L2 Lexicon Loss

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This study addressed the problem of loss or impairment of second language lexicon. In particular, the loss of receptive vocabulary (recognition) was compared with the loss of productive vocabulary (recall). Previous studies had shown vocabulary loss to be a major difficulty encountered by persons returning to their native countries after a lengthy stay in L2 environments. Leyen's 1984 study of Spanish speaking immigrants indicated that even though recall of Spanish words was difficult for those who had lived in the United States for several years, their recognition of correct Spanish words was hardly impaired. Several studies have documented L2 lexical loss of individual children. As far as I know, this was the first group study attempting to assess the attrition rate of L2 vocabulary after a return to the L1 environment.

REVIEW OF PERTINENT LITERATURE

Memory

Researchers have considered short and long-term memory to be different processes, but experiments by Kandel (1978) indicate that short and long-term memory may be due to similar chemical and physiological changes within the brain. Mishkin (1987), Gillinsky (1984), and others postulated that emotion related to the learning experience enhances storage of the event into long-term memory. Research has shown certain areas of the brain (hippocampus, and amygdala) to be important in the transfer of information from short-term to long-term memory. Gillinsky indicated that repetition of an experience enhances implantation in long-term memory. Jenkins and Dallenbach (1924) showed that a period of sleep after a learning experience enhances long-term retention. This study was concerned only with secondary, or long-term memory, and future references to memory may be assumed to mean this type of long-term storage.

Memory is a three-step process; acquisition or learning, retention, and retrieval. Three types of behavior are indicative of memory; recognition, recall, and relearning. Recognition appears to be a less difficult task than recall. Kolb and Wishaw (1985) described two types of long-term memory. Procedural memory is the "modification of behavior that takes place when a skill or an operation is mastered". Declarative memory is the ability to recount when and how the procedure was acquired. The case of an epileptic patient known as H.M. who had bilateral surgery removing the hippocampus region of both temporal lobes of the brain is well known. Thirty years of research showed that H.M. retained procedural and declarative memory of all events prior to the surgery. He was, however, unable to make new associations, or to recall new experiences. He was able to develop procedural memory and learned to solve complex puzzles with few errors, however, he treated each effort as a novel experience, had no recollection of working on the puzzles previously, and assumed that his success at solving the puzzles was due to random guesses. The studies with H.M. showed that the hippocampus and amygdala facilitate the storage or the processing of new information into long-term memory.
Dimond (1980) noted that modern theories support two explanations for memory; storage at the biochemical level, and changes in the microanatomy of the brain. Work by Kendell (1978,1983) and Alkon has shown that memory may be a function of both biochemical activity and long term change in the neurons at or near the synapses. Their recent studies with two types of marine snails have demonstrated complex electrochemical reactions and subsequent long-term changes in neurons after conditioned response learning activities. Kendell (1978) stated that "certain types of learning (memory) result from changes in the activity of specific cells, and from changes in the connections between cells....The data provide direct evidence that a specific instance of long-term memory can be explained by a long-term change in synaptic effectiveness." Gillinsky (1984) also stated:

"Memory depends primarily upon the strength and stability of cognons (basic neural units participating in perception).....and secondarily upon the connections established by the coincident activity of two or more participant cognons. The effectiveness of these cognons and their connections (the degree of retention) depends upon the extent of synchronous arousal of the participant units at the time of learning."

Mishkin (1987) suggested that emotion plays an important role in retention. Gillinsky also noted five factors which determine the number of cognons (neural receptors) activated by a stimulus, and the consequent retention of the experience:

1. Repetition of the stimulus pattern
2. The strength of the facilitative arousal accompanying the stimulus presentation
3. The age of the subject
4. Whether the subject is in a critical period of development.
5. The existence of competitive interaction by other stimulation events.

Long-term memory appears to be resistant to total loss. Information stored in long-term memory may be difficult to retrieve, yet given the proper cues, humans can remember details that have been stored and not used for many years.

**Theories of Memory Loss**

There are four major theories of memory loss: decay, extinction, interference, and retrieval failure.

Decay theory states that memory atrophies from disuse. Studies have shown retention of learned material after as many as fifty years of disuse. (Bahrick, 1984) Leyen (1984), noted that Spanish-speaking natives who had moved to the United States had little or no difficulty recognizing Spanish words that they had not used for as many as twenty years. Gillinsky (1984) stated "there is no evidence that memory traces simply decay from disuse."

