1968

Cognitive Correlates of Body Image in College Students

Richard G. Doiron
Loyola University Chicago

COGNITIVE CORRELATES OF BODY IMAGE IN COLLEGE STUDENTS

by

Richard G. Doiron

A Dissertation Submitted to the Faculty of the Graduate School of Loyola University in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

February

1968

Acknowledgments

The author first wishes to express his sincere thanks to Dr. Frank J. Kobler for the continued interest, encouragement, and helpful direction that he showed the author not only during the course of this dissertation but also while this student was in attendance at Loyola University. The author is also grateful to Dr. Patrick R. Laughlin for his assistance during the development of this study and to Kenneth Vander Woude, a fellow graduate student, who helped the author in the statistical analysis of the data. Thanks are also due to the student volunteers at Loyola University without whose cooperation this study could not have been completed.

A final note of thanks goes to the author's wife, Judith Ann, who typed this manuscript and was always willing to supply moral support when it was most needed.

Life

Richard G. Doiron was born in New York City on February 4, 1940.

He was graduated from St. Ignatius High School in Sanford, Maine in June of 1958, and from Boston College in 1962 with the degree of Bachelor of Arts. He received the degree of Master of Arts in February, 1965, from Loyola University, Chicago.

In June of 1963 the author began his clerkship in clinical psychology at the Illinois Youth Commission's Reception and Diagnostic Center in Joliet, Illinois. He remained with the Youth Commission as a staff member for two years. In June of 1965 he was appointed a Veteran's Administration intern, a position that the author held through December of 1967. From September of 1966 through December of 1967 he also served as a clinical assistant in the Department of Psychology at Loyola University.

Table of Contents

List of Tables

List of Figures

CHAPTER I

INTRODUCTION

During the past 15 years, personality theorists have shown a renewed and increased interest in the relationship between cognition and personality functioning. One of the first theorists to make mention of this developing trend was Nuttin (1955) who stated the following: "More recently, the general study of cognitive processes tends to be included in personality psychology. The human behavioral response seems to be aroused, not by a 'depersonalized' stimulus pattern, but by a meaningful life situation in the subject's personal 'world', built up by perceptual or cognitive processes. In this way, the cognitive processes become incorporated in personality study, not only as influenced by motivational factors, but as an integrative function of personality as a whole "(p.161). The theoretical interest that Nuttin mentions has resulted in attempts to find empirical support for relationships between different types of cognitive processes and different areas of personality functioning.

A recent extensive review (Holtzman, 1965) noted that research in this area has focused on personal stylistic dimensions and perceptual and cognitive functioning. More prominent examples of this type of investigation include the works of Witkin et al. (1954) on Field Independence or Psychological Differentiation; Gardner (1953) on Cognitive Styles in Categorizing Behavior; Kagan (1963) on the Psychological Significance of Conceptualization; and Fisher's (1965) work on Body Image and Cognitive Functioning.

The present research seeks to investigate the relationship between body image and cognitive functioning. The theo-

retical basis for such a relationship is not a recent development. Personality theorists such as Head (1926), Schilder (1935), Teitelbaum (1941), and Reich (1949) have provided a framework within which body image is seen as contributing an anchor point or foundation necessary for the performance of cognitive tasks or judgments.

A recent outgrowth of these proposed theoretical relationships between body image and cognition is the work of Fisher (1965). He claims to have found empirical support for the thesis that body image can be viewed as a series of peripheral landmarks from which emanate sensations that can reinforce or inhibit central cognitive processes. Fisher used work production, learning, and retention as measures of cognitive processes. That basic types of association tasks, in themselves, constitute an adequate test of cognitive functioning is debatable. Rather, it appears that a more adequate test of the effect of body image on cognitive functioning should involve a concept learning as well as a memory task.

Therefore, this study seeks not only to test the findings of Fisher but to extend the research in this area. In keeping with these goals, the following hypotheses are advanced:

Hypothesis I

> Persons who have well defined images of their bodies or "high barrier" individuals should do significantly better on concept learning and incidental memory tasks than persons whose view of their bodies is poorly defined.

