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The Importance of Time for Processing in Second Language Comprehension and Acquisition

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THESIS APPROVAL

The abstract and thesis of Jennifer Lee Watson for the Master of Arts in TESOL were presented November 26, 1996, and accepted by the thesis committee and the department.

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ABSTRACT

An abstract of the thesis of Jennifer Lee Watson for the Master of Arts in TESOL presented November 26, 1996.

Title: The Importance of Time for Processing in Second Language Comprehension and Acquisition.

Research findings on the positive impact of interaction on comprehension have led to questions regarding both the connection between comprehension and acquisition and the qualities of interaction which facilitate understanding (Ellis et al. 1994). Ellis et al. found that a high degree of comprehension on an activity which contained unknown words correlated with a high rate of vocabulary acquisition. The present study replicates the activity and testing procedures used by Ellis et al. The main focus of the Ellis et al. study was the connection between second language comprehension and acquisition. This study differs from Ellis et al. in that its focus is the role of time in second language comprehension and acquisition.

The scope of this study is restricted to the following question: Is “time for processing” a significant factor in the comprehension of directions and acquisition of new vocabulary words?

Forty adult students of English as a second language followed directions to a task which contained unknown vocabulary words. The forty students were divided among five different ESL classes of the same ability level. Each class was read a different version of directions to the task. The various versions (linguistic environments) were different in regard to repetition and time lapse between utterances. Activity scores and pre/post test improvement were analyzed using a non-parametric Wilcoxon t-test and Kruskal-Wallis 1-Way analysis of variance (ANOVA).

It was found that time + repetition led to significantly higher activity scores than the time only and the no-time + no-repetition environments. The time + repetition environments also outscored the repetition only environment. Pre/post-test scores improved significantly in all of the environments. However, an ANOVA found no statistically significant difference in improvement among the environments.

Major findings of this study are (1) students' activity scores improved in direct relation to the amount of time they were given to process information; (2) pre/post-test improvement occurred in all of the environments; (3) in contrast with Ellis et al., no correlation was found between high rates of comprehension and high rates of acquisition.

THE IMPORTANCE OF TIME FOR PROCESSING IN SECOND LANGUAGE
COMPREHENSION AND ACQUISITION

by

JENNIFER LEE WATSON

A thesis submitted in partial fulfillment of the
requirements for the degree of

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CHAPTER I

INTRODUCTION

The present study attempts to answer the following question:

Is “time for processing” a significant factor in the comprehension of directions and acquisition of new vocabulary words?

This study is a partial replication of Ellis et al. (1994). Ellis et al. found a correlation between comprehension of directions to a task and acquisition of new vocabulary words. Three different linguistic environments were established in the Ellis et al. study. The interactive environment, in which participants were allowed to interact with the native speaker giving directions, produced the highest degree of comprehension scores on the task and the highest gains in vocabulary knowledge on the post-tests. The premodified environment, in which a simplified script was read and no interaction was allowed, produced significantly lower comprehension scores and lower gains on post-tests than the interactive environment. The baseline environment, in which a script based on a native speaker performance of the task was read and no interaction was allowed, produced the lowest comprehension scores and lowest gains on post-tests.

The main purpose of the Ellis et al. study was to attempt to reveal a direct correlation between comprehension and acquisition. As the interactive environment produced the highest level of comprehension and acquisition, Ellis et al. suggested several factors which existed in the interactive environment that may have helped learners acquire new vocabulary items:

- 1) The ability of learners to pinpoint the source of their comprehension difficulty.
 - 2) The multiple repetition of the new items may have allowed the learners to develop auditory images.
 - 3) The availability of ample time to process the new items.
- (p.478).

The main purpose of the present study is to isolate time in the linguistic environment and determine its significance in regard to both comprehension and acquisition. The design of this study includes two assumptions based on the Ellis et al. results; 1) a high degree of comprehension will lead to a high degree of acquisition and 2) the interactive environment will create the optimal environment for comprehension and acquisition.

In order to isolate time in the linguistic environment, an identical activity was used in five different ESL classes. Although the activity format was identical, the directions given to the students during the activity differed between classes in regard to redundancy in the input and time lapses between utterances. Activity sheets were

corrected and an analysis was made to determine which version of the activity best facilitated comprehension of the directions. A pre-test was given before the activity and post-tests were given after the activity. Pre and post test scores were analyzed to determine whether gains in vocabulary knowledge occurred during the activity. An analysis of the pre and post test scores was made to determine which version of the activity best facilitated vocabulary acquisition.

BACKGROUND

A general consensus exists within second language acquisition theory in regard to the importance of comprehensible input in the language learning environment. The Krashen (1985) notion that comprehensible input that is just above (+1) interlanguage level ('i') facilitates acquisition has lead researchers to investigate the nature of the language learning environment. Foreigner talk and caretaker speech have been cited as examples of linguistic adjustments made by fluent speakers when addressing language learners (Chaudron, 1983; Kelch, 1985; Long, 1982, 1985). These naturally occurring adjustments are said to provide evidence that 'i' + 1 input is necessary for both comprehension and acquisition (Long, 1982).

Research into the components of foreigner talk which lead to comprehension have revealed that topic restatement and slow rate facilitate understanding of input (Chaudron, 1983; Kelch, 1985; Pica, 1985, 1985a, 1987; Loschky, 1993; Ellis et al.,

1994). However, the idea that a high degree of comprehension facilitates acquisition (Long, 1985) has led to research which investigates language learners' ability to focus on meaning and form simultaneously.

VanPatten (1989) found that learners had a difficult time comprehending a lecturette when they were asked to focus on specific lexical items or particular grammar points. Learners who were asked to focus on content only out-scored all other groups on a comprehension post-test.

VanPatten's conclusion that learners cannot focus on meaning and form simultaneously conflicts with the findings of Ellis, Tanaka, and Yamazaki (1994) who discovered a quantifiable link between high scores on an activity and gains in vocabulary knowledge. Ellis et al. (1994) note that although empirical evidence exists to support the idea that interaction aids comprehension, no empirical evidence exists which supports the notion that interaction aids second language acquisition (p. 449). To investigate the impact of interaction (negotiation) on language acquisition, they conducted the dual study described earlier in this chapter. An identically designed experiment was conducted at two different classroom sites.

Ellis et al. found that it could not be determined "whether interaction aids comprehension simply because of the additional time and input it provides or because of the qualitative features of the input it creates." (p.480) They note that "time does seem to have been a factor" (p.480) This observation is based on two aspects of the results. First, the Interactionally Modified Group had a time advantage over the

Baseline and Premodified groups. Second, the Premodified Group at one of the test sites was given directions over a 20 minute period while the Premodified Group at the other test site was given directions over a 10 minute period. The students in the 20 minute group outscored the students in the 10 minute group.

The issue of time consistently arises throughout research on the effects on comprehension of foreigner talk and interaction (Kelch 1985. Pica 1986, 1987, 1991. Ellis et al. 1994). Research in the area of psychology has given further insight into the role of time in language processing.

Ferreira, Henderson, Anes, Weeks, and McFarlane (1996) found that “high-frequency words in spoken sentences require less time to process than do low-frequency words” (p. 324).

In exploring the effects of time-compressed speech on native and EFL listening comprehension, Conrad (1989) found that the lower a student’s level of ability the slower sentences needed to be read.

The findings of Conrad (1989), and Ferreira et al. (1996) support an information-processing approach to language comprehension which maintains that frequent input becomes automatized and unfamiliar input requires a time consuming bottom-up process for comprehension (Logan, 1990).

The present study takes into account the connection between comprehension and acquisition discovered by Ellis et al. and explores the significance of time as a factor in the comprehension of directions and acquisition of new vocabulary words. It

is hoped that the results of this study will give further insight into the connection between comprehension and acquisition and also shed light on one factor that may play a crucial role in the comprehension and acquisition of new vocabulary.

THE RESEARCH QUESTION

This study will attempt to answer the following question:

Is “time for processing” a significant factor in the comprehension of directions and acquisition of new vocabulary words?

ENVIRONMENTS

As the purpose of this study was to discover the effect of time on comprehension and acquisition of new vocabulary items, it was important to create parallel environments which were identical in all respects except time. These parallel environments are referred to as Baseline A and B and Premodified A and B in the description of the environments.

Five different forms of the same activity were developed. The baseline script was used in the Interactive environment, read at an established native speaker rate in Baseline A, and read at the interactive rate in Baseline B. The premodified script was

read at an established native speaker rate in Premodified A and at the interactive rate in Premodified B:

- 1) **Baseline A:** baseline input administered at the established NS rate of 160 wpm + .05 sec. lapse between directions.
- 2) **Interactive:** baseline input with the option of interactional modification.
- 3) **Premodified A:** premodified input administered at an established NS rate of 160 wpm.
- 4) **Premodified B:** premodified input administered at the Interactive rate.
- 5) **Baseline B:** baseline input administered at the Interactive rate.

HYPOTHESES

In order to investigate the significance of time for processing in the comprehension of directions and the acquisition of new vocabulary words, three research hypotheses were made:

Hypothesis 1

Subjects in the Interactive environment will show greater comprehension of the directions, as measured by correct placement of items on a picture matrix and a higher rate of acquisition, than the subjects in the other four environments, as measured by gains on listening comprehension post-tests of the seventeen introduced vocabulary items.

Hypothesis 2

Subjects in the Premodified B environment will show greater comprehension of the directions, as measured by correct placement of items on a picture matrix, than the subjects in the Premodified A, Baseline A, and Baseline B environments and will show a higher rate of acquisition than the subjects in the Premodified A, Baseline A, and Baseline B environments, as measured by gains on listening comprehension post-tests of the seventeen introduced vocabulary items.

Hypothesis 3

Subjects in Baseline B will show greater comprehension of the directions as measured by correct placement of numbers on a picture matrix, than subjects in Premodified A and Baseline A and will show a higher rate of acquisition than the

subjects in Premodified A and Baseline A, as measured by gains on listening comprehension post-tests of the seventeen introduced vocabulary items.

If statistically significant differences were found between the environments according to the hypotheses above, then the results would support the notion that time for processing plays an important role in second language comprehension and acquisition.

The following chapters will give a more in-depth review of the literature and describe the methods through which the above hypotheses were investigated. An analysis of the results of the study will be presented and implications of the results for further research and language teaching will be discussed.

CHAPTER II

REVIEW OF THE LITERATURE

INTRODUCTION

This chapter gives an overview of the theoretical development of the role of input in second language acquisition. A general consensus is found on the importance of comprehensible input in the learning environment, regardless of whether that environment is naturalistic or in a classroom situation. Investigations in the area of negotiated input found that interaction between interlocutors during a given task did assist in correct completion of the task (Pica 1985, 1985a, 1987). Research into the effect of comprehension of a task on acquisition of new input found that saliency combined with frequency in a vocabulary learning activity led to a high probability of acquisition (Brown, 1993). However, research into learner ability to focus on structure and meaning simultaneously found that learners who focused on meaning had a difficult time paying attention to form (VanPatten, 1989). This finding calls into question the connection between comprehension and acquisition in that without the ability to focus on meaning and form simultaneously, how can learners possibly acquire new forms through comprehensible input alone?

Research on information-processing as it relates to language comprehension is reviewed in an attempt to reconcile the apparent contradiction of language learners' inability to focus on meaning and form simultaneously (VanPatten, 1989) with their ability to acquire language through comprehension alone (Brown 1993, Ellis et al. 1994). An information-processing approach to language comprehension is presented to explain this conflict. An information-processing approach to language comprehension maintains that frequent input becomes automatized and unfamiliar input requires a time consuming bottom-up process for comprehension (Logan, 1990).

THE INPUT HYPOTHESIS

Krashen's Input Hypothesis (1985) claims that language acquisition occurs when language learners encounter 'comprehensible input' (p.2). Comprehensible input is defined as language that the learner hears and understands. Krashen maintains that understanding content does not mean that the forms used to convey meaning can be reproduced and employed by the learner. The learner's ability to understand beyond his or her ability to produce is said to occur through a combination of the learner's interlanguage ('i') and the context in which the utterance is spoken (+ 1). This 'i' + 1 understanding is said to facilitate acquisition.

Defining Input

In an attempt to distinguish between 'i' and + 1, language researchers have used the terms input and intake.

Corder (1967), defines 'input' as 'what is available for going in' and 'intake' as 'what goes in.' The assumption on which these definitions is based is that not everything a learner hears is understood. In other words, 'input' is defined as all possibly comprehensible language and 'intake' is defined as what is actually understood and used by the learner.

Chaudron (1985) modifies Corder's definitions of 'input' and 'intake.' Input is defined as simply language that the learner hears which may or may not be comprehended but is not incorporated, in any way, into his/her interlanguage grammar. Intake is defined as information which is comprehensible and leads to hypotheses about the language being learned.