Extinction is the repression of old memories due to new experiences. This behaviorist theory seems to be a factor in language behavior of children who are exposed to a L2 setting.
Kenyeres (1938), Leopold (1954), and Burling (1959) all noted stages of extinction-like behavior among young children who moved to new language environments. Embarrassment concerning the child's I1 and refusal to respond in the I1 to parents are behaviors which seem related to the extinction theory. Extinction does not postulate the total loss of memory, only its extinction or repression due to new experiences.

Interference theory assumes that forgetting is a result of interference from an earlier (proactive) or more recent activity (retroactive). It is often associated with inability to transfer information from short-term memory to long-term memory. Researchers have studied the related phenomenon of I1 interference or transfer in I2 acquisition, with Krashen, Duyall, and Burt (1982) and others arguing against, and Fries (1945), and Lado (1983) arguing in favor of interference in I2 acquisition.

The theory of retrieval difficulty proposes that memory is not truly forgotten, but only difficult to retrieve. Gillinsky (1984) stated that "fully established associations are never completely forgotten." Anderson (1983) indicated that only young children can completely forget a language. Leyen (1984) noted that although persons who had not used the Spanish language for a number of years might have difficulty in recalling or producing a word in conversation, they experienced little or no difficulty in recognizing the word in a multiple-choice test, even when the distracting items in the test were very similar to the word being tested. Retrieval difficulty seems to be a plausible explanation for some types of memory loss.

Linguistic Evidence of Language Loss

Leyen (1984) summarized individual case studies of children who had changed language environments. A pattern of I2 development was evident among the children which included initial indifference to the new language, followed by acceptance and rapid development of the I2. In most cases, the I2 became the child's language of choice within six months. A tendency to respond in the I2 to parents who spoke in the I1 was a common feature of development. Some children became openly critical of their I1. In all cases, the children experienced impairment of their I1, primarily in the area of vocabulary.

Studies of children who returned to their I1 environment after learning a I2 have shown that children demonstrate the same behaviors in relearning their I1 as they did in learning the I2, however the time frame for all phases of development appears to be shortened considerably. These studies support the theories of extinction and retrieval difficulty. Apparently the children repress their previous language due to new social and linguistic experiences, and upon returning to their native countries are able to relearn their I1 more quickly, indicating that the I1 has been stored and then become extinct or during new experiences with their I2.

Karttunen (1977), in a study of Finnish immigrants to North America stated that morphology, phonology, and syntax remained intact among first generation speakers, but that lexical loss was substantial. In her study of ninety-eight Spanish speakers who had moved to the U.S.A. Leyen (1984) found that nearly two thirds reported recall of I1 lexicon as their major problem when speaking Spanish. She also found that those who had left their I1 setting at a younger age experienced the greatest degree of language loss, were less cognizant of their I1 errors, and less capable of correcting them. Similar observations
were noted by Anderson (1983).

**Methodology**

Eighty-one persons who had learned English as their first language, and had served eighteen to twenty-four month missions to Spanish-speaking countries for the LDS Church were selected as subjects for this study. The missionary experience of the subjects included a two month intensive Spanish course at Brigham Young University prior to their overseas experience, and all had returned to the United States during the past five years (1982-1986). The subjects were divided more-or-less evenly into five groups according to the year of return from their missions, with approximately sixteen subjects comprising each group.

The assessment instrument included a personal inventory questionnaire in which the participants answered questions about their usage patterns of Spanish since their missions and rated their ability to perform various tasks in Spanish. Two vocabulary tests, one designed to determine recognition of Spanish words (receptive lexicon), and another designed to test recall, or the ability to orally produce Spanish (productive lexicon) were also administered to each subject during January, February, or March, 1987. The purpose of the study was to determine the amount and rate of loss of second language vocabulary, the influence of English on Spanish vocabulary retention or loss, and to discover specific strategies used by the subjects to recognize or produce Spanish words.

It was hypothesized that there would be a significant loss of the ability to recall words over a five year period of time, and that the loss in ability to recognize words would be less, recognition being a simpler task than recall. It was also expected that more general terms would be used in producing vocabulary among those who had been home for a longer period of time, and that the transfer of English to Spanish in the form of direct translation or the use of "false cognates" would be more evident among this group.

**Self-Survey and Questionnaire**

Participants in the study completed a questionnaire which included demographic data, an assessment of their ability to perform certain Spanish language tasks, and an estimation of the amount of time they spent speaking, reading, or listening to Spanish on the TV or radio.

