ABSTRACT

PERSONALITY BREADTH AND CONCEPT IDENTIFICATION

by Walter John Schuldt

King's personality breadth model serves as the basic orientation in the present research. One dimension delineated in this model is broadness-narrowness in perceptual style. This, in essence, refers to greater or less awareness of environmental stimuli. This exploratory study investigates the relationship between personality breadth and concept identification.

One-hundred eighty male college students were tested on four measures of breadth -- Pettigrew's Category Width test, Clayton's adaptation of the Object Sorting test, King's Identification of Stimulus Elements test and King's Visual Scanning test. The measure of concept identification was an adaptation of Bourne and Haygood's task.

The obtained distribution of each measure of breadth was trichotomized and subjects were categorized into three levels of breadth -- broad, medium, and narrow. Analysis of variance was used to assess relationships between the three levels of breadth and three levels of concept identification difficulty -- 1, 3, and 5 irrelevant cues. No significant differences between levels of breadth were noted. A significant interaction effect was found between levels on the Object Sorting test and the number of irrelevant cues on the concept identification task but no psychological

interpretation was made.

Two additional analyses were performed. A Post-Test Inquiry was used to assess changes in perceptual strategy on the Visual Scanning test. Two groups were established -- a group that changed strategy and a group that did not change strategy. The relation of this change-no change dimension to performance on the five irrelevant cue condition of the concept identification task was assessed by use of a t test. No significant differences were found but results are suggestive that those subjects who changed perceptual strategy also made fewer errors on the concept identification task.

The possibility of an interaction effect between breadth and strategy was also investigated. Using the Visual Scanning test and the Post-test Inquiry, four groups were established -- broad-changers, broad-no changers, narrow-changers, and narrow-no changers. Performance of the broad-changers was compared to performance of the other three groups combined by use of a t test. The broad-changers made significantly less errors (.01 level) than did subjects in the combined group.

The results were interpreted as not necessarily giving support to King's theoretical position. However, in view of the exploratory nature of this research, the need for a more delimited and precise replication study was discussed.

Approved T. M. Allen Major Professor

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PERSONALITY BREADTH AND CONCEPT IDENTIFICATION

By

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I. INTRODUCTION

There is at present limited communication between various personality theories and the subject matter of general psychology. Personality theories are typically oriented toward accounting for individual differences, especially in the area of social adjustment, while the focus of general psychology is on the functional relationships between manipulated conditions and task performance. As a result, two disciplines have tended to develop within psychology, each with different objectives, concepts, and research methods.

There have been some recent attempts to relate task behavior to personality variables. Gardner (1953) found that equivalence-range preference, a type of cognitive style, was related to individual differences in size constancy, shape constancy, and brightness judgments. Holzman and Gardner (1960) obtained significant differences between "levelers" and "sharpeners," another type of cognitive style, on several measures of memory organization. Gruen (1959), using Tolman's concepts as a frame of reference, derived several measures pertaining to cognitive maps in an attempt to predict individual differences in human maze learning. A personality model was developed by King (1960) to predict individual differences in task behavior.

One dimension delineated in King's model is "broadness-narrowness" in perceptual style. This, in essence, refers to greater or less awareness of environmental stimuli. Broad

individuals are conceptualized as displaying a relatively even distribution of attention leading to increased awareness of the perceptual field; narrow subjects as displaying a relatively uneven distribution of attention leading to a more delimited awareness of the perceptual field. A number of other investigators have employed similar concepts, all of which might be subsumed under the generic term "personality breadth."

The theoretical basis for personality breadth research began as early as 1902 when Gross (cited by MacKinnon, 1944) assumed a functional relationship between experience intensity and the tendency for that experience to persist. Based on this assumption, he delineated two mental processes, namely, a deep-narrow process -- intense experience with much persistence -- and a shallow-broad process -- less intense experience with less persistence.

Tolman (1948) emphasized stimulus selection and the way routes to a goal are formed. He referred to a narrow cognitive map which is seen as a single goal path, and to a broader cognitive map which takes in a wider view of the environment with, consequently, more alternative goal routes.

Rokeach (1951) conceptualized cognitive organization as varying along a breadth continuum from comprehensive to narrow. Gruen (1959) also delineated "styles of cognitive representation." Two of the dimensions which he posited are "outer complexity" -- awareness of the stimulus field -- and "degree of organization" -- a concept similar to Rokeach's breadth

of cognitive organization.

Klein (1958) introduced a cognitive style variable which he called scanning. The scanner was described as one who deploys attention in a broad and intensive manner leading to an "intense concentration of the central task" and an "indiscriminate peripheral sensitivity that renders many aspects of the field available to conscious recall."