The empirical support for this hypothesis comes from a series of studies conducted by Fisher and Cleveland. Their research showed that certain personality characteristics were associated with having a well defined view of one's body. They discovered that high barrier individuals were more highly

motivated to achieve, worked better independently, were more consistent in completing various tasks, and reacted more adaptively under stress than persons who had a poorly defined view of their bodies. It was felt that these personality characteristics would make for more efficient concept learning and better recall. Further support for this hypothesis was provided by Fatterson (1962). Her study showed that articulateness of the body concept was significantly related to a global analytical type of cognitive functioning.

Hypothesis II

> Individuals with well defined images of their bodies, or high barrier individuals, should select and recall more barrier objects.

Fisher (1965) found a significant relationship between the manner that college students view their bodies and their selective perceptions and memory for words that are in keeping with such a view of themselves.

Hypothesis III

> Those persons who have a poorly defined view of their bodies should show significantly greater incidental memory for words or objects that denote or connote penetrability and/or destruction of body exterior. High penetration individuals, therefore, will select and recall more penetration objects.

In his 1965 research Fisher discovered that students who had a sense of poor boundary articulation tended to remember words which conveyed a poor state of boundedness (penetration words) but, surprisingly enough, tended to recall fewer words which specifically depicted mutilation of the body. That there was an opposite reaction to words depicting mutilation left Fisher with a discrepancy that was quite perplexing. One of the goals of this research was to see if any more light could be

shed on some of the contradictory results found by Fisher.

In order to extend previous research, this study has a twofold purpose. First, the usual comparison of high with low barrier subjects is made. Secondly, an attempt is made to determine in what ways the factors of sex, barrier, and penetration are interrelated.

CHAPTER II

REVIEW OF RELATED LITERATURE

The Body Image paradigm that was developed and is currently being used by Fisher and Cleveland (1958) originated from their work with arthritic patients. Employing such instruments as the Rorschach, the Thematic Apperception Test, and figure drawings, they noticed that these patients placed great emphasis on protective boundaries or the surface qualities of things. This finding led Fisher and Cleveland to devise an empirical scoring system to be used specifically with inkblots. They believed that many responses given to inkblots fell into two broad classes: barrier responses and penetration responses. A barrier response had to do with assigning definite structure, definite substance, and definite surface qualities to things. Penetration of boundary or simply penetration responses had to do with boundary peripheries only in the negative sense of emphasizing their weakness, lack of substance, and penetrability. With these two categories in mind, these authors established certain categories of items to which could be assigned a barrier or penetration score. Barrier items consisted of such objects as tanks, forts, and shields. Penetration responses included such things as stomachs, broken objects, and mud. They assumed that individuals who scored high on the barrier dimension (giving many Rorschach responses concerned with special containers, distinctive animal skins, or protective coverings) tended to experience their body boundaries as definite and firm. Those who scored high on the penetration dimension (giving several Rorschach responses concerned with piercing, wearing

away, or violating the boundaries of objects) tended to experience their body boundaries as indefinite and vague. From their research, the authors concluded that body boundaries develop from exposure to parents who serve as definite models and that such boundaries provide a stable frame of reference for behavior. For these researchers body image serves as a central model against which the individual measures his perceptions and his ability to perform certain skills. How body image influences these other areas of functioning remains unspecified by Fisher and Cleveland (1958).

A host of studies have been undertaken by Fisher and Cleveland (1958) in an attempt to further validate and broaden their theory of body image. Most of this validation work has been done with college students and has yielded interscorer reliability coefficients in the .80's and .90's. They found that only a chance relationship existed between Body Image scores, verbal productivity, and intelligence. However, they became aware that they had to control response total when comparing Body Image scores for different individuals. When Rorschach response total was controlled (N=25 responses) they discovered that barrier and penetration norms were quite stable in comparable samples of subjects. In three successive groups of college students median barrier score was consistently 4 and median penetration score was 2. The barrier scores in the total group ranged from 0 to 12 and the penetration scores from 0 to 8. Surprisingly enough they found that barrier and penetration scores were not necessarily correlated. A list of specific findings cited by the authors is as follows: High barrier individuals set higher goals for themselves than do low barrier individuals as measured by the level of aspiration on the

Thematic Apperception Test. Greater memory for incompleted tasks is shown by high barrier subjects. High barrier subjects are significantly less suggestible than low barrier subjects. Furthermore, high barrier subjects react better to stress than low barrier persons whether the stress is generated in a psychological laboratory or as a result of contracting poliomyelitis.

