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Effect of Induced Muscular Tension on Anxious and Nonanxious Subjects in Simple and Complex Situations

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EFFECT OF INDUCED MUSCULAR TENSION ON ANXIOUS AND NONANXIOUS
SUBJECTS IN SIMPLE AND COMPLEX LEARNING SITUATIONS

A Thesis
Presented to the Graduate Faculty of
Fort Hays Kansas State College in Partial Fulfillment
of the Requirements for the Degree Master of Science

by
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Date May 28, 1959

Approved
Major Professor

Approved
Chairman, Graduate Council
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CHAPTER I

Introduction

Studies of induced muscular tension

In the past many studies (e.g., 1, 3, 14) have been conducted to determine the effect of induced muscular tension on performance. The results of these investigations have been equivocal, some reporting facilitation, some inhibition and some no appreciable effect. The results of these findings have brought about the problem of defining conditions which modify the influence of tension.

In trying to define the conditions which modify the influence of tension, Adams (1), Bills and Stauffacher (3), and Shaw (14), conducted experiments on the possible interaction between muscular tension and the difficulty of the task.

In one of the earliest such studies, Bills and Stauffacher (3) required Ss to analyze "detective stories". The interaction reported was that induced muscular tension was beneficial to the analysis of simple stories, but the same tension was detrimental to the solution of more difficult stories.

An opposite interaction was found by Shaw (14), although his study involved a different psychological task. Using digit span tests of three different degrees of difficulty, Shaw found that induced muscular tension "...inhibits performance on the easier tasks but still facilitates performance on the more difficult tasks."

There is no interaction between muscular tension and difficulty of the task (as indicated by the different ability levels of the Ss) ac-
According to the results of a psychomotor performance experiment by Adams (1). In this study 160 Ss were selected from a group of basic airmen trainees. The Ss were then divided into four groups. On a "two hand matching test" one group practiced with no tension, while three groups practiced with tension. According to the Ss' performance on the first trial, they were divided into upper and lower quartiles for each group. The performances of these groups were compared and no significant difference was found. The present writer assumes that the same task would be difficult for a low-ability S and easy for a high-ability S and the Adams' study may be analyzed as a tension-difficult experiment. Superficially therefore, Adams' results seem to contradict those of the two experiments by Bills and Stauffacher (3), and Shaw (14). Further research, which will be described in a later section of this thesis, therefore seems advisable.

Meyer (11) hypothesized that induced muscular tension facilitates responding "by making the motor system available to an input". According to this theory, the tension does not affect the individual's ability to learn, but rather his ability to respond. This theory can account for changes in magnitude and latency of a response but not for changes in rate of acquisition, since rate of learning is not affected.

Results of a study by Bills (2) do not support Meyer's hypothesis. Bills found paired associate learning to be improved if Ss squeezed a dynamometer. In this experiment, lists of paired associates were presented for a single trial under induced tension and under no tension. Results of the experiment indicated that the tension group recalled the
words significantly better than the no-tension group. The recall followed almost immediately after the learning trial. Bills' conclusion was that induced muscular tension can directly affect the formation of habits. However, Meyer (11) doubts that induced tension was completely dissipated at the time of recall, and therefore, that performance rather than learning was being affected.

Bourne (4) tested Bills' hypothesis and the doubt expressed by Meyer. In Bourne's experiment, time intervals of varied length between learning and recalls were introduced. Four groups were used in the experiment; group T-T learned and recalled under tension, group T-N learned under tension and recalled under no tension, group N-T learned under no tension and recalled under tension, group N-N learned under no tension and recalled under no tension. The task in this experiment was to learn a list of ten paired adjectives. After a specified time interval, the list was presented a second time and the Ss would try to recall as many as possible. Five time intervals between the two presentations of the lists were used, 0, 30, 60, 120 and 240 seconds. If Bills' hypothesis is correct, regardless of the interval between learning and recall, Ss who learn under tension should recall better than those who learn under no tension. On the other hand, if tension facilitates only responding as proposed by Meyer, learning under tension should result in no better performance, providing enough time is allowed for induced tension to dissipate.

Results of Bourne's study (4) substantiated Meyer's prediction. The data show that as more time is allowed for tension dissipation, Ss' per-
performance is hindered, until, after a four minute interval, his recall score is no better than the score of a subject who learned under no tension. However, recall under tension was consistently better than recall under no tension. Thus the results tend to support the concept of tension as a drive. This concept played a role in the formulation of the present writer's study.

Anxiety and difficulty of the learning situation

If Taylor's assumptions (18) are correct, then Ss who score high on the Taylor Manifest Anxiety Scale (hereafter designated as MAS) should out-perform those Ss who score low on the MAS when all are tested on simple (or easy) learning tasks. Several studies have been conducted testing the difference between anxious and nonanxious Ss in simple learning situations.