Other cognitive breadth dimensions posited are over-inclusion (Cameron, 1951), leveling-sharpening (Holzman & Klein, 1954), equivalence range (Gardner, 1953), and category width (Pettigrew, 1958). The measures of equivalence range and category width are used in the present research and thus will be discussed later.

King's (1960) personality model will serve as the basic orientation in the present research. He emphasized the interaction between personality style and the nature of the task in predicting individual differences in task behavior. This interaction might be illustrated in a situation in which broadness-narrowness in perceptual style can be viewed in light of two concept identification tasks.

Task A consists of a number of stimulus elements or cues in the perceptual field, one of which arbitrarily serves as the correct concept. In this task the broad person, as compared to the narrow person, would be expected to solve the problem more readily in that he would be more aware of the alternatives (stimuli).

Task B represents a slight alteration in this situation.

If additional distracting stimuli are gradually added during the process of learning, the broad person's performance should be hampered more than the narrow person's performance in that he is responding to more irrelevant stimuli. While these examples are oversimplified and open to question, the general notion of personality-task interaction seems to be conveyed.

The preceding examples can also serve as an introduction to the focus of the present research which is concerned, in a more limited scope, with the relationship between personality breadth and performance on a concept identification task. Concept identification will be assessed by a task similar to that described by Bourne and Haygood (1959). This task consists of three conditions which have different numbers of cues in the perceptual field. The six-cue condition seems generally to correspond to Task A as previously described. This study was designed to evaluate possible differences between broad and narrow subjects on the concept identification task in general, or to assess possible interaction effects between levels of breadth and concept identification conditions. As an exploratory study, no specific hypotheses were formulated.

II. METHOD

Measures of Personality Breadth

Four tests which seem to reflect personality breadth were selected for use in this study. Two of these tests, the Category Width Test (Pettigrew, 1958) and Clayton's (1959) adaptation of the Object Sorting Test (Gardner, 1953), are considered measures of cognitive breadth. King devised the other two tests, the Identification of Stimulus Elements Test and the Visual Scanning Test, which he considered to be measures of perceptual breadth.

A research project is being undertaken by Perkins (1962) to assess the reliabilities and intercorrelations of these and other measures of breadth. The following discussion is to serve only as a brief introduction to the four tests used in the present study. More comprehensive descriptions of these measures can be found in Perkins' (1962) study.

Category Width Scale (CW). This paper and pencil test (Pettigrew, 1958) is a group administered, cognitive, preference task (Appendix I). Each subject is to estimate, through multiple-choice selection, the extremes of such items as "length of whales" and "annual rainfall in Washington, D.C." Each multiple-choice alternative is numerically weighted according to its direction and relative deviation from the item mean. Pettigrew sees the sum of the selected alternatives as reflecting the range of an individual's cognitive categories. In a personality breadth frame of reference, a

high score is considered indicative of breadth while a low score is considered indicative of narrowness.

Object Sorting (OS). This is a paper and pencil adaptation (Clayton, 1959) of the Object Sorting Test (Gardner, 1953). It is a group administered, cognitive, preference task (Appendix I) in which the subject is to sort 50 words, which refer to 50 objects, into groups that seem to belong together. Gardner suggests that this test indicates "equivalence range" -- the range of objects which a person is willing to subsume under one category. In a personality breadth frame of reference, the number of categories is used as a response measure with broad subjects defined as those forming few categories and narrow subjects defined as those forming many categories.

Identification of Stimulus Elements (ISE). This test, developed by King, is an individually administered, perceptual, achievement task. The subject is required to view five visual stimulus patterns, each consisting of eight different elements, and to learn a nonsense syllable associated with each pattern. The subject is then presented with a series of 40 cards each of which contains an element from one of the five stimulus patterns. The subject's task is to identify the name of the stimulus pattern to which each element belongs by marking the appropriate column of a multiple-choice answer sheet. The response measure used is the total number of correct answers. Broad persons are

defined as those who make many correct identifications; narrow persons are defined as those who make few correct identifications.

Visual Scanning (VS). This test, also developed by King, is an individually administered, perceptual, achievement task. The subject is confronted with two 12" X 12" cards each of which contains 63 different words. The subject is to view each card for one minute and recall as many words as possible. The total number of words recalled was used as the response measure. A broad person is defined as one who recalls many words; a narrow person is defined as one who recalls few words.

The Concept Identification Task.

The concept identification measure developed for use in this study was an adaptation of a task described by Bourne and Haygood (1959). As this task has been substantially changed from that delineated by Bourne and Haygood, a brief description of the stimulus materials and task will here be presented. A more comprehensive description of the specific procedures used in the present research will follow later.

