The Effects of Word Affectivity and Mode of Presentation on Retention

Lawrence W. Lezotte

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THE EFFECTS OF WORD AFFECTIVITY AND
MODE OF PRESENTATION ON RETENTION

by

Lawrence W. Lezotte

A thesis presented to the
Faculty of the School of Graduate
Studies in partial fulfillment
of the
Degree of Master of Arts

Western Michigan University
Kalamazoo, Michigan
January, 1965
ACKNOWLEDGEMENTS

The experimenter wishes to express his gratitude to Dr. E. J. Asher for advice and guidance throughout this study.
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>METHOD</td>
<td>8</td>
</tr>
<tr>
<td>Table 1</td>
<td>11</td>
</tr>
<tr>
<td>RESULTS</td>
<td>15</td>
</tr>
<tr>
<td>Table 2</td>
<td>17</td>
</tr>
<tr>
<td>Table 3</td>
<td>18</td>
</tr>
<tr>
<td>Table 4</td>
<td>19</td>
</tr>
<tr>
<td>DISCUSSION</td>
<td>20</td>
</tr>
<tr>
<td>SUMMARY</td>
<td>26</td>
</tr>
<tr>
<td>APPENDIX 1</td>
<td>28</td>
</tr>
<tr>
<td>APPENDIX 2</td>
<td>31</td>
</tr>
<tr>
<td>APPENDIX 3</td>
<td>33</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>35</td>
</tr>
</tbody>
</table>
Elementary school teachers have often been perplexed over the fact that some students consistently falter over reading and spelling certain words. The teachers have assumed responsibility for the student's problem. They have felt that the method of presenting the material to the student was not adequate or the material was too difficult. Recently investigators have studied these classroom problems and found other possible reasons for the student's reading and spelling problems.

One investigator has concluded that some words are "emotionally traumatic" to the student and his "defenses" will not allow him to correctly perceive the word when it is presented to him. (Bettelheim 1961).

This concept is not new to the research psychologist. Many experimenters have attributed their findings to the "emotional tone" or "affectivity" of the words.

These experimenters have often used word association latency or reaction time to words as one quantifiable measure of "word affectivity". Using word association latency or reaction time for measuring "affectivity" has not been its only experimental use.
Usually word association latency has been used as a measure of perceptual recognition time or verbal associative response time for different kinds of words. Daston (1957) used recognition time as a dependent variable and familiar and unfamiliar words as the stimuli. McGinnies (1949) found that a longer time was required for "taboo" words to be correctly recognized. Hall and Ugelow (1957) correlated latency of response with frequency of usage of words. These are but a few of the studies which have used association latency or reaction time as a dependent variable.

Few studies have been completed which use word associative latency as an independent variable. Recently, however, a study was completed which measured the effects of differing word association latencies on learning and retention. Linsley (1961) studied the effects of varying word associative latency as a stimulus attribute in an auditory serial learning and retention experiment. Linsley's hypotheses were: 1) no difference exists in the rate and difficulty of learning for words of significantly differing mean latency of response time; 2) no difference exists in the amount of retention for words lists of significantly differing mean latency of response time. The words were selected from a list of 300 consonant-vowel-
consonant words taken from the Lorge-Thorndike word count (Lorge and Thorndike 1944) and ranked from low to high according to their association latency of response time.

Linsley (1961) found a significant difference in trials to criterion between the long and short latency word lists. The results of the measures of retention, using recall and savings, showed no significant difference in the amount of retention for the two word lists. Linsley concluded that, "when word associative latency is manipulated as an independent variable in an auditory serial learning experiment, significant differences in the rate and difficulty of learning results".

Linsley (1961) offers the following as possible reasons why differences in retention for the word lists was not significant: 1) the criteria for learning was too severe; 2) the rest period between learning and retention was too short; 3) the measures of retention (recall and savings) were too insensitive. Linsley suggests that the differences in learning could have been the result of the frequency of usage and/or affectivity of the words used.

One of the purposes of this study was to repeat Linsley's (1961) experiment implementing several of the changes
he offered. This study used words from the same list as was used by Linsley. Also, this study used a less rigorous measure of retention and a less severe learning criteria than that used by Linsley.