Spence and Taylor (18) showed that anxious Ss perform at a higher level than nonanxious Ss in classical conditioning, which they considered a simple learning situation. In this study the anxious and nonanxious groups were widely separated with respect to MAS scores.

Hilgard, Jones, and Kaplan (7) stated that conditioned discrimination is affected not only by characteristics of the stimuli but also by the temporary sets and predisposition of the Ss. They tested the hypothesis that conditioned discrimination will be affected by the relatively persistent apprehension which tends to make one person more anxious than another. Anxious people are likely to see many situations as
threatening, while nonanxious people perceive them as neutral or non-threatening. The Ss were selected according to scores obtained on the MAS, those with a high score being the anxious group and those with low scores being the nonanxious group. In this conditioned eyelid response experiment the positive stimulus was reinforced by an air puff, which was a threatening stimulus to both anxious and nonanxious Ss. The negative stimulus was never followed by the air puff, and was considered nonthreatening. However, the authors thought that the anxious Ss may not have been able to discriminate between the positive and negative stimulus. It was assumed that anxiety, as measured by the MAS is related to anxious behavior in nonverbal situations. A positive, but non-significant correlation was obtained between anxiety and eyelid conditioning.

Other experiments along this line were these by Spence and Farber (17) and Spence and Beecroft (16). The predictions in these experiments were derived from the theory that Ss should show a greater excitatory strength to both the positive and negative controlled stimuli; in addition the difference of the two stimuli should be greater for the anxious group. In these two experiments the anxious and nonanxious Ss were chosen on the basis of scores obtained on the MAS. In these experiments Spence and his colleagues found a significant difference between anxious and nonanxious Ss in the positive controlled stimulus during differential conditioning, but no significant difference was found between the anxious and nonanxious Ss in the excitatory strength to the negative stim-
It should be noted that all of these experiments, with the exception that of Hilgard, Jones and Kaplan, (7) showed that in classical conditioning anxious Ss performed at a higher level than nonanxious Ss.

It has been hypothesized that anxiety, as an acquired drive, would facilitate learning up to a certain point and beyond this level increased anxiety would be associated with a decrement in performance (6). Specifically, it has been assumed that on a simple learning task anxious Ss would out-perform nonanxious Ss, but on a complex (i.e., difficult) learning task nonanxious Ss would out-perform the anxious Ss. A study by Farber and Spence (6) was designed to test this hypothesis. The anxious and nonanxious Ss were selected from the upper and lower 20 percent of scores obtained on the MAS. It was predicted that the total performance of the nonanxious group would be superior to that of the anxious group in a relatively complex task. As the task became less difficult, the anxious group would gain on the nonanxious group in performance; and on a simple task the anxious group would out-perform the nonanxious group. Eyelid conditioning was the simple task and the complex task consisted of a stylus maze. In the complex learning task nonanxious Ss performed significantly better than the anxious Ss. However, in conditioning the anxious Ss were superior to the nonanxious Ss.

Stevenson and Iscoe (19) tested the difference between anxious and nonanxious Ss on a complex discrimination problem. They had 20 high anxious Ss and 20 low anxious Ss, designated by scores obtained on the MAS,
learn the problem. It was found that the low anxious group performed significantly better than the high anxious group. It was hypothesized that high anxious Ss reacted to their anxiety by making task irrelevant responses.

Along similar lines, experiments have investigated anxiety as a drive in verbal learning tasks. Montague (12) assumed that anxiety as a drive combines multiplicatively with habit strength. He hypothesized that the difference between stronger and weaker response tendencies in a learning situation would decrease with anxiety, aiding performance if correct tendencies were more frequent and stronger, decreasing performance if incorrect tendencies were dominant. Two groups of Ss consisting of 20 anxious and 20 nonanxious, according to scores obtained on the MAS, were given three verbal learning tasks, made to vary in the relative number of correct and incorrect response tendencies elicited by the manipulation of intra-list similarity and association of the nonsense syllables employed. Results of the experiment were in the predicted direction. Nonanxious Ss out-performed the anxious Ss on the difficult task, but as the task became less difficult the anxious Ss surpassed the nonanxious Ss in performance. This study supports the growing belief that both drive and associative factors must be considered in performance studies, whether in the general area of learning or in the clinical area.