Stimulus Materials. The stimuli were 3-3/4" X 5-1/2" cards each of which contained a geometric pattern. These patterns contained cues varying along six possible dimensions -- color (red or green), form (triangle or square), number (one or two), size (large or small), orientation (upright or tilted), and position (left or right side of card). Three different series of cards were constructed.

Each series contained patterns which were a combination of one cue relevant for solution and x cues (1, 3, or 5) irrelevant for solution. All possible patterns appeared in each series. The order of patterns was determined in a semi-random manner -- no pattern followed itself and each pattern appeared equally often in every 64 patterns.

Experimental Task. The concept identification task was a trial and error two-choice discrimination learning problem (Bourne & Restle, 1959). Each subject is presented with a series of geometric patterns. When a pattern appears the subject is to check one of two columns on an answer sheet to indicate the category to which the pattern belongs. After each response, the subject is told the correct response. The criterion of problem solving is 16 consecutive correct identifications. The response measure is the total number of errors to solution.

Procedure

One-hundred and eighty male undergraduate students participated in this study. Every student was presently enrolled in a general introductory psychology course at Michigan State University.

All subjects were initially group tested at which time they were given the Category Width test (CW) and the Object Sorting test (OS). The specific instructions and tests administered are contained in Appendix I.

The subjects were later tested individually. The

Identification of Stimulus Elements test (ISE) and the Visual Scanning test (VS) were initially given to the subject during this individual testing session. The instructions for these tests are contained in Appendices II and III. Following the Visual Scanning test (VS), a Post-Test Inquiry (Appendix IV) was administered in an attempt to assess each subject's perceptual strategy.

The Concept Identification task (CI) was also administered during the individual session. In this task the 180 subjects were arbitrarily assigned to three experimental conditions with 60 subjects in each condition. In Condition 1-I, subjects were presented stimulus patterns containing one relevant cue and one irrelevant cue; in Condition 3-I, subjects were presented stimulus patterns containing one relevant cue and three irrelevant cues; in Condition 5-I, subjects were presented stimulus patterns containing one relevant cue and five irrelevant cues. The instructions, procedures, and criterion measures were the same for all groups.

The following instructions were read to each subject:

> "Your task is to learn to sort a series of geometric patterns into two categories -- T or F. I will say 'card' and present a geometric pattern. Observe this pattern until I say 'check.' At this time, check either column T or column F (on an answer sheet previously provided) to indicate your choice of the category to which the pattern belongs. I will then say 'T' or 'F' to indicate the correct category. If you have checked the wrong category draw a line through the entire item. If you have checked the correct category do not draw a line through the item. When you have made 16 consecutive correct responses, stop the task, indicate that you have finished, and sit quietly until you have

> been given other directions. Remember, look closely when I say 'card,' check T or F when I say 'check,' not before, look at your response when I say 'T' or 'F,' draw a line through it if wrong, leave it as it is if correct, stop after 16 correct responses in a row. Any questions?"

This was an experimenter paced task. As each card was presented, the experimenter said "card." After giving the subject five seconds to observe the card, the experimenter said "check." Eight seconds were allowed for the subject's response. The experimenter then gave the correct category and waited five seconds for the subject to comply with the instructions. This procedure was continued until the subject achieved 16 consecutive correct responses. If the subject did not achieve this criterion upon completion of 125 trials, the task was discontinued.

III. RESULTS AND DISCUSSION

The distributions of CW, OS, ISE, and VS scores were trichotomized according to the criterion measure of each test so that 20 subjects were placed in each personality breadth group -- broad, medium, and narrow. Thus, each subject was classified as either broad, medium, or narrow in terms of each of the four tests of breadth. The mean CI error scores and standard deviations for each level of breadth are presented in Table 1.

Four 3 X 3 analyses of variance were used to assess the relationship between personality breadth and concept identification. A separate analysis was used for each of the four measures of personality breadth. Each design had three levels of breadth -- broad, medium, and narrow -- and three levels of CI difficulty -- 1, 3, and 5 irrelevant cues. The results of these analyses are presented in Tables 2, 3, 4, and 5.

The F's assessing differences between number of irrelevant cues on the CI task are significant at the .01 level. These significant F's and the means in Table 1 indicates results which are basically similar to those described by Bourne and Haygood (1959). Thus, the present simple CI task seems to elicit the same type of differences as the original more complicated and highly instrumented task.