The second part of this experiment, other than duplicating Linsley's (1961) auditory mode of presentation, was to expand the stimulus presentation modalities to include a visual and simultaneous auditory and visual mode of presentation.

The amount of research comparing the efficiency of the differing modes of presentation of stimulus material is overwhelming. The findings, however, are far from conclusive. The early research in this area reports that memorizing is more rapid using the visual mode of presentation but that the amount of material retained is greater using aural presentation (Whitehead 1896). Henmon (1912) notes that with younger children auditory presentation gives better results; however, in older children and adults visual presentation is better. Further, Henmon states that the combined method of visual and auditory is significantly superior to the separate modes of presentation. Worcester (1925) concluded that neither auditory nor visual
presents any marked degree of superiority in the rate of learning of meaningful material; auditory retention, however, appears to be better than visual. Koch (1930) found that the simultaneous combination of the visual and auditory presentation was rather uniformly superior but he also adds that auditory presentation alone is uniformly inferior. Compton and Young (1933), using a reproduction task as a measure of the efficiency of the different stimulus modalities, concluded that visual, auditory, and combined visual-auditory gave nearly equal reproduction scores. Stanton (1934) concluded that the memory for advertising was recalled and recognized better if the auditory mode of presentation was used. Dewick (1934), also dealing with advertising research, supports Stanton's (1934) findings. Dewick concludes that "when the problem is recall of ideas expressed in the copy of the advertisement, auditory presentation is distinctly superior". In a study of the effectiveness of learning and retention using materials presented by lecture and silent film, the film alone was less effective than the lecture (Jayne 1944). Drawiec (1946) used both nonsense syllables and meaningful words and found that retention
by recall slightly favored the auditory mode of presentation; however, as for learning, results favored visual presentation. Hall and Cushing (1947) using three matched groups and the methods of presentation: lecture, reading, and film, found no differences in the learning of the material as measured by objective tests.

This chronological sampling of studies points up the fact that there is no consensus among researchers as to which modality seems to be most conducive to learning.

The third phase of this experiment was to study the effects of changing the test modality from that of the modality by which the stimulus material is presented. In reviewing the literature in this area few studies are available which concern themselves specifically with the effect of changing the modality of the retention test from that of the learning situation. Reed (1931), in studying the effects of crossing modalities, concluded that changes in the method of presenting of test material from that of the learning material was detrimental to the recall of the learned material. More recently, Rosenzweig and Postman (1956) found results which substantiates the Reed study. The most recent study (Franklin and Weisiger 1961) supports
the hypothesis that a change in sensory mode of presentation would reduce relearning efficiency. These studies have found that changes in the learning modality results in impaired learning.

In summary, the purposes of this experiment were to study the effects of two lists of words on retention as measured by recognition. The two lists of words were similar to those used by Linsley (1961); that is, one list was made-up of words which have been found to have a long word association latency and the other list was made-up of words with a short association latency.

The study used three modes of presentation for the two lists of words. The modalities included a visual, auditory, and a simultaneous visual and auditory.

The effects on retention for the two different learning lists and three stimulus modalities were measured using two recognition tests, visual and auditory.

The hypotheses for the experiment were:

1) the retention as measured by recognition for the list of words having short word association latency will not differ significantly from the word list which has the long word association latency.
2) the amount of retention will not differ significantly for either the visual, auditory, or simultaneous visual-auditory modes of presentation.

3) the amount of retention will be significantly greater when the recognition test and presentation modality are the same.
METHOD

Subjects Thirty-nine males and twenty-one females from a general Psychology course at Western Michigan University were used as subjects.

Apparatus The apparatus used in this experiment consisted of a Wollensak tape recorder, Model T-1500, and a memory drum, Model 303A; manufactured by the Lafayette Instrument Company.

Materials included one reel of magnetic tape, test sheets, a sheet of multiplication problems, a stopwatch, and a sheet of instructions to be read to each subject.

The experiment was conducted in a small, quiet, well lighted experimental room.