Chaudron (1985) concludes that the most important factor in determining what becomes intake and what remains input is the learner's present knowledge of the target language. If the learner's previous knowledge of the target language determines his ability to acquire new forms, it would follow that the quality of input in the environment would need to be at or just above the level of the learner's interlanguage for both comprehension and eventual acquisition to occur.

EVIDENCE SUPPORTING THE INPUT HYPOTHESIS

Caretaker Speech

Long (1982) cites the existence of caretaker speech as evidence that supports Krashen's Input Hypothesis. Caretaker speech is modified speech intended to convey meaning to young children. Structures in caretaker speech are said to be below, at and a little beyond the child's level (p. 208). The focus of caretaker speech is also said to be on the "here and now" and in that way the input is made comprehensible to the child.

Foreigner Talk

The existence of foreigner talk (modified language directed toward non-native speakers) is also said to support Krashen's Input Hypothesis (Long, 1982). Foreigner talk is simplified for low level learners and allowed to be more complex for more advanced learners. As with caretaker speech, the focus is on communication and structures are gauged to the learner's level of proficiency.

Chaudron (1983) looks to the area of topic reinstatement in foreigner talk and attempts to identify the most helpful type of reinstatement for the L2 learner.

Chaudron predicts a ranking from most to least effective types of reinstatements:

Rhetorical question >/= Repeated Noun > If-Clause >/=
Simple Noun > Synonym

Types of reinstatements:

- a. Simple Noun: The beer tastes terrific.

- b. Synonym: The brew tastes terrific.
- c. Repeated Noun: The beer...the beer tastes terrific.
- d. Topicalizing Rhetorical Question: What about the beer? It tastes terrific.
- e. If-Clause (non-conditional): If you can afford the beer, it tastes terrific.

(p. 443)

Chaudron predicted equal effectiveness between devices with \geq signs. All five of these devices were tested by creation of five different simulated lectures which students listened to and then answered questions about.

Test results showed that, contrary to Chaudron's prediction, the Repeated Noun device appeared to be far more helpful to the students on tests of both recall and recognition than any other device. The Simple Noun was the second most helpful ahead of both the Rhetorical Question and If-Clause devices. It was concluded that the simplest clues to topic were the most helpful, while syntactically more complicated modifications were least effective.

Long's (1985) Interaction Hypothesis breaks down an indirect approach to demonstrating the relationships between environmental features and interlanguage development into three steps:

Step 1: Show that (a) linguistic/conversational adjustments promote (b) comprehension of input.

Step 2: Show that (b) comprehensible input promotes (c) acquisition.

Step 3: Deduce that (a) linguistic/conversational adjustments promote (c) acquisition.

Long maintains that "evidence of the a-->b and b-->c relationships would allow the linguistic environment to be posited as an indirect causal variable in Second Language Acquisition" (p.378).

The results of the Long (1985) study of 34 intermediate ESL students revealed that the comprehension level of the content of a lecturette increased when the lecturette was simplified. Half of the students listened to a recording of a lecturette that contained run-on sentences, asides and pause fillers (NS). The other half listened to a version of the lecturette which was longer, syntactically less complex, contained rephrasing, and was read more slowly with clearer articulation compared to the NS version (FT).

All 34 students answered a multiple choice test concerning the content of the lecturette. The scores of the FT group were significantly higher than those of the NS group. It was concluded that the linguistic adjustments of the FT version aided in the comprehension of the content of the lecturette and that the improved performance of the FT group provided evidence of a causal relationship between linguistic/conversational adjustments and comprehensibility.

Kelch (1985) attempts to determine the components of foreigner talk that are most helpful to the language learner. Kelch's results support the Long (1985) hypothesis that foreigner-talk-like modification leads to higher levels of

comprehension, but appear to dispute a direct connection between comprehension and acquisition.

Kelch hypothesizes that learners would score best on a dictation test if both the 'slow rate' and 'modification' aspects of foreigner talk were employed. It was then predicted that slow rate only and modification only would produce equally marginal results while no adjustment would lead to the lowest scores on a dictation test.

It was found that a combination of slow delivery plus modification gave mixed results. When dictation tests were scored for exact accuracy, there was no notable improvement in scores as compared with 'slow rate only' and the 'modification only' results. However, when the tests were scored using an equivalent meaning measurement it became clear that there was an improvement in comprehension.

Kelch concludes that modification and slow rate enhance the learner's ability to grasp meaning, but not necessarily the ability to remember the exact form.

The connection between linguistic adjustments that occur in foreigner talk and comprehensibility indicates that foreigner talk used by native speakers when speaking to non-native speakers is helpful when it includes slow rate and repetition. Empirical evidence supporting the connection between comprehension and acquisition, however, remains elusive.

THE ROLE OF INPUT IN SECOND LANGUAGE ACQUISITION

Wagner-Gough and Hatch (1975) lend support to Krashen's Input Hypothesis in their discussion of the importance of input data in the study of Second Language Acquisition (SLA). They note that morpheme studies have revealed similar sequences in development with age, language background, and the nature of the learner's exposure to English having little effect on the sequences. However, Wagner-Gough and Hatch do not consider a pattern of language development a satisfactory explanation for the process of language learning. They view the isolation of language form from meaning in SLA research as the main hindrance to the development of a model that describes and explains language acquisition.

Wagner-Gough and Hatch consider this connection between input and output as the key to understanding how language is acquired. They consider factors such as frequency of appearance in the input and semantic weight as elements that affect whether input is internalized and employed by the learner.

The findings of Brown (1993) support the importance of the factors of frequency and semantic weight in acquisition observed by Wagner-Gough and Hatch (1975). Brown (1993) conducted a study of 100 ESL students at Brigham Young University in which vocabulary learning was investigated. Four factors of vocabulary learning were studied: word frequency, specific context word frequency, instructional focus saliency, and gap in concept saliency. The ESL students in the study

participated in a videodisk program involving exercises and glosses. Post-tests analyzed acquired word frequency in the program presented, general frequency, saliency in the program exercises and glosses, and visual "gap". The use of post-testing provided empirical evidence that certain factors in the linguistic environment influenced whether or not acquisition occurred.

Brown observed three important factors in determining the likelihood of learning a given vocabulary word:

1. General frequency does seem to make a difference in whether a word is acquired or not. Exactly how this works is not clear. Specific frequency in materials does not seem to make a difference. However, specific frequency in the social setting may. Words which were shown in the beginning to about one third to two thirds of the students who shared this environment were the words which were most often learned.

2. Words which are important (salient) in a specific context are more likely to be acquired regardless of frequency.

3. Learners are more likely to learn a word for which they have a concept prior to seeing or hearing the word form. This is especially true if the learners have the opportunity to experience the word form again in context after the initial encounter.

(Brown, 1993, p. 288)

THE LANGUAGE LEARNING ENVIRONMENT

Naturalistic Setting

Long (1982) cites delay of acquisition in environments that lack input as additional evidence of Krashen's Input Hypothesis. Acquisition is said to be delayed if

comprehensible input is unavailable. Hearing children of deaf adults have been shown to be language delayed, but were found to be able to attain the same spoken language ability of their peers after adult-child spoken conversation was made available.

Long (1982) draws three generalizations about the evidence cited:

- 1) Access to comprehensible input is a characteristic of all cases of successful first and second language acquisition.
- 2) Greater quantities of comprehensible input seem to result in better (or at least faster) acquisition.
- 3) Lack of access to comprehensible input results in little or no acquisition.

Classroom Setting

Pica (1986) attempted to test the claims regarding the contributions of naturalistic settings as opposed to formal classroom settings. Pica tested 18 adult native speakers of Spanish on English grammatical morphology. The students were divided into three groups; Instruction Only, Naturalistic, and Mixed. Data consisted of hour-long audiotaped conversations between each subject and the researcher. Error analysis of the transcriptions of the conversations determined the percentage of suppliance in obligatory context, the percentage of target-like use, the rank order of morphemes based on the suppliance in obligatory context, and the proportion of morpheme overgeneralization and overuse in relation to all errors for the following morphemes: progressive -ing, plural -s, singular copula, progressive auxiliary, article, past irregular, past regular, third person singular, and noun possession -s types. In

addition, the proportion of target-like and nontarget-like expressions of noun plural was also determined. It was found that the Instruction Only group order of acquisition correlated with Krashen's Natural Order and that there was no statistically significant difference in over generalization between the Instruction Only, Mixed and Naturalistic subjects. It was also found that the Naturalistic subjects expressed plurality with a premodifying quantifier at a statistically more frequent rate than the Instruction Only or Mixed group.

It was concluded that the Mixed group had fewer Instruction Only-type mistakes and used more Naturalistic constructions than the Instruction Only group.

White, et al.(1992) and Lightbown (1991) investigated the contribution of form-focused instruction and corrective feedback to learner accuracy in question formation.

Through the use of pre-tests, post-tests and a five week follow-up test White, et al. (1992) documented the effects of form-focused instruction on question formation on 10-12 year old beginner level ESL learners. The intensive English as a Second Language programs in the province of Quebec, Canada, where the students were attending school, encouraged students to use questions. However, even though students used questions with their teachers, visitors, and each other they rarely received correction when their question formation was incorrect. During the experiment three classes were provided with form-focused instruction and corrective feedback on question formation while six classes were given no explicit instruction on

question formation. Scores on the pre-test showed no difference in ability between groups in regard to their understanding of question formation. The post-test revealed a statistically significant difference between the groups that received explicit form-focused instruction and corrective feedback on question formation and those who did not. The five week follow-up test showed no significant decline from the post-test.

White, et al. conclude that explicit form-focused instruction and corrective feedback can lead to "genuine changes in learners' interlanguage systems" (p. 429).

Lightbown and Spada (1991) observed four classes of 10-12 year olds at an intensive English as a Second Language school in Quebec, Canada. In their observations, they found that relatively high levels of instructional time which included focus on grammar, vocabulary, and phonology correlated with accuracy of production of structures by learners. The accurate use of plural -s and progressive -ing, adjective placement in noun phrases, and possessive determiners by the students in the four classes was observed. Class 1, which had the most form-focused instruction, scored better in all three areas than the other three classes and significantly better than class 4, in which there was virtually no focus on grammar (p. 443).

The findings of White et al. and Lightbown and Spada reveal the importance of drawing the attention of learners to a particular aspect of the language. It is interesting that although the classes which did not focus on grammar were presumably rich in input, they did not provide the best environment for language acquisition.

Quality of Input Available in the Classroom

Pica and Doughty (1985) explore the varieties of input available to the learner. In a study of 34 students and their teachers, it was found that teachers and more fluent students dominated classroom talk time. It was also found that even when students were placed in groups of four, some students engaged in very little conversation as they either rarely spoke or their comments were ignored by the other students.

It was also found, however, that group work involving an information gap activity produced significantly more conversation. The information gap activity involved a master pattern with each participant given only a portion of the pattern. As the completion of the task required full participation from all members of the group, typically soft spoken students could not be ignored and were not inclined to withdraw from the activity or withhold information.

This study concluded that classroom activities must compel individuals to negotiate meaning (interact with others to complete the task) rather than just invite them to participate (p. 246). Pica and Doughty (1985) note that teachers must be aware that interaction (negotiation for meaning) in a teacher fronted activity may only lead to input which is comprehensible for the student who initiated the negotiation. It is therefore important to keep in mind who initiated the negotiation as the pre-modified state may have been comprehensible to the majority of students while the modified state may remain incomprehensible to other students both before and after modification.

Pica and Doughty (1985a) found, in a study of students and teachers from low-intermediate ESL classes, that more grammatical input was available during teacher-fronted activities than during group activities. Conversational adjustments were also more frequent during teacher-fronted activities. They point out, however, that although more grammatical input and more conversational adjustments occurred during the teacher-fronted activities, the grammatical input was mainly provided by the instructor and the conversational adjustments were directed toward specific students and may not have been beneficial for other students in the class. Although input was often ungrammatical during the group activities, students had more opportunities to use the target language during group activities than during the teacher-fronted sessions.

The discussion/decision making activities analyzed in the study did not require two-way communication between participants. Pica and Doughty (1985a) concluded that one-way communication tasks did not appear to facilitate negotiation of message in either teacher-fronted or group activities.

The Importance of Interaction

Doughty and Pica (1986) explore the hypothesis postulated in Pica and Doughty (1985a) regarding one-way vs. two-way (information gap) tasks and their effect on participation and modification of interaction. Pica and Doughty (1985a) hypothesized that an activity which required two-way communication would create a

situation more apt to facilitate interaction. Doughty and Pica (1986) analyzed participation and modification of interaction in three classes of intermediate ESL classes during an information gap task. Three different group situations were created: teacher-directed, small group consisting of four randomly selected students, and dyad. In each group the students were given a felt-board "garden" and various loose felt flowers which were to be planted (p. 311).