Ramond (13) also manipulated the stimulus-response association strength by connecting to the stimulus adjective two response words, one highly associated with the stimulus while the other had no association. Each type
of response was correct for half the items. Motivational level was assumed to be positively related to scores obtained on the MAS and the effect of differences in motivational level upon performance in a verbal learning situation, as a function of the relative strength of the correct and incorrect responses, was investigated. The anxious Ss were expected to perform at a lower level than the nonanxious Ss, when the low association responses were correct, because of the greater interference of the strong incorrect responses for this group. The results were that nonanxious Ss gave a correct response significantly more often than did anxious Ss on these presentations in which the weaker response was correct. However, there was no significant difference between the performance of the anxious and nonanxious Ss on the presentation in which the stronger response was correct. The results lent some support to the hypothesis that anxious subjects would be superior early in learning, but that they might lose this superiority as the weak responses were learned and provided competition, although the over-all difference between the groups did not reach statistical significance.

In a paired-associate learning task Taylor and Chapman (20) used nonsense syllables that had a low formal similarity, each stimulus tending to evoke its own response. Two groups of Ss, one anxious and one nonanxious, were given the task of learning eight pairs of nonsense syllables; as expected performance of the anxious group was significantly higher than that of the nonanxious group.

Similar findings have been reported by Lucas (10). The Ss were asked
to recall a list of consonants read to them. When the number of duplicated consonants within the list was increased, anxious Ss showed a significant decrease in the number recalled; while the number recalled by the nonanxious group was relatively unchanged.

Purpose of this study

The purpose of the following experiment is to clarify some of the contradictory results found in previous studies on the effect of induced muscular tension on performance.

Results of previous studies (16, 17, 18) indicate that Ss who score high on the MAS out-perform Ss who score low on the MAS on a simple learning task, but on a complex learning task the Ss who scored low on the MAS out-performed those who scored high on the MAS. However, the results of these studies have not been related to the effect of muscular tension on performance. For example, contradictory findings such as those by Shore (15) and Meyer and Noble (11) may be reconciled if the effect of task difficulty is considered; Shore's task of perceptual efficiency may be considered as a simple task while Meyer's and Noble's task of learning a verbal maze may be considered as a complex learning task.

The present study not only considers the effect that different drive levels may have on performance under tension, but also the effect that task difficulty may have.

To summarize, the present study examines the combined effects of three variables which have previously been investigated separately, but which
have never before been studied together. The three variables are muscular tension, anxiety, and task difficulty.

Problem and hypotheses

In addition to the purpose outlined above, this paper involves the problem of testing certain aspects of the Hullian theory. Many of the studies summarized above were suggested by that theory. Those studies raise the following basic problem: May muscular tension be regarded as a drive? If it is regarded as a drive (and Hull and Taylor did regard it in this way), then the following testable hypotheses may be deduced:

1. Muscular tension will facilitate performance (when tests follow immediately after learning) regardless of the difficulty of the material to be learned. In other words, there will be no interaction between tension and task difficulty.

2. Over-all performance under muscular tension will be superior.

3. Anxiety and muscular tension will produce additive effects, since both are merely adding to drive level. In other words, there will be no interaction between anxiety and muscular tension.

In addition to resolving the contradictions cited above, the present study will provide tests of the above three hypotheses. As a result, it may clarify the problem of the accuracy of the Hullian concept of drive.
CHAPTER II

Method

Subjects - Eighty students were chosen from two general psychology classes at Fort Hays Kansas State College, following the group administration of the Forced Form Choice of Taylor's Manifest Anxiety Scale. Forty students scoring 37 and above and 40 students scoring 28 and below on the Forced Form Choice of the MAS were selected for the high and low anxiety groups respectively. Within each anxiety group, Ss were assigned at random to various cells of the design.

Apparatus - A Hull-type memory drum, presenting each word for a two second duration was used with a two second interval between words. Two lists of seven paired associative adjectives, taken from Steven's list were placed on the same vellum tape. One group, consisting of adjectives with an extremely high associative value, was used for the simple learning task. Another group of adjectives with an extremely low associative value was used for the complex learning task. These two groups of adjectives could be blocked from S's view by means of a moveable shutter which cut the memory drum to half its normal size. Thus, for an immediate shift from the simple to the complex learning task, the E merely had to move the shutter from one side of the aperture to the other.

A Stoelting palm dynamometer was used as a means of producing tension. The E determined each S's maximum squeezing power during a practice session. During the experiment, S was required to squeeze to \( \frac{1}{4} \) of this maximum value. One-fourth maximum was used because it was found by Shaw (14) to be in the optimal range in facilitating performance on all length series
of digits. The S rested his arm on a table in a position so that the E could see the dynamometer. A pressure tolerance of 5 pounds was allowed; if S's pressure went outside the tolerance limits the E told him to correct it until it was within the tolerance limitations.

All sessions took place in an isolated, partially soundproof, well illuminated room.

