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**Inducement of imagery in the service of learning sign language
vocabulary**

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The University of Arizona, 1989

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INDUCEMENT OF IMAGERY IN THE SERVICE OF
LEARNING SIGN LANGUAGE VOCABULARY

by

Cindy Ellerman Rider

A Thesis Submitted to the Faculty of the
DIVISION OF EDUCATIONAL FOUNDATIONS AND ADMINISTRATION
In Partial Fulfillment of the Requirements
For the Degree of
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In the Graduate College
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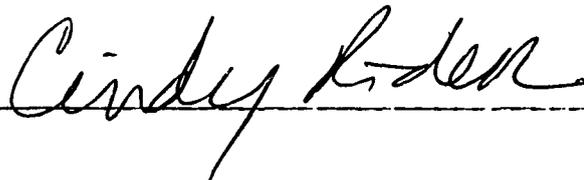
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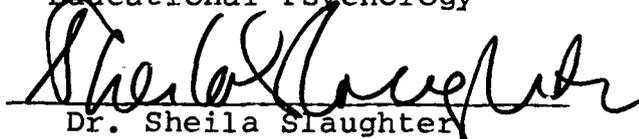
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ABSTRACT

The focus of this study was the inducement of imagery in order to retain sign language vocabulary items. Thirty-eight beginning sign language students were selected as subjects. Subjects were randomly assigned to two groups. The treatment group received instructions in the use of imagery mnemonics in order to better retain sign language vocabulary. Subjects in the control group were left to learn the vocabulary items by methods of their own choosing. Results of the statistical analyses indicated no significant difference between groups on posttest measures. However, there was a tendency toward an interaction between subjects' grade point averages and the treatments. The inducement of imagery in the treatment group was somewhat of an "equalizer" between subjects with high and low grade point averages. Additional analyses indicated that the inducement of imagery mnemonics in the treatment group was more successful for the poorer students and hindered the better students.

CHAPTER 1

INTRODUCTION

Research has shown that the use of mnemonics in foreign language learning increases retention (Lorayne & Lucas, 1974). However, much of that research is irrelevant for the purposes of studying sign language due to the echoic representation of information in most foreign languages. The parameters of sign language are visual, whereas the parameters of other foreign languages are verbal.

Statement of the Problem

The focus of this study is on the use of mnemonics, in particular imagery, as a way to improve retention of sign language vocabulary items. The use of mnemonics and imagery is a non-automatic, conscious process on the part of the learner. Therefore, the state of mindfulness in the learner was also studied. Imagery was used as a method of attempting to induce a state of mindfulness in subjects.

Significance of the Problem

Sign language has been in existence for centuries. The first school for the deaf was established in 1794 in France (Lane, 1986). However, sign language has not been researched empirically until the 1960's. To date, most

research has dealt with establishing sign language as an independent language. It is now accepted as a language, of a special, visual nature, and research is needed on the cognitive aspects of its acquisition.

One of the cognitive aspects of sign language pertains to how students retain vocabulary items. Research is needed on how to improve retention of sign language vocabulary. How instructors should teach the language for maximum retention has yet to be determined.

Due to the dearth of research in this area, this study will determine if imagery induction can aid in sign language vocabulary retention. Because imagery is a conscious process, the state of mindfulness in the learner will also be addressed.

Research Questions

The following research questions were addressed:

1. Does imagery induction improve retention of sign language vocabulary?
2. Does imagery induction increase learner's investment of mental effort in committing sign language vocabulary items to memory?
3. Who benefits more and who benefits less from the inducement of imagery?
4. Does imagery induction facilitate transfer to new sign language messages?

Definition of Terms

Imagery. Consciously experienced mental process developed in order to link experiences with concrete objects, events, and language (Paivio, 1971).

Memory. The active process of remembering (Brown, 1977).

Memory System. Applying a new method of absorbing information (Brown, 1977).

Mindfulness. The conscious use of non-automatic elaboration processes (Salomon & Globerson, 1987).

Mindlessness. The state of acting without consciously processing available information (Langer, 1985).

Mnemonics. The term can be used in both the singular and plural sense. Mnemonics is a field of study and also the process of improving memory. The term mnemonics can also refer to specific memory techniques (Higbee, 1977).

Sign Language. A visual/gestural language possessing specific linguistic rules.

Review of Literature

Two major factors are involved in this study. The first factor involves the role of mnemonics, particularly imagery, in learning. The second factor involves the role of mindfulness in learning. Each of these factors will be addressed in the following chapter.

Mnemonics

A wealth of information has been published on learning and memory. Scholars have been interested in memory for centuries. In fact, it has been stated that all learning is based on memory (Lorayne & Lucas, 1974). The first recorded memory system was used in Greece by Simonides in 500 B.C. whereby he was able to recall the location of people in a huge banquet hall after it had collapsed and killed all within it (Brown, 1977).

In the days of early Rome, Cicero developed the system of loci, in which items were remembered by placing them along a sequence of places on a familiar walk. Early Greek and Roman orators were able to deliver lengthy speeches by applying this memory system. Memory systems were also said to have been used by Shakespeare, Francis Bacon, and King Henry III (Lorayne & Lucas, 1974).

In the 1600's, D'Assigny (1985) described physical means by which to strengthen memory. He claimed that moderation in food and drink, exercise, protection of the head and feet from cold, and avoidance of sexual excess, especially on a full stomach or out of wedlock, would surely improve memory.

Today, there are innumerable memory systems in use. Bellezza (1987) states that the study of memory systems and mnemonics is crucial to our understanding of human memory and learning. She describes two main types of mnemonic devices: organizational mnemonics and encoding mnemonics. Organizational mnemonics organize the new information in memory in order to be retrieved at a later time. The system of loci described earlier in this chapter is an example of organizational mnemonics.

Encoding mnemonics are sometimes used prior to the use of an organizational mnemonic. If the item to be committed to memory is abstract, an encoding mnemonic could be used to transfer the material into a more memorable form. For example, an abstract term such as "fiscal," could be associated with the word "fishtail," which could be more easily remembered.

Bellezza (1981) also described four important variables in mnemonic devices: constructibility, associability, discriminability, and invertibility. These four properties must be present in order for a mnemonic device to function properly.

Constructibility refers to mental cues that are easy to retrieve from memory during study of the material and during recall of those mental cues. For example, suppose

one is using the system of loci to recall a list of words. If the locus is forgotten, the word will also be forgotten. In order to recall a specific event, the context and mental environment associated with that event must be recalled.

Associability refers to the relative ease of associating the new information to be retained. Visual imagery is a critical factor in associability. If an image is used that is related to the information it is to be associated with, the image and the item to be remembered are easily linked in memory. According to Paivio (1971) and Bellezza (1987), it is not possible to associate a mnemonic with an abstraction. In order for association to occur, the mnemonic must be easily imaged and related to familiar objects or locations.

Discriminability refers to using distinct mental cues for each item to be remembered. If the mental cues are similar for two or more items, then the learner can easily become confused. Bellezza (1983, 1986) demonstrated that a list of words is better remembered when different and distinct cues are used, compared to similar mental cues. Wollen and Margres (1987) also discuss the importance of distinctiveness of items to be remembered. An item cannot be retrieved from memory unless it is distinctive from the other items in memory.

Paivio (1971) described three critical assumptions underlying the use of mnemonic systems. The first assumption is that concrete objects are easier to remember than words. Also, Hunt and Marshark (1987) show that concrete material is better remembered than abstract material. Paivio's second assumption is that concrete objects are particularly effective as retrieval cues for associated material. His third assumption is that a visual image of the concrete object can serve as an effective mediator for verbal material. Paivio (1971) further states that the more concrete or "thing-like" a stimulus, the more likely it is to evoke mental images.

Before learning verbal language, we could see and remember images. The storage capacity for these images greatly exceeds the storage capacity for verbal material (Brown, 1977). Therefore, learning to associate verbal material with imagery can be quite beneficial. Day and Bellezza (1983) show that imagery plays an important role in the way information is represented and remembered in memory.

One reason why visual imagery is such a powerful memory aid is because images are much more memorable than words alone (Higbee, 1977). This concept is called the picture superiority effect. A mental picture of an object can be

remembered much more easily than a verbal description of that same object. Several studies have used imagery to compare learning of lists of pictures and words. Paivio, Rogers and Smythe (1968) have shown that when subjects study a list of pictures and words using imaginal coding, pictures are better remembered during free-recall. Further studies showed that pictures are better remembered than words during tests of recognition (Madigan, 1983), serial recall (Herman, Broussard, & Todd, 1951), and paired-associate learning (Paivio and Yarney, 1966).

Imagery has been touted as the most unique feature of mnemonic systems (Higbee, 1977). When a learner forms an image, the following process occurs (Wollen & Margres, 1987). There is an initial stimulus provided to the subjects as a basis from which to develop the images. The stimulus then causes a memory search for an appropriate image. Once the image has been chosen, it must be modified in order to interact with the new information. The result is the final image. The learner must then store the newly constructed image using an elaborative process connecting the new image with the initial stimulus. The image can then be accessed and identified by target elements. The new information to be recalled will then be the final result.

When using imagery, there are several aspects to consider in order to improve retention. First of all, the mental picture should be as clear as possible (Higbee, 1977). If the image is interactive, it can also lead to improved recall (Bower, 1970; Begg, 1982; Lorayne & Lucas, 1974). In order for an image to be interactive, one must imagine the image and the item to be remembered interacting in some way. The other alternative is separate imagery, where two separate images would be formed.

Movement in the image also makes it more effective (Higbee, 1977). For example, instead of imagining a person holding a broom, the person would be sweeping with the broom. Use of substitution can also improve recall, whereby one would imagine a dog instead of a person sweeping with the broom.

Exaggeration or bizarre images have also been found to be beneficial (Einstein & McDaniel, 1987). Early research had indicated just the opposite (Emmerich & Ackeman, 1979). However, recent research has shown that under specific experimental conditions, bizarre imagery is effective (McDaniel & Einstein, 1986). In fact, it has been shown that if an image is both interactive and bizarre, the retention is all the more enhanced (Cermak, 1975).