Demographic tables which included the following variables: 1) age 2) sex of the participants, 3) study of Spanish previous to the missionary experience, 4) study of Spanish after the mission, 5-7) speaking, reading, and listening patterns in Spanish, 8) whether Spanish was expected to be used in a career, 9) marriage to a Spanish-speaking spouse, and 10) whether the language was used as a child were prepared. These variables were then correlated with results of the vocabulary experiments using the Pearson Product Moment Correlation test.

**Receptive Vocabulary Experiment**

The receptive vocabulary test consisted of 149 picture plates with 4 pictures on each plate. The subject had to indicate which of the 4 pictures most correctly matched a word spoken in Spanish. Each item was spoken only one time. The vocabulary words included 17 modifiers, 107 nouns, 25 verbs, and 85 English cognates, which were grouped and scored as sub-tests. T-tests were
used to analyze total scores and sub-test scores between groups, and Pearson $R$
was used to determine correlation between test scores and the variables from
the self-survey.

**Productive Vocabulary Experiment**

The productive vocabulary test consisted of 100 written items. Each item
included a sentence written in English with one word underlined, and a
partially completed sentence in Spanish. To complete each item, the
participant had to supply the missing word, which was the Spanish equivalent of
the underlined English word, and speak it into a tape recorder.

After transcription, responses were tallied and judged by two native Spanish
speakers and one fluent Spanish speaker whose native language is English, and
were grouped according to the following criteria: 1) Words that were
acceptable and correct, both grammatically, and semantically. 2) Words that
were either grammatically or phonologically similar to the correct word. 3)Spanish words of a more general nature than the correct word. For example:
"building" instead of "skyscraper". 4) Spanish words, or words sounding like
Spanish that did not meet the above criteria; incorrect either grammatically,
phonologically, or semantically. 5) Words that appeared to be English words
translated into Spanish. 6) No response. The number of each type of response
was counted for each subject. Group totals were calculated and compared.
Because all the data had not been transcribed at the time this paper was
delivered, only data from the 1982 and 1986 groups was evaluated. The group
scores were analyzed by t-tests for independent groups.

**RESULTS**

The total group was comprised of 81 subjects. All subjects participated in the
completion of the self-survey of Spanish language usage patterns. All 81
subjects also participated in the receptive and productive vocabulary
experiments, however, at the time this paper was written, all data for the
productive vocabulary experiment was not available, therefore only data from
the 1982 group and the 1986 group was analyzed.

**Demographic Data from the Self-Survey**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>AGE</th>
<th>MALE</th>
<th>FEMALE</th>
<th>PREV.</th>
<th>POST</th>
<th>CAREER</th>
<th>SPOUSE</th>
<th>CHILD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>26</td>
<td>17</td>
<td>0</td>
<td>13</td>
<td>15</td>
<td>8</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>1983</td>
<td>25</td>
<td>12</td>
<td>3</td>
<td>9</td>
<td>13</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>1984</td>
<td>24</td>
<td>15</td>
<td>1</td>
<td>9</td>
<td>16</td>
<td>8</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>1985</td>
<td>23</td>
<td>11</td>
<td>6</td>
<td>12</td>
<td>15</td>
<td>11</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>1986</td>
<td>23</td>
<td>14</td>
<td>2</td>
<td>13</td>
<td>14</td>
<td>10</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

The average age of the participants was 24 years. Only about 15% of the
participants were female. Almost 70% had studied Spanish before their
missions. 90% had studied Spanish since their missions. 53% indicated a desire
to use Spanish in their careers. 27% were married to spouses who spoke at
least some Spanish, and 11% indicated that they had used Spanish to some extent
as children.

Participants were asked to indicate how often they had spoken, read, or listened to Spanish TV or radio since their missions. They responded on a scale from 1-7 with 1 indicating almost never, and 7 indicating constantly. Most noted that they had spoken Spanish to some extent since their missions with only 13% indicating that had almost never used Spanish. Almost 26% of the participants indicated that they had almost never read Spanish since their missions. Most of them indicated that they were accustomed to reading at least some Spanish. 49% of the participants noted that they almost never listened to Spanish radio or TV. Although there were some differences in Spanish usage patterns between the groups, the differences were not extreme. The 1982 group reported reading and listening to Spanish less than the other groups, and the 1984 group reported listening to Spanish less than the other groups.

