (p. 135).

Review of the Studies on the Learner's Affective Variables

A considerable amount of research has been conducted on learner variables to provide a more holistic understanding of the second and foreign language learning process. Among learner variables, motivation and affective variables (e.g., anxiety, self-esteem, and risk-taking) are being recognized as potentially influential factors in successful second language learning (e.g., Brown, 1981; Ely, 1984; Gardner & Lambert, 1972; Samimy & Tabuse, forthcoming).

Ellis (1985) presents a summary of the results of the empirical research of motivation and attitudes based on Gardner and Lambert's (1972) theoretical framework:

1 Motivation and attitude are important factors which help to determine the level of proficiency achieved by different learners. For example, Gardner (1980) reports that a single index of attitude/motivation derived from various measures of affective responses to L2 learning is strongly related to measures of French proficiency in Canadian school leavers. Savignon (1976) claims that "attitude is the single most important factor in second language learning" (p. 126).
2 The effects of motivation and attitudes appear to be separate from the effects of aptitude. The most successful learners will be those who have both a talent and a high level of motivation for learning.

3 In certain situations an integrative motivation may be more powerful in facilitating successful L2 learning, but in other situations instrumental motivations may count for more. For example, Gardner and Lambert (1982) found that an integrative orientation was related to successful learning of French in both Canada and USA, but that instrumental motivation was more important in the Philippines. Lukmani (1972) found that instrumental motivation could be more effective than integrative motivation with the non-westernized female learners of L2 English in Bombay. Burstall (1975) found that the pupil's achievement in the NFER primary French project was closely associated with both types of motivation.

4 The level and type of motivation is strongly influenced by the social context in which learning takes place (p. 118-119).

Fillmore (1979) in a longitudinal study investigated the effect of social skills of five Spanish-speaking children learning English as a second language on their L2 proficiency rate, and found that those who found it easy to interact with English-speaking children progressed more rapidly than those who did not. This study of Fillmore is criticized by Strong (1983) who conducted a similar study with thirteen children who were also learning English as L2. Strong argues that it was not so much social skills that led the children to obtain more input, but it was the learner's ability to use English that led to faster learning.
Guiora et al. (1972a, 1972b) conducted an experiment to investigate the effects on pronunciation of a reduction in inhibition brought about by administering small doses of alcohol, and found that the subjects who received the alcohol treatment did better on pronunciation tests than who did not. They concluded that inhibition has a negative effect on L2 pronunciation. The alcohol treatment condition is, however, far removed from the realities of most classroom environments.

Chastain (1975) conducted a study to investigate affective characteristics on course grades in beginning-level college language courses. The learner's anxiety level, which was one of the three affective characteristics, was assessed by an anxiety scale that consisted of items from the Sarason Test Anxiety Scale and the Taylor Manifest Anxiety Scale. Chastain found that in Audiolingual classes, there was a strong negative correlation between the final course grade and test anxiety. In traditional language classes, however, the correlation was positive.

In the same realm of anxiety and L2 learning, Kleinmann (1977) investigated the avoidance behavior of two groups of ESL students (i.e., a Spanish-speaking group and an Arabic-speaking group). Using an adapted version of the Achievement Anxiety Test, Kleinmannn investigated the facilitating and debilitating effects of anxiety on learner's oral performance. His research suggests that avoidance of certain structures could be attributed to the learner's L1 but "... within the particular avoiding group, use of the generally avoided structure is a function of facilitating anxiety level of the group's members. The evidence, therefore, seems to support the notion that certain
affective measures influence learner behavior in a foreign language” (p. 105).

There are two major concerns with the studies on individual learner differences. First of all, it is not possible to observe directly qualities such as motivation, attitudes, and anxiety. These are labels for clusters of behaviors and different sets of behavioral traits. Many investigators have employed instruments for general personality traits rather than for situation-specific personality traits. Consequently, the construct and criterion validities of such instruments have been questioned, and the results of these investigations lack consistency in their findings (Samimy & Tabuse, forthcoming). The second concern is the fact that the bulk of the available research is correlational studies. One of the problems of correlational studies is that it is only possible to show a relationship, not the direction of this relationship between or among variables. Therefore we do not know whether it is affective variables such as motivation, for example, that produce successful learning, or successful learning that enhances motivation.

Recognizing the importance of measuring situation-specific affective variables, rather than general personality traits in foreign language classroom, Samimy and Tabuse (forthcoming) conducted a longitudinal study. They investigated the possible relationships among situation-specific affective variables, motivational-attitudinal variables, and proficiency of beginning Japanese students at the university level. Their study focused on seven variables: three situation-specific affective variables (i.e., Language Class Risktaking, Language Class Sociability, and Language Class Discomfort), Motivational Types, Strength of Motivation, Attitude to the Class, and Concern
for Grade. Each variable consists of a number of items ranging from two to seven, followed by a six-point Likert response scale.

Their study was inspired by the research conducted by Ely (1984) who investigated Motivational Type, Motivational Strength, and three Situation-specific Affective Variables which were hypothesized to influence classroom participation and proficiency of first year Spanish students. Ely created the situation-specific affective variables. Language Class Risktaking was defined as "a willingness or inclination to attempt new, difficult or complex utterances in the language class without a great deal of concern for prior practice or for absolute correctness" (p. 33). Language Class Sociability referred to "deriving pleasure from using the second language to talk with others in the second language classroom" (p. 36), and Language Class Discomfort as was defined as the degree of anxiety, self-consciousness or embarrassment felt when speaking the L2 in the classroom. In his study, Ely found that Language Class Risktaking to be a strong predictor of a student's class participation and proficiency.

In the first quarter, a series of questionnaires was administered to obtain information regarding the situation-specific affective variables described above and students' personal background, as well as previous experience with Japanese. The same questionnaire was administered in the last academic quarter to investigate whether or not there were any changes in the learner's situation-specific affective variables. The collected data were then analyzed using (1) a stepwise regression to determine the variables which had the greatest influence on the students' final grades in the first and the last quarters;
(2) the Pearson product-moment correlations to determine correlations among all situation-specific affective variables, motivational-attitudinal variables, students' personal background, and final grades; and 3) a paired t-test to discern changes in the situation-specific affective, attitudinal-motivation, and achievement variables of the same students between the first and last academic quarters.

The results of the study by Samimy and Tabuse have shown that (1) situation-specific variables such as risk-taking and discomfort in the classroom affect the learner's performance, supporting Ely's hypotheses (1984); (2) instrumentally motivated students not only performed well in class but also maintained positive attitudes toward the class; and (3) the learner's grades, attitudes, and motivation deteriorated significantly at the end of the academic quarter.

The study by Samimy and Tabuse has revealed interesting insights concerning the relationship among situation-specific affective variables, motivation-attitude variables, and the learner's level of achievement. The data were collected chronologically and changes in learners' attitude and motivation were observed, adding new perspectives to the existing knowledge of motivation-attitude variables.
Chapter III

DESIGN AND PROCEDURES

Population and Sample

The sample for this experiment was drawn from Japanese 205 and Japanese 310/311 students at The Ohio State University. Japanese 205 is the first in a series of two regular intermediate Japanese courses, and Japanese 310/311 are the intensive intermediate/advanced Japanese courses. The subjects for this experiment were 39 students from Japanese 205 and 9 students from Japanese 310/311. They were operationally defined as intermediate learners, because they had already completed the beginning course sequence (Japanese 101, 102, 103, 104, for the regular courses, and Japanese 210/211 for the intensive courses), but they were not yet eligible to enroll in advanced-level Japanese courses. This sample was selected for a number of reasons. First of all, students at these levels of study had already learned all of the three Japanese orthographies (i.e., Katakana, Hiragana, and approximately 200 Kanji). Investigating the effects of types of CALL adjunct questions and the existence and absence of moderate level of external pacing on reading comprehension required subjects who already could recognize Japanese orthographies.
Secondly, reading was one of the focuses of Japanese 206 and Japanese 310/311. Students at these levels of language study were accustomed to reading texts of some length in Japanese orthographies, and thus were unlikely to become confused or frustrated by the task in question.

Thirdly, the number of students in the intermediate level courses was considerably greater than in higher-level courses. The teaching approach used in the classroom was based on Audiolingual approach.

The classroom instruction was divided into two parts: ACT and FACT. In the FACT class, an instructor provided structural and cultural information covered in a particular lesson. In the ACT class, drill practice and application were conducted in the target language only. The teaching/learning materials were controlled by the instructor.

Research Design

A two factor (i.e., types of adjunct questions and types of pacing) analysis of covariance (ANCOVA) using the learner's affective characteristics as a covariant was selected for the statistical analysis in this study. The analysis of covariance is a statistical method for equating randomly formed groups on one or more variables. In essence, analysis of covariance adjusts scores on a dependent variable for initial differences on some other variable, such as the learner's affective characteristics scores used in this experiment. The two categorical factors included high-level adjunct questions versus low-level adjunct questions, and external pacing versus self-pacing with computer-assisted language learning. The learner's affective characteristics scores,
which were assessed via Likert scale scores, were treated as a continuous, quantitative independent variable and were included in the covariance in ANCOVA. This design accounts for the main effects of the independent variables as well as interaction effects among the independent variables.

Two categorical independent variables, one continuous independent variable, and one dependent variable were included in the design. The first independent variable, the learner's affective variable characteristics, was treated as a continuous independent variable. The second independent variable, CALL pacing, consisted of two levels:

1. Moderate Amount of External Pacing
2. Self-Pacing (i.e., No External Pacing)

The third independent variable, CALL adjunct questions, consisted of two levels:

1. High-Level Adjunct Questions
2. Low-Level Adjunct Questions

The dependent variable in this study was the score in the immediate recall protocol.

Explanation of the Variables

Learner Variables

The first independent variable was the learner's affective variable characteristics. It was measured by the sum of Likert scale item scores in a language questionnaire developed by Samimy and Tabuse (forthcoming), and was thus treated as a continuous quantitative variable. The extent of each
subject's affective variable characteristics was assessed using the following three task-specific questionnaires:


These instruments have been previously tested in Ely's studies (1984, 1986, 1988) and in the study of Samimy and Tabuse (forthcoming). Appendices A, B, and C indicate these instruments.

These instruments were selected because of the unidimensional characteristics that each instrument attempts to assess. The advantage of unidimensionality was that it isolated different attributes of affective variables, and it also focused on one factor at a time. *Language Class Discomfort*, for example, focused on only one dimension--discomfort felt in the classroom by the student. The instrument is designed to measure the degree of anxiety and self-consciousness or embarrassment felt when learners speak the second or foreign language in the classroom. *Language Class Risktaking* focuses on the student's tendency to assume risks in using the second language in the classroom. *Language Class Sociability* focuses on the interaction of the student with others in the target language in the classroom. This instrument measures the degree of willingness to interact with others in the classroom using the target language. These unidimensional characteristics made data analysis less complicated and more precise. The questionnaire incorporating the above instruments was distributed to obtain the students' affective variable characteristics prior to the experiment. Appendix D indicates the language
questionnaire distributed to the subjects prior to the CALL reading experiment.

Low scores in the learner's affective characteristics would, by definition, exhibit a greater degree of debilitating affective variable trends. These students would feel, for example, less comfortable speaking in the foreign language in the classroom, more concerned about making mistakes, and less confident of their own performance. High scores in the learner's affective characteristics exhibit a greater degree of facilitative affective variable trend. These students would show more self-confidence, risk-taking, and sociability.

High-Level Adjunct Questions and Low-Level Adjunct Questions

The second independent variable is the type of CALL adjunct questions: high-level adjunct questions and low-level adjunct questions. The notion of "high-level" versus "low-level" comes from the viewpoints of Bernhardt (1983) and Meyer (1975). They both postulate that reading texts have internal structures and can therefore be broken down into a hierarchy of idea units. Certain ideas are more essential for the reader to comprehend the whole text, while other ideas provide specific information that is not of central importance. High-level adjunct questions tap a more global comprehension of the reading text. Low-level adjunct questions tap specific factual information that is of less importance to the reader in understanding the text as a whole.

In this experiment, the students were asked either a high-level (paragraph-level) question or a low-level (word-level) question about the reading passage after reading every paragraph. High-level adjunct questions focused on the ideas that were implicit and called for a global comprehension of
the text. An example of the high-level adjunct questions used in the CALL reading practice program is "What was this paragraph about?" Low-level adjunct questions focused on ideas that are explicit and more specific within the text. An example of the low-level adjunct questions is "What does the word, 野菜 mean in English?" After the question was asked for each paragraph, some short feedback was given to the student to indicate whether or not his or her response was correct. With the low-level adjunct questions, if the student's response to the adjunct question was correct, "Yes, that is right!" appeared on the screen. If the student's response to the low-level adjunct question was not correct, the correct answer was given to the student such as "The meaning of the word was "vegetables." For the high-level adjunct questions, however, the simple Yes/No feedback was not used because of the nature of the question and the possibility of multiple sentence responses by the subjects. Identifying the student's input in the form of the multiple sentences and giving the accurate feedback to respond to the input were very complicated and complex, and the current software did not have the capability to process accurately the multiple sentence input. The answer was, therefore, shown for the student on the screen, and the students were asked to compare and contrast their response to the computer's response. The subject had one chance to answer the question after each paragraph. The subject could, however, rewrite and change his or her answer until he or she hit the RETURN key.