**Task** - The S's task was to learn paired adjectives. During an experimental session, S was presented with a list of seven paired adjectives. After a time interval of a few seconds, the list was presented a second time during which S would try to recall as many of the associates as possible. This same procedure was repeated until S was able to recall all the associates. Eight groups of Ss, consisting of 10 Ss each, were used in the experiment. Four groups consisted of high-anxious Ss and four groups consisted of low-anxious Ss. Ss were assigned at random to the cells of a 2x2x2 analysis-of-variance-type design. The three variables were tension-vs.-no tension, high-vs.-low anxiety, and difficult-vs.-easy words to be associated. The following notation will be used in describing the cells:

- HA refers to high anxiety, LA to low anxiety.
- MT refers to muscular tension, NT to no tension.
- SL refers to the simple list of words, CL to the complex.
- Ss in group LA-MT-SL would, for example, be low anxiety Ss under muscular tension learning the simple list of words.

**Scoring** - The scoring was in terms of the total number of errors of each S.
CHAPTER III

Results

In order to obtain the homogeneity of variance necessary to analyze the results by analysis of variance, it was necessary to convert the scores by adding 0.5 to each raw score and then take the square root of each number.

The raw scores are in Fig. 1. Each number represents the total number of errors made by each $S$ in each cell.

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$A-1=$ Anxious  $B-1=$ Simple  $C-1=$ Tension  $xx=$ Raw Scores

$A-2=$ Non-Anxious  $B-2=$ Complex  $C-2=$ No Tension  $(xx)$ Converted Scores

Fig. 1. Raw scores based on the number of errors.
Performance curves in raw scores plotted for anxious and nonanxious Ss for each learning situation are shown in Fig. 2. Each point represents the mean number of errors per trial. Comparison clearly reveals the difference in task difficulties, with the difficult task being the hardest.
Difficult learning task with no tension

Simple learning task with no tension

Difficult learning task with tension

Simple learning task with tension

Fig. Mean number of errors per trial expressed in raw scores.
The data based on the total number of errors by anxious and non-anxious Ss under tension and no tension in a simple learning situation are shown in Fig. 3. Comparison of the two groups reveals that in a simple learning task there was no difference between the two groups under no tension. As tension was induced performance for both groups dropped. The nonanxious group's performance was affected more than the anxious group's performance.

Fig 3. Performance under a simple learning task with tension and no tension based on raw scores.
The data based on the total number of errors by anxious and non-anxious Ss under tension and no tension on a difficult learning task are shown in Fig. 4. In comparing the two groups it is apparent that the nonanxious Ss out-performed the anxious Ss with no tension in a difficult learning task. As tension was induced the performance of both groups increased, but the difference in performance of the two groups was less under tension than under no tension.

Fig. 4. Performance under a complex learning task with tension and no tension based on raw scores.
The results based on the error scores by difficulty, anxiety level and different levels of tension are shown in Fig. 5.

<table>
<thead>
<tr>
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<th>Difficult</th>
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<td>Nonanxious</td>
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Fig. 5. Average number of errors for anxious and nonanxious Ss in a simple and difficult learning situation, under tension and no tension based on raw scores.
It was found that the tasks differed in complexity, with an F ratio of 33.96 a value significant beyond the .01 level.

An interaction of 7.47, a value significant beyond the .05 level; was found in the interaction of tension and complexity.

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</table>

Fig. 6. Summary of analysis of variance based on converted error scores.
Results of the experiment did not support Hypothesis 1. A discordant hypothesis was supported. That is, a significant interaction was found between tension and difficulty of task.

Hypothesis 2 also was not supported. That is, that over-all performance under muscular tension was not superior.

Hypothesis 3 was supported in that there was no interaction found between anxiety and muscular tension. Thus, anxiety and muscular tension produced additive effects, since both add to the drive level.
CHAPTER IV

Discussion and Summary

Discussion

Results of this experiment are in accord with those found by Shaw (14), where tension facilitated performance on the perception of digits.

The results do not appear to support the theoretical formulation of Spence and Taylor (18), which was deduced from Hull's system to account for the apparent relationship between anxiety and performance.

If muscular tension is a drive then it should facilitate performance regardless of the difficulty of the material to be learned and over-all performance under muscular tension will be superior. Neither of these two proposed hypotheses were supported by the results of this study. However, the results did support the third hypothesis that anxiety and muscular tension will produce additive effects, since both merely add to the drive level.

Thus, the results do not support those psychologists who contend that muscular tension may be interpreted as a drive.

In a theoretical sense, the most valuable finding of the present study is probably this: There is a significant interaction between muscular tension and difficulty of the task. Muscular tension seems to be beneficial in difficult learning situations but is a handicap when simple associations are to be acquired. In the opinion of the writer, there is no widely-known, well-accepted psychological theory which can explain this finding. Thus, re-integration of findings regarding the variables covered in this paper would seem to be in order.
REFERENCES


TABLE 1
Multiple Choice Inventory

Do not write or mark on this booklet in any way. Your answers to the statements in this inventory are to be recorded only on the separate answer sheet. Print your name, age, sex, and the date in the blanks provided on the answer sheet.