RESULTS OF THE RECEPTIVE VOCABULARY STUDY

Scores from the receptive vocabulary test were remarkably similar. There was little variance among the groups in mean scores for the total test, or percentage scores for the sub-tests. Ranges for scores were also similar. Differences between group scores were not statistically significant. Table 2 shows the mean total score, standard deviation, and range for each group, as well as the sub-test percentage scores for modifiers, nouns, verbs, and cognates.

<table>
<thead>
<tr>
<th>GROUP</th>
<th>MEAN</th>
<th>STD.D.</th>
<th>RANGE</th>
<th>MOD.</th>
<th>NOUN</th>
<th>VERB</th>
<th>OGG</th>
</tr>
</thead>
<tbody>
<tr>
<td>82-86</td>
<td>121.11</td>
<td>8.93</td>
<td>96-138</td>
<td>64</td>
<td>85</td>
<td>78</td>
<td>84</td>
</tr>
<tr>
<td>1982</td>
<td>119.59</td>
<td>7.0</td>
<td>107-131</td>
<td>63</td>
<td>84</td>
<td>75</td>
<td>84</td>
</tr>
<tr>
<td>1983</td>
<td>120.33</td>
<td>10.74</td>
<td>103-137</td>
<td>61</td>
<td>85</td>
<td>77</td>
<td>84</td>
</tr>
<tr>
<td>1984</td>
<td>123.00</td>
<td>7.83</td>
<td>105-136</td>
<td>64</td>
<td>86</td>
<td>81</td>
<td>85</td>
</tr>
<tr>
<td>1985</td>
<td>119.82</td>
<td>8.73</td>
<td>102-138</td>
<td>64</td>
<td>84</td>
<td>78</td>
<td>83</td>
</tr>
<tr>
<td>1986</td>
<td>122.94</td>
<td>10.50</td>
<td>96-138</td>
<td>65</td>
<td>86</td>
<td>80</td>
<td>85</td>
</tr>
</tbody>
</table>

There was no difference in loss or impairment of receptive vocabulary (recognition) among the five groups.

Although vocabulary recognition scores were similar for all groups, there were some differences in errors made. Those who had been home from their missions for a longer period of time tended to leave more items untried than those who had returned more recently. 29% of those who returned in 1982 left 5 or more blank responses on the test, as compared with 13%, 12.5%, 12%, and 6% for the 1983, 84, 85, and 86 groups respectively. This indicates that those who have recently returned from their missions are more likely to attempt a response than those who have been home for longer periods of time.

Correlation of Test Scores with Self-Survey Variables

The age of all participants was nearly the same for each group, therefore correlation between age and test scores was not appropriate within each group. When age was compared with scores for the entire group (1982-86) there was no
significant correlation. Also, there was no significant correlation between the number of years since the missionary experience and test scores, although those who were younger, or who had been home for a shorter period of time did slightly better on the verb sub-test.

Although 55 of the subjects had studied Spanish before their missions, this did not have a highly significant bearing on test scores. There was a significant correlation between previous Spanish study and scores on the modifier sub-test for the 1982 group, and a high correlation for the verb sub-test for the entire group. The number of years spent in pre-mission study was not a significant predictor of test scores.

Post-mission Spanish study was the most reliable predictor of scores on the total test and the sub-tests. There was significant correlation within the 1982 and 1983 groups, and for the total group (1982-86). The number of semesters of post-mission Spanish study correlated moderately with test scores.

One of the self-survey variables, "amount of Spanish spoken" was shown to correlate significantly with test scores for the 1983 and 1986 groups. A possible explanation is that the 1983 group was involved in Spanish classes to a high degree, and the 1986 group had just returned from their missions and may have been using Spanish more than those who had been home longer.

Reading was significant with the noun sub-test for the 1983 group, and for the total test, the noun, and cognate sub-tests for the total group (1982-86).

Listening to Spanish TV and radio had no apparent correlation with test scores, nor did intention of using Spanish in a future career. Having a Spanish-speaking spouse was not highly correlated with the test scores. The use of Spanish as a child did not predict high scores on the test.