TABLE 1

Means and Standard Deviations
of Concept Identification Error Scores

Personality Breadth	Concept Identification Conditions 1-I		3-I		5-I	
	M	SD	M	SD	M	SD
Category Width (CW).						
Broad	2.75	2.65	12.90	6.90	22.00	23.51
Medium	3.45	7.58	19.75	24.85	25.50	24.03
Narrow	3.00	3.03	10.90	18.59	18.30	23.95
Object Sorting (OS).						
Broad	2.55	2.42	12.85	20.85	21.35	24.36
Medium	3.80	7.61	20.85	25.39	14.95	18.34
Narrow	2.86	3.06	9.85	18.37	29.50	26.27
Identification of Stimulus Elements (ISE).						
Broad	1.75	.97	8.45	16.29	16.80	20.37
Medium	4.70	24.30	12.90	25.01	23.45	24.12
Narrow	2.75	3.04	22.20	25.81	25.55	26.28
Visual Scanning (VS).						
Broad	2.10	2.31	16.95	21.97	17.65	18.35
Medium	2.40	1.70	9.20	15.87	25.80	27.11
Narrow	4.70	7.84	17.40	26.57	22.35	25.84

TABLE 2

Analysis of Variance of 3 CI Conditions with 3 Levels of Breadth Measured by CW

Source of Variation	df	SS	MS	F
Concept Identification	2	10841.21	5420.60	15.17**
Personality Breadth	2	942.34	471.17	1.32
CI X Breadth	4	447.86	111.96	.31
Within cells	171	61122.25	357.44	
Total	179	73353.66		

** significant at the .01 level

TABLE 3

Analysis of Variance of 3 CI Conditions
with 3 Levels of Breadth Measured by OS

Source of Variation	df	SS	MS	F
Concept Identification	2	10841.21	5420.60	15.69**
Personality Breadth	2	99.08	49.54	.14
CI X Breadth	4	3338.52	834.63	2.42*
Within cells	171	59074.85	345.47	
Total	179	73353.66		

** significant at the .01 level
* significant at the .05 level

TABLE 4

Analysis of Variance of 3 CI Conditions with 3 Levels of Breadth Measured by ISE

Source of Variation	df	SS	MS	F
Concept Identification	2	10841.21	5420.60	15.54**
Personality Breadth	2	1864.84	932.42	2.67
CI X Breadth	4	1028.86	257.22	.74
Within cells	171	59618.75	348.65	
Total	179	73353.66		

** significant at the .01 level

TABLE 5

Analysis of Variance of 3 CI Conditions with 3 Levels of Breadth Measured by VS

Source of Variation	df	SS	MS	F
Concept Identification	2	10841.21	5420.60	15.22**
Personality Breadth	2	245.01	122.50	.34
CI X Breadth	4	1355.39	338.85	.95
Within cells	171	60912.05	356.21	
Total	179	73353.66		

** significant at the .01 level

Inspection of the analysis of variance tables reveals that in no case are the differences between personality breadth groups significant. However, the results suggest that those subjects classified as broad on the ISE do better on the CI task than narrow subjects although the differences are not significant.

It is also noted that a significant interaction effect between OS and CI is evidenced in Table 3. The results suggest that the medium subjects did best on the one irrelevant and three irrelevant cue conditions while the broad and narrow groups did better on the five irrelevant cue condition. However, these data do not suggest any meaningful psychological interpretation.

The results fail to provide evidence of a general relationship between personality breadth and performance on the CI task. This seems in basic accord with Perkins' (1962) correlational analysis of various measures of personality breadth. His results yielded little evidence for the existence of such a general trait. Moreover, these results are consistent with Bourne and Restle's (1959) mathematical model which assumes no individual differences in CI task performance.

Additional Analyses

As mentioned previously, the VS Post-Test Inquiry was administered to assess each subject's perceptual strategy. In an analysis of strategy, Item 2 of this inquiry sheet

was used as a criterion measure to establish two groups -- a group that changed perceptual strategy between the first and second card of the Visual Scanning test and a group that did not change perceptual strategy. The 60 subjects participating in the five irrelevant cue condition of the CI task were used as the sample in this analysis in that this condition seemed to correspond to Task A as described in the Introduction.

The relation of this change-no change dimension to performance on the five irrelevant cue condition of the CI task was assessed by use of a *t* test. The results of this analysis are presented in Table 6. While these results are suggestive that those subjects who changed perceptual strategy also made fewer errors on the CI task, this cannot be specifically concluded in that the statistical analysis revealed a *t* (1.41) which is not significant at the .05 level.

While re-evaluating the data, the possibility of an interaction effect between breadth and perceptual strategy was suggested. Thus, another analysis explored this possibility.