The statements in this booklet represent experiences, ways of doing things, beliefs, or preferences that are true of some people but not true of others. These statements are arranged in groups which are numbered consecutively, 1, 2, 3, etc., and there are three statements within each group lettered A, B, and C. You are to read the three statements in each group carefully and decide first which one statement is most true or most nearly true of yourself or your beliefs, and then decide which statement is most false or most nearly false. Consider only one group of statements at a time, and find the number on the answer sheet that is the same as the number of the group you are answering. Mark a plus (+) on the answer sheet next to the letter (A, B, or C) corresponding to the statement that is most true of yourself, and make a zero (0) on the answer sheet next to the letter corresponding to the statement that is most false of yourself.

Here is an example:

A. I usually keep my desk in good order.

(continued on next page)
B. I like to be the chairman of a meeting.

C. I have no trouble remembering the names of people I meet.

If, for instance, statement B is most true of yourself, that is, if you judge that your interest in being chairman of a meeting is greater than either your tendency to keep your desk in order or your ability to remember names, you would mark ± on the answer sheet next to B in this question.

Then, if you judge that among the remaining two choices your tendency to remember names is less than your tendency to keep your desk in order, so that "I have no trouble remembering the names of the people I meet" is most nearly false of the three statements, you would mark 0 on the answer sheet next to C for that particular group of items.

In this way, you are to mark two statements in each group of three—the one that is most true of yourself (+) and the one that is most false (0). The third statement should be left unmarked.

Make your two judgments concerning the three statements in every group as carefully and honestly as you can. There are no correct nor wrong answers. We are interested in the way you do things and in the beliefs and preferences you have. Be sure to answer every question. Remember, mark ± for one statement in each group of three, mark 0 for another statement, and leave one statement in each group unmarked.

Do you have any questions?

(continued on next page)
Multiple Choice Inventory 1952

1. A. I was fond of excitement when I was young (or in childhood).
   B. Sometimes when I am not feeling well I am cross.
   C. My hands and feet are usually warm enough.

2. A. I know who is responsible for most of my troubles.
   B. I feel hungry almost all the time.
   C. I would like to wear expensive clothes.

3. A. I tend to be interested in several different hobbies rather than to
   stick to one of them for a long time.
   B. Sometimes I become so excited that I find it hard to get to sleep.
   C. I feel sympathetic towards people who tend to hang on to their griefs
      and troubles.

4. A. It makes me nervous to have to wait.
   B. I frequently ask people for advice.
   C. I can remember "playing sick" to get out of something.

5. A. I am inclined to go from one activity to another without continuing
   with any one for too long a time.
   B. I would like to be a journalist.
   C. I worry over money and business.

6. A. If I were a reporter I would very much like to report news of the
   theater.
   B. When I was a child I didn't care to be a member of a crowd or gang.
   C. I am often afraid that I am going to blush.

7. A. I sweat very easily even on cool days.
   B. I prefer work that requires a great deal of attention to detail.
   C. I played hooky from school quite often as a youngster.

8. A. Something exciting will almost always pull me out of it when I am
   feeling low.
   B. I certainly feel useless at times.
   C. At times I have been so entertained by the cleverness of a crook

(continued on next page)
that I have hoped he would get by with it.

9.
A. I dislike to change my plans in the midst of an undertaking.
B. I am apt to pass up something I want to do when others feel that it isn't worth doing.
C. I am easily embarrassed.

10.
A. I frequently notice my hand shakes when I try to do something.
B. I like to flirt.
C. The only interesting part of newspapers is the "funnies".

11.
A. It is safer to trust nobody.
B. I have been afraid of things or people that I know could not hurt me.
C. I enjoy gambling for small stakes.

12.
A. I have a habit of collecting various kinds of objects.
B. At times I have enjoyed being hurt by someone I loved.
C. I cry easily.

13.
A. I have nightmares every few nights.
B. I have a cough most of the time.
C. There is usually only one best way to solve most problems.

14.
A. The man who had most to do with me when I was a child (such as my father, stepfather, etc.) was very strict with me.
B. I have a great deal of stomach trouble.
C. No one cares much what happens to you.

15.
A. Several times I have been the last to give up trying to do a thing.
B. I am happy most of the time.
C. I enjoy children.

16.
A. I often become so wrapped up in something I am doing that I find it difficult to turn my attention to other matters.
B. I don't blame anyone for trying to grab everything he can get in this world.
C. At times I think I am no good at all.

(continued on next page)
17. A. I enjoy detective or mystery stories.
   B. My eyesight is as good as it has been for years.
   C. I am usually calm and not easily upset.