The extreme effectiveness of imagery was exhibited in a study conducted by Roediger (1980). He instructed subjects

to use five mnemonic techniques to study and recall lists of 20 words. The techniques were imagery, the link method, system of loci, peg method, and rehearsal. Each of the methods used imagery in some way except the rehearsal group and each of those groups using imagery recalled significantly more items than did the rehearsal group.

No studies were found specific to learning sign language through mnemonic systems. Numerous studies have been conducted using mnemonics to learn such languages as French, Chinese, Russian, and Spanish. Research has shown that visual associations can make a significant difference in learning foreign language vocabulary (Higbee, 1977). Meaningful visual associations were formed between each foreign word and its English equivalent.

However, in the present study, a different language is involved. Sign language cannot easily be compared to other foreign languages. Sign language is similar to other languages in that it has its own unique syntax and grammar (Cokely & Baker, 1980). However, it is a very different language from the perspective of the learner. It is a visual rather than a verbal language. Because of the visual nature of sign language, implications might be generated from the picture superiority effect mentioned earlier. If imagery is induced in order to

retain sign language vocabulary, these items might be easier to remember than written or verbal vocabulary items.

Mindfulness

The use of mnemonic devices is a strategic, deliberate process. It does not happen automatically. There is a conscious decision by the learner to utilize the particular mnemonic technique (Pressley, & Borkowski, & Schneider, in press). This conscious, non-automatic process can be considered a state of "mindfulness." Mindfulness has been described as a "volitional, metacognitively guided employment of non-automatic ("controlled") processes" (Salomon & Globerson, 1987, p. 625).

Several authors have alluded to the importance of being mindful in order to improve memory. Lorayne and Lucas (1974) state that one must think of what one is doing during the moment in which it is being done. They claim this procedure as a cure for absent mindedness.

Salomon and Globerson (1987) describe several sources of mindfulness. Distal sources can be intra-personal or environmental. One might have the overall tendency to be mindful. An individual might prefer situations that are more mentally taxing. This individual may intentionally choose to be engaged in activities that require mindfulness.

There are also proximal sources of mindfulness (Salomon & Globerson, 1987). These can also be intra-personal or environmental. The perceived demands and values of a particular task are an important source. Salomon and Globerson (1987) state that if a task is seen as demanding, but within a reasonable range of effort, more mindfulness can be expected. However, if the task is perceived as undemanding and familiar, little mindfulness can be expected. Also, if the task is perceived as too demanding, little mindfulness can be expected. In addition, Salomon and Globerson (1987) state that proximal sources are more conducive to experimental manipulation, thereby enabling an inducement of the mindful state.

Langer (1978) describes four situations when mindfulness occurs for an individual. The first situation is when more effort is demanded than was originally demanded. When external factors disrupt a state of mindlessness, mindfulness occurs. Mindfulness also occurs when external factors prevent completion of a behavior. Lastly, mindfulness occurs when a consequence is experienced in a particular situation that is discrepant with previous experiences with that situation. The new consequence may be positive or negative.

Measures of mindfulness have been developed by Cacioppo and Petty (1982) and Salomon and Globerson (1987).

Cacioppo and Petty (1982) found that individuals who were high on the scale of mindfulness expended more mental effort on complex tasks and enjoyed these tasks more.

Salomon and Globerson (1987) found that those with a high score of mindfulness perform better on their own with limited guidance, and that they prefer to work alone rather than in teams, when the goal is a common product.

However, Salomon and Globerson (1987) also state that individuals many times are not mindful in their activities, even when they have the available knowledge. They make two assertions as to why this is true. The first assertion is that although one may have the requisite knowledge and skills, these skills may not be conscious when needed. The second assertion is that to be mindful requires effort and individuals often do not wish to expend effort, as demonstrated in an earlier study by Salomon (1984).

This state of not being mindful, has been referred to as a state of mindlessness (Langer, 1985). Langer describes this as an important aspect of cognitive life. She defines mindlessness as "the absence of active conscious information processing, when the individual relies on a structure of the situation representative of

its underlying meaning" (p. 268). A state of mindlessness can occur after a particular experience has been repeated many times.

Langer and Weinman (1981) did a series of studies researching differences between mindfulness and mindlessness, and whether people were aware of their own mindlessness. The first study showed that subjects read familiar sentences incorrectly without being aware that they were incorrect. When the sentences contained a nonsensical word, it was still read incorrectly. In the next study, subjects wrote essays about the meaning of particular poems, and answered specific questions about the poem. The mindless subjects were less thoughtful and articulate in their essays and answered fewer specific questions correctly than did the mindful subjects. A later study again indicated the subjects' lack of awareness of the difference between mindlessness and mindfulness. Subjects were asked to discuss a familiar issue either immediately, after a short delay, or after a suggestion to think about the issue for a period of time during a delay. Subjects should not have taken the suggestion to the above issue. Results indicated that thinking about an issue that should have been responded to mindlessly, rather than mindfully, resulted in less articulate speech.

Langer (1985) suggests that some level of mindfulness is necessary for survival. Two studies were done with nursing home residents where residents were given a plant for which to be responsible and to think about (Langer & Rodin, 1976; Rodin & Langer, 1977). Results of the first study indicated that this made the residents happier, healthier, and more alert. The follow-up study indicated that twice as many people had died in the group without the thoughtful interaction with a living thing.

If a state of mindfulness is desired, studies have shown that mindfulness can be manipulated by instruction. Benware and Deci (1984) induced a state of mindfulness by having students learn materials with the intent to explain them to another individual. Wittrock (1985) induced a state of mindfulness in subjects by having them read materials, generate a mental scenario of the material, and relate the material to previous knowledge. In both studies, learning showed the expected improvement and the subjects' mindfulness was increased.

While the Wittrock (1985) study induced a state of mindfulness through the use of imagery, the present study similarly used imagery to induce a state of mindfulness. It was assumed that a mindful state was necessary in order to learn American Sign Language. American Sign Language is

not the primary language for most students, and therefore, conscious non-automatic processing must occur in order to learn the language.

Based on the literature pertaining to mindfulness and mnemonics described here, several hypotheses were tested on this research. They are as follows:

1. Imagery induction would cause a greater amount of invested mental effort.
2. Imagery induction would improve sign language vocabulary retention.
3. Imagery induction would facilitate transfer to new sign language messages.

CHAPTER 2

METHODOLOGY

Subjects

The subjects were 38 (male and female) students at the University of Arizona. The subjects were enrolled in one section of Beginning American Sign Language. Subjects were randomly assigned to two groups.

Materials

A videotaped series of 91 vocabulary words (signs) was seen by each group of subjects during three sessions. Each word was signed once, followed by a sentence in American Sign Language utilizing the vocabulary word. There was a ten second time lapse from the end of the signed sentence until the next word. (See Appendix D for written scripts of the videotapes.)

Approximately two weeks prior to the experimental sessions, students completed a questionnaire pertaining to their tendency toward mindfulness (see Appendix A). Each student received an assigned number and was asked to record that number in his or her notebook. This number was used for all future data from each subject. At this time, subjects were also asked about particular topics of

interest in order to determine excitement about learning sign language (see Appendix B and J).

Vocabulary words were taken from the required course textbook, A Basic Course in American Sign Language by Humphries, Padden, and O'Rourke. Subjects covered Lessons 1 and 2 with their regular classroom teacher. The experimental sessions covered Lessons 3 and 4. At the end of each of the three sessions, subjects completed a brief questionnaire pertaining to the amount of invested mental effort for the session (see Appendix C). After sessions two and three, subjects were asked to give written advice or recommendations to a "friend" who wanted to learn sign language (see Appendix L).

A videotaped posttest was given at the end of the third session. Forty-six of the original 91 vocabulary words were signed in sentences. Subjects were asked to write down in English each of the signed sentences. (See Appendix E for a copy of the posttest given to the subjects.) (See Appendix F for a written version of the posttest.) Twenty-three of the posttest vocabulary words were used in sentences exactly as they were seen in the practice sessions. The remaining 23 vocabulary words were used in sentences different from those used in practice sessions. During the posttest, a deaf individual abruptly entered the room and a brief, excited conversation occurred

between the instructor and the deaf individual. Subjects were then asked to write down their understanding of the conversation as accurately as possible (see Appendix I for a script of the conversation that took place). A second posttest was administered two weeks after the first was completed. The second posttest was identical to the first posttest.

Procedure

Two experimental groups were established. The treatment group received a short lecture during the first session about the use of mnemonics (see Appendix K). Subjects were asked to attempt to make a mental note for each vocabulary item, and to commit the item to memory through use of imagery mnemonics. Specific examples using sign language vocabulary were demonstrated. The control group received a lecture on the cultural aspects of deafness. They were left to learn the vocabulary items as they would normally choose to learn them (see Appendix G for the control group lecture).

The videotaped series of 91 vocabulary items was presented during three class sessions. Thirty-five items were presented during the first session, 35 the second session, and 21 on the final session, along with the posttest. Each day after subjects viewed the videotape, they were to practice with one another using the vocabulary

items (see Appendix H for practice session sheets). Subjects were able to ask the instructor to demonstrate signs they had forgotten. A tally was kept of the number of times the instructor was asked to demonstrate signs. Subjects were not allowed to rewatch the videotape. The treatment group was asked to continually use imagery while practicing the vocabulary items. In fact, the instructor stopped subjects at random during the practice sessions and asked about the image being used. Subjects in the control group were also asked about their mental processing during the practice sessions. At the end of each practice session, subjects were asked to complete a short questionnaire pertaining to their amount of invested mental effort for that session (see Appendix C). Upon completion of each practice session, two subjects were interviewed in depth about the procedures used to remember the vocabulary items.