The CALL feedback used in this experiment consisted of only the necessary information the subject needed to know to proceed to the next paragraph, because CALL feedback with an intricate design such as HINTS
and/or TRY AGAIN may significantly influence the reader's reading process and may alone affect the reader's psychological status.

Pacing

The third independent variable consisted of a moderate degree of external pacing and self-pacing (i.e., no external pacing). In an experiment of Belland, et al. (1985), a moderate amount of external pacing was determined by a pace of two seconds per line for the reading text, plus seven seconds for cognitive processing. The subjects of their experiment, however, read the text in the subjects' native language. No literature was found that described the reading speed for nonnative Japanese readers, specifically native readers of English, reading an intermediate-level text in Japanese. A formative evaluation method was used to determine a moderate amount of external pacing. A moderate amount of external pacing was determined by a pace of four seconds per word for the reading text. The total seconds used for the external pacing were 940 seconds: the first paragraph was 276 seconds (69 words x 4 seconds); the second paragraph was 320 seconds (80 words x 4 seconds); and the third paragraph was 344 seconds (86 words x 4 seconds). The word count procedure followed the guidelines established in the Japanese Educational Dictionary (1982). This level of external pacing was determined during a pilot study. A more detailed description of the process is included in the pilot study section. A clock icon was shown on the corner of the text screen to indicate the time left to complete the reading task. The computer signaled the reader with a short sound when the subject used up the allocated time limit. Then the screen
was automatically erased and the question appeared. In the self-pacing
treatment, the students were allowed to spend as long as they wished to read
the text. In other words, there was no time limit for the subject to complete the
task. When the subjects in this experimental condition finished reading the text,
they were instructed to push the RETURN key. The self-pacing subject’s
reading time was recorded by the researcher. The shortest total time spent on
reading the experimental text among the no external pacing group was 381
seconds (i.e., six minutes and 35 seconds), and the longest total time was 1613
seconds (i.e., 26 minutes and 53 seconds). In both conditions, subjects were
not allowed to go back to the passage to read it again. When the subject
proceeded to the adjunct question section of the CALL program, the screen
only accepted the student’s response to the adjunct question.

Recall Protocol

The dependent variable used to measure the readers’ comprehension of
the texts was the immediate recall protocol. The subjects were told to write
down everything they could remember about the text in English. The reading
text was divided into several idea units, which were scored using a scoring
model presented by Bernhardt and James (1987). This measure of reading
comprehension was selected because it was considered to be a direct
reflection of what the reader has actually processed and understood about the
text (Bernhardt, 1987). Bernhardt (1987) contends that this measurement
device makes the researcher able “to determine the extent to which adequate
and accurate comprehension is occurring” (p. 12).
Although other measure devices such as elicitation tasks, act-out tasks, and direct question-and-response tasks are considered to be valid measures of comprehension (Goodluch & Sloan, 1978), they were not chosen for this study for two reasons: first of all, when the question-and-response format is used in the target language the task taps the subject’s oral skill rather than comprehension. Secondly, questions, whether oral or written, exert prompting effects (Bernhardt, 1987). Thus, questions may influence the subject’s responses.

Instrumentation

(1) Language Class Discomfort (Ely, 1984; Samimy & Tabuse, forthcoming). This instrument is designed to measure the degree of anxiety, self-consciousness or embarrassment felt when learners speak the second language in the classroom. The scale consists of five items, each of which was followed by a six-point Likert response scale, with the alternative labeled: “strongly disagree,” “moderately disagree,” “slightly disagree,” “slightly agree,” “moderately agree,” and “strongly agree.” An example of the five items is “I don’t feel very relaxed when I speak Japanese in class.” High scores in this instrument indicated a student who felt comfortable in the language class. (See Appendix A for the complete instrument).

Neutral choices such as “No opinion,” and “Don’t know,” were not included in the scale in order to avoid the ambiguity these choices create as well as the possible abuse of these items by the subjects.

(2) Language Class Risktaking (Ely, 1984; Samimy & Tabuse, forthcoming). This instrument was designed to measure “a student’s tendency
to assume risks in using the second language in the second language class" (Ely, 1984: p. 33). The scale consists of six items, each of which is followed by a six point Likert response scale. An example of the six items is “I like to wait until I know exactly how to use a Japanese word before using it.” (See Appendix B for the complete instrument). Neutral choices such as “No opinion,” and “Don’t know,” were not included for the same reason stated above.

(3) Language Class Sociability (Ely, 1984; Samimy & Tabuse, forthcoming). This instrument was designed to measure the degree of willingness to interact with others in the second language class by means of the second language. The scale consists of five items, each of which is followed by a six point Likert response scale as in the case of Language Class Discomfort. An example of the five items is “I enjoy talking with the teacher and other students in Japanese.” (See Appendix C for the complete instrument). Neutral choices such as “No opinion,” and “Don’t know,” were not included for the same reason stated in the Language Class Discomfort section.

The degree of the learner’s affective variable characteristics was determined by calculating the total points each student received for each instrument. A number from one to six was assigned to each of the six points on the Likert response scale. “Strongly Disagree,” for example, received one point, while “Strongly Agree” received six points. Depending on the student’s response to the Likert scale, his or her total affective variable score was calculated. In order to avoid abuses of the scale, subjects were allowed to mark only one extreme and encouraged to read each of the statements carefully. In addition, both negative and affirmative statements were used to tap the target
affective characteristics. For example, in Language Class Discomfort, both "I don't feel very relaxed when I speak Japanese in class" and "I think I'm less self-conscious about actively participating in Japanese class than most of the other students" are included. In this case, the assignment of weight for each scale was reversed.

Computer-Assisted Language Learning

The experimental reading text, adjunct questions on the text, and pacing used in this experiment were authored by the researcher using Authorware. Authorware was chosen for its ease in creating the instructional material and also because it could easily incorporate the Japanese orthographies in the text interfaced with a Japanese software program called KanjiTalk. The experimental text created by KanjiTalk was then stored in graphic file in the software, called SuperPaint. The text was then re-inserted in Authorware, and the English font file was activated. This procedure was necessary to avoid an extra procedure to switch the font systems from Japanese to English every time the subject input the English response.

In the case of external pacing, the reading text appeared on the screen until the computer automatically proceeded to the questions. A small clock was shown on the corner of the screen to indicate the time left for the student to finish the reading task. When the subject used up the allocated reading time, the computer signaled the subject with a short tone. The text screen was then erased and the question page appeared automatically. In the case of self-pacing, each paragraph of the experimental reading text appeared on the
screen until the student pushed RETURN. The experimental tasks (i.e., reading the text and responding to the adjunct questions) were conducted paragraph by paragraph to avoid possible confusion caused by the crowded screen and to diminish the negative psychological impact that may occur as a consequence of the confusion. A Macintosh Ilis with a 13 inch screen was used as the hardware for this experiment. The icon charts of the CALL reading practice programs for the low-level adjunct question condition and the high-level adjunct question condition are included in Appendix E and F respectively.

Experimental Text

The reading text used in this study was selected from a collection of reading materials created by intermediate-level Japanese instructors at The Ohio State University. The text was not used by either Japanese 205 instructors or Japanese 310/311 instructors at the time of the experiment. The selected text was, therefore, a new text for the experimental subjects. Three educated Japanese native readers examined the reading text to ensure that the reading text was appropriate to the stated level, had authentic content, and showed no linguistic bias that could be a threat to the validity of this experiment. The text matched the guidelines created by Bernhardt (1986) for text selection in comprehension testing. The text was approximately 250 words in length, "which is long enough to provide an actual experience with real connected discourse" (p. 108). The first paragraph consisted of 69 words, the second, of 80 words, and the third, of 86 words. The word count procedure followed the guidelines stipulated in The Japanese Language Education
Dictionary (1985). The notion of "school lunch" was selected as the topic of the experimental text because the readers have some ideas about "school lunch" in general but are assumed to be unfamiliar with it in the Japanese language and cultural context. Unlike more familiar Japanese topics such as flower arranging and tea ceremony, the "school lunch" topic is not commonly discussed in a culture class, language class, or literature class. A good deal of research has shown that the existence or nonexistence of prior knowledge of the topic can significantly influence the students' reading comprehension score (e.g., Bernhardt, 1986; Carrell et al., 1983; Lee, 1987; Hudson, 1982; Johnson, 1982; and Irujo, 1986). This topic was chosen to minimize the facilitative effect of prior knowledge on reading comprehension. The experimental reading text is indicated in Appendix G.

After the reading text was selected, it was given to three native Japanese readers who were asked to perform an immediate recall protocol. This pretest with native readers was to determine if the text reflected authentic language that was comprehensible to native readers or not.

Each paragraph of the text was then divided into "idea units." Bernhardt (1983) and Meyer (1975) both assert that texts have internal structure and can therefore be broken down into hierarchical idea units. The allocation of the points for each level of the idea units followed the guidelines of Bernhardt and James (1987). The scoring format consisted of a four point system. In general specific facts that are not central to overall comprehension received a "1." Less specific and more general facts received a "2." The larger topics were weighted as "3." The topics and viewpoints that are more implicit and call for a global
comprehension of the text were weighted as “4.” The scoring procedure was done independently by three educated native readers of Japanese including the researcher. (See Appendix I for the complete idea units and the unit value for each idea.) The inter-rater reliability was 93%. The scoring of the immediate protocols also followed the guidelines of Bernhardt and James (1987). Two native readers of Japanese, including the researcher, scored the immediate recall protocol and the inter-rater reliability was 95%.

The first paragraph of the experimental text consisted of 22 items, with values ranging from “1” to “4,” and the total possible points was 44. The second paragraph consisted of 23 items, with values ranging from “1” to “4,” and the total possible points was 42. The third paragraph consisted of 31 items, with values ranging from “1” to “4,” and the total possible points was 58. The maximum total points for the whole text was 144. The lowest total points scored was 4 points, and the highest points scored was 103 points. The average reading comprehension score was 41.77. The experimental text was difficult but it appears to have differentiated between poor readers and good readers.

Data Collection and Procedures

Prior to the experiment, the subject’s affective variable characteristics information was obtained. A questionnaire that included Language Class Discomfort, Language Class Sociability, and Language Class Risktaking was distributed to the Japanese 205 and Japanese 310/311 students at the beginning of the quarter. They were asked to provide their names on the questionnaire, so that the researcher could identify them throughout the
experiment. In addition to the three affective variable instruments and the subject's name, the questionnaire included the following questions: "Is Japanese required?" "Do you own a computer?" "Have you used a computer to help with your study?" "Have you used a computer to study Japanese reading?" "Do you feel uncomfortable using a computer?" "Do you fear using a computer?" These questions were asked to obtain more information about the students and, especially their familiarity and with the computer, and their feelings toward computer-assisted language learning material. The responses to these questions are indicated in Table 6 in Chapter IV. Although 20 subjects expressed discomfort with the computer, no one expressed fear about using a computer. This question was asked to identify a subject who might have a computer phobia. It was assumed that a subject with a computer phobia would behave significantly different with the experimental CALL program than in his or her normal reading behavior. More importantly, a subject with a computer phobia must not participate in this experiment and thus must be withdrawn from the experiment. As indicated earlier, no subject was withdrawn from the experiment.

In the middle of the quarter, the researcher went to the students' classrooms and made an announcement about the reading experiment. The researcher told the subjects that intermediate-level readers were needed for this experiment. The subjects were also told that participation was on a voluntary basis. They were asked to fill out the schedule sheet to indicate when they could participate in the experiment. The subjects were then asked to come to the researcher's office at a time they specified. Data were collected one
subject at a time. The subjects were not told the purpose of the experiment until all the subjects went through the data collection process. Each subject was asked not to discuss the content of the experiment with his or her fellow students. The data collection was conducted in the duration of two and a half weeks. Each student took approximately 30 minutes to complete the experimental task.