18. A. I enjoy a race or game better when I bet on it.
   B. I always finish tasks I start, even if they are not very important.
   C. I am very confident of myself.

19. A. I usually dislike to set aside a task that I have undertaken until it is finished.
   B. Usually I would prefer to work with women.
   C. I wish I could be as happy as others.

20. A. I could be happy living all alone in a cabin in the woods or mountains.
    B. I work under a great deal of strain.
    C. I have been quite independent and free from family rule.

21. A. I often dream about things I don't like to tell other people.
    B. I like to go to parties and other affairs where there is lots of loud fun.
    C. I do not blame a person for taking advantage of someone who lays himself open to it.

22. A. Sometimes at elections I vote for men about whom I know very little.
    B. At times I am so restless that I cannot sit in a chair for very long.
    C. I am always disgusted with the law when a criminal is freed through the arguments of a smart lawyer.

23. A. I am the kind of person who takes things hard.
    B. Most people will use somewhat unfair means to gain profit or an advantage rather than to lose it.
    C. It is the slow, steady worker who usually accomplishes the most in the end.

24. A. I used to have imaginary companions.
    B. I worry quite a bit over possible troubles.
    C. I like movie love scenes.

(continued on next page)
25. A. Most people make friends because friends are likely to be useful to
them.
B. I have often felt that I faced so many difficulties I could not over-
come them.
C. I gossip a little at times.

26. A. I think nearly anyone would tell a lie to keep out of trouble.
B. At times I lose sleep over worry.
C. I readily become one hundred per cent sold on a good idea.

27. A. When embarrassed I often break out in a sweat which is very annoy-
ing.
B. I have been told that I walk during sleep.
C. I find it hard to set aside a task that I have undertaken, even for
a short time.

28. A. I am a methodical person in whatever I do.
B. I like to poke fun at people.
C. I feel anxious about something or someone almost all of the time.

29. A. I dread the thought of an earthquake.
B. Life is often a strain for me.
C. A person should try to understand his dreams and by guided by or
taking warning from them.

30. A. My sleep is restless and disturbed.
B. I have used alcohol excessively.
C. I have been inspired to a program of life based on duty which I have
since carefully followed.

31. A. I dislike to take a bath.
B. I have diarrhea ("the runs") once a month or more.
C. I always put on and take off my clothes in the same order.

32. A. I am embarrassed by dirty stories.
B. There is a very little love and companionship in my family as com-
pared to other homes.
C. At times I feel that I am going to crack up.

(continued on next page)
33.  
A. I am more self-conscious than most people.  
B. A windstorm terrifies me.  
C. I usually find that my own way of attacking a problem is best, even though it doesn't always seem to work in the beginning.

34.  
A. I am usually able to keep at a job longer than most people.  
B. I blush as often as others.  
C. I would certainly enjoy beating a crook at his own game.

35.  
A. At times I have been worried beyond reason about something that really did not matter.  
B. I prefer to stop and think before I act even on trifling matters.  
C. I sometimes tease animals.

36.  
A. If several people find themselves in trouble, the best thing for them to do is to agree upon a story and stick to it.  
B. I frequently find myself worrying about something.  
C. I like to know some important people because it makes me feel important.

37.  
A. Horses that don't pull should be beaten or kicked.  
B. What others think of me does not bother me.  
C. I am often sick to my stomach.

38.  
A. Once in a while I put off until tomorrow what I ought to do today.  
B. My feelings are hurt easier than most people.  
C. I am often afraid of the dark.

39.  
A. I usually check more than once to be sure that I have locked a door, put out a light, or something of the sort.  
B. When someone does me a wrong, I feel I should pay him back if I can just for the principle of the thing.  
C. I am a very nervous person.

40.  
A. I enjoy the excitement of a crowd.  
B. My relatives are nearly all in sympathy with me.  
C. I am about as nervous as other people.

(continued on next page)
41. A. Sexual things disgust me.
   B. I enjoy reading love stories.
   C. Often my bowels don't move for several days at a time.

42. A. I do not have as many fears as my friends.
   B. I never attend a sexy show if I can avoid it.
   C. I do not mind being made fun of.

43. A. I do not try to correct people who express an ignorant belief.
   B. I have never had a fainting spell.
   C. I do not often notice my heart pounding and I am seldom short of breath.

44. A. I don't like to face a difficulty or make an important decision.
   B. A person shouldn't be punished for breaking a law that he thinks is unreasonable.
   C. It is unusual for me to express strong approval or disapproval of the actions of others.

45. A. I am not at all confident of myself.
   B. I believe that a person should never taste an alcoholic drink.
   C. I have never done anything dangerous for the thrill of it.

46. A. I do not have spells of hay fever or asthma.
   B. I do not tire quickly.
   C. I do not read every editorial in the newspapers every day.