Daily itinerary for the sessions was as follows:

Treatment Group

| | | |
|----------------|---|--|
| First Session | - | 15 minute lecture and introduction/ roll call 15 minute videotape presentation 35 minute practice session 5 minute questionnaire |
| Second Session | - | 10 minute mnemonics reminder/ recall 15 minute videotape presentation 35 minute practice session 5 minute questionnaire 5 minute "if you had a friend" handout |

Third Session - 5 minute mnemonics reminder/roll call
 10 minute videotape presentation
 15 minute practice session
 5 minute questionnaire
 5 minute "if you had a friend" questionnaire
 40 minute post-test

Control Group

First Session - 15 minute introduction and lecture/roll call
 15 minute videotape presentation
 30 minute practice session
 5 minute questionnaire

Second Session - 10 minute introduction/roll call
 15 minute videotape presentation
 45 minute practice session
 5 minute questionnaire
 5 minute "if you had a friend" handout

Third Session - 5 minute introduction/roll call
 10 minute videotape presentation
 15 minute practice session
 5 minute questionnaire
 5 minute "if you had a friend" handout
 40 minute post-test

Statistical Analysis

A total of 17 variables were analyzed in this research. The first variable was the questionnaire measuring mindfulness as a tendency. There were 24 items on the questionnaire on which item reliability was tested. Subjects received a total mindfulness score. Two other variables were included in the questionnaire. One was each subject's reported grade point average as a measure of

aptitude. The other variable was the number of comments made. There were three built in errors. Therefore, subjects could score from 1 to 3, depending on the number of errors commented upon. The questionnaire served as a measure of subjects' aptitude and tendency toward mindfulness.

The next two variables were related to subjects' relative excitement about learning sign language. One form listed ten topics (including sign language) and asked subjects to rank order them according to their excitement about learning each particular topic. The other form used a Likert Scale in order to indicate excitement about learning each of the topics. Scores could range from a "1" indicating no excitement at all, to a "5" indicating a great deal of excitement.

The following three variables were the measures of amount of invested mental effort for each of the three sessions. Two questions were asked per session. The two questions were intercorrelated as were the scores over each of the three sessions. The end result was one final score of amount of invested mental effort.

The subsequent two variables were the written advice or suggestions given by subjects to a "friend" who wanted to learn sign language. Suggestions were divided into four classes. Class I referred to general suggestions such as

take a class or practice. Class II suggestions were more specific, such as practice fingerspelling for one hour every day or volunteer at the Arizona State School for the Deaf and Blind. Class III suggestions were related to the use of imagery or visualization. Class IV suggestions pertained to other mentions of mnemonics such as using association or using the vocabulary in memorable sentences. The suggestions were counted and categorized according to the described classes.

The final variables pertained to the posttest. There were 46 items on the posttest, each worth three points for a total possible score of 138. One point was given for the vocabulary item learned in the practice session. One point was given for the other vocabulary items in the sentence. A subject could score three points total for the sentence if the English translation was absolutely correct. Posttest items were tested for item reliability.

The conversation between the deaf individual and the instructor was worth a total of 18 points. Each subject's written version could be scored from 0-18. The second posttest was scored similar to the first posttest.

The final four variables pertain to items within the posttests. Odd-numbered sentences on the posttests were identical to the sentences seen on the practice session tapes. Even-numbered items utilized the same vocabulary

word as seen on the practice tape, however, the sentence was different. Therefore, these four variables were Posttest 1 Familiar Items, Posttest 1 Unfamiliar Items, Posttest 2 Familiar Items, and Posttest 2 Unfamiliar Items.

A series of analyses of variance were run on each of the aptitude variables in order to determine the similarity of the two experimental groups. An analysis of variance was also used to indicate whether there were statistically significant differences on the posttests and amount of invested mental effort measures.

Pearson correlations were conducted on all 17 variables. One correlation table included all subjects. Two additional correlation tables compared the two treatment groups.

An analysis of covariance was carried out holding the grade point average variable constant. All other variables were treated as dependent variables. The two treatment groups were considered the independent variables. To complete the statistical analyses, a 2 (treatment) x 2 (grade point average) analysis of variance was conducted. The median grade point average was 2.9 on a scale of 4.0. Therefore, high grade point averages (2.9 and above) were compared to low grade point average (below 2.9).

CHAPTER 3

RESULTS

Several preliminary analyses were necessary in order to compile data into meaningful units. An item reliability test was conducted on the mindfulness questionnaire. This indicated that three items (13, 17 and 23) had to be deleted in order to make the measure internally more consistent. Therefore, 21 items were included in the total mindfulness score ($\text{Alpha}=.83$). An item reliability test was also conducted on the posttest items. All items were found to be internally consistent ($\text{Alpha}=.94$). Therefore, all 46 items were totaled into one posttest score for each of the two posttests. Each posttest had two components which were analyzed separately. One-half of the posttest items were familiar sentences which had been seen in the practice sessions. The other half of the posttest items used the target vocabulary word as seen in the practice session, but the vocabulary word was used in an unfamiliar sentence.

The amount of invested mental effort was measured through two questions per subject on each of the three sessions. This comprised a total of six items pertaining

to the amount of invested mental effort per subject. Table 1 presents the intercorrelations between the six original amount of invested mental effort variables.

Table 1. Inter-correlations of Amount of Invested Mental Effort Variables (AIME).

| | 1 | 2 | 3 | 4 | 5 | 6 |
|----------|-----|-----|-----|-----|-----|---|
| 1-AIME1a | - | | | | | |
| 2-AIME1b | .52 | | | | | |
| 3-AIME2a | .62 | .44 | | | | |
| 4-AIME2b | .32 | .65 | .68 | | | |
| 5-AIME3a | .67 | .34 | .67 | .37 | | |
| 6-AIME3b | .27 | .64 | .50 | .72 | .50 | |

Thus, as it can be seen in Table 1, the relatively high and consistent item inter-correlations indicated that it was possible to combine the six items into one score of the amount of invested mental effort per subject.

After completion of these preliminary analyses, the two experimental groups (treatment and control) were compared for initial comparability. Analyses of variance tests were conducted on the aptitude measures of mindfulness-as-a-tendency, grade point average, number of comments, excitement about learning sign language, and sign

language excitement ranking. Table 2 presents univariate F-tests with $df=1$ and 33. As seen in Table 2, these analyses indicated no significant difference between the two experimental groups.

Table 2. Analysis of variance on aptitude measures.

| Variable | MS | MS (Error) | F ($df=1,33$) |
|--------------------|--------|---------------|--------------------|
| Mindfulness | 196.51 | 137.40 | 1.43 |
| GPA | 1.42 | .94 | 1.51 |
| Number of Comments | .17 | .29 | .58 |
| Excitement | .02 | .31 | .06 |
| Sign Ranking | 2.03 | 1.87 | 1.09 |

In order to test the first hypothesis that the treatment group would report a significantly greater amount of invested mental effort, an analyses of variance was conducted to compare the two groups. The means were 31.26 (Control Group) and 29.31 (Treatment Group). However, the difference was not statistically significant ($F(1,33)=.34$, $p>.05$). In light of the absence of any difference between the groups on amount of invested mental effort, the first hypothesis had to be rejected.

In order to test the second hypothesis that there would be a significant difference between the groups on posttest measures in favor of the treatment group, analyses of variance were conducted on the two posttests. The means for the control and treatment groups on the first posttest were 99.79 and 100.19 respectively. Means on the second posttest for control and treatment groups were 104.53 and 104.25 respectively. No significant differences were found between the groups on these posttest measures ($F(1,33)=.002$ and $F(1,33)=.001$, $p>.05$ for both). Due to the absence of difference between the groups, the second hypothesis was also rejected.

In order to test the third hypothesis that the treatment group would receive a significantly higher score on the transfer of sign language learning test, an analyses of variance was conducted to compare the two groups. The means for the control and treatment groups were 4.6 and 5.3 respectively. No significant differences were found between the groups on this measure ($F(1,33)=.26$, $p>.05$). Therefore, the third hypothesis was rejected due to the lack of difference between groups.

Absence of differences between groups may have been masked by general ability differences between groups. Grade point average is the closest approximation available to tap general ability. Therefore, an analysis of

covariance was conducted on each of the dependent variables, using grade point average as the covariate. The other independent variable was manipulation of mnemonics. No significant differences were found except in the advice variables. Advice 3 and 7 pertained to advice given about using imagery to learn sign language. The advice data were taken during sessions 2 and 3. On session 2 (Advice 3), although the difference was not statistically significant, there was a tendency for the treatment group to give more relevant advice than the control group. Treatment and control group means were .44 and .16 respectively ($F(1,33)=2.65, p<.11$). On session 3 (Advice 7), the kind of advice given was significantly different between the two groups. Treatment and control means were .44 and .05, respectively ($F(1,33)=6.17, p<.01$).

Additional 2 (grade point average) x 2 (treatment) analyses of variance were carried out. Grade point average scores were divided into high scores (above the overall median of 2.9) and low scores (below the median). There was a main effect due to grade point average on excitement about sign language ($F(1,34)=4.17, p<.05$), showing that high grade point average scorers indicated greater excitement about sign language than did low grade point average scorers. There was also a main effect due to grade

point average on the mindfulness variable ($F(1,34)=5.46$, $p<.05$). This indicates that subjects with higher grade point averages receive higher mindfulness scores.

There were main effects due to grade point average on each of the posttests, but not due to treatment: Posttest 1 Familiar Items ($F(1,34)=9.78$, $p<.01$), Posttest 1 Unfamiliar Items ($F(1,34)=8.72$, $p<.01$), Posttest 2 Familiar Items ($F(1,34)=7.03$, $p<.05$), Posttest 2 Unfamiliar Items ($F(1,34)=12.40$, $p<.01$). Those subjects having a higher grade point average did better on the posttests regardless of treatment differences.

No analysis of variance showed a main effect due to treatment or grade point average on the following variables (treatment group F value is shown first, and grade point average F value is shown second): Number of comments ($F(1,34)=1.19$, .005), sign language ranking ($F(1,34)=1.27$, .19), amount of invested mental effort ($F(1,34)=.49$, .97), Burst ($F(1,34)=.004$, .06).

However, there was a tendency toward an interaction between grade point average and treatments. Figures 1 through 5 depict this tendency as manifested on the posttest measures.