In a room with a computer, the student was asked to relax and was told that the performance of this experiment did not affect his or her class grade. The researcher then explained the procedures for the experiment—the subject was to read a passage in Japanese that was divided into three paragraphs followed by a question in English after each paragraph on a Macintosh computer. The subjects were asked to type in their responses in English. The subjects who were assigned to the high-level adjunct questions were asked to type in the shortest possible answer in response to the question. The no external pacing group subjects were told that there was no time limit to read the text. Although the subjects were not told that their reading time would be recorded, the researcher kept a record of their reading time. The subjects who were in the external pacing group were told that they had a time limit for each paragraph and therefore they needed to read the text quickly. In addition, they were told that the time limit was at a comfortable level so that they would be able to look at every word in the paragraph comfortably. The subjects were also told that they were to write down everything they could remember in English about the reading passage when they finished the computer program. Before the experiment, the students were informed of the recall protocol scoring.
procedure in which both specific and general ideas about the passage were
counted as comprehension scores. This instruction was included to minimize
the “shaping” effect (Jarvis, 1970; Rivers, 1980) of the types of adjunct
questions asked that may greatly bias the comprehension result. The subjects
were not allowed to take any notes while they read. The subjects were not
allowed to ask questions about the content of the reading passage while they
were going through the experimental procedure. In order to minimize confusion
and psychological impact in the experimental situation, a sample reading
paragraph with either a high-level or low-level question was given to the
student.
(See Appendix H for the sample reading paragraph).

The student’s recall protocol was scored by the researcher and one other
native reader of Japanese who was trained in the recall protocol scoring
system. The inter-rater reliability of the two raters was 95%.

Pilot Study

In order to evaluate the efficacy of the CALL reading practice program,
experimental procedures, and an experimental text, a pilot study was
conducted. The subjects were drawn from those who successfully completed
intermediate-level Japanese instruction but who were not enrolled in the
advanced-level Japanese instruction at The Ohio State University at the time of
the pilot study. The major purposes of the pilot study were to determine the
suitability of the moderate amount of external pacing, experimental text, and
CALL reading program.
The external pacing figure was determined first by asking an intermediate-level Japanese instructor to read the passage aloud assuming the rate of reading of her students. This task was chosen because the reading instruction always included reading aloud in the classroom, and therefore it was believed that the instructor had some sense of how fast students read passages aloud. Then a student who successfully competed intermediate-level Japanese instruction in the previous year was asked to read the passage with different pacing conditions. The nonnative reader was asked to give his feedback for each pacing condition. The moderate amount of pacing was later modified to four seconds per word after asking three nonnative readers of Japanese who completed intermediate-level Japanese instruction to proceed through the CALL reading program.

The results of the pilot study indicated that the CALL reading program and the experimental text were suitable for the experiment. The moderate amount of external pacing was, however, adjusted from three seconds per word to four seconds per word, including cognitive processing time, to incorporate the feedback from the pilot study subjects.

Data Analysis

A trained rater and the researcher scored the recall protocols. The scores of the students' recall protocols were then analyzed statistically to show the effects of learner types, different types of CALL adjunct questions, and different types of pacing on reading comprehension in Japanese. An analysis of covariance was used to test for the main effects of the two categorical
independent variables (i.e., the high-level versus the low-level adjunct questions, and the existence and absence of the moderate amount of external pacing) and one continuous independent variable (i.e., the learner's affective characteristics score).

Covariance is a form of analysis of variance (ANOVA) and is a statistical method that can be used to equate groups on one or more variables. ANCOVA adjusts reading comprehension scores for initial differences on the learner's affective characteristics scores and compares adjusted scores in the two categorical conditions. In other words, the groups are equalized with respect to the control variable (i.e., affective characteristics scores) and then compared. Thus, ANCOVA is a superior method to ANOVA for controlling for learner's affective characteristics differences in this experiment.

**Null Hypotheses**

\( H_01: \) There is no significant difference due to the extent of the learner's affective variable characteristics on the reading recall measures of intermediate Japanese readers with different types of CALL adjunct questions and CALL pacing. (A)

\( H_02: \) There is no significant difference between high-level adjunct questions and low-level adjunct questions in CALL reading material on the reading comprehension of intermediate Japanese readers. (B)

\( H_03: \) There is no significant difference between the external pacing and self-
pacing of reading texts in CALL reading material on the reading comprehension of intermediate Japanese readers. (C)

$H_04$: There is no significant interaction among the types of adjunct questions used in the CALL reading program and the learner's affective variable characteristics. (AxB)

$H_05$: There is no significant interaction among the types of CALL adjunct questions and the presence or absence of the CALL external pacing. (BxC)

$H_06$: There is no significant interaction between the learner's affective variable characteristics and the types of CALL pacing on the reading comprehension of intermediate Japanese readers. (AxC)

$H_07$: There is no significant interaction among the learner's affective variable characteristics, the types of CALL adjunct questions, and the types of CALL pacing on the reading comprehension of intermediate Japanese readers. (AxBxC)
CHAPTER IV

RESULTS AND DISCUSSION

Introduction

Research evidence suggests that moderate levels of external pacing of a microcomputer instructional program result in more effective learning with regards to both the amount learned and competency in using the newly learned content. Moderate levels of external pacing also appear to improve overall time efficiency of learning (Belland, et al., 1985). The findings of the CALL research with French as a Foreign Language subjects suggest that the subjects who answered higher-level adjunct questions recalled the reading text much more than those who practiced lower-level questions (Pederson, 1985). One of the most important, yet least studied variables in CALL research is the realm of learner variables. Individual learner variables must be incorporated in basic CALL research because different learners are influenced in different ways by the given CALL conditions, and by their perception of the task expectations (Salomon, 1979). A considerable number of studies recognize learner variables, motivation, and affective variables as potentially influential factors in successful second language learning (e.g., Bailey, 1983; Chastain, 1975; Ely, 1988; Heyde, 1979; Horwitz & Horwitz, 1986). Samimy and Tabuse (forthcoming) conducted a longitudinal study to investigate the possible
relationships among situation-specific affective variables, motivational-attitudinal variables, and proficiency of beginning Japanese students at the university level. They found that affective variables such as risk-taking and discomfort significantly affected the learner’s performance.

The present study investigated the effects of learner variables, types of adjunct questions, and types of pacing in CALL reading practice on recall measure of reading comprehension in intermediate college Japanese. The subjects for this experiment were 48 intermediate-level readers of Japanese as a foreign language. They read an experimental text in Japanese using a CALL reading practice program created by the researcher. The subject’s affective variable characteristics were assessed using three task-specific affective variable instruments developed by Samimy and Tabuse (forthcoming) prior to reading the CALL experimental text. The subjects were then randomly assigned to the four experimental conditions. The four experimental conditions were: (1) low-level adjunct questions with no external pacing, (2) high-level adjunct questions with no external pacing, (3) low-level adjunct questions with a moderate amount of external pacing, and (4) high-level adjunct questions with a moderate amount of external pacing.

A two factor (i.e., high-level versus low-level CALL adjunct questions, and the existence versus absence of CALL external pacing) analysis of covariance (ANCOVA) design with the learner’s affective characteristics as a covariant was chosen to analyze the data for this study because this design could account for both the main effects and the interaction effects of the independent variables. This design was chosen over the analysis of variance
(ANOVA) design because it can adjust subjects' reading comprehension scores for initial differences on the learner's affective characteristics variable and compare adjusted scores. The ANCOVA design also increases the power of the statistical test by reducing within-group (error) variance. The dependent variable was the reading comprehension score measured by immediate recall protocol.

Data Analysis

To assess the effect of the learner's affective variable, types of adjunct questions, and types of pacing on reading comprehension with computer-assisted language learning, a two-factor ANCOVA design with the affective characteristics as a covariant was used. There were three independent variables. The first independent variable, the learner's affective variable characteristics, consisted of the total score from the three situation-specific affective variable instruments (i.e., Language Class Risktaking, Language Class Discomfort, and Language Class Sociability), and was treated as a continuous, quantitative variable. The types of pacing, the second independent variable, were treated as a categorical variable with two levels:

(a) a moderate amount of external pacing, and
(b) self-pacing (i.e., no external pacing).

The third independent variable, the types of adjunct questions, was treated as a categorical variable with two levels:

(a) high-level adjunct questions, and
(b) low-level adjunct questions.
The dependent variable for this study was the subject's reading comprehension score assessed by immediate recall protocol.

The ANCOVA test for the dependent variable of reading comprehension as measured by immediate recall protocol scores produced the observed means and standard deviations shown in Table 2. The mean of the reading comprehension score for the low-level adjunct question with no external pacing condition was 47.66, 34.66 for the low-level adjunct question with moderate external pacing condition, 40.58 for the high-level adjunct question with no external pacing, and 44.16 for the high-level adjunct question with moderate external pacing. There was a considerable difference in the reading comprehension scores between the low-level adjunct question with no external pacing condition and the low-level adjunct question with external pacing condition. These means were later adjusted using the least square means in the additional ANCOVA test and this difference was found significant at $p<.039$ (See Table 8). The mean of affective characteristics scores for the low-level adjunct question with no external pacing condition was 59.25, 62.66 for the low-level adjunct question with moderate external pacing condition, 59.25 for the high-level adjunct question with no external pacing, and 58.66 for the high-level adjunct questions with moderate external pacing condition. There was not a considerable difference of the affective variable characteristics scores among each experimental condition. The means and standard deviations of affective characteristics scores in each experimental condition are shown in Table 3. The main effect of the first independent variable, the learner's affective characteristics, was statistically significant at $p<0.0001$ level with $F(1,$
The main effect of the second independent variable, types of CALL pacing, was not found significant at \( p>0.65 \) with \( F(1, 47)=0.2 \). The main effect of the third independent variable, the types of CALL adjunct questions, was not statistically significant at \( p>0.52 \) with \( F(1, 47)=0.52 \). No two-way interaction was found statistically significant in the omnibus ANCOVA analysis. The three-way interaction among the independent variables was found statistically significant at \( p<.03 \) level \( F(1, 47)=4.81 \). Table 4 lists the overall ANCOVA test and Table 5 lists the parameter estimates of the ANCOVA test.

Additional ANCOVA analyses were conducted for each level of adjunct questions to further analyze the three-way interaction. The levels of adjunct questions were selected for further analyses because the significant three-way interaction produced by the omnibus ANCOVA test revealed a considerable difference in reading comprehension scores between the low-level adjunct question with no external pacing condition and the low-level adjunct question with external pacing condition. The results of the additional ANCOVA tests produced four significant findings. The main effect for the learner's affective variable characteristics scores was significant for both the low-level adjunct question condition at \( p<.0009 \) with \( F(1, 23)=15.15 \), and the high-level adjunct question condition at \( p<.0193 \) with \( F(1,23)=6.47 \). A significant two-way interaction between the affective variable characteristics score and the types of pacing was found at \( p<.04 \) with \( F(1,23)=4.45 \). Table 6 indicates the results of the additional ANCOVA test for the low-level adjunct question condition. Table 7 indicates the parameter estimate of the additional ANCOVA analyses in the low-level adjunct question condition.
The least squares means of the reading comprehension scores between the self-paced group (mean=52.18) and the moderate amount of pacing group (mean=33.32) in the low-level adjunct question condition were found significantly different at $p<.0394$. Table 8 indicates the least squares means and standard error of the least square means of reading comprehension scores in the two pacing conditions.

Following are the specific results for each null hypothesis examined in this experiment:

$H_0 \ 1(A)$: There is no significant difference due to the extent of the learner's affective variable characteristics on the reading recall measures of intermediate Japanese readers with different types of adjunct questions and pacing. An examination of Table 4 revealed significant differences between the subjects' reading comprehension scores due to the extent of learner's affective characteristics, and thus led to a rejection of the null hypothesis, $p > 0.0001$.