It was found that the information gap task resulted in a statistically significant increase in both participation and modification of interaction when compared to the teacher directed activity in Pica and Doughty (1985a). Differences in the amount of modification of interaction in the small group and dyad tasks were insignificant. However, there was a significant increase of modification of interaction in the small group and dyad situations when compared with the teacher-fronted task. Doughty and Pica (1986) suggest that students may be less likely to ask questions in front of the entire class. This suggestion was supported by the informal notation of an instructor that in the teacher-fronted task "individual student's boards often did not correspond to the instructions given" (p. 319). The research by Pica and Doughty shows a connection between speech modification and comprehension and the necessity of shared goals and beliefs between interlocutors.

In order to further investigate the effect of interaction on comprehension, Pica (1987) analyzed the output of both nonnative speakers (NNSs) and a native speaker (NS) in an interactive environment. The first group of students was read a

premodified set of directions by a NS. The second group was read an unmodified set and was then allowed to ask questions of the NS.

It was found that when the unmodified directions were difficult, the NNSs who interacted with the NS scored significantly better than the group with the corresponding premodified set who were not allowed to interact.

Pica concludes that grammatical simplification alone does not assist in an effective way. Repetition of content words appeared to increase comprehension. As repetition of content words occurred at a higher rate in the interactive group, it was suggested that simplification of grammatical structures may actually reduce the number of repetitions, leading to a lower level of comprehension.

Pica, Holliday, Lewis, and Morgenthaler (1989) address the claim that although comprehension of input is invaluable to the acquisition of a second language it is not sufficient for mastery of that language (Schmidt, 1983). This idea maintains that comprehension of input does not require the learner to pay attention to grammatical form, while communication forces the non-native speaker to organize output in a grammatical way.

Three tasks were performed by native and nonnative speakers of English. An "information gap" task, "jigsaw" task and a discussion about the two tasks were carried out by three groups of 10 dyads.

It was found that the type of modifications by native speakers and the ways in which nonnative speakers requested clarification did not change according to the tasks.

The "information gap" task was found to have provided the best conditions for nonnative speakers to modify their output to the native speaker and receive modified input.

Pica (1991) strives to find empirical support for Long's (1982, 1985) argument that the act of engaging in negotiation best facilitates learner comprehension. Pica (1991) involved twenty-four English students participating in a comprehension task with their teacher in which the teacher gave directions to a task to sixteen learners who completed the task to the best of their abilities. In the first group of the students who were given directions some students were designated negotiators while others were not allowed to interact with their teacher. The second group of students completed the task by listening to a transcription of the negotiation process that had occurred with the first group of students. During the reading of the transcription special care was taken to duplicate the amount of time it took for the actual negotiation that occurred with the first group.

It was found that students who were at a developmentally higher level than their classmates comprehended the directions given by the teacher whether they participated in negotiation, observed negotiation, or listened to the transcription. In contrast, students who were at a developmentally lower level performed significantly better at the task when they were designated negotiators than when they merely listened to the negotiation process.

THE CONNECTION BETWEEN COMPREHENSION AND ACQUISITION

VanPatten (1989) suggests that learners cannot consciously process input for both meaning and form simultaneously.

VanPatten's study included 202 students of Spanish. Each class was asked to perform a different kind of task noting various information while listening to a three minute passage. As the students listened to the passage they were told to make a check mark on a piece of paper for every time they heard their assigned form. After the students listened to the passage, they were all asked to write down as much as they could remember from the passage.

It was found that students asked to focus on content only produced the highest degree of recall, while students asked to focus on lexical words scored nearly as well. The lowest scores came from the groups in which grammatical form was the focus. The definite article group scored better than the verb morpheme group.

VanPatten concludes that conscious attention to form in the input competes with conscious attention to meaning.

Ellis, Tanaka, and Yamazaki (1994) note that although empirical evidence exists to support the idea that negotiation aids in comprehension, no empirical evidence exists which supports the notion that negotiation of meaning aids second language acquisition (p. 449). To investigate the impact of negotiation on language acquisition, they conducted a dual study. An identically designed experiment was

conducted at two different classroom sites. This experiment involved several environments. In the Baseline Group students were given directions that were derived from NS to NS performance of a task (the baseline). In the Premodified Group students were given a simplified version of the baseline. In the Interactionally Modified Group students were read the baseline version of the directions but were allowed to interact with the NS giving the directions. The participants in each environment took a pre-test before the task and a post-test after the activity in order to determine whether words were acquired during the task.

Results on the completion of the task and post-tests revealed that students in the Interactionally Modified Group outperformed students in the other two environments. However, Ellis et al. found that it could not be determined "whether interaction aids comprehension simply because of the additional time and input it provides or because of the qualitative features of the input it creates" (p. 480). They note that "time does seem to have been a factor" (p. 480). This observation is based on two aspects of the results. First, the Interactionally Modified Group had a time advantage over the Baseline and Premodified groups. Second, the Premodified Group at one of the test sites was given directions over a 20 minute period while the Premodified Group at the other test site was given directions over a 10 minute period. The students in the 20 minute group outscored the students in the 10 minute group.

The Ellis et al. studies provide evidence that "access to modified input promotes acquisition" (p. 481). Evidence is also provided that indicates that

"premodified input can [also] be effective in promoting acquisition" (p. 481). The studies did not, however, attempt to determine how interactionally modified input aids acquisition.

Ellis et al. suggest several factors in interaction which may have helped learners acquire new items:

1. The ability of learners to pinpoint the source of their comprehension difficulty.
2. The multiple repetition of the new items may have allowed the learners to develop auditory images.
3. The availability of ample time to process the new items.
4. The ability of the learners to relate the spoken forms of the new items to their pictorial referents.
5. The nonverbal response to the directions may have facilitated long-term storage of the new items.

(p. 478).

The apparent conflict between VanPatten's findings regarding learners' inability to focus on content and form simultaneously and Ellis' empirical support of the connection between comprehension and acquisition may be reconciled if we analyze the design of VanPatten's experiment. VanPatten's subjects were forced to focus on linguistic aspects of the input and note those aspects with a check on a piece of paper. In contrast, the Ellis design allowed subjects to focus on whatever aspect of the language they needed to focus on in order to comprehend the input.

THE ROLE OF CONSCIOUSNESS IN INPUT PROCESSING

Krashen (1985) maintains that there is a fundamental difference in second language development between 'acquisition' and 'learning.' 'Acquisition' is defined as "a subconscious process identical to child first language acquisition" (p. 1). 'Learning' is defined as "a conscious process that results in language knowledge but not high level comprehension or fluency" (p. 1).

Since Krashen's proposal of the acquisition-learning hypothesis several researchers in the area of linguistics, psycholinguistics, and psychology have proposed an information-processing approach to second language learning which challenges Krashen's definition of acquisition as an unconscious process.

Ellis (1991) reviews Long's interaction hypothesis and introduces a revised, weaker version. Ellis' revision maintains that although comprehension through interactional modification facilitates L2 acquisition it is neither necessary nor sufficient for L2 acquisition. In addition, Ellis maintains that modifications to input during negotiation make acquisition possible in cases where learners both comprehend the input and notice new features in it and then compare what is noticed with their own output. The idea that comprehended input must be noticed and then compared with the learner's own output runs counter to Krashen's acquisition-learning hypothesis.

McLaughlin, Rossman, and McLeod (1983) maintain that "acquisition of a complex skill, such as learning a second language...involves the gradual integration of

lower-level skills and their accumulation as automatic processes in long-term storage” (p. 152). McLaughlin et al. state that the hallmarks of automatic processing are increased speed and reallocated attention (p.154).

Schmidt (1990) identifies three questions concerning the role of consciousness in input processing:

1. Whether conscious awareness at the level of 'noticing' is necessary for language learning (the subliminal learning issue).
2. Whether it is necessary to consciously 'pay attention' in order learn (the incidental learning issue).
3. Whether learner hypotheses based on input are the result of conscious insight and understanding or an unconscious process of abstraction (the implicit learning issue).

(p. 127)

Schmidt cites VanPatten (1989), who argued that because second language learners must focus on meaning when attending to language input “they can only acquire forms when processing for meaning is automatic and freed resources can be devoted to communicatively less informative aspects of input” (Schmidt, 1990, p. 144). Schmidt concludes that subliminal language learning is impossible. He states that “noticing” is the condition which allows for conversion of input into intake.

Tomlin and Villa (1994) draw critical distinctions between attention, awareness, and consciousness. They state that two points must be incorporated into SLA theory on the mechanisms of acquisition:

1. Attention involves at least three theoretically and empirically separable components: alertness, orientation, and detection.
2. Attention is not awareness, although awareness requires attention.
(p. 194)

Robinson (1995) proposes a model of the relationship between attention and memory that is complementary to Schmidt's (1990) noticing hypothesis. Robinson's proposition runs counter to Krashen's (1985) learning vs. acquiring distinction hypothesis and attempts to reconcile the differing positions of Tomlin and Villa (1994) and Schmidt (1990). Tomlin and Villa maintain that detection is responsible for encoding in memory yet detection can occur without awareness. Schmidt, however, has claimed that conscious noticing is necessary for learning. Robinson equates Schmidt's "noticing" with what Tomlin and Villa call "detection."

Robinson focuses on Cowan's (1988) model of short and long-term memory. Robinson points out that the different positions of Tomlin and Villa and Schmidt can be reconciled if the concept of noticing is defined as detection plus rehearsal in short-term memory, prior to encoding in long-term memory (Robinson, 1995, p. 296). Cowan's model illustrates the theory that activation in short-term memory must exceed a certain threshold before it becomes part of awareness (Cowan, 1988, p. 165). Additionally, short-term memory is viewed as a subset of long-term memory.

Under this model, detection would then lead to rehearsal. The nature of rehearsal and elaboration would depend on whether or not the task demanded data-driven or conceptually-driven processing: data-driven processing is defined as "small

pieces which are later assembled in working memory" and conceptually-driven processing is defined as "integration of encoded stimuli within the context of surrounding stimuli, themselves the result of the activation of schemata in long-term memory" (p. 297-299).

Logan (1990) supports Robinson's view of data-driven and conceptually-driven processing as he addresses three shared characteristics of repetition priming and automaticity:

(a) The speed of processing increases as a power function of the number of exposures to a specific stimulus,

(b) the benefit from repeated exposures is specific to individual items, and

(c) the benefit is based on underlying associations between stimuli and the interpretations given to them in the context of specific experimental tasks.
(p.1)

Logan argues that the shared characteristics of repetition priming and automaticity result from the mechanism which stores and retrieves representations of individual instances. These "instances" are defined as exposures to specific items.

Logan proposes a "race model" to account for the shared characteristics of repetition priming and automaticity. This "race model", the instance theory of automaticity, outlines a mechanism which consists of two simultaneous processes. One process is an algorithm - a "bottom-up" way of either comprehending input or supplying appropriate output. The other is an automatic - "top-down" - retrieval

process. Logan states that “the theory assumes that the decision to rely on memory (automatic retrieval) is based on a race between the retrieval process and the algorithm - whichever finishes first determines performance” (p. 3). Logan maintains that a person who has been repeatedly exposed to an instance will sooner or later no longer need the algorithm process because the retrieval process (memory) will eventually beat the algorithm to the finish line.

Following the arguments of Logan and Robinson, Ellis (1996) maintains that language learning is the acquisition of memorized sequences for both vocabulary and discourse. Ellis argues that interactions between short-term and long-term phonological memory are inherent in this learning process. Short-term memory is said to allow representation and rehearsal, which leads to establishment of long-term sequence information. Ellis states:

There are reciprocal interactions between long-term sequence representations and short-term storage whereby long-term sequence information allows the chunking of working memory contents that accord with these consolidated patterns, thus extending the span of short-term storage for chunkable materials...it is this long-term knowledge base of word sequences that serves as the database for the acquisition of language grammar.

(p. 115)

THE ROLE OF TIME IN INPUT PROCESSING

The issue of time consistently arises throughout research on the effects on comprehension of foreigner talk and interaction (Kelch 1985; Pica 1986, 1987, 1991;

Ellis et al. 1994). Research in the area of psychology has given further insight into the role of time in language processing.

Ferreira, Henderson, Anes, Weeks, and McFarlane (1996) investigate spoken-language processing. Processing time for each segment of sentences that had been divided into word or wordlike segments was recorded. It was found that “high-frequency words in spoken sentences require less time to process than do low-frequency words”(p. 324).