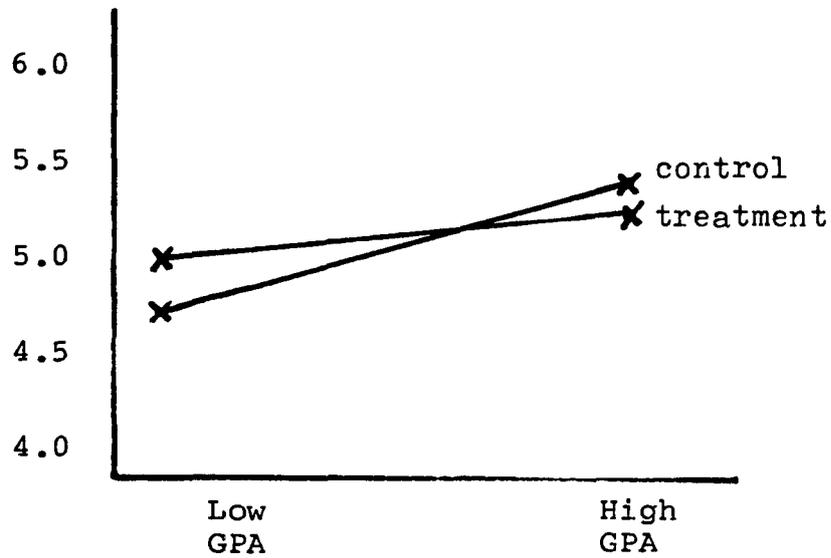


Figure 1. 2 (treatment) x 2 (GPA) analysis of variance on Burst.

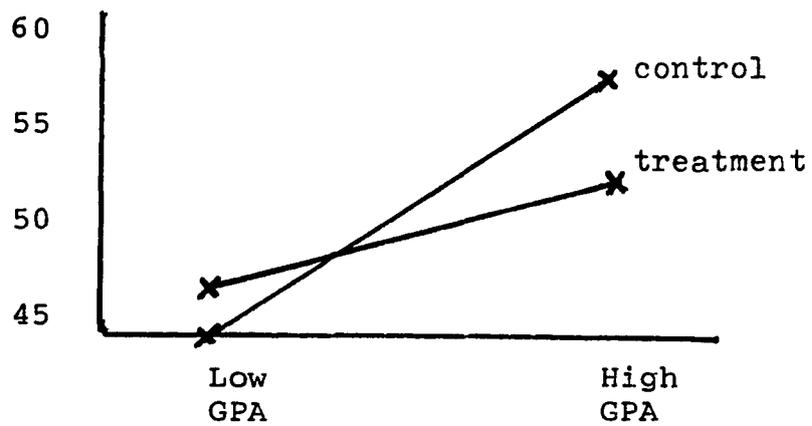


Figure 2. 2 (treatment) x 2 (GPA) analysis of variance on posttest 1 familiar items.

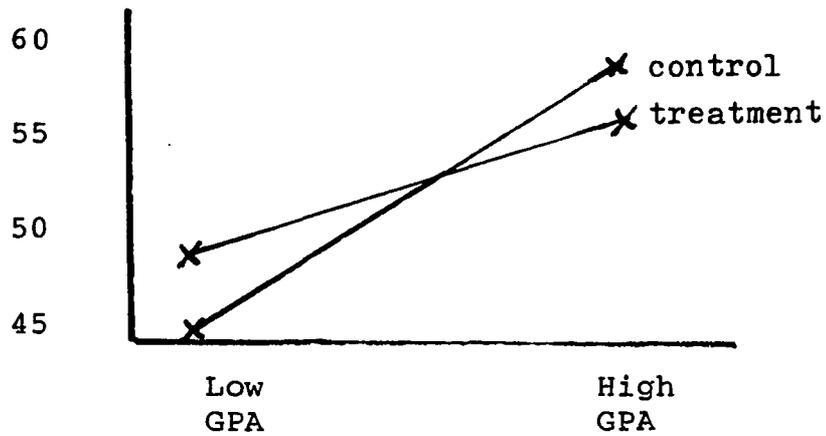


Figure 3. 2 (treatment) x 2 (GPA) analysis of variance posttest 1 unfamiliar items.

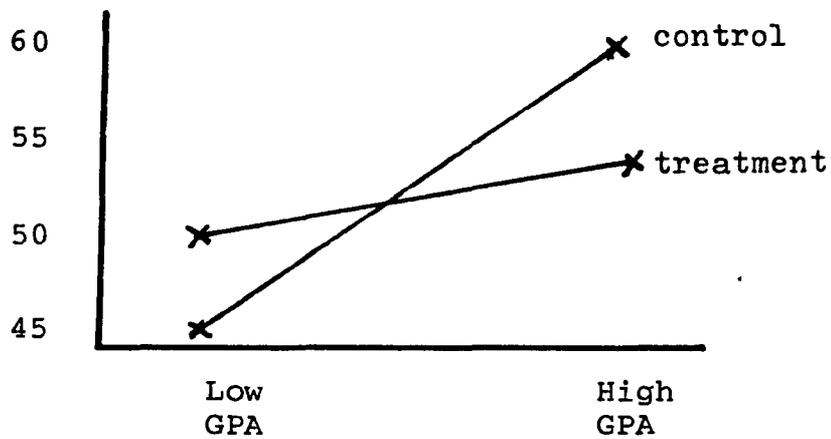


Figure 4. 2 (treatment) x 2 (GPA) analysis of variance on posttest 2 familiar items.

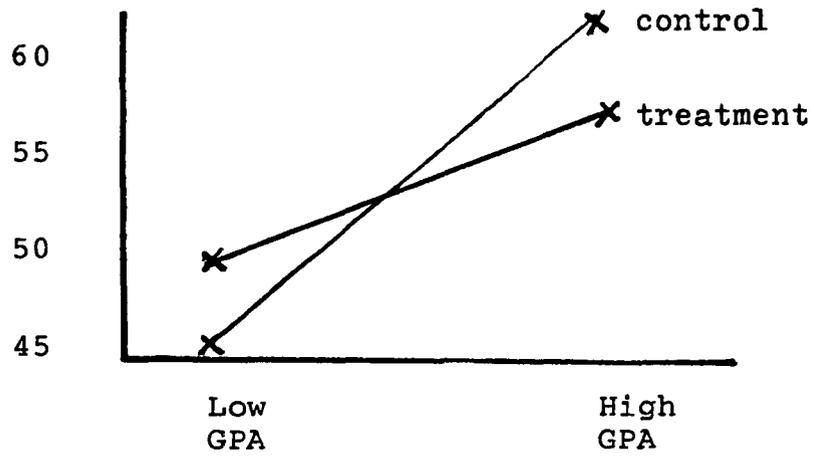


Figure 5. 2 (treatment) x 2 (GPA) analysis of variance on posttest 2 unfamiliar items.

Systematically, it appears that high grade point average scorers did better in the control group relative to low grade point average scorers, while the difference between high and low grade point average scorers was observably smaller in the treatment group. It appears that inducement of mnemonics in the treatment group was somewhat of an "equalizer" between subjects with high and low grade point averages.

Such a tendency for interaction invited a closer examination of inter-variable correlations. Correlation analyses were carried out on all variables separately for each group (N=18 in the treatment group, and N=20 in the control group). A pattern emerged suggesting that aptitude measures were better predictors of success on the posttests in the control group than in the treatment group. Correlations between grade point average and the posttests were .38, .41, .40, and .50 in the control group. Correlations were lower on those same variables in the treatment group at .16, .44, .15, and .32.

There was also a tendency for several correlations to be positive in the control group and negative in the treatment group. Correlations between mindfulness and posttest measures were .29, .26, .32, and .32 in the control group, while they were .14, -.02, -.03, and .13 in the treatment group.

The same trend followed for correlations between the amount of invested mental effort and posttest variables. Correlations between amount of invested mental effort and posttest measures were .15, .25, .24, and .32 in the control group, and -.32, -.29, -.55, and -.42 in the treatment group. These correlations were compared by converting the correlation coefficients to Fishers Z scores revealing systematic significant differences between the two groups. These differences suggest that control subjects exerting more mental effort did better on posttest measures while the opposite was true for treatment subjects.

The pattern of intercorrelations between sign language ranking and posttest variables continues with correlations of .56, .56, .49, and .54 in the control group and -.15, -.11, -.13, and -.05 in the treatment group. Each of these differences was significant ($p < .05$). These differences suggest that control subjects who highly ranked sign language as an interesting topic to study did better on posttests while there was no relationship between sign language ranking and posttest variables for treatment subjects.

Advice variables 3 and 7 (advice related to imagery) were highly intercorrelated in both groups (Control: $r = .55$, Treatment: $r = .52$). This was to be expected, as Advice 3

and 7 were the same type of advice given over two sessions. Advice 7 correlated .14 to .28 with posttest scores in the control group. The respective correlations were highest in the treatment group ranging from .17 to .55. The same pattern emerged respective to correlations between mindfulness and amount of invested mental effort variables where the correlation was .17 in the control group and .43 in the treatment group. Tables 3 and 4 show the correlation matrices for control and treatment groups.

In summarizing the correlational findings, it can be said that aptitude measures were better predictors of success on posttest measures for the control subjects than for the treatment subjects. The recurring significant pattern of positive control group correlations, and negative treatment group correlations indicated that control group subjects who reported exerting more effort did better on posttest measures, while the opposite was true for treatment group subjects.

A tally was kept during each of the practice sessions of the number of times subjects asked the instructor to repeat particular vocabulary items. Table 5 presents specific data from each session.