This finding demonstrates that subjects' affective variable characteristics do impact the reading recall measures with different types of adjunct questions and pacing. The estimated coefficient, 1.8085, produced by the ANCOVA test indicates that, holding all other factors in the model constant, an increase of one point in the learner's affective characteristic score would yield an average increase of 1.8085 points in reading comprehension. In practical terms, this result means that a subject with a high affective variable score (i.e., the person who takes risks, who feels comfortable speaking in Japanese in class, and who socializes with the classmates) was predicted to score high in the reading comprehension score assessed by the immediate recall protocol, while the
### Table 2
Observed Means and Standard Deviations of Recall Protocol Scores as a Function of Learner's Affective Characteristics

<table>
<thead>
<tr>
<th>Experimental Condition</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-Level Question/No External Pacing</td>
<td>47.6666</td>
<td>27.8480</td>
</tr>
<tr>
<td>Low-Level Question/External Pacing</td>
<td>34.6666</td>
<td>24.1748</td>
</tr>
<tr>
<td>High-Level Question/No External Pacing</td>
<td>40.5833</td>
<td>22.6666</td>
</tr>
<tr>
<td>High-Level Question/External Pacing</td>
<td>44.1666</td>
<td>25.3371</td>
</tr>
</tbody>
</table>

$N=48$, cell size = 12

### Table 3
Observed Means and Standard Deviations of Affective Characteristics in Each Experimental Condition

<table>
<thead>
<tr>
<th>Experimental Condition</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-Level Question/No External Pacing</td>
<td>59.2500</td>
<td>8.0127</td>
</tr>
<tr>
<td>Low-Level Question/External Pacing</td>
<td>62.6666</td>
<td>14.9747</td>
</tr>
<tr>
<td>High-Level Question/No External Pacing</td>
<td>59.2500</td>
<td>8.8638</td>
</tr>
<tr>
<td>High-Level Question/External Pacing</td>
<td>58.6666</td>
<td>9.3646</td>
</tr>
</tbody>
</table>

$N=48$, cell size = 12
<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>SS</th>
<th>df</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>11191.85</td>
<td>7</td>
<td>3.62</td>
<td>0.0041**</td>
</tr>
<tr>
<td>Affective Variable (AV)</td>
<td>8905.75</td>
<td>1</td>
<td>20.14</td>
<td>0.0001**</td>
</tr>
<tr>
<td>Pacing</td>
<td>88.96</td>
<td>1</td>
<td>0.2</td>
<td>0.6562</td>
</tr>
<tr>
<td>Adjunct Questions (AQ)</td>
<td>231.08</td>
<td>1</td>
<td>0.52</td>
<td>0.4740</td>
</tr>
<tr>
<td>AV x Pacing</td>
<td>156.66</td>
<td>1</td>
<td>0.35</td>
<td>0.5551</td>
</tr>
<tr>
<td>AV x AQ</td>
<td>190.25</td>
<td>1</td>
<td>0.43</td>
<td>0.5157</td>
</tr>
<tr>
<td>Pacing x AQ</td>
<td>1607.10</td>
<td>1</td>
<td>3.63</td>
<td>0.0638</td>
</tr>
<tr>
<td>AV x Pacing x AQ</td>
<td>2126.05</td>
<td>1</td>
<td>4.81</td>
<td>0.0342*</td>
</tr>
</tbody>
</table>

R-Square = 0.3874  N = 48, cell size = 12
** significance at p<.01 level  * significance at p<.05 level
### Table 5
Analysis of Covariance Parameter Estimates for Immediate Recall Protocol Score

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>Standard Error of Estimate</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affective Characteristics</td>
<td>1.8085</td>
<td>0.6771</td>
<td>0.01**</td>
</tr>
<tr>
<td>Pacing</td>
<td>58.4204</td>
<td>58.7206</td>
<td>0.3258</td>
</tr>
<tr>
<td>Question</td>
<td>47.4263</td>
<td>48.5362</td>
<td>0.3344</td>
</tr>
<tr>
<td>Affective x Pacing</td>
<td>-1.0642</td>
<td>0.9849</td>
<td>0.2864</td>
</tr>
<tr>
<td>Affective x Question</td>
<td>-1.0238</td>
<td>0.7985</td>
<td>0.2072</td>
</tr>
<tr>
<td>Question x Pacing</td>
<td>-152.7898</td>
<td>80.1518</td>
<td>0.0638</td>
</tr>
<tr>
<td>Affective x Question x Pacing</td>
<td>2.9216</td>
<td>1.3325</td>
<td>0.0342*</td>
</tr>
</tbody>
</table>

R-Square=0.387496

** significance at p<.01 level      * significance at p<.05 level
### Table 6

**Additional Analyses of Covariance by Low-Level Adjunct Question**

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>SS</th>
<th>df</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>7463.17</td>
<td>3</td>
<td>5.85</td>
<td>0.0049**</td>
</tr>
<tr>
<td>Error</td>
<td>8510.15</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>15973.33</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affective Variable (AV)</td>
<td>6447.64</td>
<td>1</td>
<td>15.15</td>
<td>0.0009**</td>
</tr>
<tr>
<td>Pacing</td>
<td>1323.66</td>
<td>1</td>
<td>3.11</td>
<td>0.09</td>
</tr>
<tr>
<td>Pacing * AV</td>
<td>1894.16</td>
<td>1</td>
<td>4.45</td>
<td>0.047*</td>
</tr>
</tbody>
</table>

R-Square=0.4672  N = 24, cell size = 12  
** significance at p<.01 level  *significance at p<.05 level

### Table 7

**Secondary Analysis of Covariance Parameter Estimates for Immediate Recall Protocol Score by Low-Level Adjunct Question**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>Standard Error of Estimate</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affective Variable (AV)</td>
<td>.784</td>
<td>.4153</td>
<td>.0734</td>
</tr>
<tr>
<td>Pacing</td>
<td>-94.3694</td>
<td>53.5110</td>
<td>.0931</td>
</tr>
<tr>
<td>AV*Pacing</td>
<td>1.857</td>
<td>0.0880</td>
<td>.0477*</td>
</tr>
</tbody>
</table>

R-Square=0.4672  
*Significance at p<.05 level
Table 8
Observed Least Squares Means and Standard Errors of Recall Protocol Scores in the Low-Level Adjunct Question Condition

<table>
<thead>
<tr>
<th>Level</th>
<th>Mean</th>
<th>Standard Error of Estimate</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>No External Pacing</td>
<td>52.180</td>
<td>6.100</td>
<td>0.0394*</td>
</tr>
<tr>
<td>Moderate External Pacing</td>
<td>33.326</td>
<td>5.996</td>
<td></td>
</tr>
</tbody>
</table>

N=24, cell size=12
* significance at p<.05 level

subject with a low affective variable score (i.e., the person who does not take risks, who does not feel comfortable speaking in Japanese in class, and who does not socialize with the classmates) was predicted to score low in the reading comprehension score assessed by the immediate recall protocol. This prediction was made in every experimental condition.

$H_0^2$ (B): There is no significant difference between high-level adjunct questions and low-level adjunct questions in CALL reading material on the reading comprehension of intermediate Japanese readers. The null hypothesis of no significant main effect of the types of CALL adjunct questions on the reading comprehension was not rejected, $p>0.4740$. The manipulation of different levels of questions asked during the CALL reading practice alone did not have a significant effect on the learner's reading comprehension score.
H_0^3 (C): There is no significant difference between the external pacing and self-pacing of reading text in CALL reading material on the reading comprehension of intermediate Japanese readers. The null hypothesis of no significant main effect of the types of pacing on the reading comprehension was not rejected, \( p > 0.6562 \). The manipulation of the existence and absence of moderate external pacing alone did not significantly influence the reading comprehension score.

H_0^4 (AxB): There is no significant interaction among the types of adjunct questions used in the CALL reading program and the learner's affective variable characteristics. The null hypothesis of no significant interaction between the types of CALL adjunct questions and the learner's affective characteristics was not rejected, \( p > 0.5157 \).

H_0^5 (BxC): There is no significant interaction among the types of CALL adjunct questions and the presence or absence of the CALL external pacing. The null hypothesis of no significant interaction between the types of CALL adjunct questions and the presence or absence of the CALL external pacing was not rejected, \( p > 0.0638 \).

H_0^6 (AxC): There is no significant interaction between the learner's affective variable characteristics and the types of CALL pacing on the reading comprehension of intermediate Japanese readers. The null hypothesis of no
significant interaction between the learner's affective characteristics and the types of pacing was not rejected in the omnibus ANCOVA test, at \( p > .5551 \). The additional ANCOVA tests conducted for each level of the low-level adjunct question condition, however, indicated a significant interaction between the learner's affective variable characteristics and the types of CALL pacing at \( p > .0477 \) with \( F(1,23) = 4.45 \) in the low-level adjunct question condition. This result indicates that the learners' reading comprehension scores varied significantly according to the learner's affective variable characteristics scores and the types of pacing in the low-level adjunct question condition. Figure 1 indicates the significant two-way interaction between the learner's affective variable characteristics and the types of pacing in the low-level adjunct question condition. For the subjects in the no-external-pacing condition, the estimated coefficient of the learner’s affective characteristics score on the predicted reading comprehension score was 2.64. This means that holding all other factors in the model constant, an increase of one point in learner's affective characteristics score would yield an increase of 2.64 in the predicted reading comprehension score. For the subjects in the external pacing condition, the estimated coefficient produced was 0.785, indicating that holding all other factors in the model constant, an increase of one point in learner's affective characteristics score would yield an increase of 0.785 in the predicted reading comprehension score. The learner's affective characteristics had a greater influence in the no-external-pacing condition than the external pacing condition.

In the high-level adjunct question condition, however, no significant two-way interaction was obtained. The result must be interpreted with caution,
however, in the light of the significant three-way interaction obtained in the omnibus ANCOVA analyses. No definitive conclusions, therefore, can be drawn about the interaction effect.

![Graph](Image)

**Figure 1 Two-Way Interaction between Affective Characteristics and Types of Pacing on Immediate Recall Protocol Score in the Low-Level Adjunct Question Condition**

\[ H_07 (AxBxC): \text{There is no significant interaction among the learner's affective variable characteristics, the types of CALL adjunct questions, and the types of CALL pacing on the reading comprehension of intermediate Japanese readers. A significant three-way interaction was observed among the three} \]
independent variables as indicated. Figure 2 shows the interaction among the experimental conditions (i.e., the types of adjunct question and the existence and absence of the moderate amount of external pacing) and the learner's affective characteristics as measured by the predicted reading comprehension score.

The significant interaction reported shows that the predicted reading comprehension scores varied depending on the experimental condition the subjects were in. For the subjects in the low-level adjunct questions with no external pacing condition, the estimated coefficient of the learner's affective character score on the predicted reading comprehension score was 2.64. This means that holding all other factors in the model constant, an increase of one point in learner's affective characteristics score would yield an average increase of 2.64 in predicted reading comprehension score. The affective characteristics had the greatest impact on the predicted reading comprehension score in this experimental condition.

For the subjects in the high-level adjunct questions with no-external pacing condition, the estimated coefficient produced by ANCOVA was 0.74, indicating that holding all other factors in the model constant, an increase of one point in learner's affective characteristics score would yield an average increase of 0.74 in predicted reading comprehension score. The learner's affective characteristics in this experimental condition did not have as great an impact as the low-level question with no external pacing condition. Similarly, for the subjects who were in the low-level adjunct questions with a moderate amount of external pacing condition, the learner's affective characteristics did
not have a great influence. The estimated coefficient for this condition was 0.78, indicating that holding all other factors in the model constant, an increase of one point in learner's affective characteristics score would yield an average increase of 0.78 in predicted reading comprehension score.

Figure 2 Interaction of Affective Characteristics, Types of Questions, and Types of Pacing on Immediate Recall Protocol Score

For the subjects in the high-level adjunct questions and moderate amount of external pacing condition, the estimated coefficient was 1.808, indicating that holding all other factors in the model constant, an increase of one
point in the learner's affective characteristics score would yield an average of 1.808 in predicted reading comprehension score. The learner's affective characteristics in this condition had the second greatest impact on the reading comprehension score, following the low-level question, no external pacing condition.

Discussion

The Learner's Affective Variable Characteristics

The main effect for the learner's affective variable characteristics on reading comprehension in Japanese with different types of CALL pacing and CALL adjunct questions was found to be significant. This indicates that the learner's affective characteristics variable was the single best predictor for the learner's reading comprehension score among the three independent variables. The result postulates that learners who take risks, who feel comfortable in class, and who socialize with other students in class tend to score higher in reading comprehension assessed using immediate recall protocol than those who do not take risks, who do not feel comfortable in class, and who do not socialize with their classmates when they use CALL reading practice. The learner's affective variables have been found important for the learner's language performance in many studies (e.g., Gardner, 1985; Gardner & Lambert, 1972; Schumann, 1975; Scovel, 1978). In a longitudinal study with college-level beginning learners of Japanese as a Foreign Language, Samimy and Tabuse (forthcoming) found that motivation and task-specific affective variables, especially language class risk-taking, are the best predictors for the
learner's performance. Those students who kept their motivation high and those who felt comfortable taking risks in the classroom stayed in the program and tended to receive higher final grades than those who did not. The results of the present study are in accord with the result of Samimy and Tabuse's study, indicating the importance of the learner's affective characteristics on the learner's language performance. In addition, the results of this study provided a new insight in terms of the relationship between the learners' affective variables and their performance on reading comprehension with CALL. Currently there is no research evidence found that suggests a direct relationship between the learner's affective variable characteristics and the learner's performance on reading comprehension measured by immediate recall protocol. The results of the present experiment revealed a significant main effect of the learner's affective variable characteristics on reading comprehension in Japanese with different types of CALL adjunct questions and CALL pacing, suggesting that the learner's affective variable characteristics is the best predictor for the learner's performance on reading comprehension. The main effect of the learner's affective variable characteristics was found in both the omnibus ANCOVA tests and the additional ANCOVA tests. In addition to the main effect of the learner's affective variable characteristics, the three-way interaction effect was also found significant. The significant interaction means that the learner's affective variable characteristics had a different effect on the subject's reading comprehension depending on the experimental condition he or she was in. The affective characteristics in one experimental condition had more influence on reading comprehension than the other. The present research has provided new base-
line data in the area of affective variable characteristics and reading comprehension with CALL.