Procedure Two lists of seventeen words were used. All words were three-letter consonant-vowel-consonant (CVC) English words. There were no proper names, abbreviations, homonyms or foreign words included in these lists. The words were selected from the 300-word list used by Linsley (1961). The 300 words were ranked in terms of their latency of response time.

One list of seventeen words was selected from those
words which were found to have a short latency of response
time (Linsley 1961); henceforth this list will be referred
to as list A. The second list of seventeen words was also
selected from this list of 300 words. This list was found
to have a long latency of response time (Linsley 1961);
henceforth this list will be referred to as list B.

Both lists A and B were equated for frequency of
usage according to the Lorge-Thorndike word count (Lorge
and Thorndike 1944). The mean association latency and
frequency of usage for lists A and B are listed in Table 1.

The complete lists, their latency of response time
and frequency of usage are presented in Appendix I.

This experiment used three stimulus modalities.
The first modality was a visual serial presentation of the
words using a standard memory drum. The second modality
was an aural serial presentation of the words using a
standard tape recorder. The third modality was simultaneous
aural and visual presentation of the words utilizing both
the memory drum and tape recorder. Under all three
modalities the words were presented at the rate of one
word per second. Each subject was given three presenta-
tions of the list of words. There was a seventeen second
rest period between list presentations. The words were recorded using the experimenter's voice. Care was taken to be sure the taped words were clearly recognizable. This was determined by asking independent observers to listen to the words and judge whether or not they clearly recognized all the words.

Each subject was randomly assigned to learn one of the two lists of words using one of the three presentation modes.

The subject was instructed to study each word as it was presented. He was told not to say the word out loud. He was also told that the list of words would be presented three times. The exact instructions for each learning condition are presented in Appendix 2. After each subject was presented with the list of words he was then given a sheet of simple multiplication problems to solve. The subject was instructed to do as many problems as possible in the six-minute work period given.

Recognition was used as the measure of retention. The recognition test consisted of a sheet of fifth three-letter (CVC) words. Seventeen of the fifty words represented either list A or B. The other thirty-three words
Table 1
Mean association latency and frequency of usage for lists A and B.

<table>
<thead>
<tr>
<th>List</th>
<th>Mean association latency (seconds)</th>
<th>Mean frequency of usage number/million</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (short)</td>
<td>1.59</td>
<td>7.88</td>
</tr>
<tr>
<td>B (long)</td>
<td>2.85</td>
<td>8.05</td>
</tr>
</tbody>
</table>
served as distractors. The distractors were randomly drawn from Linsley's (1961) original list of 300 words. The words from the learning list were randomly distributed through-out the distractors by using a table of random numbers. The same distractors were used for both list A and list B. the position of the stimulus words was the same for both test sheets.

A test sheet for both list A and B is presented in Appendix 3.

Each subject was tested for retention both aurally and visually. In the visual test the subject was given the sheet with the fifty words and instructed to study each word and decide if the word appeared on the original learning list. If the word was recognized as being from the original list the subject was to circle the word.

The subject was also told that he could only proceed through the list once. He had to make his decision on each word as it appeared on the sheet. No time limit was given. The only requirement was that the subject respond to each word before he moved to the next word on the test sheet.

In the aural test the subject was told that the
The experimenter would read a list of words and that the original list of seventeen words was included in this list he would hear. The subject was instructed to study each word as it was presented and decide whether he recognized the word as being from the original list. If the word was from the original the subject was to respond by saying "yes" if it was not from the original list the subject was to say "no". The experimenter would not proceed until either a "yes" or "no" response was given by the subject.

The experimenter recorded the "yes" responses given by the subject by circling that word.

Every second subject was tested first visually and then aurally. The remaining subjects were tested first aurally, then visually.

The total correct responses for a subject on a single test was the number of words he correctly recognized from the original learning list. To avoid indiscriminate responding only the first seventeen words circled were scored.

The experiment was designed using a 2 x 3 factorial design (list A and B, x the three sensory modes of presentation). A single F. test will be used to compare
the effects of crossing test modality from that of the original stimulus presentation.
RESULTS

The analysis of varience computed on the number of words correctly recognized is summarized in Table 2. No significant interaction between words of differing word association latency and the three modes of presentation of stimulus material was found. The analysis yielded an "F" ratio of 1.47, which is not significant at the .05 level.