Several years after Fisher and Cleveland developed their concept of body image, a thorough study of its reliability was made. Holtzman (1961) had decided to include barrier and penetration as two of the 22 variables of his newly constructed Holtzman Inkblot Technique. In the standardization of his instrument the following reliability coefficients were obtained for barrier and penetration: When the average scoring consistency of these measures was tested, intra-scorer values of .90 for barrier and .89 for penetration were obtained: the inter-scorer values being .84 for both barrier and penetration. It should be noted that unlike Fisher and Cleveland, Holtzman included both clinical and normal groups in his standardization studies. Odd-even reliabilities and standard errors of measurement are given by Holtzman and these measures range from a low of .41 with a S.E of 1.4 for housewives to a high of .90 with a S.E of 1.1 for 4th graders, the extreme values in this case both being found on the penetration dimension. The final measure of reliability to be computed was that of test-retest reliability. Obtained values ranged from a low of .34 to a high of .51 for penetration and barrier respectively. The values in both instances were obtained with a three-month interval and using eleventh graders.

Daston and McConnell (1962) did a less extensive relia-

bility study whereby they investigated the stability of Rorschach penetration and barrier scores over a period of time, using a sample of 20 normal male subjects who had been hospitalized with long-term physical disorders but screened for absence of psychiatric disorders. All subjects were tested twice with two months intervening between testing. Test-retest stability for barrier and penetration respectively were: Rater A .90, .82; Rater B .88, .79. Differences between means for related samples were not significant for either raters on barrier or penetration scores. However, both raters found penetration scores to decrease on retest. Since mild psychological changes probably occurred in the subjects between tests, the conclusion was that penetration score may be a more sensitive indicator of minimal change than barrier score. The findings of this study are in agreement with that of Cleveland (1960) where penetration score proved to be more changeable and less stable than barrier score. Why there should be a decrease in penetration score in a normal population is not adequately explained by Daston and McConnell. It is evident from the studies just reviewed that barrier and penetration are adequately reliable measures with barrier being somewhat more stable than penetration.

Fisher (1963) in a review and further appraisal of his body boundary concept believed that support had been found for the view that the more definite an individual's boundaries, the more likely he was to manifest relatively high physiological reactivity in body exterior as contrasted to body interior sectors. Fisher and Cleveland have felt that the strongest empirical support for their theory has come from studies on physiological reactivity such as those of Davis (1960) and

Zimny (1965). In both of these studies significant support was found for the theory that barrier score is related to physiological reactivity.

However, the physiological aspects of Fisher's theory have been criticized on a theoretical as well as an empirical level. Mednick (1959) wrote a strongly critical review of Fisher and Cleveland's 1958 text: Body Image and Personality. In this review Mednick made several criticisms that later served to generate empirical tests of the barrier theory. He noted that more than two thirds of the studies reported by Fisher and Cleveland were based on rescoring of data originally collected by others. He went on to say that no attempts were made to account for important covariants in these studies; that the difference of only one barrier response in a record of 20 responses would separate a high from a low barrier individual, and that errors were made in citing the probability levels for these studies. Wylie (1961) also strongly criticized the general theory of barrier and penetration. She made a specific criticism of the physiological underpinnings of this theory by saying that in the Davis (1960) study, many of the statistical tests are interpreted as being independent of one another. Wylie quite justifiably contends that different measures of physiological reactivity are not independent of one another and that it is, therefore, difficult to interpret their significance levels.