**Types of CALL Adjunct Questions**

It was anticipated that the types of CALL adjunct questions would influence the reader's comprehension of the experimental text, because the types of questions would stimulate the different levels of reading processes. When the word-level questions were asked, the reader's attention would be placed on word-level processing, and the paragraph-level questions would induce a higher-level processing that by its nature included the lower-level processing. The subjects in the high-level (paragraph-level) adjunct questions condition, therefore, were expected to score higher on reading comprehension assessed by immediate recall protocol than those who were in the low-level (word-level) adjunct questions condition. These expectations of the types of adjunct questions, however, were not supported by the findings at the simple main effect level.

The three-way interaction effect, however, was found significant. The interaction results indicate the low-level (word-level) questions with no external pacing provided a condition where the learner's affective characteristics had the greatest influence on reading comprehension, while the word-level questions with external pacing provided a condition where the learner's affective characteristics had the least influence on reading comprehension. In other words, when the subjects were asked word-level questions and had unlimited time to complete the reading task, sociable and comfortable risk-takers
performed much better than those who were not. When the word-level questions were asked and subjects had to finish the task within a certain time limit, however, there was no dramatic difference in the reading performance between the sociable and comfortable risk-takers and those who were not.

The high-level (paragraph-level) questions with external pacing condition, on the one hand, provided a condition where the affective variable characteristics had the second greatest influence on reading comprehension. The paragraph-level questions with no external pacing, on the other hand, provided a condition where the affective variable characteristics did not have a dramatic influence on reading comprehension. In other words, when the paragraph-level questions were asked and the subjects were told to complete the task within a certain time limit, the sociable and comfortable risk-taker performed much better than those who were not. When the paragraph-level questions were asked and the subjects were allowed to spend an unlimited time on task, the difference on the reading performance between social and comfortable risk-takers and those who were not was not very salient. The types of adjunct questions with the types of pacing provided different environments, and those environments influenced the subjects’ reading comprehension.

**Types of Pacing**

Because a moderate amount of external pacing would have a direct effect on attending behaviors and motivation of the subjects on task, it was expected that the external pacing group subjects would score higher than the self-pacing group on reading comprehension assessed by immediate recall
protocol. The subjects in the external pacing group should acquire more information in less time. This anticipation, however, was not supported by the finding at the simple main effect level. The three-way interaction among independent variables, however, indicated a statistical significance. This significant interaction revealed that the no-external-pacing with the low-level adjunct questions condition provided an environment where the learner's affective variable characteristics could have the greatest influence on the subject's performance on reading comprehension. The no-external-pacing condition combined with the high-level adjunct questions, however, provided an environment where the subject's affective characteristics did not have a striking influence on his or her performance on reading comprehension. In other words, when the subjects were allowed an unlimited time to complete the task and were asked paragraph-level questions about the passage, the sociable and comfortable risktaker markedly outperformed the others. When the subjects were allowed an unlimited time to complete the task and were asked the word-level questions, both the sociable and comfortable risktaker and those who were not performed similarly on the reading comprehension task.

The external pacing condition with the high-level adjunct question condition created an environment where the learner's affective variable characteristics had the second greatest influence on the subject's performance on reading comprehension. The external pacing condition with the low-level adjunct question condition created the environment where the learner's affective variable characteristics did not have a dramatic influence on the subject's reading performance. In simpler terms, when the subjects were under
a time constraint to complete a task and were asked paragraph-level questions, sociable and comfortable risktakers performed considerably better than those who were not. Under a time constraint to complete a task, when the subjects were asked word-level questions, the difference between the risktakers and non-risktakers was not as salient as in the paragraph-level question condition. The types of pacing with the types of adjunct questions, therefore, provided different environments for the subjects. The different environments then influenced the subjects' performance on reading comprehension.

An interesting phenomenon must be noted here. The adjunct analysis of the subjects' reading speed revealed that 9 out of 24 subjects in the external pacing condition used 940 seconds, the maximum time allowed, to read the paragraphs while 15 subjects read the text within 940 seconds. Only 6 out of 24 subjects in the no external-pacing condition read the text using more than 940 seconds. The rest of the subjects in this experimental condition read the text in less than 940 seconds. The subjects in this experimental condition might have been highly motivated and might have placed their own time limit (i.e., their own external pacing) to process the text.

The Interaction among The Learner's Affective Characteristics.

Types of CALL Adjunct Questions and Types of CALL Pacing

It was anticipated that individual learners would be influenced differently by different experimental environments. This expectation was supported by the findings. The three-way interaction among the three independent variables was found significant. The relationship between the learner's affective
characteristics and the predicted reading comprehension scores differed depending on the experimental condition in which the subjects were placed. The greatest coefficient value was found in the low-level adjunct question with no external pacing condition. The coefficient weight for this experimental condition was 2.64, indicating the steepest slope. In this condition the learner’s affective characteristics had the greatest impact on the predicted reading comprehension score. Those who scored high in the affective variable characteristics scored much higher on the reading comprehension score than those who did not.

The coefficient of the low-level adjunct question with external pacing was 0.74, indicating a mild slope. In this condition, the impact of the affective characteristics was the least of all conditions. There was not a big difference in the reading comprehension scores between those who scored high and who scored low on the affective characteristics variable.

The coefficient of the high-level adjunct question with no external pacing condition was 0.78, also indicating a mild slope. In this condition, the impact of the learner’s affective characteristics was not great, and there was not a big difference on the reading comprehension scores between those who scored high and low in their affective characteristics variable.

The coefficient of the high-level adjunct question, external pacing condition was 1.808, indicating the second steepest slope, following the low-level question with no external pacing condition. The learner’s affective characteristics in this condition had great influence on the reading comprehension scores. The difference on the reading comprehension scores
between the high and low affective characteristics was considerable.

As seen in the Figure 2, a noticeable gap was observed between the two groups of the experimental conditions. The low-level adjunct questions with no external pacing condition, and the high-level adjunct questions with external pacing condition both indicated greater influence of the affective characteristics on reading comprehension, while the low-level adjunct questions with external pacing condition, and the high-level adjunct questions with no external pacing condition both revealed less impact of the affective characteristics on reading comprehension. The low-level adjunct question with no external pacing condition was anticipated to influence the subjects in the least beneficial way. In other words, the worst reading comprehension scores were anticipated from the subjects in this condition. The subjects would be functioning at the word-level processing due to the word-level questions asked. The subjects would not be as motivated and focused on the task as those in the external pacing condition. The high-level adjunct question with external pacing condition was anticipated to influence the subjects in the most beneficial way. That is, the best overall comprehension performance was expected from this experimental condition. The high-level (paragraph-level) questions would induce higher-level reading processing including the low-level (word-level) processing. The external pacing would increase attention and motivation.

One hypothesis about this phenomenon is that the learner's affective characteristics might have a greater influence in these two extreme conditions than the rest. In the no external pacing with low-level question condition the learners have to set their own pace to keep their attention and motivation at the
maximum level, and they also have to be aware of the fact that they need to activate both lower-level and higher-level processing to comprehend the text better. This condition provides the least program-controlled environment. The environment is, therefore, susceptible to individual affective differences. In the external pacing with high-level question condition, the learners have to consider external pacing as a positive stimulus, not a negative restriction to hinder their performance, and the high-level questions also have to be regarded as an overall comprehension check, not as a vague question that confuses the learner. This condition, in contrast to the least program-controlled environment, provides the most demanding environment to complete a task. This environment is also susceptible to individual affective differences. A further study with more experimental conditions is necessary to investigate this phenomenon.

**The Interaction between the Learner's Affective Characteristics and Types of Pacing**

Additional ANCOVA tests at each level of adjunct questions were conducted to further analyze the significant three-way interaction produced by the omnibus ANCOVA tests. The results revealed were consistent with the findings of the omnibus tests. The learner's affective characteristics variable was found significant in both the low-level and the high-level adjunct question conditions. In the low-level adjunct question condition, a significant two-way interaction between the affective characteristics and the types of pacing was obtained. This result indicates that the no-external-pacing group and the
external pacing group performed differently in comprehending the text according to their affective characteristics scores. The learner's affective characteristics had more influence to the no-external-pacing group than to the external pacing group in the low-level adjunct question condition. The no-external-pacing group scored significantly higher in their reading comprehension scores than the external pacing group in the low-level adjunct question condition. In the high-level adjunct question condition, no significant two-way interaction was obtained between the learner's affective characteristics and the types of pacing. The learner's affective characteristics significantly influenced the learner's comprehension scores, but there was not a significant difference in reading comprehension scores between the two pacing group.

Adjunct Analysis

The Experimental Text and Reading Comprehension Scores

The experimental text chosen for this experiment was, on average, a difficult text to read. The average comprehension score was 41.77 out of 144 possible maximum points. In other words, the readers comprehended 30% of the text on the average. The lowest points scored was 4, and the highest points scored was 103. The range of the comprehension score and the number of the subjects in that range is indicated in Figure 3. As indicated in Figure 3, some fluctuation of distribution of subjects in each range is observed. The experimental text could differentiate between poor readers and good readers.
Response to the Extraneous Questions

The experimental subjects were all college-level intermediate learners of Japanese as a Foreign Language. The information obtained from the extraneous section of the language questionnaire distributed to every subject is indicated in Table 9.

As indicated in Table 9, about a half of the subjects (N=23) were taking Japanese out of personal interest. The majority of the students in this study had survived the beginning level Japanese courses, which had a high attrition rate. Almost all the subjects came from a group which started the beginning-level Japanese course at the same time. The first beginning-level Japanese course

![Range of Scores](image)

**Figure 3** Range of Scores
offered had more than 120 students. At the intermediate level, however, the
number of students in the regular class, for example, had dropped to 41. The
general characteristics of the subjects were that they were hardworking, highly
motivated, and had positive attitudes toward learning Japanese.

<table>
<thead>
<tr>
<th>Questions Asked</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is Japanese required?</td>
<td>25</td>
<td>23</td>
</tr>
<tr>
<td>2. Do you own a computer?</td>
<td>26</td>
<td>22</td>
</tr>
<tr>
<td>3. Have you used a computer to help with your studies?</td>
<td>29</td>
<td>19</td>
</tr>
<tr>
<td>4. Have you used a computer to study Japanese?</td>
<td>5</td>
<td>23</td>
</tr>
<tr>
<td>5. Have you used a computer to study Japanese reading?</td>
<td>1</td>
<td>27</td>
</tr>
<tr>
<td>6. Do you feel uncomfortable using a computer?</td>
<td>20</td>
<td>28</td>
</tr>
<tr>
<td>7. Do you fear using a computer?</td>
<td>0</td>
<td>48</td>
</tr>
</tbody>
</table>
More than half of the subjects (N=26) own their own computer. Although 29 subjects said they have used a computer to help with their studies, only 5 subjects said that they have used a computer to study Japanese. There was only one subject who had used a computer to study Japanese reading. No subject expressed fear of using computers, though 20 subjects expressed discomfort. Those who expressed their discomfort with using computers appeared to have had some negative experience with computers in their major study areas such as International Business, Mechanical Engineering, and Electrical Engineering. The psychological impact of these experiences on the CALL experiment was, therefore, considered not to be a threat to the validity of this experiment.

Subjects' Language Backgrounds

The subjects' native languages were English (39 subjects), Chinese (6), Arabic (1), Turkish (1), and Korean (1). There were five subjects of the 39 English native readers who had Japanese parent(s). The average comprehension score and comprehension score range according to the subject's native language background is shown in Table 10.

The subject's native language background was not considered as a threat to the validity of this experiment because of the random assignment of the subjects to each experimental condition. In addition, within the same native language group some subjects had more exposure to Japanese language and culture than others. Some had been to Japan; some have a Japanese parent or parents; some had Japanese conversation partners. Their previous
exposure, however, did not appear to have influenced the reading performance greatly. For example, the subject who scored the lowest was a native speaker of English who had participated in the summer intensive language program at a Japanese university in Japan. This subject read the text the fastest (381 seconds) but did not recall the passage well. The subject who scored the highest was also a native speaker of English and had taught English in Japan. The subject had not received any formal language instruction. The average reading comprehension score for the 34 English native readers was 37.82. The five subjects whose parent (or parents) was Japanese scored between 13 and

<table>
<thead>
<tr>
<th>Native Language</th>
<th>Number of Subjects</th>
<th>Range of Score</th>
<th>Average Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>34</td>
<td>4-103</td>
<td>37.82</td>
</tr>
<tr>
<td>Chinese</td>
<td>6</td>
<td>41-98</td>
<td>66.33</td>
</tr>
<tr>
<td>Arabic</td>
<td>1</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Turkish</td>
<td>1</td>
<td>47</td>
<td>47</td>
</tr>
<tr>
<td>Korean</td>
<td>1</td>
<td>98</td>
<td>98</td>
</tr>
<tr>
<td>Japanese parent(s))</td>
<td>5</td>
<td>13-57</td>
<td>32</td>
</tr>
</tbody>
</table>
57, and the average reading comprehension score for this group was 32. The native Arabic reader scored 20. The native Turkish reader scored 47. The native Korean reader scored 98. The six native Chinese readers scored between 41 and 98, and the average reading comprehension score for this group was 66.33. It must be noted that the average reading comprehension score for the six Chinese native readers was considerably high. Because the number of Chinese native readers in this experiment is small, no definitive conclusion can be drawn from this observation. A further study is recommended to obtain more accurate information.