Card I of the VS was used as the measure of breadth in this analysis in that it could be conceived of as, primarily, a perceptual task. It was felt that increased cognitive functioning may be introjected into VS task performance when Card II is presented in that the subject may strive for better performance by associating or categorizing the perceived words. Thus, Card II was not included in this analysis.

TABLE 6

Comparison of Perceptual Strategy Groups on CI Error Scores

	M	SD	
Change	17.3	20.5	t = 1.41*
No Change	25.7	24.9	

* not significant at the .05 level

All subjects were ranked according to their score on Card I of the VS test and divided as close to the median as possible. The upper portion of the distribution was defined as broad; the lower portion defined as narrow. Item 2 of the VS Post-Test Inquiry was used to determine if a subject did or did not change perceptual strategy. Based on these two dichotomies, four groups were established -- broad-changers, broad-no changers, narrow-changers, and narrow-no changers. Each group's performance was then compared on the five irrelevant cue condition of the CI.

A *t* test was used to assess the apparent significant difference of the mean error score of the other groups combined. The mean error scores, standard deviations, and *t* test are presented in Table 7. It is to be noted that the broad-changers made significantly less errors on this CI task than did the combined group. Moreover, one should note the little amount of difference between the means of the broad-no changers, narrow-changers, and narrow-no changers which gives increased credence to the assumption that these three groups are basically similar and significantly different in performance from the broad-changers.

It is realized that this has been a post-hoc analysis. Moreover, it is stressed that significance tests have been used to assess apparent differences in obtained data. Therefore, the obtained significance levels cannot be interpreted as for legitimate statistical tests. These results are

TABLE 7

Comparison of Broad-changers, Broad-no changers, Narrow-changers, and Narrow-no changers on CI Error Scores

	M	SD	
Broad-changers	4.33	3.04	
Broad-no changers	26.29	24.54	t = 5.83**
Narrow-changers	23.83	22.99	
Narrow-no changers	24.67	27.70	

** significant at the .01 level. The t test indicates significance of difference between mean errors of broad-changers as compared to mean errors of other three groups combined.

accordingly considered suggestive of individual differences in task performance.

These results do not necessarily support King's theoretical position. The individual differences attributed to broadness-narrowness on the Visual Scanning test could be a function of memory. It is possible that all subjects perceived the same number of words and that the obtained differences are a function of the number of words recalled. Moreover, narrowness in perceptual style and lack of strategy change could both be manifestations of perseveration. If a subject perseverated on a few words and on a given strategy, he would have been classified as a narrow-no changer. Thus, it seems difficult to discern whether perseveration is the significant variable, rather than perceptual style, or whether perseveration is a manifestation of perceptual style.

In view of the post-hoc statistical analyses and the alternative interpretations attributable to the results, a replication study is being planned. It is hoped that this study can be designed to control memory effects, assess perseveration, and obtain an empirical, rather than an introspective, measure of strategy.

Although the present exploratory study does suggest the possibility of a perceptual style dimension, no evaluation of King's model can be made until the results of a more delimited and precise replication study are assessed. However, it is felt that King's concepts of broadness-

narrowness in perceptual function can and will open up new avenues of research. Moreover, it is hoped that the present research served, in a small way, to demonstrate the possibility of obtaining increased integration of personality theory and the subject matter of general psychology.

IV. SUMMARY

A personality model developed by King (1960) to predict individual differences in task behavior serves as the basic orientation in the present research. One dimension delineated in this model is broadness-narrowness in perceptual style. This, in essence, refers to greater or less awareness of environmental stimuli. The present study was designed to investigate the relationship between personality breadth and concept identification. As an exploratory study, no specific hypotheses were formulated.

A total of 180 male undergraduate students was group tested on two tests utilized as measures of breadth -- the Category Width test (Pettigrew, 1958) and an adaptation of the Object Sorting test (Clayton, 1959). King's personality breadth measures, the Identification of Stimulus Elements test (Perkins, 1962) and the Visual Scanning test (Perkins, 1962), were given during individual testing sessions. Moreover, an adaptation of Bourne and Haygood's (1959) concept identification task was also employed.

The obtained distribution for each measure of personality breadth was trichotomized and subjects were categorized into three levels of breadth -- broad, medium, and narrow. Analysis of variance was used to assess the relationship between personality breadth, as measured by each personality breadth test, and concept identification. Each design had three

levels of breadth -- broad, medium, and narrow -- and three levels of concept identification difficulty -- 1, 3, and 5 irrelevant cues. These four analyses did not reveal any significant differences between the three levels of breadth. However, they did reveal significant differences between the three concept identification conditions indicating results basically similar to those described by Bourne and Haygood (1959). A significant interaction effect was also noted between levels on the Object Sorting test and the number of irrelevant cues on the concept identification task but no psychological interpretation was made.