47. A. My worries seem to disappear when I get into a crowd of lively friends.
   B. It is not hard for me to ask help from my friends even though I cannot return the favor.
   C. I have very few headaches.

48. A. I do not always tell the truth.
   B. I do not like everyone I know.
   C. I practically never blush.

(continued on next page)
49.  
A. I have never been made especially nervous over trouble that any members of my family have gotten into.  
B. I have never been in love with anyone.  
C. I find it hard to keep my mind on a task or job.

50.  
A. I cannot keep my mind on one thing.  
B. When I leave home I do not worry about whether the door is locked and the windows closed.  
C. It does not bother me particularly to see animals suffer.

51.  
A. If I were in trouble with several friends who were equally to blame, I would rather take the whole blame than to give them away.  
B. I do not blame a person for taking advantage of someone who lays himself open to it.  
C. I feel unable to tell anyone all about myself.

52.  
A. I wish I could get over worrying about things I have said that may have injured other people's feelings.  
B. I enjoy reading love stories.  
C. Most people make friends because friends are likely to be useful to them.

53.  
A. When I take a new job, I like to be tipped off on who should be gotten next to.  
B. At periods my mind seems to work more slowly than usual.  
C. I do not mind being made fun of.

54.  
A. I think it is usually wise to do things in a conventional way.  
B. My daily life is full of things that keep me interested.  
C. I like to study and read about things that I am working at.

55.  
A. I prefer work that requires a great deal of attention to detail.  
B. I have never been in trouble with the law.  
C. I am a good mixer.

56.  
A. A windstorm terrifies me.  
B. I have strong political opinions.  
C. I am greatly bothered by forgetting where I put things.

(continued on next page)
57.  
A. I enjoy social gatherings just to be with people.  
B. I have no fear of water.  
C. It is the slow, steady worker who usually accomplishes the most in the end.

58.  
A. I wake up fresh and rested most mornings.  
B. I enjoy detective or mystery stories.  
C. I frequently find it necessary to stand up for what I think is right.

59.  
A. I brood a great deal.  
B. Usually I would prefer to work with women.  
C. The only interesting part of newspapers is the "funnies".

60.  
A. I easily become impatient with people.  
B. I have never done anything dangerous for the thrill of it.  
C. I believe that a person should never taste an alcoholic drink.

61.  
A. I have never been in love with anyone.  
B. I usually find that my own way of attacking a problem is best, even though it doesn't always seem to work in the beginning.  
C. In school I found it very hard to talk before the class.

62.  
A. I like to attend lectures on serious subjects.  
B. My hardest battles are with myself.  
C. I enjoy gambling for small stakes.

63.  
A. I have often felt that strangers were looking at me critically.  
B. If I could get into a movie without paying and be sure I was not seen I would probably do it.  
C. I am a methodical person in whatever I do.

64.  
A. I frequently have to fight against showing that I am bashful.  
B. Something exciting will almost always pull me out of it when I am feeling low.  
C. When I was a child I didn't care to be a member of a crowd or gang.

(continued on next page)
65.  
A. I am always disgusted with the law when a criminal is freed through the arguments of a smart lawyer.  
B. One or more members of my family is very nervous.  
C. I could be happy living all alone in a cabin in the woods or mountains.  

66.  
A. I don't blame anyone for trying to grab everything he can get in this world.  
B. I have more trouble concentrating than others seem to have.  
C. I have a habit of collecting various kinds of objects.  

67.  
A. I do not always tell the truth.  
B. It is not hard for me to ask help from my friends even though I cannot return the favor.  
C. I have often lost out on things because I couldn't make up my mind soon enough.  

68.  
A. I like to read newspaper articles on crime.  
B. I do many things which I regret afterwards. (I regret things more or more often than others seem to.)  
C. I believe that promptness is a very important personality characteristic.  

69.  
A. I do not try to correct people who express an ignorant belief.  
B. No one cares much what happens to you.  
C. I feel weak all over much of the time.  

70.  
A. It is unusual for me to express strong approval or disapproval of the actions of others.  
B. I am apt to take disappointments so keenly that I can't put them out of my mind.  
C. A person shouldn't be punished for breaking a law that he thinks is unreasonable.  

71.  
A. I always finish tasks I start, even if they are not very important.  
B. I get mad easily and then get over it soon.  
C. What others think of me does not bother me.  

(continued on next page)
72. A. People have often misunderstood my intentions when I was trying to put them right and be helpful.  
B. The man who provides temptation by leaving valuable property unprotected is about as much to blame for its theft as the one who steals it.  
C. It is always a good thing to be frank.

73. A. I seem to make friends about as quickly as others do.  
B. At times I feel like swearing.  
C. The members of my family and my close relatives get along quite well.