Attempts to validate Fisher and Cleveland's theory while at the same time attempting to rectify some of the methodological weaknesses inherent in previous studies have been unsuccessful. Eigenbrode and Shipman (1960) attempted to test whether 54 patients with external psychosomatic disorders had greater barrier scores than did 29 patients with internal psychosomatic

disorders. After much effort to insure the homogeneity of their two groups and the reliability of their scoring, nothing more than a chance difference was obtained. The authors concluded that the barrier approach was theoretically ambiguous and that the scoring system needed clarifying.

A recently conducted study by Hirt, Ross, and Kurtz (1967) investigated the construct validity of body-boundary perception. More specifically, these authors attempted to test the Fisherian hypothesis that body image is important in determining the body sites at which symptoms occur when stress causes psychosomatic illness. In this research an attempt was made to correct limitations in the research of Fisher and Cleveland as specified by Mednick (1959). The Holtzman Inkblots were administered and scored by an examiner who was unaware of the purpose of the study. The protocols were also scored for integration as well as for barrier and penetration in order to provide another index of psychopathology to serve as a covariant in the analysis of the data. The study was divided into two parts. The subjects in Experiment I were placed into body-interior and body exterior groups solely on the basis of their current hospital diagnosis. The data was analyzed by comparing barrier, penetration, and integration for 20 body-interior patients (asthmatics, cardiacs) with 20 body-exterior patients (dermatology, arthritics). In Experiment II the same procedure was followed with the exception that subject selection for the two groups was more stringent and a third group was included whose symptoms were mixed. In Experiment I the two groups showed no significant difference on either penetration or barrier. The analysis of covariance did approach significance but in the opposite direction to that predicted by the theory. More specif-

ically, the group with interior body site of disease gave fewer penetration and more barrier responses. The results for Experiment II did approach significance but again in the opposite direction. Hirt, Ross, and Kurtz concluded that their research casts considerable doubt on the adequacy of Fisher and Cleveland's model and they point also to the practical problems of subject selection and uncontrolled sources of variance in this type of research.

Shipman (1965) attempted to test the psychological underpinnings of Fisher's theory. He wanted to see if the theory could be confirmed on this level having been unable to confirm it on a physiological level. He found support for only two of the seven claimed relationships with personality traits. High barrier people had significantly higher scores on the Gough 284-item adjective checklist and they held up better than the other Ss under the stress of the Stroop Color-Naming Test. The author explains the discrepancies between his findings and those of Fisher and Cleveland by saying that the latter authors' results may be applicable to a college population but not to a non-college population such as was used in this study. Some of the value of Shipman's study is lost as a result of the relatively small number of subjects used. Furthermore, one can question the homogeneity of his sample. The small sample and the use of a correlational approach make it difficult to attribute the results to specific causes, e.g., differences in subjects, low reliabilities of the various instruments used, etc.

Believing that his body boundary concept had been supported on a physiological level, Fisher (1964) attempted to test its relationship to cognitive factors. His major hypothesis was that the greater an individual's awareness of his own body in

relation to the total perceptual field, the more likely he is to display selectively superior recall for words referring to his body. In this study, body awareness was measured by counting the number of body references in the subjects' controlled reports concerning that of which they were immediately conscious or aware. Retention of body versus non-body words was studied by means of a task which involved learning and later recalling lists composed of ten words pertaining to the body and ten to non-body objects. The results based on 92 subjects were statistically significant at the .001 level. The body and non-body words were equated for average word length but no mention is made of the words having been equated for associational value and/or frequency of occurrence in the English language. This omission is a serious one in a study of this type.

In a similar study, Fisher (1965) tested the general hypothesis that body experience may influence responses to projective stimuli. It was proposed that the more aware an individual is of his stomach, the more frequently he will produce stomach-related themes, e.g., a nutritive theme imaginatively elaborated in inkblots. The measure of stomach awareness involved comparing the prominence of one's stomach with a series of other paired body sectors. From this study it was concluded that body experiences may play a meaningful role in the individual's response to various types of unstructured stimuli. Wylie (1961) poses an important question regarding body boundary and body site: Are barrier scores determined by the focusing of a person's attention at a respective body site or do individuals attend to particular regions of the body because of their being high or low barrier people?