Two additional analyses were performed. A Post-Test Inquiry was used to assess each subject's perceptual strategy on the Visual Scanning test. Two groups were established on the basis of Item 2 of this inquiry -- a group that changed strategy and a group that did not change strategy. The relation of this change-no change dimension to performance on the 5 irrelevant cue condition of the concept identification task was assessed by use of a *t* test. No significant differences were found but the results are suggestive that those subjects who changed perceptual strategy also made fewer errors on the concept identification task.

The possibility of an interaction effect between breadth and strategy was also investigated. Using Card I of the Visual Scanning test as a measure of breadth and Item 2 of the Visual Scanning Post-Test Inquiry as an index of change,

four groups were established -- broad-changers, broad-no changers, narrow-changers, and narrow-no changers. The performance of the broad-changers was compared to the performance of the other three groups combined by use of a *t* test. The broad-changers made significantly less errors (.01 level) than did subjects in the combined group.

The results were interpreted as not necessarily giving support to King's theoretical position. However, in view of the exploratory nature of this research the need for a more delimited and precise replication study was discussed.

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A P P E N D I C E S

APPENDIX I

INVENTORY BOOKLET

Print Name _____
Last first Middle Initial

Age _____

Sex M or F (Circle one)

Estimation Questionnaire

The following 20 items call for two estimates or judgments, one for Part a and one for Part b of each item. Indicate your estimate by circling the appropriate number. In every case, give what you consider to be the most accurate estimate. Be sure to answer every item.

1. It has been estimated that the average width of windows is 34 inches. What do you think:
   a. is the width of the widest window ...
      1. 1,363 inches 3. 48 inches
      2. 341 inches 4. 81 inches
   b. is the width of the narrowest window ...
      1. 3 inches 3. 11 inches
      2. 18 inches 4. 1 inch
2. Ornithologists tell us that the best guess of the average speed of birds in flight would be about 17 m.p.h. What do you think:
   a. is the speed in flight of the fastest bird ...
      1. 25 m.p.h. 3. 73 m.p.h.
      2. 105 m.p.h. 4. 34 m.p.h.
   b. is the speed in flight of the slowest bird ...
      1. 10 m.p.h. 3. 12 m.p.h.
      2. 2 m.p.h. 4. 5 m.p.h.
3. The average length of whales in the Atlantic Ocean has been estimated by zoologists to be roughly 65 feet. What do you think:
   a. is the length of the longest whale in the Atlantic Ocean...
      1. 120 ft. 3. 86 ft.
      2. 190 ft. 4. 75 ft.
   b. is the length of the shortest whale in the Atlantic Ocean..
      1. 6 ft. 3. 52 ft.
      2. 43 ft. 4. 21 ft.
4. Shipping authorities have calculated that the average weight of merchant ships registered with the U. S. Maritime Commission in 1946 was 5,705 tons. What do you think:
   a. is the weight of the heaviest ship registered with the commission ...
      1. 10,500 tons 3. 23,000 tons
      2. 62,000 tons 4. 7,500 tons
   b. is the weight of the lightest ship registered with the commission ...
      1. 3,900 tons 3. 2,700 tons
      2. 1,100 tons 4. 2 tons

5. Weather officials report that during this century Washington, D.C. has received an average rainfall of 41.1 inches annually. What do you think:
   a. is the largest amount of rain that Washington has received in a single year during this century ...
      1. 82.4 inches
      2. 45.8 inches
      3. 63.7 inches
      4. 51.2 inches
   b. is the smallest amount of rain that Washington has received in a single year during this century ...
      1. 20.2 inches
      2. 36.3 inches
      3. 9.9 inches
      4. 29.7 inches
6. An average of 58 ships entered or left New York Harbor daily during the period from 1950 through 1955. What do you think:
   a. was the largest number of ships to enter or leave New York in a single day during this period ...
      1. 69 ships
      2. 153 ships
      3. 76 ships
      4. 102 ships
   b. was the smallest number of ships to enter or leave New York in a single day during this period ...
      1. 34 ships
      2. 3 ships
      3. 16 ships
      4. 43 ships
7. For the past twenty years, Alaska's population has increased an average 3,210 people per year. What do you think:
   a. was the greatest increase in Alaska's population in a single year during these twenty years ...
      1. 6,300
      2. 21,500
      3. 3,900
      4. 4,800
   b. was the smallest increase in Alaska's population in a single year during these twenty years ...
      1. 470
      2. 1,960
      3. 980
      4. 2,520
8. Boating experts estimate that the average speed of all sailing craft in America is around 4.1 knots. What do you think:
   a. is the speed of the fastest sailing boat in America ...
      1. 8.2 knots
      2. 30.7 knots
      3. 5.9 knots
      4. 21.3 knots
   b. is the speed of the slowest sailing boat in America ...
      1. 3.3 knots
      2. 0.6 knots
      3. 2.2 knots
      4. 1.2 knots
9. Book review editors guess that around 300 new American novels have appeared annually since World War II. What do you think:
   a. is the largest number of novels to be published in America in a single year during this period ...
      1. 380 novels
      2. 495 novels
      3. 870 novels
      4. 620 novels

b. is the smallest number of novels to be published in America in a single year during this period ...