Subjects' Reading Speed and Pacing

The subjects' reading speed also varied considerably. The external pacing group was allowed 940 seconds to read the three paragraphs; 276 seconds for the first paragraph, 320 seconds for the second paragraph, and 344 seconds for the third paragraph. Eight subjects from this group used up the allotted time, and the rest of the subjects read the text within the time limit. In the self-pacing group, the range of reading speed was between 381 seconds and 1613 seconds. The average reading time to read the three experimental paragraphs for these subjects was 655 seconds. Six students took over 940 seconds (i.e., the maximum time allocated for the external pacing group) to read the paragraphs, and the rest of the subjects read within 940 seconds. The observation of the subject's reading speed reveals that the self-pacing group subjects read the text as fast as the external pacing group subjects. Moderate external pacing of an instructional program, however, could increase attention
and motivation. The learner, therefore, should acquire more information in less
time than he or she would in self-paced instructional program (Belland et al.,
1985). The subjects' reading speeds suggest that all subjects were equally
motivated and seemed to have paid attention to their task.

**Difference on Comprehension Scores by Sex**

There was a considerable difference in the performance of reading
comprehension between female and male subjects. The 20 female subjects
comprehended the experimental text much better than the 28 male subjects.
The average comprehension score of the female subjects was 50.95 and that of
the male subjects was 35.21. This phenomenon is in accord with the results of
the studies that show sex differences in language learning strategies (e.g.,
study (1983), females reported a significantly greater propensity than males to
engage in second-language social interactions with others outside of class. In
the study by Ehrman and Oxford (1989), females used conversational input
elicitation strategies significantly more frequently than males. Females also
used general study strategies and formal rule-related practice strategies
significantly more often than men. Ehrman and Oxford explain that the frequent
use of conversational input elicitation strategies is a reflection of the way
women and men transfer unconscious discourse strategies to a new language.
They also speculate that women's desire for good grades and a need for social
approval may influence their use of general study strategies and formal rule-
related practice strategies. In addition, "women's greater use of these two kinds
of strategies might also echo their verbal superiority. Another possible explanation is women's greater willingness than men to conform to conventional norms" (p. 297). These studies, however, focused on the differences by sex mainly with regards to the subject's conversational ability. The result of the present study must be examined further in terms of the relationship between the subject's general reading strategies as well as CALL reading strategies and the sex difference is strongly recommended.
CHAPTER V

SUMMARY, RECOMMENDATIONS, IMPLICATIONS, AND LIMITATIONS

Overview of the Study

This study was designed to add to the small amount of both foreign language reading research and computer-assisted language learning research in Japanese. This study investigated the effects of the learner's affective variable characteristics, the types of CALL adjunct questions, and the existence and absence of CALL external pacing on reading comprehension of the intermediate-level readers of Japanese as a Foreign Language. The study had three specific purposes. The first was to examine the effect of the learner's affective variable characteristics (e.g., risk-taking, discomfort, and sociability) on reading comprehension in Japanese with different types of CALL adjunct questions and CALL pacing. The second purpose was to examine the effect of different types of adjunct questions: high-level (i.e., paragraph-level) adjunct questions versus low-level (i.e., word-level) adjunct questions with CALL on reading comprehension in Japanese. The third purpose was to investigate the effect of CALL pacing: a moderate amount of external pacing versus no external pacing on reading comprehension in Japanese.

There were three independent variables. The first independent variable,
the learner's affective characteristics, was a continuous, quantitative variable assessed by three task-specific affective variable instruments. The second independent variable was the types of CALL adjunct questions, and was a categorical variable with two levels: high-level (i.e., paragraph-level) adjunct questions versus low-level (i.e., word-level) adjunct questions. The third independent variable, pacing, was a categorical variable with two levels: moderate level of external pacing versus no external pacing. The dependent variable was the subject's reading comprehension score measured by immediate recall protocol.

A Japanese CALL practice reading program incorporating the two categorical independent variables with two levels each was created and developed by the researcher. A Macintosh IIsi with a 13 inch high resolution RGB monitor was used as the hardware, and Authorware was used to develop the CALL reading practice materials interfaced with KanjiTalk and SuperPaint. The reading text used for this experiment was selected from a collection of reading material for the intermediate-level readers of Japanese created by the native Japanese instructors at The Ohio State University. The topic of the text was "school lunch." The text was 235 words in length and it was divided into three paragraphs. The subjects for this experiment were 48 college intermediate-level learners of Japanese as a Foreign Language. The subjects' native languages were English (39 subjects), Chinese (6), Arabic (1), Turkish (1), and Korean (1). After the information on the learners' affective characteristics was assessed, the subjects were randomly assigned to the four experimental conditions: (1) low-level adjunct questions and no external
pacing, (2) high-level adjunct questions and no external pacing, (3) low-level adjunct questions and a moderate amount of external pacing, and (4) high-level adjunct questions and a moderate amount of external pacing. The subject's recall protocol was then scored and statistically analyzed using two factor analysis of covariance (ANCOVA) with the learner's affective characteristics as the covariant. Additional ANCOVA tests at each level of the adjunct questions were conducted to further analyze the significant result obtained by the omnibus tests.

Summary of Findings

An omnibus ANCOVA test revealed a significant three-way interaction among the learner's affective variable characteristics, types of CALL adjunct questions, and types of CALL pacing. The learner's performance on reading comprehension was influenced by the learner's affective variable characteristics in different ways in the different experimental conditions. The learner's affective characteristics variable had the greatest influence on reading comprehension in the low-level adjunct question with no-external-pacing condition, and it had the least influence in the low-level adjunct question with external pacing condition. In other words, those who took risks, socialized with their classmates and felt comfortable in classroom scored higher in reading comprehension than those who did not. This phenomenon was observed in all four experimental conditions. The most difference between the risktaker and the non-risktaker was observed in the experimental condition where the subjects were asked the word-level questions and had unlimited time to
comprehend the text. The least difference was observed in the condition where the subjects were asked the word-level questions and had a limited time to comprehend the text.

A considerable gap was observed between the two groups of the experimental conditions. The learner's affective characteristics had a great influence on reading comprehension in the following conditions: (1) the low-level questions with no external pacing condition, and (2) the high-level questions with external pacing condition. The learner's affective characteristics did not have a major influence on the reading comprehension in the following two experimental conditions: (1) the high-level questions with no external pacing condition; and (2) the low-level questions with external condition. It is hypothesized that the learner's affective variable characteristics may have greater impact in the first two experimental conditions because these conditions are susceptible to individual differences. The low-level adjunct question with no-external-pacing condition is the least program-controlled condition and the high-level adjunct question with external pacing condition provides the most demanding environment.

Additional ANCOVA tests for the each level of the adjunct questions were conducted to further analyze the significant three-way interaction obtained by the omnibus test. The additional ANCOVA tests produced a significant two-way interaction between the learner's affective characteristics and the types of pacing in the low-level adjunct question condition. As shown in Figure 1 in Chapter IV, the learner's affective characteristics had a greater influence to the subjects in the no-external-pacing condition than the external pacing condition.
The no-external-pacing group scored significantly higher than the external pacing group in the low-level adjunct question condition.

These results supported Salomon's theory (1979), especially two of his basic tenets mentioned in Chapter I. They are (1) different learners are affected in different ways by the use of any given coding element; and (2) a medium's coding elements often will interact with related learner differences and related learning tasks.

A simple main effect of the learner's affective characteristics was found significant both in the omnibus ANCOVA test and in the additional ANCOVA tests with two levels of adjunct question conditions. These findings postulate that the learner's affective characteristics variable was the single best predictor for the subjects' performance on reading comprehension with the CALL reading practice program. These findings revealed a close relationship between the learner's affective variable characteristics and the learner's performance on reading comprehension. The learner's affective characteristics variable appears to influence the learner's performance on reading comprehension with the CALL Japanese reading practice. Classroom reading instruction tends to be in the oral form in the target language where learners need to switch orthographies. In the Japanese language class, especially, oral reading of the text is considered an important teaching method to enhance the student's learning of the orthography, especially Kanji compounds (Ogawa, 1991). Ample research results indicate that the learner's oral performance is influenced by the learner's affective variables (e.g., Brown, 1980; Ely, 1986; Kleinmann, 1977; Schumann, 1975). A close relationship between the
learner's affective characteristics and the learner's performance on reading comprehension is naturally predicted. The simple main effects for the types of CALL pacing and the types of CALL adjunct questions were not found significant. It must be noted, however, that the significant three-way interaction described indicates that all of the independent variables were important in this experiment.

The adjunct analyses revealed the following. First of all, the experimental text could differentiate good readers from poor readers. The subjects' reading comprehension scores ranged from 4 to 104 out of 144 possible maximum points. The average reading comprehension score was 41.77, indicating that the experimental text was rather difficult to comprehend. Secondly, the experimental subjects appeared to be all highly motivated. The no-external-pacing group subjects read the text as fast as the moderate amount of external pacing group subjects, suggesting that the no-external-pacing group subjects might have established their own pacing to complete the reading task. Thirdly, the female subjects comprehended the text better than the male subjects. The average reading comprehension score of the 20 female subjects was 50.95 and that of the 28 male subjects was 35.21. The female subjects might have used different strategies than male subjects as shown in the studies that revealed gender differences in general social behavior, verbal ability, and language learning strategies (e.g., Gilligan, 1982; Maccoby & Jacklin, 1974).
Recommendations for Further Research

This study was the first experiment to investigate the effects of learner characteristics, types of pacing, and types of adjunct questions with CALL on reading comprehension of college-level intermediate learners of Japanese. Replications and expansions of the present study are therefore clearly needed. The same experiment could be replicated including the following adjustments. First of all, more than one experimental texts could be used to diminish the influence of the learner's prior knowledge of the content of the reading material. One experimental text was used in this experiment, and therefore, the results of this study are limited to the texts that are similar in nature.

Secondly, the subject's writing ability could be investigated prior to the experiment. The student's ability to write a free-recall protocol about an expository text is assumed to be a valid way to measure their ability to comprehend that text in this study. In this experiment, the subjects were told to write their recall protocol in the language with which they feel comfortable. The nonnative readers of English overwhelmingly used the English language—the intermediary language between the subject's native language and Japanese in their learning process—rather than using the subject's own native language. The information on the learner's writing ability in the language used for the recall protocol procedure, however, might reveal more accurate relationship between the learner's writing ability and reading comprehension assessed by the recall protocol.

Thirdly, the subject's native language background could be more strictly controlled for a replication. The subjects in the present experiment came from
five different language backgrounds; Arabic (1 subject), Chinese (6), English (39), Korean (1), and Turkish (1). It is generally believed that Chinese and Korean readers can comprehend Japanese reading texts much better than the rest because they share Chinese-origin characters and therefore guess the meaning of Kanji. The Chinese and Korean readers comprehended the text fairly well in this experiment. The subjects were randomly assigned to the four experimental conditions in the present study. The possibility exists, however, that differences on reading comprehension scores could have existed among treatment groups due to their native languages. Using the subjects drawn from one native language background to replicate the present study would eliminate the possibility of differences caused by different native language backgrounds.

Reading studies involving second language learners of Japanese are also necessary. As mentioned in Chapter I, there has been little crosslingual research conducted to examine the reading behaviors of native and nonnative readers. Basic CALL reading studies that examine reading behaviors in Japanese are even more scarce, despite the fact that more and more software has been developed in this area (e.g., Hirata, 1990 & 1992; Hadamitzky, 1992; Hyperglot Software, 1992). These investigations may first focus on collecting base-line data and may include comparative studies on reading behaviors between native and nonnative readers of Japanese, between different levels of readers, and between readers of Japanese who use different orthographic systems.

The relationship between the learners' affective characteristics and their performance in four skills (i.e., listening, speaking, reading, and writing) and
grammar needs to be explored in the future. The results of this study indicate that the learners' affective variable characteristics have a close relationship with their performance on reading comprehension. The learners' affective characteristics variable in this study was assessed using task-specific language questionnaire, which measure the learners' affective variables in the second or foreign language classroom environment, especially regarding their oral skills. The development of new instruments that reflect the learners' affective characteristics in different skills might provide a more accurate view of the relationship between the specific language skill and the learners' performance on reading comprehension.