Males performed better on the tests than did females. The top ten scores were by males, while the bottom 10 scores were evenly distributed among males and females. There are two possible explanations for this; first, the number of females in the study was very small, and second, females serve 18 month missions while males serve 24 month missions. In his thesis on attrition patterns of Chinese tones among returned missionaries, Zhang Jie (1987) noted a significant difference between male missionaries who had served 18 and 24 month missions when LDS church policy allowed 18 month mission for males. Table 3 shows the correlation of variables with the total scores for the receptive vocabulary test.
TABLE 3
CORRELATION OF VARIABLES WITH RECEPTIVE VOCABULARY SCORES

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>SEX</td>
<td>1</td>
<td>HC</td>
<td>X</td>
<td>X</td>
<td>.01</td>
<td>.05</td>
</tr>
<tr>
<td>PREVIOUS SPAN. STUDY</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>YEARS STUDIED</td>
<td>X</td>
<td>X</td>
<td>.1</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>POST-MISSION SPAN.</td>
<td>.05</td>
<td>.1</td>
<td>HC</td>
<td>HC</td>
<td>X</td>
<td>.01</td>
</tr>
<tr>
<td>SEMESTERS STUDIED</td>
<td>X</td>
<td>.1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>AMOUNT SPOKEN</td>
<td>X</td>
<td>.05</td>
<td>X</td>
<td>X</td>
<td>.05</td>
<td>X</td>
</tr>
<tr>
<td>AMOUNT READ</td>
<td>X</td>
<td>HC</td>
<td>X</td>
<td>X</td>
<td>.1</td>
<td></td>
</tr>
<tr>
<td>TV AND RADIO</td>
<td>.1</td>
<td>HC</td>
<td>-.05</td>
<td>X</td>
<td>-.1</td>
<td>X</td>
</tr>
<tr>
<td>USE IN CAREER</td>
<td>X</td>
<td>X</td>
<td>1</td>
<td>.01</td>
<td>-.1</td>
<td>X</td>
</tr>
<tr>
<td>SPAN. SPOUSE</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>SPAN. USE AS CHILD</td>
<td>X</td>
<td>X</td>
<td>-1</td>
<td>X</td>
<td>-1</td>
<td>X</td>
</tr>
</tbody>
</table>

X = not significant
HC = high correlation, but not statistically significant
- before an entry indicates negative correlation.

Summary of Receptive Vocabulary Study

In general, post-mission Spanish study was the strongest predictor of success on the tests. The number of semesters taken also demonstrated a positive correlation. Reading in Spanish and speaking Spanish also correlated highly with test scores. Males tended to perform better than females on the tests although this may be explained by the very small number of female participants, and by the fact that females serve missions that are 6 months shorter than males. Correlations of sub-test scores with variables did not differ appreciably from those of the total score. There was no significant difference in performance on the total test or any of the sub-tests among the five groups of subjects.

RESULTS OF THE VOCABULARY PRODUCTION EXPERIMENT

The vocabulary production test was designed to determine recall of Spanish words. Because all data was not available at the time this paper was presented, only data from the 1982 and the 1986 groups was analyzed.

Responses of participants were judged according to the following categories: 1) correct, 2) nearly correct (either phonologically or grammatically), 3) a more general term, 4) an incorrect Spanish or Spanish-sounding word, 5) a word sounding like an English word translated into Spanish, and 6) no response.

There were significant differences in the recall of vocabulary between the two groups. Of 100 possible responses, the 1982 group average for correct scores (category 1) was 61.8, while the average for the 1986 score was 76.2. This difference is significant at the .01 level of confidence. There was no significance in the difference in scores for categories 2, 3, 4, or 5, but there was a high, nearly significant correlation for category 3 (more general term). The 1982 group tended to use more general terms than the 1986 group.
The 1982 group also left more than 3 times as many responses blank as the 1986 group. The difference in scores for category 6 (no response) is significant at the .01 level of confidence. Table 4 displays the data for the production test scores. The average number of responses for each category is indicated.

**Table 4**

**Production Test Average Scores**

<table>
<thead>
<tr>
<th>Category of Response</th>
<th>1982</th>
<th>1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Correct Word</td>
<td>61.8*</td>
<td>76.2*</td>
</tr>
<tr>
<td>2. Nearly correct Word</td>
<td>5.5</td>
<td>4.4</td>
</tr>
<tr>
<td>3. More General Term</td>
<td>5.9 HC</td>
<td>3.0 HC</td>
</tr>
<tr>
<td>4. Incorrect Word</td>
<td>3.9</td>
<td>4.5</td>
</tr>
<tr>
<td>5. Sounds Like English Translation</td>
<td>4.1</td>
<td>4.0</td>
</tr>
<tr>
<td>6. No Response</td>
<td>18.8*</td>
<td>5.8*</td>
</tr>
</tbody>
</table>

* = significant at .01 level
HC = high correlation but not significant

**Correlation of Production Test Scores with Self-Study Variables**

The production test scores were correlated with the variables from the self-study and tested for significance. Speaking, reading, and listening to Spanish showed high correlation with correct responses on the test for the 1982 group, while for the 1986 group the number of years of pre-mission Spanish study was the most important factor.