1.	145 novels	3.	90 novels
2.	205 novels	4.	260 novels

10. Between 1900 and 1940 there was an average of 48 lynchings per year in the United States. What do you think:

a. was the largest number of lynchings in any one year during this period in the United States ...

1.	79	3.	53
2.	63	4.	135

b. was the smallest number of lynchings in any one year during this period in the United States ...

1.	1	3.	33
2.	11	4.	19

11. It has been calculated that the average time for all trains in 1953 from New York City to Washington, D.C. was 285 minutes (4 hours and 45 minutes). What do you think:

a. was the time of the slowest train from New York City to Washington in 1953 ...

1.	337 min.	3.	396 min.
2.	304 min.	4.	483 min.

b. was the time of the fastest train from New York City to Washington in 1953 ...

1.	236 min.	3.	268 min.
2.	202 min.	4.	145 min.

12. The average number of births in the world per day during 1955 has been computed to be 27,440. What do you think:

a. was the largest number of births in the world in any one day during 1955 ...

1.	36,501	3.	49,876
2.	28,207	4.	30,023

b. was the smallest number of births in the world in any one day during 1955 ...

1.	26,340	3.	14,330
2.	24,725	4.	19,704

13. When all of the world's written languages are considered, linguists tell us that the average number of verbs per language must be somewhere around 15,000. What do you think:

a. is the largest number of verbs in any single language ...

1.	21,000	3.	50,000
2.	18,000	4.	30,000

b. is the smallest number of verbs in any single language ...

1.	1,000	3.	5,000
2.	13,000	4.	10,000

14. The average muzzle to tail length of a sample of 1,000 German Shepherd dogs is 40.3 in. What do you think:
    a. is the length of the longest Shepherd dog in the sample ...
        1. 60.4 inches
        2. 47.8 inches
        3. 44.1 inches
        4. 54.2 inches
    b. is the length of the shortest Shepherd dog in the sample ...
        1. 34.6 inches
        2. 28.4 inches
        3. 19.7 inches
        4. 36.9 inches
15. The average population of South American countries is approximately 8.6 million people each. What do you think:
    a. is the population of the most populated country in South America ...
        1. 11.2 million
        2. 54.7 million
        3. 23.6 million
        4. 129.1 million
    b. is the population of the least populated country in South America ...
        1. 7,000
        2. 6.2 million
        3. 2.4 million
        4. 29,000
16. A Stanford University home economist has estimated that the average American spends around 55 minutes of his day eating. What do you think:
    a. is the longest eating time of any single American ...
        1. 185 minutes
        2. 125 minutes
        3. 245 minutes
        4. 90 minutes
    b. is the shortest eating time of any single American ...
        1. 16 minutes
        2. 4 minutes
        3. 38 minutes
        4. 27 minutes
17. In 1946 the average number of births per state was 68,000. What do you think:
    a. was the highest number of births in a single state ...
        1. 87,000
        2. 122,000
        3. 71,000
        4. 254,000
    b. was the lowest number of births in a single state ...
        1. 29,000
        2. 53,000
        3. 14,000
        4. 900
18. Immediately after World War II, the average number of submarines owned by the largest seven navies in the world was 58. What do you think:
    a. was the largest number of submarines owned by one of these navies ...
        1. 159
        2. 91
        3. 118
        4. 69
    b. was the smallest number of submarines owned by one of these navies ...
        1. 22
        2. 9
        3. 36
        4. 47

19. The average number of churches per religious denomination in the United States is estimated to be 511. What do you think.
    a. is the largest number of churches of a single religious denomination in the U.S.A. ...
        1. 4,833
        2. 757
        3. 1,219
        4. 39,801
    b. is the smallest number of churches of a single religious denomination in the U.S.A. ...
        1. 313
        2. 146
        3. 1
        4. 23

20. In the years 1916 through 1946, according to the U.S. Weather Bureau, there was an average of 140 tornadoes a year in the United States. What do you think:
    a. was the largest number of tornadoes in a single year in the United States during this period ...
        1. 154
        2. 243
        3. 312
        4. 197
    b. was the smallest number of tornadoes in a single year in the United States during this period ...
        1. 103
        2. 122
        3. 61
        4. 28