74. A. At times I have a strong urge to do something harmful or shocking.  
B. When I was a child I belonged to a crowd or gang that tried to stick together through thick and thin.  
C. I am apt to pass up something I want to do when others feel that it isn't worth doing.

75. A. It makes me impatient to have people ask my advice or otherwise interrupt me when I am working on something important.  
B. I have been quite independent and free from family rule.  
C. I like to poke fun at people.

76. A. I am often afraid of the dark.  
B. I prefer to stop and think before I act even on trifling matters.  
C. It makes me feel like a failure when I hear of the success of someone I know well.

77. A. While in trains, busses, etc., I often talk to strangers.  
B. I never worry about my looks.  
C. My skin seems to be unusually sensitive to touch.

78. A. I am in just as good physical health as most of my friends.  
B. I can be friendly with people who do things which I consider wrong.  
C. I believe that promptness is a very important personality characteristic.

79. A. I prefer to do things according to a routine which I plan myself.  

(continued on next page)
B. I very seldom have spells of the blues.
C. I think a great many people exaggerate their misfortunes in order to gain the sympathy and help of others.

80.
A. When in groups of people I have trouble thinking of the right things to talk about.
B. I like to know some important people because it makes me feel important.
C. I think nearly anyone would tell a lie to keep out of trouble.

81.
A. I am against giving money to beggars.
B. I often must sleep over a matter before I decide what to do.
C. I think Lincoln was greater than Washington.

82.
A. I like to be with a crowd who play jokes on one another.
B. I think that I feel more intensely than most people do.
C. At times I feel that I can make up my mind with unusually great ease.

83.
A. I gossip a little at times.
B. Policemen are usually honest.
C. I seem to be about as capable and smart as most others around me.

84.
A. Sexual things disgust me.
B. Even when I am with people I feel lonely much of the time.
C. I always put on and take off my clothes in the same order.

85.
A. My plans have frequently seemed so full of difficulties that I have had to give them up.
B. I used to have imaginary companions.
C. I would certainly enjoy beating a crook at his own game.

86.
A. I sometimes tease animals.
B. I like movie love scenes.
C. It makes me uncomfortable to put on a stunt at a party even when others are doing the same sort of thing.

87.
A. When someone does me a wrong, I feel I should pay him back if I can, just for the principle of the thing.

(continued on next page)
B. I am often so annoyed when someone tries to get ahead of me in a line of people that I speak to him about it.
C. Often I cross the street in order not to meet someone I see.

89. A. I am inclined to go from one activity to another without continuing with any one for too long a time.
B. I readily become one hundred percent sold on a good idea.
C. I wish I were not so shy.

90. A. I do not mind meeting strangers.
B. I dislike to change my plans in the midst of an undertaking.
C. I liked school.

91. A. Sometimes at elections I vote for men about whom I know very little.
B. The one to whom I was most attached and whom I most admired as a child was a woman (mother, sister, aunt, or some other woman.)
C. Sometimes some unimportant thought will run through my mind and bother me for days.

92. A. I played hooky from school quite often as a youngster.
B. I sometimes find it hard to stick up for my rights because I am so reserved.
C. I like to flirt.

93. A. My feelings are not easily hurt.
B. My table manners are not quite as good at home as when I am out in company.
C. I like to read about history.

94. A. When a man is with a woman he is usually thinking about things related to her sex.
B. I have a work and study schedule which I follow carefully.
C. Some of my family have habits that bother and annoy me very much.

(continued on next page)
95. 
A. Most people are honest chiefly through fear of being caught. 
B. I like to go to parties and other affairs where there is lots of loud fun. 
C. Criticism or scolding hurts me terribly.

96. 
A. I enjoy a race or game better when I bet on it. 
B. I am sure I am being talked about. 
C. At times I have enjoyed being hurt by someone I loved.

97. 
A. At times I have been so entertained by the cleverness of a crook that I have hoped he would get by with it. 
B. I would like a position which requires frequent changes from one kind of task to another. 
C. It bothers me to have someone watch me at work even though I know I can do it well.

98. 
A. I try to remember good stories to pass them on to other people. 
B. I have often had to take orders from someone who did not know as much as I did. 
C. I dream frequently.

99. 
A. If given the chance I would make a good leader of people. 
B. Once a week or oftener I become very excited. 
C. I have no patience with people who believe there is only one true religion.

100. 
A. I do not try to cover up my poor opinion or pity of a person so that he won't know how I feel. 
B. I have the wanderlust and am never happy unless I am roaming or traveling about. 
C. I frequently ask people for advice.
TABLE 2

Paired-associative adjectives used in the simple and complex learning situations

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1S. S. Stevens (Ed.), Handbook of Experimental Psychology, p. 548-552.