As it can be seen in Table 5, the total number of requests by subjects in the control group was greater than requests made by the treatment group during each of the

Table 3. Pearson correlations for control group.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | |
|---------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|-----|-----|-----|
| 1. GPA | 1.0 | | | | | | | | | | | | | | | | | | |
| 2. Number of Comments | .08 | 1.0 | | | | | | | | | | | | | | | | | |
| 3. Excitement | .15 | .25 | 1.0 | | | | | | | | | | | | | | | | |
| 4. Sign Language Ranking | .03 | .21 | .58 | 1.0 | | | | | | | | | | | | | | | |
| 5. Mindfulness | .40 | .02 | -.08 | .25 | 1.0 | | | | | | | | | | | | | | |
| 6. AIME | -.03 | -.29 | .13 | .12 | .17 | 1.0 | | | | | | | | | | | | | |
| 7. Advice 1 | .13 | .00 | .34 | .18 | .05 | .19 | 1.0 | | | | | | | | | | | | |
| 8. Advice 2 | .17 | .23 | .18 | .49 | -.16 | -.17 | -.15 | 1.0 | | | | | | | | | | | |
| 9. Advice 3 | .18 | .03 | -.43 | -.31 | .57 | .37 | -.14 | -.24 | 1.0 | | | | | | | | | | |
| 10. Advice 4 | .05 | -.21 | .10 | -.33 | -.28 | .15 | .20 | -.18 | -.16 | 1.0 | | | | | | | | | |
| 11. Advice 5 | .12 | .29 | -.23 | -.05 | -.22 | -.19 | .51 | -.06 | -.20 | -.02 | 1.0 | | | | | | | | |
| 12. Advice 6 | .21 | .18 | .28 | .24 | .28 | -.08 | -.18 | .44 | .05 | -.07 | -.65 | 1.0 | | | | | | | |
| 13. Advice 7 | .31 | -.12 | .16 | .06 | .25 | .22 | .23 | .36 | .55 | -.09 | -.19 | .17 | 1.0 | | | | | | |
| 14. Advice 8 | .18 | -.27 | -.09 | -.24 | -.29 | -.03 | .25 | .06 | -.21 | .78 | .10 | -.09 | -.11 | 1.0 | | | | | |
| 15. Burst | .09 | .28 | .25 | .34 | .10 | .02 | -.26 | .59 | -.07 | -.21 | -.34 | .42 | -.31 | -.20 | 1.0 | | | | |
| 16. Posttest 1 Familiar | .38 | -.04 | .67 | .56 | .29 | .15 | .47 | .34 | -.16 | -.06 | -.13 | .43 | .23 | .03 | .30 | 1.0 | | | |
| 17. Posttest 1 Unfamiliar | .41 | .00 | .61 | .56 | .26 | .25 | .38 | .38 | -.24 | -.19 | -.10 | .39 | .14 | -.06 | .41 | .89 | 1.0 | | |
| 18. Posttest 2 Familiar | .40 | .03 | .45 | .49 | .32 | .24 | .47 | .25 | -.06 | -.14 | -.03 | .32 | .27 | .04 | .15 | .88 | .89 | 1.0 | |
| 19. Posttest 2 Unfamiliar | .50 | .09 | .57 | .54 | .32 | .32 | .35 | .31 | -.04 | -.14 | -.13 | .32 | .28 | .00 | .32 | .89 | .95 | .94 | 1.0 |

Table 4. Pearson correlations for treatment group.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|-----|-----|
| 1. GPA | 1.0 | | | | | | | | | | | | | | | | | |
| 2. Number of Comments | .27 | 1.0 | | | | | | | | | | | | | | | | |
| 3. Excitement | .17 | -.34 | 1.0 | | | | | | | | | | | | | | | |
| 4. Sign Language Ranking | .07 | -.03 | .00 | 1.0 | | | | | | | | | | | | | | |
| 5. Mindfulness | .16 | .47 | .11 | -.11 | 1.0 | | | | | | | | | | | | | |
| 6. AIME | .08 | .45 | .19 | .23 | .43 | 1.0 | | | | | | | | | | | | |
| 7. Advice 1 | -.14 | -.24 | .00 | -.39 | -.01 | -.47 | 1.0 | | | | | | | | | | | |
| 8. Advice 2 | -.06 | .27 | .17 | -.02 | -.43 | -.02 | -.05 | 1.0 | | | | | | | | | | |
| 9. Advice 3 | .22 | -.16 | -.13 | -.46 | .01 | -.46 | .09 | -.39 | 1.0 | | | | | | | | | |
| 10. Advice 4 | -.01 | -.09 | -.13 | .23 | .24 | .32 | -.36 | -.36 | -.23 | 1.0 | | | | | | | | |
| 11. Advice 5 | -.31 | -.20 | .00 | -.26 | .00 | -.35 | .46 | .00 | -.23 | .00 | 1.0 | | | | | | | |
| 12. Advice 6 | .10 | .49 | .03 | .16 | -.08 | .20 | -.18 | .59 | -.38 | -.45 | -.15 | 1.0 | | | | | | |
| 13. Advice 7 | .03 | -.16 | .27 | -.31 | .34 | -.36 | .28 | -.21 | .52 | -.23 | .07 | -.38 | 1.0 | | | | | |
| 14. Advice 8 | .18 | -.19 | -.16 | .27 | .01 | -.21 | -.11 | -.25 | .05 | .44 | -.09 | -.18 | -.14 | 1.0 | | | | |
| 15. Burst | .17 | -.30 | .42 | .10 | -.06 | -.08 | -.10 | .04 | -.01 | .17 | -.10 | -.18 | .13 | .41 | 1.0 | | | |
| 16. Posttest 1 Familiar | .16 | -.21 | .35 | -.15 | .14 | -.32 | .24 | -.17 | .27 | -.10 | .14 | -.28 | .55 | .00 | .58 | 1.0 | | |
| 17. Posttest 1 Unfamiliar | .44 | .02 | .17 | -.11 | -.02 | -.29 | .12 | -.02 | .27 | -.10 | -.02 | .00 | .17 | -.01 | .48 | .80 | 1.0 | |
| 18. Posttest 2 Familiar | .15 | -.16 | .12 | -.13 | -.03 | -.55 | .49 | -.02 | .19 | -.21 | .19 | -.11 | .46 | .24 | .52 | .81 | .76 | 1.0 |
| 19. Posttest 2 Unfamiliar | .32 | -.10 | .30 | -.05 | .13 | -.42 | .32 | -.07 | .15 | -.22 | .22 | -.11 | .43 | .26 | .62 | .86 | .78 | .91 |

Table 5. Tally of practice session requests.

| | Session 1 | Session 2 | Session 3 |
|---------------------------------|-----------|-----------|-----------|
| Total Number of Items Presented | 35 | 35 | 21 |
| Number of Requests (Control) | 54 | 35 | 17 |
| Number of Requests (Treatment) | 35 | 30 | 16 |

three sessions. However, the difference between groups in total number of requests diminished over the three sessions. The control group had 35% more requests for repeated presentation in the first session, 15% more requests in the second session, and only 6% more requests in the third session.

One of the research questions addressed pertained to the mental processing reported by the two experimental groups. Subjects were questioned at random during practice sessions and then two subjects were questioned in detail in each group after each of the three sessions.

In the control group, many subjects reported mental processing related to the iconicity of the sign language vocabulary. Statements were made such as: "The sign looks like I perceived it before starting to learn sign language." I just remember, the signs make sense, and are

normal." However, several subjects indicated that they used imagery. Statements were made such as: "I remember it visually." "I see it in my head." "I remember the sign for understand, because it's like the light going on boing!" Some subjects reported using association, but were not able to clearly define their mental processing.

In the treatment group, subjects reported that they did indeed use imagery to remember the sign language vocabulary items. Comments were made such as: "I put a scenario to each vocabulary word." "I see it in my head." "I relate the vocabulary word to the first image that comes to mind." "I relate it to something I'm familiar with." Some subjects indicated that they had always used imagery, but that it had not always been a conscious process. They stated that it would probably help them with the rest of the class and in other classes. Several subjects indicated that it was much more difficult to use imagery with abstract vocabulary words.

Subjects in the treatment group reported that they did use the mnemonic device of imagery to retain the sign language vocabulary items. As mentioned previously in this chapter, on the average, the use of imagery did not significantly improve their posttest scores over those in the control group. However, the inducement of imagery appeared to equalize the performance of high and low grade point average scorers in the treatment group.

CHAPTER 4

DISCUSSION

This study focused on the use of mnemonics in order to retain sign language vocabulary items. The use of mnemonics, namely imagery, was also expected to induce a state of greater mindfulness in subjects, thus to facilitate retention. A total of 38 beginning sign language students participated. The treatment group was instructed to use imagery in order to retain sign language vocabulary, while the control group was left to use their own methods of learning and retention.

The measured independent variables were as follows: grade point average, mindfulness-as-a-tendency, number of comments, sign language ranking, and excitement about learning sign language. The manipulated independent variable was the inducement of mnemonic imagery in the treatment but not the control group. The amount of invested mental effort reported by subjects and advice given by subjects were process variables. The dependent measures included the five posttest measures of Burst, Posttest 1 Familiar Items, Posttest 1 Unfamiliar Items, Posttest 2 Familiar Items, and Posttest 2 Unfamiliar Items.

It was expected that inducement of imagery in the treatment group would perhaps make those subjects more mindful, which in turn would produce higher posttest scores. However, these expectations did not come to fruition. There were no significant differences between groups on the posttest measures. There was also no significant difference in the amount of reported invested mental effort between groups. The analyses did indicate that subjects with higher grade point averages did do better on the posttests, were more excited about learning sign language, and were more mindful, regardless of treatment.

The most interesting finding was a tendency toward an interaction between grade point average and treatments on posttest measures. The inducement of mnemonics tended to "equalize" the posttest scores for low and high grade point average scorers in the treatment group. In the control group, high grade point average scorers did better on the posttest measures than did the low grade point average scorers, as might have been expected.

The assumption was made that all subjects had the capacity to produce visual images. However, results indicated that there were varying capacities to produce images amongst treatment subjects. There was no procedure to measure each individual subject's ability to produce

images. From the amount of invested mental effort reported, subjects in the treatment group were exerting somewhat more effort. Those who tried harder to comply with the directions to produce images with each vocabulary item received, quite unexpectedly, poorer scores on the posttests. These same subjects also did not recommend imagery as a way to learn sign language on Advice variables 3 and 7. The subjects in the treatment group who expended more effort in producing the mnemonic images appear to have faced great difficulties, and the harder they tried, the less well they learned the items.

In the control group, the opposite results were found. Those subjects who reported exerting more mental effort in learning the vocabulary items did better on the posttest measures. Interestingly enough, they were also more likely to advise using imagery to learn sign language, even though they received no instructions pertaining to the use of imagery mnemonics. Apparently, control subjects used imagery independently in order to retain the sign language vocabulary items.