Stine (1990) investigates the on-line processing of written text by younger and older adults by measuring young and elderly adults as they read single sentences for immediate recall. It was found that both young and old readers allocated time to process word-level and constituent-level features. The similarity between young and elderly performance at the word-level, constituent-level, and eye movement sweep toward the left to begin a new line of text lends evidence to the idea that microlevel processes become automatic with practice over time and that age deficits are minimal for such processes (p. 68). However, differences in how time was allocated were discovered. Younger adults allocated extra processing time at sentence boundaries and at clause boundaries while older adults allocated extra time at major and minor clause boundaries only. Stine suggested that the elderly time allocation strategy may produce smaller, more manageable chunks that could be handled easily within a limited capacity working memory (p. 73).

Conrad (1989) explored the effects of time-compressed speech on native and EFL listening comprehension. He asked three different types of students (native English speakers, high-level ESL learners, and medium-level ESL learners) to recall time-compressed recordings. The recordings decreased in rates of time-compression ranging from 40% to 90% normal playing time (p. 6). Conrad found that the lower the student's level of ability the slower the sentences needed to be read.

SUMMARY

In giving an overview of the theoretical development of the role of input in second language acquisition we see that there is general consensus on the importance of comprehensible input in the learning environment, regardless of whether that environment is naturalistic or in a classroom situation. The Pica (1985, 1985a, 1987) investigations found that interaction between interlocutors during a given task did assist in correct completion of the task. Research into learner ability to focus on structure and meaning simultaneously found that learners who focused on meaning had a difficult time paying attention to form (VanPatten, 1989). However, Brown (1993) found that saliency combined with frequency in a vocabulary learning activity led to a high probability of acquisition. Ellis et al. (1994) also discovered a quantifiable link between comprehension and acquisition.

The findings of Brown (1993) and Ellis et al. (1994) may be reconciled with VanPatten (1989) if research on language processing in the area of psychology is taken into account. The VanPatten study asked subjects to focus on designated forms within the input and then asked them to recall content. In contrast, the Ellis et al. and Brown studies allowed their subjects to focus on their own individual area of need rather than a designated form. The findings of Ellis et al. and Brown appear to be in line with the findings of Conrad (1989), Stine (1990), and Ferreira et al. (1996) in that these five studies support an information-processing approach to language comprehension which maintains that frequent input becomes automatized and unfamiliar input requires a time consuming bottom-up process for comprehension (Logan, 1990).

CHAPTER III

METHODOLOGY

This chapter explains in detail the nature of the participants and data collecting procedures. All of the non-native speaker participants studied English through Clark College in Vancouver, WA. Three of the four native speaker participants were not associated with Portland State University or Clark College. In addition, they had no English teaching experience. The fourth native speaker participant was a graduate student in the MA TESOL program at Portland State University.

As in the Ellis et al. (1994) study, interactive, baseline, and premodified environments were established for this study. However, as the focus of this study was the effect of time on comprehension and learning of new vocabulary items, it was important to create parallel environments which were identical in all respects except time. A total of five different environments (forms of the same activity) were developed for this study. The parallel environments are referred to as Baseline A and B and Premodified A and B in the description of the environments.

All non-native speaker participants were given three identical tests. The first test was given before the task, the second was given after the task, and the third was given two weeks later. The tests were given in an attempt to determine which of the

five environments was most conducive to vocabulary learning. Incorrect words on the pre-test were considered "unknown words." If fewer words were incorrect on the post-test, it was assumed that previously "unknown" words had been acquired. Learning (acquisition) was measured by a decrease in the percentage of incorrect words. It was assumed that the post-tests were measuring retention of previously unknown words that were comprehended during the activity.

TREATMENT

In this study, five linguistic environments were established. Under these five conditions, separate groups of NNS subjects were asked to complete a task. The task consisted of 12 directions which required the students to write numbers on a picture matrix handout (see Appendix A). The numbers corresponded to individual pictures below the matrix. Directions such as, 'Place the ladle in the dish drainer,' and 'Put the saucepan on the stove,' were read by the administering NS. The subjects would then respond to the directions by writing the number of the object on its designated location in the picture matrix.

Activity sheets were scored by giving one point for writing the correct object number anywhere on the picture matrix and one point for correct placement. There were twenty four possible points on the activity.

TESTING

A listening comprehension pre-test was given before the beginning of the task. The purpose of the pre-test was to determine whether or not the students were familiar with the vocabulary items in the task before they were introduced to them during the task. Immediately following the task, a post-test was given in order to determine whether or not the students had learned any new vocabulary items. An additional follow-up post-test was given two weeks later in order to determine whether or not any new vocabulary items had been acquired. The pre-test, post-test, and two week post-test were identical in format and content.

Testing involved two handouts (see Appendix B). The first handout was identical to the handout used for the task except that the vocabulary items that were located in the picture matrix were also numbered. The second handout was an answer sheet. The NS who administered the task also administered the pre and post-tests. The administering NS called out vocabulary items and the students wrote down the numbers of the corresponding pictures on their answer sheets.

The test included a total of twenty six words (see Appendix B). Of those twenty six words, seventeen were target words (words used during the task) and nine were non-target words (words that were spoken only during the test). Non-target words were included in the testing because improvement of test scores due to familiarity with test format and vocabulary seemed probable. The effect of priming

through test taking alone could then be contrasted with the effect of participation in the task by analyzing both non-target word and target word scores between pre and post-tests.

The target words and non-target words were corrected separately. If the number of wrong target words decreased between the pre and post-tests, it was assumed that target words were learned. If the number of wrong non-target words decreased between the pre and post-tests, it was assumed that repetition priming was a factor.

ENVIRONMENTS

Five environments were established:

1) **Baseline A:** unmodified input administered at the established NS rate of 160 wpm + .05 sec. lapse between directions.

2) **Interactive:** unmodified input with the option of interactional modification.

3) **Premodified A:** premodified input administered at an established NS rate of 160 wpm.

4) **Premodified B:** premodified input administered at the interactive rate.

5) **Baseline B:** unmodified input administered at the interactive rate.

Baseline A

The first environment was that of unmodified input without the option of interactional modification. The unmodified input script, which was read by a NS, was derived from a baseline. The baseline was established by recorded interaction during a successful performance of the task between two NSs.

The unmodified script was read at the established baseline interaction rate of 160 words per minute (wpm) with a .05 second time lapse between directions (see Example 1 and Appendix C).

Example 1

Excerpt from Baseline A
(Unmodified script at NS rate of 160 wpm + .05 sec. lapse.)

START 00:00

- 1) Put the ladle in the dish drainer. .05
- 2) .10 Put the toaster on the shelf.

End 00:15

Interactive Environment

The second environment was that of unmodified input with the option of interaction with the NS reading the directions. The baseline script in this environment was identical to the baseline script used in Baseline A. In this second environment,

however, the students were given the option of verbally interacting with the NS in order to clarify any lack of comprehension of the directions. Utterances by the participants were recorded and transcribed (see Example 2). The transcription of the Interactive environment was used to create a premodified script. The premodified script incorporated the utterances and repetition that occurred in the environment (see Appendix C and Examples 3 and 4, pages 45 and 46).

Example 2

Excerpt from the Transcript of the Interactive Environment
(B, C, Z, and Y = NNS participants)

START 00:00

1)

NS/ Put the ladle in the dish drainer. .03

B/ What is ladle?

NS/ .07/ What is ladle? a ladle is a big spoon.

B/ Spoon ahh spoon.

Z/ Ladle. Where ladle big spoon?

NS/ .27/ Ladle in the dish drainer.

Z/ Dish drainer.

NS/ What is?....

Y/ What is dish drainer?

Z/ Drainer

Y/ I don't know.

NS/ .47/ Dishes. You eat off of dishes.

Y/ .53/ Dishes....Plate?

NS/ Very good. / .58/ Dish drainer is used after you clean the dishes.

B, C/ Hmm, Nnn.

NS/ 1:02/ The dishes are very wet. Because you use lots of water you put the dishes into the dish drainer.

C/ I know.

B/ Dish drainer.

C/ And after that some water fall down.

NS/ Exactly. The water falls down.

Y/ Dish drainer.

NS/1:26/ So the direction was, put the ladle in the dish drainer. Ready?

B, C/ Yes.

NS/ Ready?

Y/ Yes.

2)

NS/1:34/ Put the toaster on the shelf.

Premodified A

The third environment was that of premodified input at an established native speaker rate. The premodified script incorporated all of the directions and noun repetition spoken by the NS during the Interactive environment. To establish a NS rate of completion, a NS was read the premodified directions by the administering NS. Do to excessive repetition in the premodified script, no time lapse between directions was required by the NS in order to complete the directions. A NS rate of 160 wpm was established and then incorporated into the Premodified A script (see Example 3 and Appendix C).

Example 3

Excerpt from Premodified A
(Premodified script at the NS rate of 160 wpm.)

START 00:00

1) Put the ladle in the dish drainer. A ladle is a big spoon. Put the ladle in the dish drainer. You eat off of dishes. Dishes are plates. A dish drainer is used after you clean dishes. When the dishes are very wet you put the dishes into the dish drainer.
Put the ladle in the dish drainer.

2) Put the toaster on the shelf.

END 00:25

Premodified B

The fourth environment was that of premodified input at the established Interactive rate. The Interactive rate included the time lapses which occurred between utterances by the administering NS. A premodified script that was identical to the script used in Premodified A was the source of the directions given to the students. However, in the Premodified B script, the time lapses between utterances by the NS and completion of directions by the NNSs that occurred in the Interactive environment were incorporated (see Example 4 and Appendix C).

Example 4

Excerpt from Premodified B
(Premodified script at the Interactive rate.)

START 00:00

- 1) Put the ladle in the dish drainer. .03] .07 A ladle is a big spoon. .10] .27
Put the ladle in the dish drainer. .30] .47 You eat off of dishes. .50] .53 Dishes are
plates. .55] .58 A dish drainer is used after you clean dishes. 1:01] 1:02 When the
dishes are very wet you put the dishes into the dish drainer. 1:08] 1:26 Put the ladle
in the dish drainer. 1:30]
- 2) 1:34 Put the toaster on the shelf. 1:37]

Baseline B

The fifth environment was that of unmodified input at the established Interactive rate. The baseline script was identical to the scripts used in Baseline A and the Interactive environment. In this environment, however, the time lapses between directions given and completion of directions that occurred in the Interactive environment were incorporated (see Example 5 and Appendix C).

Example 5

Unmodified B
(Unmodified script at the Interactive rate.)

START 00:00

- 1) Put the ladle in the dish drainer. .03]

- 2) 1:34 Put the toaster on the shelf. 1:37]

PARTICIPANTS

The participants in this study were of two types. The first type, native speakers of English (NSs), participated in three different facets of the study. There were a total of 4 NS participants in this study. For the establishment of the baseline and the native speaker rate of successful completion of the task under the premodified condition,

three NS participants ages 26, 27, and 29 who were neither college students nor instructors participated. The 26 and 29 year old NSs performed the task and established a baseline that was used as a guideline in the creation of the baseline script (see Example 1, page 42)). After a premodified script had been developed, it was read to the 27 year old NS so that a NS rate of successful competition of the task under the premodified condition could be established (see Example 3, page 42). One additional NS participant was required for the in-class performances of the task. This participant (the administering NS) was a graduate student in the Portland State University MA TESOL program. The administering NS read the unmodified directions and the premodified directions to students in five different English as a second language (ESL) classrooms while keeping track of the time lapse between directions. The nonnative speakers (NNSs) in these ESL classes constituted the second group of participants in this study.

The NNS subjects were Level 2 ESL students attending Clark College in Vancouver, WA. The Level 2 classes at Clark College that participated in this study were attended by a variety of nationalities: Russian and Vietnamese speakers made up the bulk of the classes, while Spanish, Cambodian, and Chinese speakers were in the minority. Level 2 students in the Clark College ESL program have scored between 27 and 45 on the English for International Communication (Intercom) placement test given by the coordinator of the program. The Washington State basic skills competency indicators for Level 2 students at Clark College include: The ability to

participate effectively in diverse groups by using memorized phrases, the ability to initiate and maintain simple face-to-face conversations to satisfy basic survival and everyday needs, and the ability to respond to oral instructions that include some unfamiliar vocabulary if the instructions are presented slowly with some repetition. There were approximately 20 students registered in each class. However, because of attendance and unwillingness to sign consent forms, the number of students participating in each environment ranged from as many as thirteen to as few as four.

TABLE I
Environments , Participants, and Class Times

Environments	# of Students	Time of Day
Baseline A	10	12:00 P.M.
Interactive	4	12:00 P.M.
Premodified A	5	3:00 P.M.
Premodified B	8	3:00 P.M.
Baseline B	13	12:00 P.M.
Total	40	

SETTING

The federally funded Clark College ESL program is located off campus in Town Plaza Center (TPC). TPC is a shopping mall in Vancouver located a few miles east of the Clark College main campus. ESL classes at TPC are distinct from the

English for Non-Native Learner (ENNL) classes that are held on the main campus. ENNL classes are academic in nature, requiring college tuition and emphasizing preparation for regular college course work. ESL classes at TPC do not require tuition and emphasize survival English skills for the workplace. All NNS participants in this study were students in the ESL program at TPC.