Continuing to develop his thesis of the relationship

between body image and cognitive processes, Fisher (1965) conducted a series of seven small experiments using college students as subjects. His general hypothesis was that both learning retention and word production can be predicted from body image variables, an assumption which implies that body landmarks may function as a source of sensory information which influences cognition. The general procedure followed by the author was to evaluate subjects on various dimensions for each of the studies. Initial factors such as penetration score, relative awareness of front versus back of body, experiences with anal symptoms, prominence of an individual's body in his perceptual field, and stomach awareness were determined. These determinations having been made, subjects were given a word list containing 10 words bearing on the dimensions to be measured, e.g., penetration, anality, stomach, etc., and 10 neutral words or 10 words supposedly having equal meaning for the subjects. After S had studied the list for one minute, it was removed and he was told that he would have five minutes to recall and write on a sheet of paper as many of the words as possible. The recall was scored by summing the number of penetration words and subtracting the sum of non-penetration words. The product-moment correlational technique was used in determining the relationship between mean penetration score and mean recall score. The same statistical procedure was used in evaluating the other dimensions already mentioned. In six of the seven studies, results significant at the $p < .05$ level were obtained. Fisher concludes that a sense of poor boundary articulation facilitates memory for words which convey the image of a poor state of boundedness in a generalized abstract sense, e.g., words representing the penetration scoring system, but

has the opposite effect for words which specifically depict mutilation of the body. This is a discrepancy which the author admits is perplexing. He suggests, however, that his major hypothesis is supported in that body image can be conceptualized as a series of peripheral landmarks from which emanate sensations that can reinforce or inhibit central cognitive processes. The present author agrees with Fisher's hypothesis but sees this research of Fisher's as having many methodological weaknesses. One large, well-controlled study would have been more meaningful than a series of small studies. These small studies were restrictive in the number of Ss used, were limited in that they did not employ Ss of both sexes in each study, required 25 responses to the Rorschach which is an atypical use of this instrument, and did not control for frequency of occurrence in the English language for the penetration and non-penetration words used.

The majority of studies reported thus far were conducted by Fisher and Cleveland themselves or are ones dealing with non-cognitive correlates of body image. The studies to be discussed now are of great significance to the present writer's research in that they specifically investigate the relationship between a body image paradigm and a cognitive task. More particularly, Blatt et al. (1965) proposed that concerns about one's body intactness would be reflected in a Wechsler subtest pattern where the Object Assembly score is lower than those of other subtests. Two measures were utilized to test this hypothesis. First, Clinical Psychologists who were unfamiliar with the hypothesis were asked to select from the files of a guidance clinic children for whom bodily concerns were believed to be a dominant issue. They were then asked to select a group

of children for whom bodily concerns were of minimal importance. In the former group there were seven children and in the latter, six. The two groups were compared for absolute differences in scores on Object Assembly and extent of deviation of OA score from total mean score. The second procedure used involved selecting from clinical files test records of adult patients who had either conspicuously low or high OA scores. Twenty records with high Object Assembly scores (10 males and 10 females) were selected by persons unaware of the hypothesis but with the thought of minimizing age, overall IQ, and lack of familiarity with the Wechsler Adult Intelligence Scale. The Rorschach protocols of the group with high OA scores and those with low OA scores were rated by an independent judge for indications of bodily concern (e.g., anatomical concern, x-ray, blood, sexual response; responses were also tallied for expression of missing parts, decay, disintegration, or grotesque body parts). The two procedures used yielded support for the main hypothesis. In the first case, OA scores were found to be significantly lower in children with bodily concerns than in the control group. There were no other significant subtest differences. With respect to adult patients with low and high OA, there was a significantly greater percentage of Rorschach responses indicating bodily concern in the group scoring low in Object Assembly. The results of this study are especially relevant to the research at hand. However, because of the exceedingly small sample used, the conclusions which might be drawn from these results should be definitely tempered.