The above results bring forth an interesting question. Why did mental effort correlate negatively with outcomes in the treatment group, and positively with outcomes in the control group? Those treatment group subjects who worked harder to produce images did not succeed. Perhaps the

inducement of imagery as a mnemonic device for those subjects was misleading. Possibly, those subjects were not as capable at producing images and still they expended effort in unsuccessfully complying with the instructions, thus failing to commit the vocabulary items to memory. They might have done better using another type of mnemonics.

Because of these treatment group subjects who tried diligently to produce images, yet failed, the means of the treatment and control groups were not significantly different. However, closer inspection indicates some interesting differences between the two experimental groups. There was a tendency for the inducement of imagery mnemonics to work better for the poorer students and less so for the better ones. Indeed, when further correlational analyses were conducted, comparing high and low grade point average scorers across groups, differential correlations between group membership and scores on the second posttest (Familiar Items) emerged. Among the high grade point average scorers, the less instructional inducement provided, the better these posttest scores: The correlation between groups (treatment = 1, control = 2) and posttest was .38. On the other hand, the parallel correlation for the low grade point averages was -.29. The difference was significant with $p < .05$. That is, while the

academically better subjects did better on Posttest 2 Familiar Items without any imagery inducement, the subjects who were academically poorer did better on the Posttest 2 Familiar Items with the experimental inducement. The same pattern emerged on Posttest 2 Unfamiliar Items. Also there, high grade point averages benefited more without inducement, and low grade point averages benefited with it. Correlations between group and Posttest 2 (Unfamiliar Items) were .41 and -.23, respectively ($p < .05$).

Two possible implications thus follow. The first is that trying harder, that is exerting more mental effort, works against some subjects, possibly the ones who have difficulty producing images. It would be interesting to identify more specifically the characteristics of the subjects who fall into this category. The second idea is that academically poorer subjects unlike academically good ones, benefit from imagery induction.

A final conclusion might be drawn that excessive help to some subjects (i.e., imagery instructions), is less than helpful. The inducement of imagery did not help the better learners in the treatment group to do better on the posttest measures. Salomon (1971) came to the same conclusion. He found that when remedial learners were "spoon fed" visualization techniques that should have been activated independently, the subjects who were the poor

visualizers benefited more than the more capable visualizers. The latter experienced interference, manifesting depressed posttest learning scores. Earlier studies showed the same findings (Bruner, 1961; Jensen, 1967), as did a more recent study by Clark (1987). Several other studies have shown that when subjects were "spoon fed" something they were capable of doing on their own, they actually had a poorer performance (Jensen, 1967; Gentile, Kessler, & Gentile, 1969).

Clark (1987) described three types of effects where instruction has actually hindered learning. When instruction serves to substitute learning procedures this effect has been found. It has also been found when instruction imposes less desirable motivational goals on learners. Learning has also been hindered when student control has been substituted for system control over instructional method.

Clark (1987) also states that novel learning strategies often interfere with the skills of high ability students. However, these same learning strategies benefit the low aptitude students. The low aptitude students lack an effective approach to learning and are thereby able to acquire an effective approach utilizing these novel learning strategies.

Potential Limitations of the Study

Two different instructors were used in the experiment due to time limitations, one instructor per group. However, a strict lesson outline was prepared and was given to each instructor before each experimental session. Both instructors met prior to and after each session to discuss the outlines and insure similarity between groups. Even with these precautions, the two experimental groups might have been handled differently. Or perhaps because of these precautions, the two groups were too similar, thus decreasing the impact of the imagery induction. Without an independent classroom observation of both groups, the differences or lack of differences was impossible to determine.

Another possible limitation is that the use of instructional inducement of imagery does not insure that each subject expends the effort to develop an image for each vocabulary item. In order to account for this potential limitation, subjects in the treatment group were continually reminded to use imagery. During the practice sessions, the instructor frequently approached each group about the particular processes being utilized to remember the vocabulary items. At the end of each session, two subjects were questioned in detail about the mental processing being used. Due to these frequent reminders,

the instructor of the treatment group was confident that subjects were making the attempt to produce images for each vocabulary item. However, as mentioned previously, subjects had differing capacities for producing these images. These differing capacities proved to be a limitation of the study, albeit producing some of the more interesting results.

Recommendations for Future Research

Several recommendations can be based on the findings and implications of the present study. Using a larger sample size or using subjects in different phases of sign language learning may have produced a stronger effect of mnemonics. Perhaps when students arrive at intermediate or advanced levels of language learning they use different methods of learning and retention. Or perhaps when students are at the advanced levels of sign language learning, they tend to rely more heavily on imagery or another type of mnemonics. If this were to be the case, one might expect the findings to be similar to those of the present study.

Use of imagery in subjects over an entire semester, rather than merely three sessions, might also produce different conclusions. Perhaps those high grade point

average scorers would experience less interference with the imagery instructions if given over an entire semester. Additionally, the exertion of more mental effort over a longer period of time might produce better results for some subjects.

Use of imagery in learning iconic sign language vocabulary items versus arbitrary sign language vocabulary items could prove to be an interesting area for further research. Perhaps the use of imagery interferes with the learning of iconic vocabulary items due to their "picture-like" representation. Conversely, perhaps imagery enhances iconic vocabulary learning for the same reasons.

A measure of individual subject's ability to produce images could also yield different results in this study. Rothkopf (1970) stated that in most instructional situations, what is learned depends on the activities of the student. It seems that individual differences do need to be addressed, particularly due to the differences found in this study in subjects' capacities for image production.

Conclusion

In conclusion, the research conducted in this study demonstrated that the use of imagery did not significantly increase the retention of sign language vocabulary items on the average. However, several interesting findings did

emerge. The suggestion of imagery mnemonics might have been misleading for some subjects in the treatment group. Some treatment group subjects were not as capable at producing images. Yet, these subjects expended effort in unsuccessfully producing images, thereby failing to retain the sign language vocabulary items.

Finally, the excessive assistance of the imagery instructions was actually less than helpful to some subjects in the treatment group. The imagery training apparently interfered with those high grade point average scorers in the treatment group who may have possessed visual imagery capabilities. Therefore, the imagery assistance helped the academically poorer subjects in the treatment group to succeed, while it hindered the academically better subjects.

APPENDIX A

MINDFULNESS-AS-A TENDENCY QUESTIONNAIRE

NOTE: Please write down your assigned number in your notebook.

Assigned Number _____

This is a totally anonymous, exploratory questionnaire which will serve us in our class discussions. THERE ARE NO RIGHT OR WRONG ANSWERS TO THE QUESTIONS ONLY HONEST OR DISHONEST ONES. Please respond as honestly as you can to ALL questions.

Next to each question you have a scale of five intervals. PLEASE CIRCLE THE NUMBER THAT BEST DESCRIBES YOU IN YOUR DAILY LIFE. NOT NECESSARILY AS A COLLEGE STUDENT.

- 1 - Item totally fails to describe you
- 2 - Item is a poor description of you
- 3 - Item is an irrelevant description of you
- 4 - Item is a fair description of you
- 5 - Item is a very good description of you

1. I would prefer complex to simple problems

1 2 3 4 5

2. I like to do things, not to think a lot about the doing

1 2 3 4 5

3. I like to have the responsibility of handling a situation that requires a lot of thinking

1 2 3 4 5

4. Thinking is not my idea of fun

1 2 3 4 5

5. I would rather do something that requires little thought than something that is sure to tax my thinking abilities

1 2 3 4 5

Assigned Number _____

6. I find satisfaction in deliberating hard and for long hours
1 2 3 4 5
7. If something is familiar to me and there is no reason to really consider it anew I don't think about it too much
1 2 3 4 5
8. I only think as hard as I have to
1 2 3 4 5
9. I prefer to think about small, daily projects to long-term ones
1 2 3 4 5
10. I would rather have fun than have a good time
1 2 3 4 5
11. I like tasks that require little thought once I have learned them
1 2 3 4 5
12. I really enjoy a task that involves coming up with new solutions to old problems
1 2 3 4 5
13. I don't trust the first solution that comes to my mind; I prefer to think of something else
1 2 3 4 5
14. Learning horse new ways of doing old things does not excite me very much
1 2 3 4 5
15. I prefer my life to be filled with puzzles that I must solve
1 2 3 4 5

Assigned Number _____

16. Even when I do mundane things I think a lot about how I do them

1 2 3 4 5

17. I notice many unimportant details in my surrounding

1 2 3 4 5

18. I would prefer a task that is intellectual, difficult, and important to one that is totally important but does not require much thought

1 2 3 4 5

19. I feel relief rather than satisfaction after completing a task that required a lot of mental effort

1 2 3 4 5

20. It's enough for me that something gets the job done, I don't care how or why it works

1 2 3 4 5

21. I concentrate my attention on those things that really require it, not to every little nonsense around

1 2 3 4 5

22. I usually end up deliberating about issues even when they do not affect me personally

1 2 3 4 5

23. I always work hard to find a new perspective on familiar things

1 2 3 4 5

24. I am often amazed at how mindless I can be

1 2 3 4 5

25. I am often tempted to put more thought into a task than the job requires for its completion

1 2 3 4 5

26. What is your overall Grade Point Average (GPA)?

Any comments about this questionnaire?

APPENDIX B

SIGN LANGUAGE RANKING

Assigned Number _____

Please rank order the following topics based on your excitement about learning each particular topic. Give a 1 rating to the topic you would be most excited about, and give a 10 rating to the topic you would be least excited about.

- _____ Psychology
- _____ Physics
- _____ Sign Language
- _____ Astronomy
- _____ Mathematics
- _____ French
- _____ American History
- _____ Spanish
- _____ Sociology
- _____ Business Administration

APPENDIX C

AMOUNT OF INVESTED MENTAL EFFORT

APPENDIX D

VIDEOTAPE PRACTICE SESSION SCRIPTS

The following list represents each vocabulary word and a sentence using the word in American Sign Language as seen on the videotapes. The English translation of each sentence is in parentheses.