Students in the ESL classes at TPC are often absent or are forced to drop due to work schedules and family obligations. To accommodate as many students as possible Clark College offers the same level class several times a day, Monday through Thursday. Coincidentally, all of the classes that participated in this study were held in the afternoon.

The seating arrangement in the classes was informal. Students sat with two to four classmates at round tables. Students generally sat with friends who shared their native language and often spoke their native language even when encouraged to speak English or asked to remain quiet by their instructor. A dry erase board and rectangular table for the teacher's materials were located at the front of the rooms.

SUMMARY

This chapter described the two types of participants in this study: native and non-native speakers of English. The treatment was described as a one-way information-gap activity involving a numbered picture handout. Testing involved two

handouts - a numbered picture handout and an answer sheet. The five linguistic environments established in this study were listed and described. The purpose of the environments was to isolate time as factor in language comprehension and acquisition.

CHAPTER IV

RESULTS

In this chapter the results of the measures used during the research are reported: a pre-treatment vocabulary test consisting of both words used during the treatment (target words) and words not used during the treatment (non-target words), scores on the treatment activity, and two post-treatment vocabulary tests that were identical to the pre-treatment test. The standard deviation from the mean for each environment's activity scores was computed. A non-parametric Kruskal-Wallis one-way analysis of variance was then used to determine whether there was a statistically significant difference in performance on the activity between the environments. The standard deviation of pre and post-test scores was computed for each environment. To discover the number of acquired words, improvement between the pre and post tests was computed. A t-test for paired samples was run on the results to analyze their statistical significance. A non-parametric Wilcoxon test was also run because of the small sample sizes. The non-parametric Kruskal-Wallis one-way analysis of variance was then run in order to determine whether a statistically significant difference existed between the environments in regard to pre-test/post-test improvement. Two of the

environments were too small to show valid statistics and are described using only the standard deviation.

ENVIRONMENTS

The research has been designed to compare five groups performing the same task under different linguistic environments. The baseline script was used in the Interactive environment, read at an established native speaker rate in Baseline A, and read at the interactive rate in Baseline B. The premodified script was read at an established native speaker rate in Premodified A and at the interactive rate in Premodified B.

1) **Baseline A:** unmodified input administered at the established NS rate of 160 wpm + .05 sec. lapse between directions.

2) **Interactive:** unmodified input with the option of interactional modification.

3) **Premodified A:** premodified input administered at an established NS rate of 160 wpm.

4) **Premodified B:** premodified input administered at the interactive modified rate.

5) **Baseline B:** unmodified input administered at the interactive modified rate.

ACTIVITY SCORE RESULTS

The treatment consisted of an activity in which the students were asked to follow twelve directions. The students were to write the corresponding number of an object pictured at the bottom of a handout in a designated spot in a picture matrix at the top of the handout (see Appendix A). The activity score was determined by giving one point for correct placement and one point for correct number selection. There were twenty four possible points on the activity.

Table II shows the activity scores for each environment from highest mean percentage to lowest mean percentage.

TABLE II
STANDARD DEVIATION OF ACTIVITY SCORES

Environments	Mean Error % Score	Standard Deviation	Minimum Score	Maximum Score
Interactive (n = 5)				
Activity	0.82	0.12	0.63	0.92
Premodified B (n = 13)				
Activity	0.73	0.27	0.13	1.00
Baseline B (n = 8)				
Activity	0.53	0.11	0.38	0.67
Premodified A (n = 4)				
Activity	0.53	0.21	0.25	0.71
Baseline A (n = 10)				
Activity	0.32	0.18	0.13	0.58

A Kruskal-Wallis 1-Way analysis of variance found a statistically significant difference ($P=.0013^*$) between the mean activity scores for Premodified B, Baseline B, and Baseline (see Appendix D, line 1). A Wilcoxon 2-tailed analysis found statistically significant different performance on the activity between Premodified B and Baseline B ($P=.0290^*$), Premodified B and Baseline A ($P=.0018^*$), and Baseline B and Baseline A ($P=.0156^*$). The sample sizes in Premodified A and the Interactive environment were too small to be included in this statistical analysis.

PRE-TEST AND POST-TEST RESULTS

The students were given a vocabulary pre-test in order to determine the number of vocabulary items they did not know prior to the treatment. They were then given the same vocabulary test after the treatment in order to determine whether they had learned any new vocabulary items. The test consisted of twenty six vocabulary words. Seventeen of the words were used during the treatment (target words) and nine of the words appeared only on the vocabulary test (non-target words).

The scores for both target and non-target words on the pre and post-tests were analyzed according to a t-test for paired samples and the non-parametric Wilcoxon test.

Table III (see page 56) shows the target word pre and post-test scores for each environment. The environments are presented from highest to lowest according to

their mean percentage activity score. The percentage scores on the pre and post-tests represent incorrect words. Consequently, a post-test score that is lower than a pre-test score would indicate an improvement.

TABLE III
STANDARD DEVIATION OF TARGET WORD PRE/POST-TEST SCORES

Environments	Mean Error % Score	Standard Deviation	Minimum Score	Maximum Score
Interactive (n = 5)				
Pre-Test	0.60	0.13	0.47	0.82
Post-Test	0.31	0.08	0.24	0.41
Mean Difference= .29				
Premodified B (n = 13)				
Pre-Test	0.55	0.18	0.29	0.88
Post-Test	0.33	0.19	0.06	0.59
Mean Difference= .22			2-Tailed P= .0000*	
Baseline B (n = 8)				
Pre-Test	0.75	0.13	0.59	0.94
Post-Test	0.53	0.21	0.29	0.88
Mean Difference= .22			2-Tailed P= .0180*	
Premodified A (n = 4)				
Pre-Test	0.51	0.32	0.12	0.88
Post-Test	0.32	0.28	0.12	0.71
Mean Difference= .19				
Baseline A (n = 10)				
Pre-Test	0.60	0.17	0.24	0.76
Post-Test	0.46	0.21	0.24	0.76
Mean Difference= .14			2-Tailed P= .0120*	

The paired difference between target word pre-test and post-test scores was found to be statistically significant in Premodified B, Baseline B, and Baseline A.

Because of small sample size, neither the t-test nor the Wilcoxon test could be considered reliable in regard to the Interactive and Premodified A environments.

The paired difference between non-target word pre-test and post-test scores was also found to be statistically significant in Premodified B, Baseline B, and Baseline. Because of small sample size, neither the t-test nor the Wilcoxon test could be considered reliable in regard to the Interactive and Premodified A environments.

Table IV (see page 58) shows the non-target word pre and post-test scores for each environment. The environments are presented from highest to lowest according to their mean percentage activity score. The percentage scores on the pre and post-tests represent incorrect words. Consequently, a post-test score that is lower than a pre-test score would indicate an improvement.

A Kruskal-Wallis 1-Way analysis of variance found that there was no statistically significant difference in improvement of target scores among Premodified B, Baseline B, and Baseline A (see Appendix D, line 2). The Interactive and Premodified A environments could not be included in the analysis of variance because of their small sample size.

A Kruskal-Wallis 1-Way analysis of variance found that there was also no statistically significant difference in improvement of non-target word pre and post-test scores among Premodified A, Baseline B, and Baseline A (see Appendix D, line 3). The Interactive and Premodified A environments could not be included in the analysis of variance because of their small sample size.

TABLE IV
STANDARD DEVIATION OF NON-TARGET WORD PRE/POST-TEST SCORES

Environments	Mean Error % Score	Standard Deviation	Minimum Score	Maximum Score
Interactive (n = 5)				
Pre-Test	0.47	0.09	0.33	0.56
Post-Test	0.31	0.05	0.22	0.33
Mean Difference=	.16			
Premodified B (n = 13)				
Pre-Test	0.36	0.12	0.22	0.56
Post-Test	0.26	0.11	0.11	0.44
Mean Difference=	.10			
			2-Tailed P= .0050*	
Baseline B (n = 8)				
Pre-Test	0.50	0.08	0.44	0.67
Post-Test	0.35	0.07	0.22	0.44
Mean Difference=	.15			
			2-Tailed P= .0120*	
Premodified A (n = 4)				
Pre-Test	0.25	0.14	0.11	0.44
Post-Test	0.25	0.14	0.11	0.44
Mean Difference=	.00			
Baseline A (n = 10)				
Pre-Test	0.37	0.17	0.11	0.56
Post-Test	0.26	0.13	0.11	0.44
Mean Difference=	.11			
			2-Tailed P= .0120*	

Table V (see page 59) shows the target word pre-test and two week post-test scores for each environment. The environments are presented from highest to lowest according to their mean percentage activity score. The percentage scores on the pre and post-tests represent incorrect words. Consequently, a post-test score that is lower than a pre-test score would indicate an improvement.

The paired difference between target word pre-test and two week post-test scores was found to be statistically significant in Premodified B, Baseline B, and Baseline A. Because of small sample size, neither the t-test nor the Wilcoxon test could be considered reliable in regard to the Interactive and Premodified A environments.

TABLE V
STANDARD DEVIATION OF TARGET WORD PRE/TWO WEEK POST-TEST SCORES

Environments	Mean Error % Score	Standard Deviation	Minimum Score	Maximum Score
Interactive (n = 5)				
Pre-Test	0.60	0.13	0.47	0.82
Two Week Post-Test	0.42	0.11	0.29	0.59
Mean Difference=	.18			
Premodified B (n = 13)				
Pre-Test	0.55	0.18	0.29	0.88
Two Week Post-Test	0.26	0.13	0.12	0.47
Mean Difference=	.29			
			2-Tailed P= .0015*	
Baseline B (n = 8)				
Pre-Test	0.75	0.13	0.59	0.94
Two Week Post-Test	0.52	0.16	0.35	0.82
Mean Difference=	.23			
			2-Tailed P= .0180*	
Premodified A (n = 4)				
Pre-Test	0.51	0.32	0.12	0.88
Two Week Post-Test	0.32	0.28	0.12	0.71
Mean Difference=	.19			
Baseline A (n = 10)				
Pre-Test	0.60	0.17	0.24	0.76
Two Week Post-Test	0.42	0.20	0.24	0.71
Mean Difference=	.18			
			2-Tailed P= .0117*	

A Kruskal-Wallis 1-Way analysis of variance found that there was no statistically significant difference in improvement of target word pre and two week post-test scores among Premodified A, Baseline B, and Baseline A (see Appendix D, line 4). The Interactive and Premodified A environments could not be included in the analysis of variance because of their small sample size.

Table VI (see page 61) shows the non-target word pre-test and two week post-test scores for each environment. The environments are presented from highest to lowest according to their mean percentage activity score. The percentage scores on the pre and post-tests represent incorrect words. Consequently, a post-test score that is lower than a pre-test score would indicate an improvement.

The paired difference between non-target word pre-test and two week post-test scores was found to be statistically significant in Premodified B, Baseline B, and Baseline A. Because of small sample size, neither the t-test nor the Wilcoxon test could be considered reliable in regard to the Interactive and Premodified A environments.

A Kruskal-Wallis 1-Way analysis of variance found that there was no statistically significant difference in improvement of non-target word pre and two week post-test scores among Premodified A, Baseline B, and Baseline A (see Appendix D, line 5). The Interactive and Premodified A environments could not be included in the analysis of variance because of their small sample size.

TABLE VI
STANDARD DEVIATION OF NON-TARGET WORD PRE/TWO WEEK
POST-TEST SCORES

Environments	Mean Error % Score	Standard Deviation	Minimum Score	Maximum Score
Interactive (n = 5)				
Pre-Test	0.47	0.09	0.33	0.56
Two Week Post-Test	0.40	0.10	0.33	0.56
Mean Difference= .07				
Premodified B (n = 13)				
Pre-Test	0.36	0.12	0.22	0.56
Two Week Post-Test	0.16	0.13	0.00	0.33
Mean Difference= .20			2-Tailed P= .0033*	
Baseline B (n = 8)				
Pre-Test	0.50	0.08	0.44	0.67
Two Week Post-Test	0.35	0.07	0.22	0.44
Mean Difference= .15			2-Tailed P= .0117*	
Premodified A (n = 4)				
Pre-Test	0.25	0.14	0.11	0.44
Two Week Post-Test	0.25	0.14	0.11	0.44
Mean Difference= .00				
Baseline A (n = 10)				
Pre-Test	0.37	0.17	0.11	0.56
Two Week Post-Test	0.24	0.16	0.00	0.44
Mean Difference= .13			2-TAILED P= .0117*	

Table VII (see page 62) shows the target word post-test and two week post-test scores for each environment. The environments are presented from highest to lowest according to their mean percentage activity score. The percentage scores on the post and two week post-tests represent incorrect words. Consequently, a two week post-

test score that is lower than a post-test score would indicate an improvement, where a two week score that is higher than a post-test score would indicate a decline.