Rockwell (1967) failed to replicate the results of Blatt and her co-workers. In the Rockwell study, 30 boys of average or above average intelligence who had previously taken the

WISC were selected from the files of the Child Development Clinic at the University of Minnesota. Half of the 30 cases were those of boys whose folders contained statements about bodily concern. These 15 cases served as the experimental group and they were matched for WISC Full Scale IQ with a comparable group that had no history of bodily concern. No significant differences were found between the two groups on the OA or any other WISC subtest. An independent analysis of individual items on the OA also yielded negative results. Both of these studies can be criticized for using data originally collected for other purposes.

In a similar but apparently less rigidly conducted study Faterson in Messick and Ross (1962) found that articulateness of body concept as reflected in figure drawings was significantly related only to those parts of an intelligence test which involve the global analytical dimension. Faterson was interested in the degree of articulateness of body concept, that is, of the extent to which the body is experienced as having limits or boundaries, and discreet yet interrelated parts within those boundaries. The measures of body articulateness were figure drawings rated on a five-point scale designed to yield a single, overall rating. The drawings of a group of 30 ten-year-old boys were correlated with their performance on the Wechsler Intelligence Scale for Children. It was found that the drawings correlated significantly only with performance on the Block Design, Picture Completion, and Object Assembly subtests, but were not significantly related to scores on verbal subtests. Some support is furnished for the hypothesis that the manner in which we view ourselves relates to the way we deal with external objects. Faterson presents this

study as being of the pilot or exploratory type, the results of which are meant to be more suggestive than definitive.

It is evident from the several studies just reviewed that more rigorously executed studies are needed before we can say with confidence that a meaningful relationship exists between body image and cognition.

The review of the literature thus far has focused on body image and its possible relationship to cognitive factors. The orientation will now be on cognitive factors and their personality correlates. By approaching the review of the literature in this fashion the emphasis can be placed on cognitive as well as on personality factors. However, regardless of whether we look at the cognitive correlates of personality factors or the personality correlates of cognitive factors, it is surprising to see how few empirical attempts have been made to examine the relationship between personality organization and intellective processes.

The principal cognitive task used in the present research is one of concept formation. One of the earliest and most meaningful studies in the area of personality and concept formation was conducted by Romanow (1958). Her study dealt with the acquisition of concepts associated with interfering responses of varying strength as a function of two drive level indicators: manifest anxiety and ego involvement. Two separate studies were conducted, one to test manifest anxiety as a drive indicator and the other to test ego involvement. In Experiment I, three groups of 31 Ss who differed in degree of manifest anxiety as measured by the Taylor Manifest Anxiety Scale were used. In Experiment II, ninety volunteers were divided into three groups of 30 Ss each and given different ego-involving

instructions. With the exception of the additional ego-involving instructions in Experiment II, the tasks for the two experiments were the same. In both cases Ss were presented with lists consisting of 24 nouns presented repeatedly in a series. The stimulus nouns formed six concepts of four nouns each, since one particular descriptive response was correct for the four different nouns in the list. For two of these concepts (i.e., two "sets" of four nouns) the correct response was attached to the stimulus with high associative strength; for two of the other concepts, the correct response was one of moderate associative strength, and for the remaining two concepts, the correct response was one of low associative strength. Strength of tendencies competing with the correct response varied inversely with associative strength of the correct response. S was told that he would see a series of 24 nouns and that he was to give a response to each noun, a sensory adjective describing the object in the simplest way. When S gave a response within the four-second period E told him whether the response was "right or wrong." The study with the anxiety groups confirmed the theory to some extent since the high anxiety group did more poorly than the other groups where interfering tendencies were strong. The expected relationship between the anxiety and ego involvement groups was inferior when interfering tendencies were strong. In terms of method used this study is quite adequate, although since it is theoretically based on Hullian theory, only very general implications for other similar types of studies can be drawn from its results. One implication is that non-cognitive factors affect concept formation to the extent that the cognitive task facilitates the activity of these non-cognitive factors.