An "F" ratio of 1.28, which is not significant at the .05 level, was found for comparisons of the long and short word association latency lists (Table 2).

The amount of retention for the three modes of presentation did not differ significantly. An "F" ratio of 2.88, which is not significant at the .05 level, was found.

Table 3 summarizes the means for visual and auditory recognition tests when both the visual and auditory presentation of stimulus material were used. The difference between mean amount of retention when the recognition test modality was different than the presentation modality and mean amount retained when both modalities remained the
same was analyzed. The summary of the test of significance (Table 4) yeilded a "t" ratio of .007, which is not significant at the .05 level. No significant differences in amount of recognition was found when the recognition test modality was different than the stimulus presentation modality as compared to amount of recognition when the recognition test was the same as the stimulus presentation modality.
Table 2

Analysis of variance of retention for words of differing latency of response time using three modes of presentation.

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>ms</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>List latency</td>
<td>1</td>
<td>7.01</td>
<td>1.28</td>
</tr>
<tr>
<td>Mode of presentation</td>
<td>2</td>
<td>15.92</td>
<td>2.88</td>
</tr>
<tr>
<td>Latency/mode interaction</td>
<td>2</td>
<td>8.00</td>
<td>1.47</td>
</tr>
<tr>
<td>Experimental error</td>
<td>114</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>119</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ F = 3.07 \, 1/114 \, \text{df} \, \text{at} \, .05 \, \text{level} \]
<table>
<thead>
<tr>
<th>Presentation Modality</th>
<th>Mean auditory Recognition</th>
<th>Mean visual Recognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auditory</td>
<td>11.6</td>
<td>10.7</td>
</tr>
<tr>
<td>Visual</td>
<td>12.4</td>
<td>12.3</td>
</tr>
</tbody>
</table>
Table 4

Significance of the difference between means for retention when modality for the list presentation is the same as or opposite of the retention test modality.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>S_D</th>
<th>&quot;t&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same modality</td>
<td>11.9</td>
<td>2.24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Different modality</td>
<td>11.5</td>
<td>2.62</td>
<td>.54</td>
<td>.7</td>
</tr>
</tbody>
</table>

"t" = 2.02 38 df at .05 level
DISCUSSION

The preceding analysis of retention data may be interpreted as indicating that when word association latency is manipulated as an independent variable no significant differences in retention results. These results support the hypothesis that words of differing association latency will not produce significantly different amounts of retention as measured by recognition. This finding supports the previous research by Linsley (1961) which indicated that retention is not significantly affected when word association latency is varied. Although Linsley's suggestions were implemented no difference in results were obtained.

Two possible explanations may account for these findings. First, the six minute retention period was too short for a significant amount of material to be forgotten. Second, the matching technique used to insure comparable frequency of usage for both lists may not have been adequate. The Lorge-Thorndike word count was used as the source for word frequency. This word count published in 1944 may not reflect shifts in word usage which
evolve as the culture changes, particularly over a 20-year period. Other methods might be attempted in an effort to equate words for frequency of usage.

Two possible conclusions may be drawn from these findings; 1) word association latency is not a good measure of word affectivity, or 2) words of differing affectivity, as reflected by differing word association latency, have no significant effect on retention.

In the final analysis, frequency of usage of words of the type used in this study may have more influence on recognition than any emotional factors which may be reflected in differing word association latency. Soloman and Postman (1952) concluded that recognition thresholds vary inversely with frequency of prior usage. They state that frequency of past usage is a determiner of response strength in both recognition situations and responses measured in experiments in verbal learning (Solomon and Postman 1952).

In future studies which attempt to manipulate word association latency as an independent variable the following might be considered worthwhile: 1) longer retention periods should be used to allow a significant
amount of material to be forgotten; 2) all lists of words should be matched for frequency of usage but something other than the Lorge-Thorndike (1944) word count would seem desirable; 3) different measures of retention should be used for different groups to compare the results. These results may be a function of the method of measuring retention as well as a result of the variables being manipulated.

The data also leads to the conclusion that there is no significant difference in retention when various stimulus presentation modalities are used. Neither visual, auditory, nor the simultaneous combination of vision and audition significantly affected retention.