Object Sorting I

First of all, I want you to know that there is no answer to this test. Everyone does it in his own way. I want you to do it in the way that seems most natural, most logical, and most confortable to you. The instructions are simply to put together into groups the names of the objects listed below which seem to you to belong together. Write these groups down on the paper provided, labeling the categories A, B, etc. For example, in category A you would place those objects which seem to belong in one group, in category B those objects which seem to belong in a second group, and so on for as many or as few groups as you feel is necessary. You may have as many or as few objects in a group as you like, so long as the objects in each group belong together for one particular reason. However, no object may be placed in more than one group. If, after you have thought about all the objects, a few do not seem to belong with any of the others, you may put each of those objects into groups by themselves. So that you will be sure to sort all of the objects, it is suggested that you place a check mark next to each object when you place it in a category. Use a pencil with an eraser.

lamp post	hat	towel
television set	golf club	a watch
rock	picture	tree
hammer	wallet	postage stamp
ruler	spoon	chair
gloves	telephone	band aid
sweater	pillow	milk bottle cap
aspirin	rug	window shade
canoe	screw driver	a bolt
coat	measuring cup	shoe
pencil	cigarette	daffodil

book-end	radio	a baseball
lamp	a match	handkerchief
rope	dictionary	comb
a tire	a pot	tobaggan
pistol	nail scissors	dime
arrow	shovel	

Object Sorting I

APPENDIX II

Identification of Stimulus Elements (ISE) Test

Instructions and Procedure

Training Series. "I am going to show you some figures or designs. They were specially constructed so they may appear somewhat unusual or different. These figures have names which I would like you to learn. Look closely as I show you the figures one at a time. During the first presentation, I'll give you the names."

The figures are presented in the following order: CAX, MOG, LUD, BIV, JEK. The exposure time for each figure is 8 seconds. As E presents the first figure, he states: "This is C-A-X, cax." The same procedure is followed for the remaining four figures on the first trial.

After the first trial, E shuffles the cards so they will be presented in a different order on the second trial. E then states: "Now I'm going to show the figures again. See if you can identify them. Hold up the correct card as soon as you recognize the figure. Remember, look at the figures closely." E gives the correct name after 6 seconds. Presentation time, as on the first trial, is 8 seconds per figure.

A total of six trials is given, with E shuffling the cards before each trial. Before each trial, E indicates the number of the trial. For example -- "This is the second

trial." He also states: "Look at the figures closely."

Before the seventh trial, E states: "Now continue to indicate the names of the figures by holding up the correct card. I want you to remember something else as you look at the figures. When we're all through, I'm going to ask you to draw each figure from memory. So again I say 'Look at the figures closely.'" A total of 6 more trials are given under these conditions.

Test Series. "Instead of having you draw each figure, I'm going to ask you to do something very similar. I'm going to show you some parts or elements of the figures that you've just learned. In other words, each of the drawings that you will now see belongs to one of the previous figures. I want you to name the figures from which these parts were taken. Use this answer sheet that I give you. If you're not sure, make a guess."

The 40 stimulus elements are individually presented (as numbered on the cards), the exposure time being 12 seconds for each stimulus element.

APPENDIX III

Visual Scanning (VS) Test

I. Simple Scanning and Recall

There are some words scattered about on the other side of this card. I'm going to let you look at this card for a short period of time, about a minute. Your task will be to find as many words as you can. When I take the card away, write down all the words that you remember seeing. Any questions? All right, now look at the card. (E hold Card I approximately 18 inches from S for 60 seconds. After the card is taken away, S records his responses, i.e., words, on a sheet of paper that is provided.)

Now here's another card with some different words scattered about on it. We'll do the same thing as before. Ready to look at the card? All right, here's the card. (E holds Card II approximately 18 inches from S for 60 seconds. After the card is taken away, S records his responses as before.)

APPENDIX IV

Name_____

VS Test

I. Post-Test Inquiry

1. Indicate how you approached the test on the first card that was shown to you (Circle appropriate letter):

    a. Concentrated on the words on one part of the card or in a certain area.

    b. Scanned most of the card picking up words from a relatively wide area.

    c. Concentrated on words of a similar nature or of the same category, like all animals or all parts of the body.

    d. An approach other than the above. Describe this approach briefly. _____

    e. Some combination of the above approaches. Briefly indicate the combination. _____

2. Did you change your approach on the second card? (Circle a or b.)

    a. Yes

    b. No

    If answer was "yes", briefly describe the change.