Davis (1965) studied the possible effect of anxiety on selection strategies. This study is important in that it represents one of the few studies dealing with both a personality factor in the form of anxiety and the selection strategies of the Bruner, Goodnow & Austin (1956) paradigm. Davis in his research was also interested in the effects of verbal intelligence and task instruction on selection strategies. The method used involved dividing 48 Ss into two levels of vocabulary proficiency as measured by the Verbal subtest of the Wechsler Adult Intelligence Scale. These two groups of Ss were then subjected to two types of task instructions as well as two levels of stress. It was found that verbal intelligence had a substantial effect on the utilization of selection strategies and cue utilization (i.e., profiting from task instructions). Cue utilization was most likely to occur among brighter Ss operating in a somewhat stressful situation, one which produced anxiety. More particularly, it was discovered that the high vocabulary group made fewer errors and redundant card choices. As the number of problems increased from four to eight, increased reliability resulted. With respect to the factor of anxiety, no clear-cut relationship could be established between it and selection strategy. Davis explains this by questioning the efficacy of his stress task in producing significant anxiety increases. The real value of Davis' research does not lie in the specific results that he obtained since he was not able to demonstrate the main effect of anxiety on selection strategies. However, the interaction that he found between verbal intelligence, task instruction, and anxiety suggests that personality factors must be considered as influences which affect selection strategies or problem-solving efficiency.

Another study in which the Bruner, Goodnow & Austin (1956) paradigm was used was one conducted by Eiferman (1965). A conjunctive concept attainment task was used. The purpose of her research was to investigate what happens to systematic and consistent response patterns over a series of problems. The analysis was based, in addition to the card choices used in previous experiments, on Ss' verbal reports about each of their choices. Several findings emerged from this study. First, it was found that a positive correlation existed between the ability to justify one's card selection verbally and efficiency in concept attainment. Secondly, a majority of Ss became systematic in their response pattern after having been exposed to a few problems of the same type. Lastly, a good number of Ss after having attained systematic response patterns became unsystematic again for a shorter or longer run. In terms of Eiferman's research, the most important finding was that efficiency in concept attainment is closely related to the ability to justify one's card selection. This finding lends support to the hypothesis that persons with good body images would be superior in concept attainment since they would have greater ability to justify the card selections than persons with poor body images.

Amster (1965) studied the relation between intentional and incidental concept learning under conditions of multiple stimulation. Her research is very much apropos to the present writer's research for several reasons. As in the present study, her research permits the study of intentional and incidental learning separately and in relation to each other; her condition of multiple stimulation is comparable to the simultaneous presentation of barrier and penetration words in the

present study; and, what Amster describes as high and low interference prone subjects, seems theoretically close to what has been called high and low barrier individuals./ Furthermore, as in the present research, Amster's subjects were undergraduates ranging in age from 18 to 25 years. The experimental task consisted of two slightly different perceptual designs called "Zaregs" which were presented for a period of 2.5 seconds. Interspersed between the "Zaregs" were positive, negative, or neutral stimuli. An example of a positive stimulus was a picture of a child with a pleasant expression. Intentional subjects were told to attend to the "Zaregs" and the incidental subjects were requested to notice features in the interspersed photos. Three measures of recall were made at two-minute intervals following the presentation of the various stimuli. Interference proneness was determined by means of the Stroop Color-Word Test. The results indicate that differences between intentional and incidental learning are greatest under conditions of multiple stimulation, incidental learning being significantly reduced and intentional learning being relatively unaffected. It was further found that low-interference-prone subjects showed better recall under intentional set than high-interference-prone subjects but the low-interference-prone subjects were poorer under incidental set.

With respect to the incidental learning phase of the proposed research, the following can be stated. The present writer is not aware of any research which has dealt specifically with how body image affects the learning of incidental materials. Fisher's (1965) previously mentioned study was similar to research dealing with incidental learning in that his Ss were presented with stimulus words and a recall test was used to

measure retnetion of selected words. However, all of the stimulus words were presented with the implication, at least, that all of them were to be intentionally, not incidentally learned.