The rapid progress of technology should make conducting CALL research easier. The need for more basic studies on CALL is therefore even more stressed. In this study, the types of adjunct questions and the types of pacing were used to explore their effects. It was found that learners' affective characteristics influenced the reading comprehension differently in the four experimental conditions. The results supported Salomon's hypothesis (1979), which states that different learners are affected in different ways by the use of a given set of coding elements. The findings also revealed the importance of incorporating learner variables in the development of CALL materials. Other conditions that reflect the computer's specific coding elements such as the availability and unavailability of the text on the screen while answering CALL questions, and the effectiveness of a pop-up dictionary while reading the text for comprehension could be included in these studies. Basic CALL research that supports or refutes the existing theories of language learning should be
conducted prior to the development of software.

Differences in comprehension scores by sex added an interesting insight to the existing knowledge. Research on sex differences in terms of language learning strategies reveals that females are better language learners because females have superior verbal ability (Gage & Berliner, 1975; Maccoby & Jacklin, 1974; Tyler, 1965), and females report greater strategy use than men (Ehrman & Oxford, 1989; Nyikos & Oxford, 1989; Politzer, 1983). The result of a longitudinal study by Samimy and Tabuse (forthcoming) also revealed that females received better overall grades than males in the beginning Japanese class. No research, however, has been conducted to examine gender differences on the reading comprehension in Japanese. In the present study, the gender difference was not incorporated in the research design and therefore no definitive conclusions could be drawn from the findings. Studies that examine gender differences in learning strategies in Japanese are strongly recommended.

Pedagogical Implications

An important implication of this study is that the learners' affective characteristics influence the subjects' performance on reading comprehension with CALL adjunct questions and pacing in Japanese. This finding is in accord with other studies that claim the importance of learner characteristics in learning a second or foreign language in general. This study, more specifically, revealed an interesting relationship between the students' affective characteristics seen in the classroom environment and their reading performance with CALL. Those
who took risks, who felt comfortable in class, and who socialized with other students performed better in reading a Japanese text with CALL than those who did not. The learner's affective characteristics variable appears to influence not only the classroom performance but also the reading performance via computer.

The language teaching philosophy that values a strict control of learning and teaching materials both inside and outside the classroom needs to be reexamined. This teaching philosophy does not allow the learner to take risks and test his or her language hypotheses.

Our view of the learners' individual affective differences in the classroom also needs to be reconsidered. Language teachers tend to view their learners as a rather homogeneous group and expect the learners to respond to the teachers' stimuli in a rather similar way. This tendency is especially salient when a group of students with no previous language background begins studying a second or foreign language at the same time. More effective teaching/learning may occur when language teachers obtain the learner's affective characteristics, and identify subgroups within the group according to the affective characteristics information so that teachers can make special efforts to create a secure and comfortable learning atmosphere that is conducive to risktaking, socialization, and comfortable learning in the target language.

CALL material developers need to recognize the importance of the learner's affective characteristics and try to incorporate affective variables into CALL materials. This study revealed that different learners interacted differently with the types of adjunct questions and the types of pacing. The influence of the
learner’s affective characteristics, for example, appears to be greater in the low-adjunct question with no external pacing condition and the high-level adjunct question with external pacing condition, than in the low-level adjunct question with external pacing condition and the high-level adjunct question with no external pacing condition. When developing CALL material, the instructional material designer might utilize instruments to assess the user’s affective characteristics, and place the learner at the appropriate condition that will result in the optimal performance by the particular user.

Limitations of the Study

1. Subjects were assumed to come from the population of intermediate level Japanese learners, and therefore, the subject’s language background was not considered. Although the subjects were randomly assigned to one of the four experimental conditions, the possibility exists that differences on reading comprehension scores could have existed between treatment groups due to their native languages despite random assignment. Generalizability of findings regarding intermediate-level university Japanese students is limited.

2. Every subject was able to finish reading the three paragraphs of the experimental text in the four experimental conditions. The rate of the external pacing was determined through a formative evaluation method and adjusted several times. It must be acknowledged, however, that the amount of external pacing determined by the researcher may not have been "moderate" to the subjects in the external pacing conditions.
3. The experimental text used in this study was selected by the researcher. It was further evaluated by two other native readers of Japanese for its linguistic and cultural authenticity as well as its appropriateness for the level of the subjects. It was assumed that the topic (i.e., school lunch) was general, but the same topic would be almost new information within the cultural framework of Japanese schools. The possible effect of the subject's prior knowledge of this topic on the reading comprehension, however, must be noted.

4. Subjects read one intermediate-level experimental text in Japanese. The results of this experiment is therefore limited to the comprehension of the text that is similar in its structure and nature.

5. Subjects may have been unfamiliar with writing recall protocols and may not have known how much to write, though they were instructed as to what was expected of them. The immediate recall protocol was written after subjects read the text. Subjects depended on short-term memory to recall information. One cannot, therefore, generalize the findings to the effect of long-term memory on the experimental text.

6. The subjects in this experiment came from a language curriculum that has a rigid learning schedule. The teaching method used in the classroom is based on the Audiolingual approach. Learners within different curriculums and teaching/learning environments may come from a different research population. The generalizability of the results of this study is therefore limited to the teaching/learning environment similar to this study.
LIST OF REFERENCES


at the annual meeting of the American Education Research Association, Toronto, Canada.


APPENDIX A

LANGUAGE CLASS DISCOMFORT
Language Class Discomfort

1. I don't feel very relaxed when I speak Japanese in class. (-)

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Moderately Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Moderately Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

2. Based on my class experience so far, I think that one barrier to my future use of Japanese is my discomfort when speaking. (-)

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Moderately Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Moderately Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

3. At times, I feel somewhat embarrassed in class when I am trying to speak. (-)

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Moderately Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Moderately Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

4. I think I am less self-conscious about actively participating in Japanese class than most of the other students.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Moderately Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Moderately Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

5. I sometimes feel awkward speaking Japanese. (-)

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Moderately Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Moderately Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

* A minus sign (-) indicates an item which was reversed in calculating the total score.
APPENDIX B

LANGUAGE CLASS RISK TAKING
Language Class Risktaking

1. I like to wait until I know exactly how to use a Japanese word before using it. (-)

   | Strongly | Moderately | Slightly | Slightly | Moderately | Strongly |
   | Disagree | Disagree   | Disagree | Agree    | Agree      | Agree    |

2. I don't like trying out a difficult sentence in class. (-)

   | Strongly | Moderately | Slightly | Slightly | Moderately | Strongly |
   | Disagree | Disagree   | Disagree | Agree    | Agree      | Agree    |

3. At this point, I don't like trying to express complicated ideas in Japanese in class. (-)

   | Strongly | Moderately | Slightly | Slightly | Moderately | Strongly |
   | Disagree | Disagree   | Disagree | Agree    | Agree      | Agree    |

4. I prefer to say what I want in Japanese without worrying about the small details of grammar.

   | Strongly | Moderately | Slightly | Slightly | Moderately | Strongly |
   | Disagree | Disagree   | Disagree | Agree    | Agree      | Agree    |

5. In class, I prefer to say a sentence to myself before I speak it. (-)

   | Strongly | Moderately | Slightly | Slightly | Moderately | Strongly |
   | Disagree | Disagree   | Disagree | Agree    | Agree      | Agree    |

6. I prefer to follow basic sentence models rather than risk misusing the language. (-)

   | Strongly | Moderately | Slightly | Slightly | Moderately | Strongly |
   | Disagree | Disagree   | Disagree | Agree    | Agree      | Agree    |

* A minus sign (-) indicates an item which was reversed in calculation for the total score.
APPENDIX C

LANGUAGE CLASS SOCIABILITY
Language Class Sociability

1. I'd like more class activities where the students use Japanese to get to know each other better.

<table>
<thead>
<tr>
<th>Strongly</th>
<th>Moderately</th>
<th>Slighty</th>
<th>Slighty</th>
<th>Moderately</th>
<th>Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>Disagree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
</tbody>
</table>

2. I think learning Japanese in a group is more fun than learning on my own.

<table>
<thead>
<tr>
<th>Strongly</th>
<th>Moderately</th>
<th>Slighty</th>
<th>Slighty</th>
<th>Moderately</th>
<th>Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>Disagree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
</tbody>
</table>

3. I enjoy talking with the teacher and other students in Japanese.

<table>
<thead>
<tr>
<th>Strongly</th>
<th>Moderately</th>
<th>Slighty</th>
<th>Slighty</th>
<th>Moderately</th>
<th>Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>Disagree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
</tbody>
</table>

4. I enjoy interacting with the other students in the Japanese class.

<table>
<thead>
<tr>
<th>Strongly</th>
<th>Moderately</th>
<th>Slighty</th>
<th>Slighty</th>
<th>Moderately</th>
<th>Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>Disagree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
</tbody>
</table>

5. I think it is important to have a strong group spirit in the language classroom.

<table>
<thead>
<tr>
<th>Strongly</th>
<th>Moderately</th>
<th>Slighty</th>
<th>Slighty</th>
<th>Moderately</th>
<th>Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>Disagree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
</tbody>
</table>
APPENDIX D

LANGUAGE QUESTIONNAIRE
Language Questionnaire

In filling out this questionnaire on language learning, please be as accurate and frank as possible in your answers. You should give your first reaction after reading each item. On the other hand, please do not rush, since it is important to express your true opinion.

Thank you very much.

1. Your name: _________________________________

2. Japanese Language Class: Japanese 205
Japanese 310/311
Other: __________

3. Is Japanese required? Yes___ No___

4. Do you own a computer? Yes___ No___

5. Have you used a computer to help with your studies? Yes___ No___

6. Have you used a computer to study Japanese? Yes___ No___

7. Have you used a computer to study Japanese reading? Yes___ No___

8. Do you feel uncomfortable using a computer? Yes___ No___

9. Do you fear using a computer? Yes___ No___
Please CIRCLE the response which best indicates your own feeling.

1. I do not feel very relaxed when I speak Japanese in class.

<table>
<thead>
<tr>
<th>Strongly</th>
<th>Moderately</th>
<th>Slightly</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>Disagree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
</tbody>
</table>

2. I would like more class activities where the students use Japanese to get to know each other better.

<table>
<thead>
<tr>
<th>Strongly</th>
<th>Moderately</th>
<th>Slightly</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>Disagree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
</tbody>
</table>

3. I like to wait until I know exactly how to use a Japanese word before using it.

<table>
<thead>
<tr>
<th>Strongly</th>
<th>Moderately</th>
<th>Slightly</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>Disagree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
</tbody>
</table>

4. I prefer to say what I want in Japanese without worrying about the small details of grammar.

<table>
<thead>
<tr>
<th>Strongly</th>
<th>Moderately</th>
<th>Slightly</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>Disagree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
</tbody>
</table>

5. I think learning Japanese in a group is more fun than learning on my own.

<table>
<thead>
<tr>
<th>Strongly</th>
<th>Moderately</th>
<th>Slightly</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>Disagree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
</tbody>
</table>
6. Based on my class experience so far, I think that one barrier to my future use of Japanese is my discomfort when speaking.

<table>
<thead>
<tr>
<th>Strongly</th>
<th>Moderately</th>
<th>Slightly</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>Disagree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
</tbody>
</table>

7. At times, I feel somewhat embarrassed in class when I am trying to speak.

<table>
<thead>
<tr>
<th>Strongly</th>
<th>Moderately</th>
<th>Slightly</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>Disagree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
</tbody>
</table>

8. I enjoy talking with the teacher and other students in Japanese.

<table>
<thead>
<tr>
<th>Strongly</th>
<th>Moderately</th>
<th>Slightly</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>Disagree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
</tbody>
</table>

9. I do not like trying out a difficult sentence in class.

<table>
<thead>
<tr>
<th>Strongly</th>
<th>Moderately</th>
<th>Slightly</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>Disagree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
</tbody>
</table>

10. In class I prefer to say a sentence to myself before I speak it.

<table>
<thead>
<tr>
<th>Strongly</th>
<th>Moderately</th>
<th>Slightly</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>Disagree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
</tbody>
</table>
11. I enjoy interacting with the other students in the Japanese class.

12. I think I am less self-conscious about actively participating in Japanese class than most of the other students.


14. I think it is important to have a strong group spirit in the language classroom.

15. At this point, I do not like trying to express complicated ideas in Japanese in class.
16. I prefer to follow basic sentence models rather than risk misusing the language.

<table>
<thead>
<tr>
<th>Strongly</th>
<th>Moderately</th>
<th>Slightly</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Strongly</th>
<th>Disagree</th>
<th>Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Agree</th>
<th>Agree</th>
</tr>
</thead>
</table>

APPENDIX E

COMPUTER-ASSISTED LANGUAGE LEARNING
WITH LOW-LEVEL ADJUNCT QUESTIONS
Now you will be reading a passage for comprehension. The reading passage consists of three paragraphs. After each paragraph, you will be asked to answer one question. When you finished reading the passage, please let Tabuse-sensee know. She will give you a sheet of paper for you to write down everything you can remember about the passage.