Session 1

1. about - Happy me, about them. (I'm happy about them.)
2. bed - Bed, big. (The bed is big.)
3. black, black person - Black man dance. (The black man is dancing.)
4. blue - Blue pretty. (The color blue is pretty.)
5. book - Book mine. (The book is mine.)
6. box, package, room. (The box is his.)
7. brown - Bed brown. (The bed is brown.)
8. brown - Bed brown. (The bed is brown).
9. car - Car, grandfather his. (The car belongs to grandfather.)
10. chair, seat - Chair blue. (The chair is blue.)
11. class, group, team - Friend, my class. (The friend is in my class.)
12. color - Color pretty. (The color is pretty.)
13. dialogue, talk with - Friend, me, dialogue. (I talked with my friend.)
14. enjoy, appreciate - niece my, enjoy cook. (My niece enjoys cooking.)
15. find, discover - Good-friend mine, find girl. (My best friend found a girl.)
16. fingerspell - Fingerspell learn me. (I learned to fingerspell.)
17. for - Dance for me. (Dance for me.)
18. forget - Forget him friend. (I forgot about my friend.)

19. from - Uncle my, from America. (My uncle is from America.)
20. gray - Gray ugly. (The color gray is ugly.)
21. green - car, green. (The car is green.)
22. have, own, possess - Husband, have me. (I have a husband.)
23. home - Home, beautiful. (My home is beautiful.)
24. in, contained in - sister in room. (My sister is in the room.)
25. know, aware, conscious - I know he smart. (I know he is smart.)
26. like - nephew, like me. (I like my nephew.)
27. lose - he lose chair. (He lost the chair.)
28. money - money find she. (She found money.)
29. name - Sister your, name? (What is your sister's name?)
30. need, necessary - Need me, strong. (I need to be strong.)
31. new, modern - Student new, he. (He is a new student.)
32. old, age - grandmother mine old. (My grandmother is old.)
33. orange - Book orange, his. (The orange book is his.)
34. paper, page - Paper interesting. (The paper is interesting.)
35. practice, exercise, train, rehearse - Practice, me smart. (I practiced and was smart.)

Session 2

1. read - Learn read me. (I am learning to read.)
2. red - Chair red. (The chair is red.)
3. remember - Remember me? (Do you remember me?)
4. sign, sign language - Sign beautiful. (Sign language is beautiful.)
5. table, desk - Table small. (The table is small.)
6. thank-you - thank-you for car. (Thank you for the car.)
7. want, desire - Want cook you? (Do you want to cook?)
8. white - white color ugly. (The color white is ugly.)
9. white-person - white-person sleepy. (The white person is sleepy.)
10. yellow - paper yellow. (The paper is yellow.)
11. awful, terrible - Sister yours awful. (Your sister is awful.)
12. bad, unfortunate - Student bad he. (He is a bad student.)
13. believe - believe me. (Believe me.)
14. cat - Cat small. (The cat is small.)
15. cheap - table cheap. (The table is cheap.)
16. clean, nice, pure - Parents mine nice. (My parents are nice.)
17. cold, winter - Room cold. (The room is cold.)
18. dirty - Room dirty. (The room is dirty.)
19. dog - Dog mad. (The dog is mad.)
20. don't-know - Wife yours I don't-know. (I don't know your wife.)

21. don't-like - Teach I don't-like. (I don't like to teach.)
22. don't-want - Tell me don't want. (I don't want to be tall.)
23. eat, food - Food awful. (The food is awful.)
24. expensive - He surprised, expensive table. (He was surprised it was an expensive table.)
25. explain, describe - surprised me, explain. (I'm surprised, could you explain?)
26. feel, feelings, sense - Feel tired me. (I feel tired.)
27. good - She cook good. (She is a good cook.)
28. hear, sound - He hear me. (He hears me.)
29. hot, heat - Me hot and sleepy. (I am hot and sleepy.)
30. house - House big. (The house is big.)
31. huh? Dance, huh? (Do you want to dance?)
32. hungry, wish - me hungry and tired. (I am hungry and tired.)
33. language - Learn language me. (I am learning a language.)
34. lesson, course, chapter - She taught lesson. (She taught the lesson.)
35. love - Sister love brother. (The sister loves her brother.)

Session 3

1. meet - I meet her. (I met her.)
2. movie - Movie sad. (The movie is sad.)
3. no - Mother say no. (Mother said no.)
4. not - She, me good-friend not. (She and I are not good friends.)
5. oh-I-see, oh - Oh, interesting. (Oh, that is interesting.)
6. right, correct - You right, me stupid. (You are right, I'm stupid.)
7. school - School, learn me. (I learn at school.)
8. see sight - I see him happy. (I see that he is happy.)
9. sentence, language - Sentence learn me. (I learned the sentence.)
10. sick - Woman she sick. (The woman is sick.)
11. smell, odor - I cook, smell bad. (When I cook it smells bad.)
12. sorry, regret - Son, sorry he. (My son is sorry).
13. taste, prefer, favorite - You cook, my favorite. (You cooked my favorite.)
14. understand, comprehend - He understand me. (He understands me.)
15. well, so - Well, teach me. (Well, teach me.)
16. word, vocabulary - Sentence have word. (A sentence has words.)
17. work, job - Work mine don't-like. (I don't like my job.)
18. world - World small. (It's a small world.)
19. wrong - Teacher mine wrong. (My teacher was wrong.)
20. yes - Yes, he husband mine. (Yes, he is my husband.)
21. young, youth - Girl young. (The girl is young.)

APPENDIX E

POSTTEST

Assigned Number _____

Posttest

As you see each sentence signed on the videotape, write down the English translation for the sentence. Please answer each item to the best of your ability.

1.

2.

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19.

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21.

Assigned Number _____

22.

23.

24.

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APPENDIX F

POSTTEST SCRIPT

Posttest

The following sentences are written as they will be seen on the posttest. The English translation is in parentheses. The odd numbered sentences are exactly as soon on the practice tapes. The even numbered sentences use the vocabulary word in a different sentence from the one seen on the practice tape. The specific vocabulary word is underlined.

1. Happy me about them. (I'm happy about them.)
2. Grandfather he's black. (His grandfather is a black individual.)
3. Book mine. (The book is mine.)
4. Chair brown nice. (The brown chair is nice.)
5. Car grandfather his. (The car belongs to my grandfather.)
6. Class enjoy learn. (The class enjoys learning.)
7. Friend, me dialogue. (I talked with my friend.)
8. Find wife you? (Did you find a wife?)
9. Dance for me. (Dance for me.)
10. Woman from America. (The woman is from America.)
11. Car green. (The car is green.)
12. Home warm. (My home is warm.)
13. I know he smart. (I know he is smart.)
14. Lose money me. (I lost money.)
15. Your sister name? (What is your sister's name?)
16. He my new friend. (He is my new friend.)
17. Book orange his. (The orange book is his.)
18. I practice they surprised. (They were surprised I practiced.)
19. Red chair. (the chair is red.)

20. Sign learn me. (I am learning sign language.)
21. Thank you for car. (Thank you for the car.)
22. White book heavy. (The white book is heavy.)
23. Paper yellow. (The paper is yellow.)
24. Bad boy he. (He is a bad boy.)
25. Cat small. (The cat is small.)
26. Family his nice. (His family is nice.)
27. Room dirty. (The room is dirty.)
28. Sign don't know me. (I don't know sign language.)
29. Tall me don't want. (I don't want to be tall.)
30. Food expensive. (The food is expensive.)
31. Surprised me, explain. (I'm surprised, could you explain?)
32. Feel good me. (I feel good.)
33. Me hot and sleepy. (I am hot and sleepy.)
34. Interesting huh? (This is interesting isn't it?)
35. Learn language me. (I learned a language.)
36. Grandfather love grandmother. (My grandfather loves my grandmother.)
37. Movie sad. (The movie was sad.)
38. Book interesting not. (The book is not interesting.)
39. You right me stupid. (You're right, I'm stupid.)
40. I saw little boy. (I saw the little boy.)
41. Woman she sick. (The woman is sick.)
42. Sorry, me tired. (Sorry, I am tired.)

43. He understands me. (He understands me.)
44. You fingerspell word happy. (Fingerspell the word happy.)
45. World small. (It's a small world.)
46. Yes, I'm angry. (Yes I am angry.)

APPENDIX G
CONTROL GROUP LECTURE

We are going to be using a different approach to learning sign language vocabulary from Chapters 3 and 4 in your textbook in our next three class sessions. We are going to be using videotaped instruction in lieu of your textbook. Before we begin the videotape, I would like to give you some information about deaf culture. Deaf people have a culture of their own and understanding this culture may help you to have a better grasp of American Sign Language.

Many people in this country consider deafness not a physical condition but an ethnic identity. Those who accept this identity view themselves as belonging to a proud and distinctive subcultural group known as the deaf community. Composed of people who use sign language as their primary means of communication, the deaf community has over the past 150 years developed a rich social life and folklore. Through their own efforts to meet their own needs, deaf people have organized a nationwide and international network of social, religious, athletic, dramatic, scholarly and literary organizations serving local, national, and international memberships. Every four years, for example, the World Games for the Deaf (the Deaf Olympics) bring together deaf athletes from any countries to compete for international prizes.

Like any true subcultural group, the deaf community adheres to certain particular social norms and values which are passed from generation to generation. Unlike other subcultural groups, however, the deaf community recruits its members in an unique fashion. In general, human culture is passed down within families. But because 90% of deaf children have two hearing parents, only a minority of deaf community members acquire their cultural identity and distinctive social skills at home. Most deaf children learn about the deaf subculture in schools for the deaf, from other children, teachers, and dormitory counselors. Nonetheless, the deaf community is quite cohesive, with high percentage of members marrying within the group.

A number of people have begun to study folklore and folklife. They have collected jokes, legends, games, riddles, etc. based on sign language and the experiences of deaf people. In addition, linguistics have isolated some of the characteristics and values of deaf culture. The following list outlines some of these characteristics:

1. Membership is based on deafness. Members have little or no hearing and define themselves as deaf.
2. There is a heavy emphasis on vision. American Sign Language (A.S.L.), a visual mode of communication, is the language used within the deaf community. Members gain the vast majority of their information

through their eyes and make a point of observing closely what is happening around them.