TABLE VII
STANDARD DEVIATION OF TARGET WORD POST/TWO WEEK POST-TEST SCORES

Environments	Mean Error % Score	Standard Deviation	Minimum Score	Maximum Score
Interactive (n = 5)				
Post-Test	0.31	0.08	0.24	0.41
Two Week Post-Test	0.42	0.11	0.29	0.59
Mean Difference= .11				
Premodified B (n = 13)				
Post-Test	0.33	0.19	0.06	0.59
Two Week Post-Test	0.26	0.13	0.12	0.47
Mean Difference= .07			2-Tailed P= .0912	
Baseline B (n = 8)				
Post-Test	0.53	0.21	0.29	0.88
Two Week Post-Test	0.52	0.16	0.35	0.82
Mean Difference= .01			2-Tailed P= .8650	
Premodified A (n = 4)				
Post-Test	0.32	0.28	0.12	0.71
Two Week Post-Test	0.32	0.28	0.12	0.71
Mean Difference= .00				
Baseline A (n = 10)				
Post-Test	0.46	0.21	0.24	0.76
Two Week Post-Test	0.42	0.20	0.24	0.71
Mean Difference= .04			2-Tailed P= .5540	

The paired difference between target word post-test and two week post-test scores was not found to be statistically significant in Premodified B, Baseline B, and Baseline A. Because of small sample size, neither the t-test nor the Wilcoxon test

could be considered reliable in regard to the Interactive and Premodified A environments.

A Kruskal-Wallis 1-Way analysis of variance found that there no statistically significant difference on target word post and two week post-test scores among Premodified B, Baseline B and Baseline A (see Appendix D, line 6). The Interactive environment and Premodified A could not be included in the analysis of variance because of their small sample size.

Table VIII (see page 64) shows the non-target word post-test and two week post-test scores for each environment. The percentage scores on the post and two week post-tests represent incorrect words. Consequently, a two week post-test score that is lower than a post-test score would indicate an improvement, where a two week score that is higher than a post-test score would indicate a decline.

The paired difference between non-target word post and two week post-test scores was found to be statistically significant in Premodified B. The statistically significant paired difference in Premodified B indicates that non-target words were learned during the two week period between the activity and the two week post-test. No statistically significant difference was found in Baseline A or Baseline B. Because of small sample size, the Wilcoxon test could be considered reliable in regard to the Interactive and Premodified A environments.

A Kruskal-Wallis 1-Way analysis of variance found that there no statistically significant difference on non-target word post and two week post-test scores among

Premodified B, Baseline B, and Baseline A (see Appendix D, line 7). The Interactive and Premodified A environments could not be included in the analysis of variance because of their small sample size.

TABLE VIII
STANDARD DEVIATION OF NON-TARGET WORD POST/TWO WEEK
POST-TEST SCORES

Environments	Mean Error % Score	Standard Deviation	Minimum Score	Maximum Score
Interactive (n = 5)				
Post-Test	0.31	0.05	0.22	0.33
Two Week Post-Test	0.40	0.10	0.33	0.56
Mean Difference= .09				
Premodified B (n = 13)				
Post-Test	0.26	0.11	0.11	0.44
Two Week Post-Test	0.16	0.13	0.00	0.33
Mean Difference= .10			2-Tailed P= .03570*	
Baseline B (n = 8)				
Post-Test	0.35	0.07	0.22	0.44
Two Week Post-Test	0.35	0.07	0.22	0.44
Mean Difference= .00			2-Tailed P= 1.0000	
Premodified A (n = 4)				
Post-Test	0.25	0.14	0.11	0.44
Two Week Post-Test	0.25	0.14	0.11	0.44
Mean Difference= .00				
Baseline A (n = 10)				
Post-Test	0.26	0.13	0.11	0.44
Two Week Post-Test	0.24	0.16	0.00	0.44
Mean Difference= .02			2-Tailed P= .7530	

Table IX shows the percent improvement between pre and post-test scores for target and non-target words. The environments are presented from highest to lowest according to their mean percentage activity score.

TABLE IX
STANDARD DEVIATION OF THE DIFFERENCE BETWEEN
PRE/POST-TEST IMPROVEMENT OF TARGET AND NON-TARGET
WORD TEST SCORES

Environments	Target/Non-Target Mean Difference	Standard Deviation	Minimum Difference	Maximum Difference
Interactive (n = 5)	0.14	0.11	-0.05	0.24
Premodified B (n = 13) 2-Tailed P= .0059*	0.12	0.15	-0.11	0.30
Baseline B (n = 8) 2-Tailed P= .2076	0.07	0.15	-0.11	0.36
Premodified A (n = 4)	0.19	0.15	0.00	0.35
Baseline A (n = 10) 2-Tailed P= .3139	0.02	0.10	-0.11	0.18

The Wilcoxon t-test showed a statistically significant difference in improvement between target and non-target word test scores in Premodified B (P= .0059*). This result indicates that the activity in Premodified B was conducive to target word learning. No statistically significant difference between target and non-target word improvement was found in Baseline A or Baseline B. This result indicates that in Baseline A and Baseline B the activities were no more conducive to vocabulary learning than just taking the vocabulary test. However, a Kruskal-Wallis 1-Way

analysis of variance found no statistically significant difference among the environments in improvement on target word scores compared to improvement on non-target word scores (see Appendix D, line 8). Because of small sample size, the Wilcoxon test could be considered reliable in regard to the Interactive and Premodified A environments.

SUMMARY

In summary, a statistically significant difference on activity scores between the environments was discovered. The Interactive and the Premodified B environments produced the highest activity scores. However, high activity scores did not appear to lead to a high degree of acquisition.

There was a statistically significant difference between target word pre and post-test scores in all of the analyzed environments. This difference indicates that words were learned during the activities. However, non-target word scores also improved at a statistically significant rate between pre and post-tests. Improvement of non-target word scores indicates an improvement in test taking skills as none of the non-target words were used during the activity. When the difference in improvement between target and non-target word scores was analyzed, it was found that Premodified B was a more conducive environment for learning target words than for learning non-target words. In Baseline A and B no difference was found between

target word improvement and non-target word improvement. Although it can be said that Premodified B was conducive to vocabulary learning, we cannot say that it was a better environment for vocabulary learning than Baseline A and B because the ANOVA revealed no statistically significant difference between the three environments.

Target word scores did not improve or decline significantly between the post-test and two week post-test. However, a statistically significant improvement between post and two week post-tests on non-target word scores did occur in Premodified B. It may be important to note that although statistically significant improvement on non-target word scores did occur in Premodified B, an analysis of variance found no statistically significant difference between non-target post and two week post test scores among the environments.

Although both target and non-target words appeared to have been acquired, no statistically significant difference in improvement among the environments could be found.

CHAPTER V

DISCUSSION OF THE RESULTS

This chapter discusses the results of the study. As the focus of this study was the effect of time on comprehension and learning of new vocabulary items, it was important to create parallel environments which were identical in all respects except time. These parallel environments are referred to as Baseline A and B and Premodified A and B in the description of the environments.

Five different forms of the same activity were developed. The baseline script was used in the Interactive environment, read at an established native speaker rate in Baseline A, and read at the interactive rate in Baseline B. The premodified script was read at an established native speaker rate in Premodified A and at the interactive rate in Premodified B. It is important to note that the interactive rate included the time lapses which occurred between utterances by the administering NS during the Interactive environment:

- 1) **Baseline A:** baseline input administered at the established NS rate of 160 wpm + .05 sec. lapse between directions.

- 2) **Interactive:** baseline input with the option of interactional modification.
- 3) **Premodified A:** premodified input administered at an established NS rate of 160 wpm.
- 4) **Premodified B:** premodified input administered at the Interactive rate.
- 5) **Baseline B:** baseline input administered at the Interactive rate.

All non-native speaker participants were given three identical tests. The first test was given before the task, the second was given after the task, and the third was given two weeks later. The tests were given in an attempt to determine which of the five environments was most conducive to vocabulary learning.

Each of the three hypotheses investigated in this study are discussed in the light of the results of the study. General conclusions made from the findings are presented. The limitations and methodological problems in the study are also discussed. The implications of the results for Second Language Acquisition research are considered and suggestions for further research are presented.

FINDINGS

Research Hypothesis 1

The first hypothesis was two fold in nature. The first part maintained that subjects in the Interactive environment would show greater comprehension of the directions, as measured by correct placement of items on a picture matrix. The second part of hypothesis 1 maintained that subjects in the Interactive environment would show a higher rate of acquisition than the subjects in the other four environments as measured by gains on listening comprehension post-tests of the seventeen introduced vocabulary items.

The results of the study only partially support the first part of hypothesis 1. The Interactive environment subjects' comprehension of the directions was significantly better than that of the subjects in the Baseline A and Baseline B environments but not significantly different from the comprehension of the directions by subjects in the Premodified B environment. Premodified A could not be included in the ANOVA due to small sample size. However, the mean activity score in the Interactive environment was thirty percent higher than the mean activity score in Premodified A. As special care was taken to reduplicate both the type of input and the time lapses which occurred in the Interactive environment into the Premodified B

script, it is not surprising that the activity scores between the Interactive environment and Premodified B were so similar.

The second part of hypothesis 1 is not supported by the results. Although the sample size in the Interactive environment was too small to be included in the ANOVA of the difference between pre and post-test scores, it appears that the post-test scores in the Interactive environment do not show improvement above and beyond the other four environments.

Research Hypothesis 2

The second hypothesis was also two fold in nature. The first part maintained that subjects in the Premodified B environment would show greater comprehension of the directions, as measured by correct placement of items on a picture matrix, than the subjects in the Premodified A, Baseline A, and Baseline B environments. The second part of hypothesis 2 maintained that subjects in the Premodified B environment would show a higher rate of acquisition than the subjects in the Premodified A, Baseline A, and Baseline B environments as measured by gains on listening comprehension post-tests of the seventeen introduced vocabulary items.

The results of the study support the first part of hypothesis 2. The activity scores of the subjects in the Premodified B environment were significantly better than the scores of the Baseline A and Baseline B environments. Premodified A could not

be included in the ANOVA due to small sample size. However, the mean activity score in Premodified B was twenty percentage points higher than the mean activity score in Premodified A.

The second part of hypothesis 2 was not supported by the results. When improvement between pre and post-tests was analyzed, no statistically significant difference among any of the environments was found.

Research Hypothesis 3

The third hypothesis was also two fold. First, it maintained that subjects in Baseline B would show greater comprehension of the directions as measured by correct placement of numbers on a picture matrix, than subjects in Premodified A and Baseline A. Second, it maintained that subjects in Baseline B would show a higher rate of acquisition than the subjects in Premodified A and Baseline A as measured by gains on listening comprehension post-tests of the seventeen introduced vocabulary items.

The first part of hypothesis 3 was partially supported by the results. A statistically significant difference on the activity scores was found between Baseline B and Baseline A. Premodified A could not be included in the ANOVA due to small sample size. However, the mean activity score in Premodified A and Baseline B were identical.

The second part of the hypothesis was not supported by the results. When improvement between pre and post-tests was analyzed, no statistically significant difference between environments was found.

DISCUSSION

The activity and test format in this study replicated Ellis et al.(1994) who found a significant difference between interactive, premodified, and baseline environments on both the subjects' treatment activity score and number of acquired words. The purpose of this study was to isolate one element of the negotiation process to discover its significance. Ellis suggested that time might play an important factor because, in his dual-study, one of the premodified groups was read the directions more slowly than the other. The group that was read the slow version did better on the activity and learned more words than the group that was read the faster version.

The findings of this study parallel Ellis et al. (1994) as well as Pica et al. (1987), Doughty et al. (1986), and Loschky (1993) in regard to the high degree of comprehension reached by the subjects in the Interactive environment when compared to subjects who were in the Baseline environments. However, the subjects in the Premodified B environment in this study did nearly as well as those in the Interactive environment. The discrepancy in this area between this study and the Ellis, Pica, Doughty, and Loschky studies can be explained by the incorporation of the identical

number of repetitions and time lapse that occurred in the Interactive environment into the Premodified B script.

Although the Premodified A environment was too small to be included in the ANOVA, it is noteworthy that the subjects in Premodified A scored twenty percentage points lower than the subjects in Premodified B despite the fact that the scripts in Premodified A and B were identical in regard to the number of repetitions.