The data support the hypothesis that there is no significant difference in the amount of retention for visual, auditory, or simultaneous visual-auditory modes of presentation. These findings agree with the previous research (Whitehead 1896, Worcester 1925, Stanton 1934, Dewick 1935, Jayne 1944, Krawic 1946) but the data are contradictory to other findings (Hall and Cusing 1947, Compton 1933, Koch 1930a).

The apparent inconsistencies in this area of
retention and mode of presentation may be the result of an interaction effect between the modalities and the particular retention measure used. A second factor may also be an interacting effect of the modality used and the learning criteria required. A second study should be designed to examine these possible relationships which may exist between the modality and the methodologies.

A more careful examination should be made as to the extent of the existence within a given individual of one preferred modality. This "preferred" modality, if it does exist, could have potential ramifications for educational programs. When the subjects in this experiment were presented visual and auditory material simultaneously they invariably reported to the experimenter that they attended to one of the two stimulus modalities. In using simultaneous presentation of material the subjects should be given pre-tests to determine if a given subject will make use of both modes of stimulus presentation.

The data of this experiment do not support the hypothesis that a change in modality from the learning situation to the test situation results in a significant difference in retention. The data, when analyzed, yeilded
a "t" = .7 which was not significant.

These findings do not support the previous research (Reed 1931 and Franklin and Weisiger 1961). In the two previous studies the experimenters found that crossing sense modalities from the learning situation to the learning test resulted in a significant difference in measured retention.

The conflicting results of these studies may be explained by the fact that the learning criteria was less severe. Another explanation may be that recognition as a measure of retention requires the subject to perform a completely different task than relearning. Recognition has been found to require only a minimal amount of association strength for successful recognition (Postman and Jenkins 1948). Probably the most significant fact is that two recognition tests were given to each subject so that each subject served as his own control. This may have certain advantages but by using a measure of retention with a low threshold of recognition the counterbalance effect may not have been as significant as the fact that both the visual and auditory recognition tests, regardless of which test was administered first, tended to
set the subject. The subject would generally make the same responses on the second test as on the first, right or wrong. A second group may be more desirable for this type of test situation.

These results may again hint at a modality-retention measure interaction since mean differences were found when using a visual/aural and aural/visual test sequence (Franklin and Weisiger 1961).
SUMMARY

Each of sixty subjects were randomly assigned to learn one of two lists of seventeen words. The two lists of words were equated for frequency of usage but had significantly differing word association latencies.

The lists were presented to the subject using either a visual, aural or simultaneous visual and aural mode of presentation.

The subject was given three presentations of the list of words after which he was given a six-minute period to solve problems. At the end of the six minutes the subject was given a visual and auditory recognition test.

No significant differences in the amount of retention were found for the two lists of words or the three modes of presentation. No significant difference was found in retention when the recognition test was of a different mode of presentation than the original learning situation.

These findings support the hypothesis that there will be no difference in retention of words having long or short word association. The hypothesis that no significant difference in retention will be found for the three modes of presentation is also supported.

The hypothesis that the amount of retention will differ
significantly when the recognition test is presented using the same modality as was used to present the original stimulus material was not supported by the data.

Possible explanations for not supporting this hypothesis are: 1) the time between word presentation and retention test was not long enough to allow a significant amount of forgetting to take place; 2) the learning criteria was less severe than in previous research (Reed 1931, Franklin and Weisiger 1961); 3) both the visual and aural recognition tests were given to each subject; the first recognition test, be it aural or visual, tended to set the subject for the second test.
APPENDIX 1
Instructions to subject for the visual condition

In this experiment I am attempting to see if various conditions affect learning and problem solving. As a subject you will serve under one of these conditions. Other students, like yourself, will be assigned to other conditions.

You have been randomly assigned to learn a list of words using the visual condition. The visual condition is set-up like this: In a moment you will be shown a list of seventeen three-letter words. These words will appear, one at a time, in this window on the memory drum. Each word will be shown three times so if you do not learn the word the first time you will have two other opportunities. Do not say the words out loud, just study them.

You will be tested on these words, so please do the best you can.