Ready?

Push return to read the first paragraph.
Wait Options
Wait until mouse click.
Wait until keypress.
Show prompt.

Erase display at icon "Title page"
Eraser
Effects: Fade out.

Introduction

Display:
こんにちは！

You will read three paragraphs in Japanese. The reading passage will appear only once for each paragraph. Each paragraph is then followed by a question in English. Please answer the question in the shortest possible form in English as you proceed. The computer will give you brief feedback to your answer.

After reading the passage, you will be asked to write down everything you can remember in English on a sheet of paper provided. Everything (from core ideas to specific information in the passage) counts.

An example is prepared for you.

Press RETURN when you are ready.
わたしは三か月前から日本ごを勉強しています。いつもいいじょうを買いたいと思っています。英わじてんだけではなくて、わ英じてんもいります。でも、いいじょうがなかなかなくて困っています。

Wait Options
Wait until mouse click.
Wait until keypress.
Show prompt.

Erase: example sentence
Erase display at icon "Example"

what is eiwa?

Interaction Options
Pause before exiting.
Show prompt.
Erase: upon exit.
Ignore null entries.
Show entry marker.
Erase entry upon exit.
Area position and size:
Left: "100"
Top: "150"

1992IN 446 221 406
Authorware Professional™ by Authorware (v 1.6)
What does the word, 英わじてん mean in English?
Yes, it means an English-Japanese dictionary.
No, it means an "English-Japanese dictionary."
Now you have the general idea about what you need to do.

If you have any questions, ask Tabuse-sensee.

Push return to proceed.
日本の小学校や中学校にはきゅうしょくというものがあります。きゅうしょくというのは学校が小学生や中学生のために作ってくれるお昼ごはんのことです。日本のきゅうしょくはなかなかおいしくて、クラスのみんなが、いっしょに教室で食べます。小学校では、ふつう先生もいっしょに食べます。
What does "た" mean in English?
Yes, that is right!
No, it means "classroom."
高校になると、きゅうしょくのない学校が多くなります。学生たちは家からおべんとうを持って来ます。おべんとうというのは、自分の家から持って来たお昼ごはんのことです。ふつうは、ごはん、にく、やさいなどを入れておべんとうを作りますが、わかり人たちの中には、ごはんのおべんとうよりサンドイッチなどの方が好きな人がたくさんいます。
What does にし mean in English?

Text Response Options
Ignore capitalization.
Ignore extra punctuation.
Ignore all spaces.
Ignore extra words.
Ignore word order.
Title: "vegetables"
Match at least 0 words.
Judge: not judged.
Branch: Exit.
Erase: after next entry.
Yes, it means "vegetable(s)."
No, the answer is "vegetable(s)."

Display:
大学には学生しょくどうがあります。学生のための安いレストランです。日本人はことばをみじかくするのが好きですから、学生しょくどうのことをふつう学しょく "がくしょく"とよびます。学しょくでは、そばなどの安いものや、天ぷらのような少し高いものもあります。日本人だれでも学しょくの食べものは"まずい"と言いますが、学生にとって一番大事なことは、やっぱり"安い"ということでしょう。
What does 少し mean in English?

a little

Text Response Options
Ignore capitalization.
Ignore extra punctuation.
Ignore extra words.
Ignore word order.
Title: "a little"
Match at least 0 words.
Judge: not judged.
Branch: Exit.
Erase: after next entry.
Yes, it means "a little (bit)."
No, it means "a little (bit)."
You have finished reading the passage.

Now you are going to write down everything you remember about the passage.

Tell Tabuse-sensee that you finished.

She will give you a sheet of paper.

ごくろうさまでした！
APPENDIX F

COMPUTER-ASSISTED LANGUAGE LEARNING

WITH HIGH-LEVEL ADJUNCT QUESTIONS
Now you will be reading a passage for comprehension. The reading passage consists of three paragraphs. After each paragraph, you will be asked to answer one question. When you finished reading the passage. Please let Tabuse-sensee know. She will give you a sheet of paper for you to write down everything you can remember about the passage.

Ready?

Push return to read the first paragraph.
Japanese Reading Experiment

Motoko Tabuse, Fall 1991.

Wait Options
Wait until mouse click.
Wait until keypress.
Show prompt.

Erase title page
Erase display at icon "Title page"
Eraser
Effects: Fade out.

Introduction

Display:
こんにちは！

You will read three paragraphs in Japanese. The reading passage will appear only once for several minutes for each paragraph. You need to read fast. Each paragraph is then followed by a question in English. Please answer the question in the shortest possible form in English as you proceed. The computer will give you brief feedback to your answer.

After reading the passage, you will be asked to write down everything you can remember in English on a sheet of paper provided. Everything (from important ideas to specific information in the passage) counts.

An example is prepared for you.

Press RETURN when you are ready.

Wait Options
Wait until mouse click.
Wait until keypress.
Show prompt.

erase the introduction

Erase display at icon "Introduction"

example

Display:
わたしは三か月前から日本語を勉強しています。いつもいいじょうを買いたいと思っています。英しけてんだけではなくて、わ英じてんもいります。でも、いいじょうがなかなかなくて困っています。
What is this paragraph about?

Text Response Options
Ignore capitalization.
Ignore extra punctuation.
Ignore extra words.
Ignore word order.
Title: "buying dictionaries"
Match at least 0 words.
Judge: not judged.
Branch: Exit.
Erase: after next entry.

Display: Chicago Chicago Chicago
Yes. It's about buying good dictionaries.
This paragraph is about buying good dictionaries.
Now you have the general idea about what you need to do.

If you have any questions, ask Tabuse-sensee.

Push return to proceed.
日本の小学校や中学校にはきゅうしょくというものがあります。きゅうしょくというのは学校が小学生や中学生のために作ってくれるお昼ごはんのことです。日本のきゅうしょくはなかなかおいしくて、クラスのみんなが、いっしょに教室で食べます。小学校では、ふつう先生もいっしょに食べます。
What is this paragraph about?

school lunch
Yes. This paragraph is about school lunch.
This paragraph is about school lunch.
高校になると、きゅうしょくのない学校が多くなります。
学生たちは家からおべんとうを持って来ます。おべんとう
というのは、自分の家から持って来たお昼ごはんのこと
です。ふつうは、ごはん、にく、やさいなどを入って
おべんとうを作りますが、わかい人たちの中には、ごはん
のおべんとうよりサンドイッチなどの方が好きな人が
たくさんいます。
Who brings おべんとう to school?
Yes. High school students bring obentoo to school.
According to this passage, high school students bring obento to school.
大学には学生しゃくどうがあります。学生のための安いレストランです。日本人はことばをみじかくするのが好きですから、学生しゃくどうのことをふつう学しゃく "がくしょく"とよびます。学しゃくでは、そばなどの安いものや、天ぷらのような少し高いものもあります。日本人はだれでも学しゃくの食べものは"まずい"と言いますが、学生にとって一番大事なことは、やっぱり "安い"ということでしょう。
What is the most important thing for the university students regarding 学しくく?
Yes. The most important thing for the university students regarding lunch is that it is cheap.
According to the passage, the most important thing is that it is cheap.
You have finished reading the passage.

Now you are going to write down everything you remember about the passage.

Tell Tabuse-sensee that you finished.

She will give you a sheet of paper.

ごくろうさまでした！
APPENDIX G

THE EXPERIMENTAL TEXT
日本の小学校や中学校にはきゅうしょくというものがあります。きゅうしょくというのは学校が小学生や中学生のために作ってくれるお昼ごはんのことです。日本のきゅうしょくはなかなかおいしくて、クラスのみんなが、いっしょに教室で食べます。小学校では、ふつう先生もいっしょに食べます。
高校になると、きゅうしょくのない学校が多くなります。学生たちは家からおべんとうを持って来ます。おべんとうというのは、自分の家から持って来たお昼ごはんのことです。ふつうは、ごはん、にく、やさいなどを入れておべんとうを作りますが、わかい人たちの中には、ごはんのおべんとうよりサンドイッチなどの方が好きな人がたくさんいます。
大学には学生しくどうがあります。学生のための安いレストランです。日本人はことばをみじかくするのが好きですから、学生しくどうのことをふつう学しく"がくしょく"とよびます。学しょくでは、そばなどの安いものや、天ぷらのような少し高いものもあります。日本人はだれでも学しょくの食べものは"まずい"と言いますが、学生にとって一番大事なことは、やっぱり"安い"ということでしょう。
_sample_reading_text_

わたしは三か月前から日本ごを勉強しています。いつも
いいじょうを買いたいと思っています。英わじてんだけで
はなくて、わ英じてんもいります。でも、いいじょうが
なかなかなくて困っています。
APPENDIX I

IDEA UNITS SCORING TEMPLATE
## Idea Units Scoring Template for the experimental text

### Paragraph 1

<table>
<thead>
<tr>
<th>Unit Value</th>
<th>Idea Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Japanese school</td>
</tr>
<tr>
<td>2</td>
<td>Elementary School</td>
</tr>
<tr>
<td>2</td>
<td>Middle School</td>
</tr>
<tr>
<td>2</td>
<td>“kyuushoku”</td>
</tr>
<tr>
<td>2</td>
<td>exists</td>
</tr>
<tr>
<td>3</td>
<td>schools make or prepare</td>
</tr>
<tr>
<td>4</td>
<td>school lunch</td>
</tr>
<tr>
<td>2</td>
<td>for elementary school children</td>
</tr>
<tr>
<td>2</td>
<td>for middle school students</td>
</tr>
<tr>
<td>1</td>
<td>Japanese school lunch is</td>
</tr>
<tr>
<td>1</td>
<td>fairly/pretty</td>
</tr>
<tr>
<td>2</td>
<td>delicious/good</td>
</tr>
<tr>
<td>2</td>
<td>everyone</td>
</tr>
<tr>
<td>1</td>
<td>in the class</td>
</tr>
<tr>
<td>3</td>
<td>eat (school lunch)</td>
</tr>
<tr>
<td>2</td>
<td>together</td>
</tr>
<tr>
<td>1</td>
<td>in the classroom</td>
</tr>
<tr>
<td>2</td>
<td>in the elementary school</td>
</tr>
<tr>
<td>2</td>
<td>teachers</td>
</tr>
<tr>
<td>1</td>
<td>also</td>
</tr>
</tbody>
</table>
21. eat (school lunch)  
22. together (with the students)
<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Unit Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>At the high school level</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>many</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>schools</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>do not provide</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>school lunch</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>(high school) students</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>bring</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>(their own) lunch</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>from home</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>usually</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>make</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>lunch</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>with</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>rice</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>meat</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>vegetables</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>among</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>young people</td>
<td>2</td>
</tr>
<tr>
<td>19</td>
<td>many (people)</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>like</td>
<td>3</td>
</tr>
<tr>
<td>21</td>
<td>sandwich</td>
<td>2</td>
</tr>
</tbody>
</table>
22. better than
23. lunch with rice
Paragraph 3

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Unit Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>In the university</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>there is a</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>cafeteria/dining room</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>Japanese people</td>
<td>3</td>
</tr>
<tr>
<td>5.</td>
<td>like to</td>
<td>2</td>
</tr>
<tr>
<td>6.</td>
<td>shorten</td>
<td>2</td>
</tr>
<tr>
<td>7.</td>
<td>words</td>
<td>2</td>
</tr>
<tr>
<td>8.</td>
<td>therefore, so</td>
<td>2</td>
</tr>
<tr>
<td>9.</td>
<td>the students call</td>
<td>1</td>
</tr>
<tr>
<td>10.</td>
<td>the students' cafeteria</td>
<td>2</td>
</tr>
<tr>
<td>11.</td>
<td>&quot;gakushoku&quot;</td>
<td>2</td>
</tr>
<tr>
<td>12.</td>
<td>At gakushoku</td>
<td>1</td>
</tr>
<tr>
<td>13.</td>
<td>there are</td>
<td>1</td>
</tr>
<tr>
<td>14.</td>
<td>inexpensive things</td>
<td>2</td>
</tr>
<tr>
<td>15.</td>
<td>such as</td>
<td>1</td>
</tr>
<tr>
<td>16.</td>
<td>soba</td>
<td>1</td>
</tr>
<tr>
<td>17.</td>
<td>and/as well as</td>
<td>1</td>
</tr>
<tr>
<td>18.</td>
<td>a little (more)</td>
<td>1</td>
</tr>
<tr>
<td>19.</td>
<td>expensive things</td>
<td>2</td>
</tr>
<tr>
<td>20.</td>
<td>such as</td>
<td>1</td>
</tr>
<tr>
<td>21.</td>
<td>tenpura</td>
<td>1</td>
</tr>
</tbody>
</table>
everyone says the food at the cafeteria is not good but for the (university) students the most important thing is that it is cheap