Time-lapse seems to have also been a factor when we compare the activity scores between Baseline A and Baseline B. The ANOVA revealed that the subjects in Baseline B scored significantly better on the activity than did the subjects in Baseline A.

These results suggest that time for processing plays an even more important role than repetition in the comprehension of directions.

The results of this study differ from the Ellis (1994) dual-study in regard to word acquisition. Ellis found that the interactive environments produced a statistically significant improvement in acquisition when compared to the premodified and baseline environments. Ellis found that the premodified environments also produced significant improvement in acquisition when compared with the baseline environments.

All of the environments in this study seemed to facilitate word acquisition. A statistically significant difference between pre and post-tests occurred in all of the

environments. However, an ANOVA revealed no significant difference in acquisition as measured by the gains on the vocabulary post-tests among any of the environments.

Target words appear to have been learned during the activity in the Interactive and Premodified B environment. When the paired difference between target word improvement and non-target word improvement was analyzed, it was found that target word scores improved significantly over non-target words in Premodified B. The sample size in the Interactive environment was too small to be considered reliable, but the difference in improvement appeared to mirror that of Premodified B. Despite the significantly different degrees of improvement between target and non-target word scores in Premodified B, an ANOVA found no statistically significant difference among the environments.

The fact that non-target word scores improved significantly in all of the environments indicates that a majority of the students were struggling with the test format and may actually have known more words than was indicated by their pre-test scores. When the students were given the identical test again, immediately following the activity, they were familiar with the testing procedure and were thus able to focus fully on the test words.

In psychological terms, this phenomenon can be explained by the instance theory of automaticity (Logan, 1988). The instance theory of automaticity claims that “performance is automatic when it is based on the retrieval of prior events from memory rather than some general algorithmic computation” (Logan 1990, p.3) In

other words, as soon as unfamiliar data (such as a particular test taking procedure) becomes familiar it becomes automatized and no longer requires attention. Accessing automatized data requires very little time and short-term memory storage; thus freeing up room in short-term working memory for processing of less familiar data (such as recognizing spoken words in a foreign language).

Although the findings of this study, regarding acquisition, contradict the findings of Ellis et al. (1994), they parallel the findings of Loschky (1993) in which “there was no correlation found between differences in moment-to-moment comprehension and gains in vocabulary recognition” (p.301). These findings also support the Kelch (1985) conclusion that "slow rate" plus "modification" enhance the ability to grasp meaning, but not necessarily the ability to retain exact form.

LIMITATIONS

Several of the limitations of this study relate to the sample population involved in the treatment and testing. All of the NNSs were in a non-academic ESL program. Their program did not emphasize the importance of attendance or test taking. Additionally, because of the various nationalities in the classes, it was impossible to explain the nature of the consent forms and the test taking procedures in the students' native languages. These factors led to a great deal of attrition because many students

refused to sign consent forms, hid pre and/or post-tests from the test administrator, or were absent for the two week post-test.

Attrition led to very small sample sizes in two of the environments. These environments had such small sample sizes that, in most cases, a statistical analysis of their results could not be considered valid. This was clearly a limitation of this study as the results from these environments could not be generalized.

As discussed in the previous section, students' lack of understanding of the test taking procedure may have contributed to the overall gain on post-test scores immediately following the activity. This overall gain on both target and non-target word scores made it difficult to determine whether any target words were learned during the activity.

IMPLICATIONS FOR SLA THEORY AND SECOND LANGUAGE TEACHING

In the area of second language acquisition research there has been an on going debate about the most effect environment for second language learning (Asher et al., 1972; Long, 1982, 1985, 1990; Pica, 1986, 1991, 1992; VanPatten et al., 1993; White et al., 1992). This debate has led to studies which explore the types of activities that best facilitate communication (Pica et al., 1985, 1987, 1989; Doughty, 1986). The results of this study support the use of communicative activities in order to teach target

words. Although no difference in gains in vocabulary knowledge could be detected between the environments in this study, statistically significant gains in vocabulary knowledge were made overall.

The significant gains made in all of the environments parallel the results of Loschky (1993) who also found no significant difference in vocabulary gains between environments, but a significant gain overall. Loschky concluded that “acquisition due to some factor shared by all groups did occur” (p.318).

The results of this study and Loschky (1993) also lend support to the notion that activities which force students to process unfamiliar data (“notice it” Ellis 1991 and 1996) do lead to gains in ability.

The results of this study dispute the assumption of Kelch (1985) who declared that “modification only” and “slow rate only” would produce equally marginal results in regard to comprehensibility. The results of this study show that modification only and slow rate only (time lapse only) do indeed produce marginal results. However, those results were not equal. A statistically significant difference on activity scores was found between the parallel environments Baseline A (no time lapse) and Baseline B (+ time lapse). This statistically significant difference indicates that Baseline B was more conducive to comprehension than Baseline A. Small sample size prevented statistical analysis of the twenty percentage point mean difference on activity scores between the parallel environments Premodified A (no time lapse) and

Premodified B (+ time lapse). However, this large percentage difference indicates that Premodified B was more conducive to comprehension than Premodified A.

Both the results and the limitations of this study suggest implications for second language teaching. The results suggest that if interaction with or among students is either not an option or the students are inhibited, special care should be taken to pause between sentences so that students are not flooded with information. Slow rate does occur naturally in foreigner talk and is often employed by instructors. However, note that in Ellis et al. (1994) and Loschky (1993) the premodified environments had scripts that were read at slow, foreigner talk rates but produced significantly lower comprehension scores than the interactive environments. The similarity between the Interactive and Premodified B environments in this study indicates that exaggerated time lapses between key words and phrases facilitate greater comprehension. The importance of time for processing is also indicated by the statistically significant difference between Baseline A and Baseline B.

In addition to classroom talk, time for processing should be taken into account when audio materials are being developed for second language learners. Rather than attempting to reduplicate a native speaker-like situation with excessive topic restatements and slow rate of delivery, it may be adequate and ultimately advantageous to simplify native speaker dialogue and lecturettes by inserting time lapses between utterances.

The limitation of this study in regard to repetition priming indicates that when learners are familiar with testing format their ability to concentrate on the target language increases. The familiarity factor should be taken into account when preparing exams and activities. New information should be introduced and rehearsed in a familiar format so that the students can focus their full attention on the new information. New activities should be introduced as a final review - using familiar structures and vocabulary. Tests should also be of a familiar format. It may be necessary to introduce quizzes throughout the term that are similar in format to upcoming, important exams.

SUGGESTIONS FOR FURTHER RESEARCH

The findings of this study suggest the need for further research in two different areas. First, there is a need for further research into the connection between comprehension and acquisition. The findings of this study clearly indicate that the connection between comprehensible input and acquisition is tenuous at best. One of the major limitations of this study was small sample sizes. A reduplication of this study would require a large, stable subject population so that the results could be analyzed for statistical significance. Another major limitation of this study was the effect of repetition priming on post-test scores. A possible solution to the repetition priming problem would be to develop pre, post, and two week post-tests that were

different in format. However, it may be impossible to determine the degree of difficulty of the various test formats and thus it would be impossible to determine if a low post-test score was caused by vocabulary knowledge attrition or a difficult post-test format. The simplest solution to the repetition priming problem would be a “Pre-test/Post-test/Two Week Post-test Only” control group to account for repetition priming in regard to test score improvement.

The second area of suggested further research is the significance of time for processing on comprehension. The results of this study show a statistically significant improvement on activity scores between environments. Improvement on activity scores appeared to increase as time allowed for processing increased. Further research in this area is needed to both support these findings and determine how much time is optimal for processing second language input.

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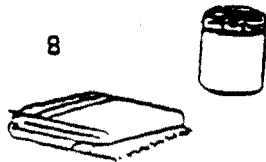
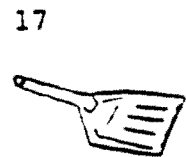
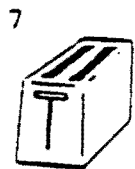
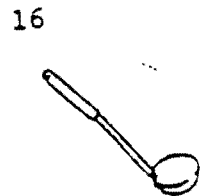
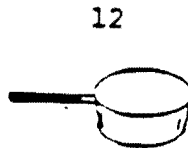
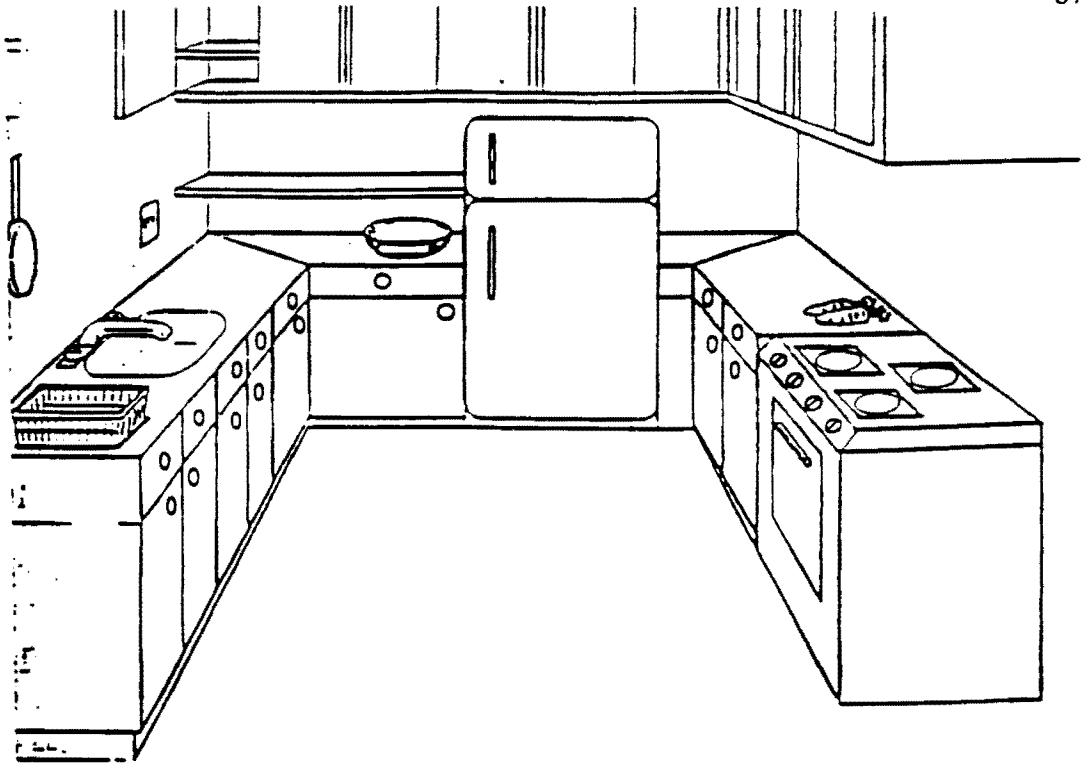
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APPENDIX A
ACTIVITY HANDOUT



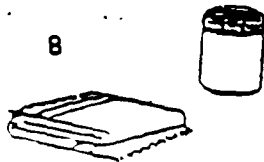
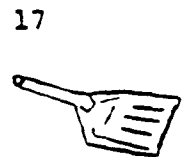
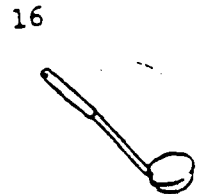
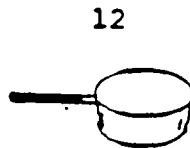
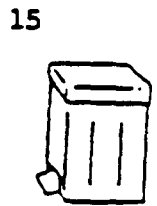
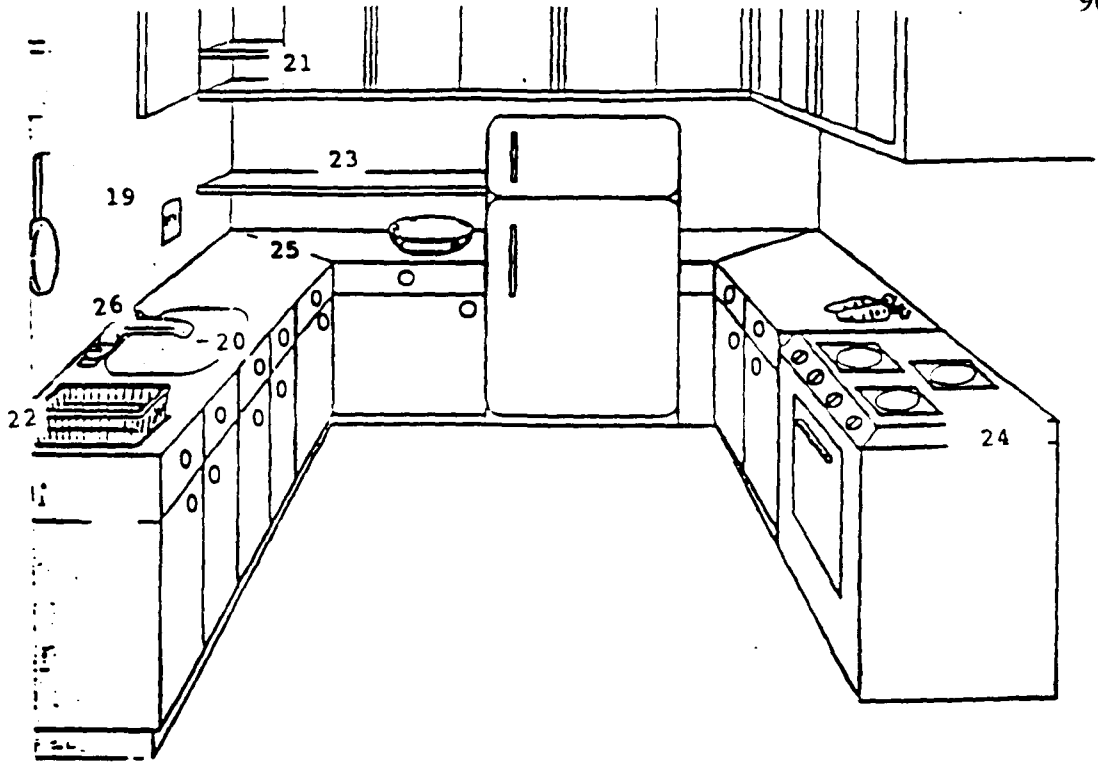
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APPENDIX B
TEST AND TEST HANDOUTS