3. There is a specific set of social norms. Members follow certain social habits that are somewhat different from the general society. Among these are the following:
 - a. members do not generally use their voices with deaf friends but will with hearing persons. In fact, many members of the deaf community disassociate themselves from speech.
 - b. members will wave, tap, or throw a small piece of paper to attract a person's attention.
 - c. members will talk (i.e., sign) with food in their mouths.
 - d. members use a variety of devices to replace ordinary alarm clocks, doorbells, telephones, for flashing lights to get their attention.
4. Members place a strong emphasis on fostering and maintaining social ties within the community.

The accepted form of etiquette within the deaf community is slightly different from that of the hearing community. Deaf culture, for example, has no prohibition against staring because it is necessary for effective sign communication. The hearing culture, however, considers staring rude.

Any questions about deaf culture? We will be discussing it in more detail as the semester progresses. Now, over the next three class sessions we will be learning vocabulary from Chapters 3 and 4 on videotape instead of from the textbook. On the videotape, you will see each sign shown once, and then the sign used in a sentence. There will be a time lapse after each sentence before continuing to the next vocabulary item. Do you have any questions before we begin?

APPENDIX H

PRACTICE SESSION HANDOUTS

Practice Session I
(Treatment Group)

Divide into pairs and practice sentences or conversations using the following vocabulary words. Be sure to utilize the image you chose for each item. If you have forgotten how to sign a particular vocabulary word, you may ask the instructor. However, you may not rewatch the videotape.

about
bed
black, black person
blue
book
box, package, room
brown
brown
car
chair, seat
class, group, team
color
dialogue, talk with
enjoy, appreciate
find, discover
fingerspell
for
forget
from
gray
green
have, own, possess
home
in, contained in
know, aware, conscious
like
lose
money
name
need, necessary
new, modern
old, age
orange
paper, page
practice, exercise, train rehearse

Practice Session 2
(Treatment Group)

Divide into pairs and practice sentences or conversations using the following vocabulary words. Be sure to utilize the image you chose with each item. If you have forgotten how to sign a particular vocabulary word, you may ask the instructor. However, you may not rewatch the videotape.

read
red
remember
sign, sign language
table, desk
thank-you
want, desire
white
white-person
yellow
awful, terrible
bad, unfortunate
believe
cat
cheap
clean, nice, pure
cold, winter
dirty
dog
don't-know
don't-like
don't-want
eat, food
expensive
explain, describe
feel, feelings, sense
good
hear, sound
hot, heat
house
huh?
hungry, wish
language
lesson, course, chapter
love

Practice Session 3
(Treatment Group)

Divide into pairs and practice sentences or conversations using the following vocabulary words. If you have forgotten how to sign a particular vocabulary word, you may ask the instructor. However you may not rewatch the videotape. Be sure to utilize the image you chose with each item.

meet
movie
no
not
oh-I-see, oh
right, correct
school
see, sight
sentence, language
sick
smell, odor
sorry, regret
taste, prefer, favorite
understand, comprehend
well, so
word, vocabulary
work, job
world
wrong
yes
young, youth

Practice Session I
(Control Group)

Divide into pairs and practice sentences or conversations using the following vocabulary words. If you have forgotten how to sign a particular vocabulary word, you may ask the instructor. However, you may not rewatch the videotape.

about
bed
black, black person
blue
book
box, package, room
brown
brown
car
chair, seat
class, group, team
color
dialogue, talk with
enjoy, appreciate
find, discover
fingerspell
for
forget
from
gray
green
have, own, possess
home
in, contained in
know, aware, conscious
like
lose
money
name
need, necessary
new, modern
old, age
orange
paper, page
practice, exercise, train rehearse

Practice Session 2
(Control Group)

Divide into pairs and practice sentences or conversations using the following vocabulary words. If you have forgotten how to sign a particular vocabulary word, you may ask the instructor. However, you may not rewatch the videotape.

read
red
remember
sign, sign language
table, desk
thank-you
want, desire
white
white-person
yellow
awful, terrible
bad, unfortunate
believe
cat
cheap
clean, nice, pure
cold, winter
dirty
dog
don't-know
don't-like
don't-want
eat, food
expensive
explain, describe
feel, feelings, sense
good
hear, sound
hot, heat
house
huh?
hungry, wish
language
lesson, course, chapter
love

Practice Session 3
(Control Group)

Divide into pairs and practice sentences or conversations using the following vocabulary words. If you have forgotten how to sign a particular vocabulary word, you may ask the instructor. However, you may not rewatch the videotape.

meet
movie
no
not
oh-I-see, oh
right, correct
school
see, sight
sentence, language
sick
smell, odor
sorry, regret
taste, prefer, favorite
understand, comprehend
well, so
word, vocabulary
work, job
world
wrong
yes
young, youth

APPENDIX I

"BURST" SCRIPT

Deaf person enters the room waving wildly. Instructor stops videotape and a brief excited conversation occurs.

Deaf Person: "Hey, hey book need me!!"

Hearing Person: "What book?"

Deaf Person: "Sign language book, red, blue."

Hearing Person: "Well,"

Deaf Person: "Mine lost."

Hearing Person: "Yes, find me sign language book."

Deaf Person: "Oh, thank you, thank you!"

APPENDIX J

SIGN LANGUAGE EXCITEMENT SCALE

Assigned Number _____

Please circle the number which best represents your feelings about learning each of the following topics. A "1" rating indicates no excitement at all about the topic. A number "5" rating indicates a great deal of excitement about learning the topic.

- | | | |
|----------------------------|-------------------------------|--------------|
| 1. French | 1-----1-----1-----1-----1 | |
| Not at all excited | 1 2 3 4 5 | Very excited |
| 2. Psychology | 1-----1-----1-----1-----1 | |
| | 1 2 3 4 5 | |
| 3. American History | 1-----1-----1-----1-----1 | |
| | 1 2 3 4 5 | |
| 4. Physics | 1-----1-----1-----1-----1 | |
| | 1 2 3 4 5 | |
| 5. Spanish | 1-----1-----1-----1-----1 | |
| | 1 2 3 4 5 | |
| 6. Sign Language | 1-----1-----1-----1-----1 | |
| | 1 2 3 4 5 | |
| 7. Sociology | 1-----1-----1-----1-----1 | |
| | 1 2 3 4 5 | |
| 8. Business Administration | 1-----1-----1-----1-----1 | |
| | 1 2 3 4 5 | |
| 9. Astronomy | 1-----1-----1-----1-----1 | |
| | 1 2 3 4 5 | |
| 10. Mathematics | 1-----1-----1-----1-----1 | |
| | 1 2 3 4 5 | |

APPENDIX K

TREATMENT GROUP LECTURE

We are going to be using a different approach to learning the sign language vocabulary from Chapters 3 and 4 in your textbook. However, this approach is meant to replace the use of your textbook. As you know, sign language is a very visual language and we are going to be using visualization to help us remember our sign language vocabulary.

Have you ever tried to remember a list of 50 words or a 30-digit number after hearing them only once? How about 100 sign language vocabulary items? We are going to be discussing some ways to make these types of tasks easier for you.

One way people can remember information is by using something called mnemonics. Has anyone ever heard this term? Mnemonic devices are basically ways to improve memory. Do you know of any mnemonics you might have used in the past? How about Every Good Boy Does Fine to remember the musical notes on the scale? How do you remember the number of days in each month? Can you think of any others? (First letter of each planet - Men Very Easily Make Jugs Serve Useful Nocturnal Purposes.)

Imagery can also prove to be very helpful in memory. Information can be recorded in memory in either a visual form (pictures) or a verbal form (words). For example, you

may have a visual image of a chair or you may think of the word chair (verbal). Because sign language is so visual, we are going to be using our visual memory in these sessions. This doesn't mean to picture the word "chair" in your mind, but to picture the object chair.

Visual associations have been used in learning Spanish, Russian and even Chinese. Visual associations were formed between each foreign word and its English equivalent. Now we are going to be using visual associations to learn sign language.

Let's take an example. Let's say you want to remember the sign for "beg" (show sign). I would visualize a man in tattered clothing, with a beard, uncombed hair, maybe a few teeth missing. He is standing on a corner in downtown Tucson with his hand out asking passersby for money. I focus on the hand outstretched asking for money and I notice dirt underneath his fingernails and very dry skin. Therefore, when I think about "What's the sign for beg?", I then conjure up this visual image and the sign comes to me right away.

When you are doing this for yourself, the mental picture you have should be seen as clearly as possible. It might help you to close your eyes to visualize it. Also, make the picture very detailed. Notice how I visualized

the man's clothing, hair, missing teeth, and even the dirt underneath his fingernails as he held out his hand.

Some other suggestions for making your visual associations effective are to use motion. Have action in your image. For example, I might imagine this man going from person to person with his hand outstretched.

Another idea is to use substitution. For example, instead of a man with his hand out, imagine a dog with a human hand doing the begging. Making the image slightly bizarre might help you to remember it more easily.

You might also use exaggeration in your visualization. Perhaps this beggar is an incredibly tall man. He is towering above all the other people on the street. He has to stoop way down with his hand outstretched in order to ask for money.

Do you have any questions so far? OK, now let's try it for yourselves. (Show the signs for window, decide, and from. After each one ask several students about the image they used to remember that sign.)

OK, now are you ready to try it for real? Over the next three class sessions we are going to be learning vocabulary from Chapters 3 and 4 in your text, audio instead of the textbook. On the videotape, you will see each sign shown once, and then the sign used in a sentence. There will be a time lapse after each sentence before

continuing to the next vocabulary item. As each vocabulary item is presented, concentrate very carefully on an image that will help you to remember that sign. There is not a lot of time between signs, so you need to be thinking very carefully about an image for each item. Any questions before we begin?

APPENDIX L

ADVICE HANDOUT

Assigned Number _____

Suppose you had a friend who really wanted to learn sign language. What recommendations would you give this friend about the way(s) he/she should go about learning sign language?

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