The next four categories of responses (nearly correct words, more general terms, incorrect words, and words that sound like English translations) account for only a small portion of the total responses. In no case did the average number of responses for any of these categories exceed 6 for either the 1982 or 1986 group. As a result, any correlations are based upon data that is nearly homogenous, and statistical judgments may be questionable.

Post-mission study correlated highly with nearly correct responses for the 1982 group, while intended use of Spanish in a career, and the use of Spanish as a child correlated negatively. Previous study of Spanish was an accurate predictor of this response for the 1986 group. The career variable correlated negatively for the 1986 group.

In the 1982 group, those who read more used less general terms on the production test, indicating that reading may be helpful in recalling correct words. For the 1986 group, the females tended to use more general terms than the males.

There was no significant correlation between the use of incorrect words and any of the variables for either group. Those who had studied Spanish after their mission used more incorrect words, but they also left fewer blank responses.

Pre-mission Spanish study correlated highly with responses that were judged to be translations of English words for both groups. For the 1982 group, reading showed a high positive correlation, while the intention to use Spanish in a career showed a high negative correlation.
Reading correlated negatively with category 6 (no response) for the 1982 group, indicating that those who read were more apt to make a response than to leave an item blank. Pre-mission study showed a high negative correlation for the 1986 group, indicating that study of the language may encourage attempted responses. Although speaking correlated highly with this category, nearly everyone in the 1986 group indicated a high level of Spanish speech, and there were very few blanks left on the test, with the average being just over 5.

**Summary of Production Test Results**

There were significant differences between the 1982 and 1986 groups. The 1986 group answered almost 25% more correct responses than the 1982 group, while the 1982 group left more than three times as many items blank as the 1986 group. The 1982 group tended to use more general terms, however this was not statistically significant. No clear pattern emerged from the correlation tests, however pre or post-mission study, increased speech, reading, and listening to Spanish did appear to enhance recall.

**Conclusions and Recommendations**

The purpose of this study was to determine the loss of lexicon among Spanish speaking missionaries who had returned from their missions during the past five years. Previous studies had indicated that lexical loss is often more pronounced than syntactic, morphological, or phonological loss, and that recall of vocabulary words, especially in a conversational setting, is a more difficult task than recognition of words. Retrieval failure, interference, and extinction have been shown to explain memory impairment or difficulty, with recent neurobiological research indicating that long-term memory may be permanently stored in the brain.

Results of the receptive vocabulary test demonstrated very little difference in the recognition of Spanish words among subjects who had been home for five years and those who had just returned. This finding correlates with Leyen's study (1984), and supports neuropsychological theories of the permanence of long-term memory, and retrieval failure as a basis for memory loss. The fact that recently returned missionaries tended to make more attempts at items than those who had been home for a longer period of time indicates different communicative strategies used. It appears that those with recent, extensive experience in a language are more willing to attempt to communicate, while those who have not used the language for a period of time are more likely to avoid making errors. This finding was also born out by the results of the vocabulary production test. The similarity of responses in regard to English-Spanish cognates across all groups indicates that there was little, if any transfer or borrowing from the LI as a communicative strategy. The results of the receptive vocabulary test indicate that in relation to grammatical categories the subjects performed best on the noun sub-test, then on the verb sub-test, and worst on the modifier sub-test. This seems to follow the LI vocabulary acquisition theory of Clark (1974), and Barrett (1986), and also supports Anderson (1983) who indicated that those things learned last may be forgotten first.

Results of the vocabulary production test indicated a significant difference
between those who had recently returned and those who had been home five years. Those who had been home longer tended to use more general terms, and left more items unanswered, indicating a strategy of error avoidance. These results support Leyen's 1984 study demonstrating the difficulty of recalling lexicon as compared to recognizing words.

Study of Spanish after the missionary experience was the single most important variable in predicting success on the tests. Pre-mission Spanish study, and increased speech, reading, and listening to Spanish also correlated highly with success on the tests. Other variables did not seem to be accurate predictors of success.

The results indicate that a strong foundation in a language forms the basis for long-term retention of vocabulary. Continued study, as well as use of the language for communication benefit the recall of vocabulary words.
REFERENCES