Vocabulary Test

- 1) ladle
- 2) sink
- 3) canister
- 4) saucepan
- 5) counter
- 6) lid
- 7) shelf
- 8) pot holder
- 9) dishwashing liquid
- 10) eggplant
- 11) dustpan
- 12) stove
- 13) faucet
- 14) plate
- 15) garbage can
- 16) scouring pad
- 17) dish drainer
- 18) cabinet
- 19) blender
- 20) outlet
- 21) toaster
- 22) tea pot
- 23) dish towel
- 24) apple
- 25) coffee maker
- 26) broom



PRE-TEST

NAME _____

- 1) _____
- 2) _____
- 3) _____
- 4) _____
- 5) _____
- 6) _____
- 7) _____
- 8) _____
- 9) _____
- 10) _____
- 11) _____
- 12) _____
- 13) _____
- 14) _____
- 15) _____
- 16) _____
- 17) _____
- 18) _____
- 19) _____
- 20) _____
- 21) _____
- 22) _____
- 23) _____
- 24) _____
- 25) _____
- 26) _____

POST-TEST

NAME _____

- 1) _____
- 2) _____
- 3) _____
- 4) _____
- 5) _____
- 6) _____
- 7) _____
- 8) _____
- 9) _____
- 10) _____
- 11) _____
- 12) _____
- 13) _____
- 14) _____
- 15) _____
- 16) _____
- 17) _____
- 18) _____
- 19) _____
- 20) _____
- 21) _____
- 22) _____
- 23) _____
- 24) _____
- 25) _____
- 26) _____

TWO WEEK
POST-TEST

NAME _____

- 1) _____
- 2) _____
- 3) _____
- 4) _____
- 5) _____
- 6) _____
- 7) _____
- 8) _____
- 9) _____
- 10) _____
- 11) _____
- 12) _____
- 13) _____
- 14) _____
- 15) _____
- 16) _____
- 17) _____
- 18) _____
- 19) _____
- 20) _____
- 21) _____
- 22) _____
- 23) _____
- 24) _____
- 25) _____
- 26) _____

APPENDIX C
ACTIVITY SCRIPTS

Baseline A

(Baseline script at NS rate of 160 wpm + .05 sec. lapse.)

START 00:00

- 1) Put the ladle in the dish drainer.
- 2) Put the toaster on the shelf.
- 3) Put the saucepan on the stove.
- 4) Put the lid in the dish drainer.
- 5) Pot holder on the counter.
- 6) Put the dishwashing liquid next to the faucet.
- 7) Put the eggplant in the cabinet.
- 8) Put the dustpan on the shelf.
- 9) Garbage can next to the stove.
- 10) Put the scouring pad next to the faucet.
- 11) And put the blender in the cabinet.
- 12) Put the toaster next to the stove.

END 01:30

Baseline B
(Baseline script at the Interactive rate.)

START 00:00

- 1) Put the ladle in the dish drainer.
- 2) 01:34 Put the toaster on the shelf.
- 3) 02:07 Put the saucepan on the stove.
- 4) 03:51 Put the lid in the dish drainer.
- 5) 05:08 Pot holder on the counter.
- 6) 07:29 Put the dishwashing liquid next to the faucet.
- 7) 09:32 Put the eggplant in the cabinet.
- 8) 12:23 Put the dustpan on the shelf.
- 9) 14:27 Garbage can next to the stove.
- 10) 15:06 Put the scouring pad next to the faucet.
- 11) 16:01 And put the blender in the cabinet.
- 12) 16:58 Put the toaster next to the stove.

END 17:30

Premodified A

(Premodified script at NS rate of 160 wpm.)

START 00:00

1)

Put the ladle in the dish drainer. A ladle is a big spoon. Put the ladle in the dish drainer. You eat off of dishes. Dishes are plates. A dish drainer is used after you clean dishes. When the dishes are very wet you put the dishes into the dish drainer. Put the ladle in the dish drainer.

2)

Put the toaster on the shelf.

3)

Put the saucepan on the stove. You cook with a saucepan. You can put cold food in a saucepan and cook the food. You can put soup in a saucepan then put the saucepan on the stove and make the soup very hot. A saucepan is a small pan. A saucepan is a small pot used for soup.

4)

Put the lid in the dish drainer. A lid goes on top of a pan. A lid is a cover for the pan - like a hat. Put the lid in the dish drainer.

5)

Pot holder on the counter. Put the pot holder on the counter. You cook with a pot. When the pot gets very hot you need a pot holder to pick it up. To hold the pot you need a pot holder. The pot holder is square. It's a piece of material. It is a cloth or towel used to pick up the pot. Put the pot holder on the counter. The counter is the place in the kitchen that you cook on. You can cut things on it. You can put anything on the counter. The counter is like a table. Put the pot holder on the table. The pot holder is the shape of a square.

6)

Put the dishwashing liquid next to the faucet. Put the dishwashing liquid next to the faucet. Dishwashing liquid is soap - soap for dishes. Next to the faucet. The faucet is the place in the sink where the water comes out. When you turn on the faucet, water comes out.... Put the dishwashing liquid next to the faucet. The faucet is the place in the sink where the water comes out. If you turn on the faucet the water comes out. Water comes out of the faucet. Dishwashing liquid is soap that you use to clean the dishes.

7)

Put the eggplant in the cabinet. Put the eggplant in the cabinet. Eggplant is a kind of vegetable. Eggplant is a round vegetable. It is round but it's kind of long too. Long and round. It is purple. It's a purple vegetable. Put the eggplant in the cabinet.

8)

Put the dustpan on the shelf. Put the dustpan on the shelf. A dustpan is used to clean. If some dirt is on the floor, you take the dustpan and pick it up. Put the dustpan on the shelf. You use the dustpan to pick up dirt. You use the dustpan to pick up dirty stuff - dirty things on the floor. The dustpan is usually metal or plastic.

9)

Can you put the garbage can next to the stove. Garbage can next to the stove. The garbage can next to the stove.

10)

Put the scouring pad next to the faucet. You use the scouring pad to clean dishes. You use it to clean dishes. Put the scouring pad next to the faucet. Put the scouring pad next to the faucet.

11)

Put the blender in the cabinet. You can put juice or fruit inside the blender and stir it up really fast. The blender stirs up fruit and juice very quickly.

Put the blender in the cabinet.

12)

Put the toaster next to the stove. Toaster next to the stove. Put the toaster next to the stove.

END 4:30

Premodified B
(Premodified script at the Interactive rate.)

START 00:00

1)

Put the ladle in the dish drainer. .07 A ladle is a big spoon. .27
Put the ladle in the dish drainer. .47 You eat off of dishes. .53
Dishes are plates. .58 A dish drainer is used after you clean
dishes. 1:02 When the dishes are very wet you put the dishes into
the dish drainer. 1:26 Put the ladle in the dish drainer.

2)

1:34 Put the toaster on the shelf.

3)

2:07 Put the saucepan on the stove. 2:37 You cook with a
saucepan. 2:42 You can put cold food in a saucepan and cook the
food. 2:54 You can put soup in a saucepan then put the saucepan on
the stove and make the soup very hot. 3:17 A saucepan is a small
pan. 3:30 A saucepan is a small pot used for soup.

4)

3:51 Put the lid in the dish drainer. 4:09 A lid goes on top of a
pan. 4:20 A lid is a cover for the pan - 4:27 like a hat. 4:58 Put
the lid in the dish drainer.

5)

5:08 Pot holder on the counter. 5:23 Put the pot holder on the
counter. 5:37 You cook with a pot. 5:44 When the pot gets very
hot you need a pot holder to pick it up. 5:52 To hold the pot you
need a pot holder. 5:58 The pot holder is square. 6:02 It's a piece
of material. 6:08 It is a cloth or towel used to pick up the pot.
6:20 Put the pot holder on the counter. 6:26 The counter is the
place in the kitchen that you cook on. 6:33 You can cut things on
it. 6:35 You can put anything on the counter. 6:50 The counter is
like a table. 7:03 Put the pot holder on the table. 7:12 The pot

holder is the shape of a square.

6)

7:29 Put the dishwashing liquid next to the faucet. 7:34 Put it next to the faucet. 7:44 Dishwashing liquid is soap - 7:49 soap for dishes. 7:52 Next to the faucet. 8:09 The faucet is the place in the sink where the water comes out. 8:22 When you turn it on, water comes out. 8:33 When you turn on the faucet the water comes out.... 8:45 Put the dishwashing liquid next to the faucet. 8:55 The faucet is the place in the sink where the water comes out. 9:05 If you turn on the faucet the water comes out. 9:11 Water comes out of the faucet. 9:15 Dishwashing liquid is soap - 9:18 that you use to clean the dishes.

7)

9:32 Put the eggplant in the cabinet. 9:37 Put the eggplant in the cabinet. 10:28 Eggplant is a kind of vegetable. 10:39 Eggplant is a round vegetable. 11:21 It is round but it's kind of long too. 12:06 Long and round. 12:09 It is purple. 12:15 It's a purple vegetable. 12:21 Put the eggplant in the cabinet.

8)

12:23 Put the dustpan on the shelf. 12:33 Put the dustpan on the shelf. 12:39 A dustpan is used to clean. 12:46 If some dirt is on the floor, you take the dustpan and pick it up. 13:00 Put the dustpan on the shelf. 13:35 You use the dustpan to pick up dirt. 13:47 You use the dustpan to pick up dirty stuff - 13:50 dirty things on the floor. 14:03 The dustpan is usually metal or plastic.

9)

14:27 Can you put the garbage can next to the stove. 14:47 Garbage can next to the stove. 15:01 The garbage can next to the stove.

10)

15:06 Put the scouring pad next to the faucet. 15:16 You use the scouring pad to clean dishes. 15:31 You use it to clean dishes.

15:44 Put the scouring pad next to the faucet. 15:54 Put the scouring pad next to the faucet.

11)

16:01 Put the blender in the cabinet. 16:11 You can put juice or fruit inside the blender and stir it up really fast. 16:19 The blender stirs up fruit and juice very quickly. 16:30 Put the blender in the cabinet.

12)

16:58 Put the toaster next to the stove. 17:08 Toaster next to the stove. 17:18 Put the toaster next to the stove.

END 17:30

APPENDIX D
ANALYSIS OF VARIANCE

Summary of Analysis of Variance of the Difference Among Environments

Source of Variation	Cases	Corrected for ties		
Data Source		Chi-Square	D.F.	Significance
Between Groups:				
Premodified B	13			
Baseline B	8			
Baseline A	10			
Total	31			
1. Activity Scores		13.2211	2	0.0013*
2. Pre/Post Target Word Scores		2.7772	2	0.2494
3. Pre/Post Non-Target Word Scores		2.0644	2	0.3562
4. Pre/TW Post Target Word Scores		2.9467	2	0.2292
5. Pre/TW Post Non-Target Word Scores		1.4649	2	0.4807
6. Post/TW Post Target Word Scores		1.3266	2	0.5151
7. Post/TW Post Non-Target Word Scores		4.1089	2	0.1282
8. Pre/Post Impr. Target/Non-Target Word Scores		2.6067	2	0.2716