Do you have any questions?
Instructions to subjects for the auditory condition.

In this experiment I am attempting to see if various conditions affect learning and problem solving. As a subject you will serve under one of these conditions. Other students, like yourself, will be assigned to other conditions.

You have been randomly assigned to learn a list of words using the auditory condition. The auditory condition is set-up like this: In a moment you will hear a list of seventeen three-letter words. These words will be played on this tape recorder. Each word will be heard three times so if you do not learn the word the first time you will have two other opportunities. Do not say the words out loud, just study them.

You will be tested on these words, so please do the best you can.

Do you have any questions?
Instructions to subjects for the simultaneous visual and auditory condition.

In this experiment I am attempting to see if various conditions affect learning and problem solving. As a subject you will serve under one of these conditions. Other students, like yourself, will be assigned to other conditions.

You have been randomly assigned to learn a list of words using the simultaneous visual and auditory condition. The simultaneous visual and auditory condition is set-up like this: In a moment you will be shown a list of seventeen three-letter words. These words will appear, one at a time, in this window on the memory drum. At the same time you see these words you will hear them as they are being played on this tape recorder. Each word will be seen and heard three times so if you do not learn the word the first time you will have two other opportunities. Do not say the words out loud, just study them.

You will be tested on these words so please do the best you can.

Do you have any questions?
APPENDIX 2
<table>
<thead>
<tr>
<th>WORDS</th>
<th>LATENCY OF RESPONSE TIME (SECONDS)</th>
<th>FREQUENCY OF USAGE NUMBER/MILLION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PAR</td>
<td>1.75</td>
<td>5</td>
</tr>
<tr>
<td>2. GIN</td>
<td>1.74</td>
<td>9</td>
</tr>
<tr>
<td>3. PEW</td>
<td>1.74</td>
<td>5</td>
</tr>
<tr>
<td>4. FIB</td>
<td>1.35</td>
<td>2</td>
</tr>
<tr>
<td>5. HOG</td>
<td>1.59</td>
<td>14</td>
</tr>
<tr>
<td>6. TAN</td>
<td>1.59</td>
<td>14</td>
</tr>
<tr>
<td>7. SIP</td>
<td>1.57</td>
<td>8</td>
</tr>
<tr>
<td>8. SET</td>
<td>1.53</td>
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</tr>
<tr>
<td>9. GUM</td>
<td>1.40</td>
<td>11</td>
</tr>
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<td>10. PUP</td>
<td>1.39</td>
<td>6</td>
</tr>
<tr>
<td>11. HEM</td>
<td>1.54</td>
<td>14</td>
</tr>
<tr>
<td>12. JOT</td>
<td>1.63</td>
<td>3</td>
</tr>
<tr>
<td>13. COG</td>
<td>1.64</td>
<td>1</td>
</tr>
<tr>
<td>14. MOP</td>
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<td>15. PEP</td>
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<td>16. HUG</td>
<td>1.61</td>
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<td>17. WIG</td>
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<td>LATENCY OF RESPONSE TIME (SECONDS)</td>
<td>FREQUENCY OF USAGE NUMBER/MILLION</td>
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<td>7. BOG</td>
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<td>8. SAG</td>
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Group A Test Sheet

Short latency of response word list

HOG

GUM

HEN

HOB

WIG

SIP

YON

HIS

PEP

FEW

FIB

JET

TEN

NIX

HUM

PEN

TUB

COG

SUB

PAR

PIN

SOP

SIX

TAX

DAW

HEM

FIG

PEW

GUM

MOP

TIN

MAT

RIB

CUD

DUB

NAP

PUP

RUG

HAG

NIL

GIN

GAS

HOP

TAN

WOW

YAM

BET

BAN

JOT

HUG
Group B Test Sheet

Long latency of response word list

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REFERENCES


2. Compton, R., Young, P. A study of organic set immediate reproduction of spatial patterns presented by successive points to different senses. J. exp. Psychol., 1933, 16, 775-797.


11. Drawiec, T. A comparison of learning and retention


17. Reed, H. The influence of a change of conditions upon the amount recalled. J. exp. Psychol., 1931, 14, 632-649.