Even though there are no studies that are directly applicable to the research at hand, some facts about incidental learning in particular and how such learning is affected by a personality factor like motivation would be of value. Postman in Melton (1964) states that the strategy of research has been to scrutinize under incidental conditions functional relations known to obtain in intentional learning. Or to put it another way, how does recall change when instructions to learn are omitted? Therefore, according to Postman, "incidental" and "intentional" learning are defined primarily by categories of instruction stimuli. Two basic incidental learning paradigms have been developed. In Type 1 the S is exposed to the stimulus materials but given no instructions to learn. Following the exposure, his retention is tested unexpectedly. In Type II the S is given a specific learning task but during practice is also exposed to materials or cues which are not covered by the learning instructions. The present research will employ a Type II design. Of importance in this type of design is the orientation task. Such a task should meet two requirements: First, it should insure that the S perceives the incidental stimulus materials. Secondly, it should minimize the development of uncontrolled sets to learn.

Brown (1954) studied factors influencing incidental learning. He used four groups of 20 Ss each and presented them with either four or eight trials of incidental learning of either words or syllables. The Ss pronounced the names of the items for the alleged purpose of having their speech recorded

and studied. An additional experimental group was treated comparably except that no pronunciation was employed. Learning was done by means of the anticipation method, and the first anticipation score was taken as a measure of incidental learning. The results are as follows: Under all conditions intentional learning is consistently superior to incidental learning. Overt pronunciation was not found to be a factor influencing incidental learning. It was further found that words were no easier to learn than syllables under the conditions of incidental learning, whereas with intentional learning, words were the easier materials. Lastly, significantly more learning was accomplished by eight than by four trials with both incidental and intentional learning.

In a significant review article on motivation and cue utilization in intentional and incidental learning, Kausler & Trapp (1960), speaking from a Hullian-Spencian theoretical framework, make the following point: Task difficulty, generalized drive levels, and levels of incentive-oriented motivation have an interaction effect upon the amount of incidental learning; that is, when performing easy tasks which require little concentration, high generalized drive Ss should display more incidental learning than low drive Ss. When performing difficult tasks, because of a funneling of the perceptual range with regard to incidental cues in combination with increase in drive level, low drive level Ss should display superior incidental learning. Davis' (1965) study of concept formation indicates that incidental learning is affected by a complex interaction of task variables, e.g., anxiety and degree of motivation engendered by the instructions. These factors all suggest that the incidental learning task to be used in the

proposed research should prove to be a discriminator between high and low barrier individuals since they supposedly differ on the variables of motivation, at least.

CHAPTER III

METHOD

Design

A 2x2x2 factorial design with repeated measures for six concept learning problems was used with the following variables: (a) barrier score (high or low); (b) penetration score (high or low); (c) sex of subject (male or female).

Subjects

Ninety-six psychology students, ages 18 to 25 inclusively (See Appendix F), were assigned to each of eight groups on the basis of their respective (a) sex, (b) barrier score (high or low), and (c) penetration score (high or low). The eight groups represent the eight possible combinations of barrier score, penetration score and sex of subject. Group #1, for example, is comprised of high barrier high penetration males. Barrier and penetration scores were determined by means of the Holtzman Test Form A administered in group form. The Holtzman Test (Holtzman 1958, 1961), it was felt, was particularly well suited as a measure of barrier and penetration scores since these two factors were considered and included by Holtzman as part of the twenty-two variables measured by his test. At the time that Holtzman (1961) decided to incorporate barrier and penetration scores as variables in his test he thought that the Fisher and Cleveland (1958) system seemed unduly arbitrary at several points. He believed that since barrier and penetration are highly complex heterogeneous variables, some revision of the variables might have been desirable prior to incorporating them into the Holtzman Inkblot Technique. Notwithstanding these

considerations, he decided that by including these variables at that time, data obtained in standardizing the test would make refinements of the barrier and penetration variables possible. Furthermore, he believed that the basic concepts had been examined in enough different contexts to warrant their inclusion in the original form of the test. It might be added that Holtzman (1966) did not later find the need to revise these two variables.

Another advantage of this test was the availability of a standardized and validated method of group administration (Swartz and Holtzman, 1963).

The instructions and procedure for the group administration of the Holtzman Test were as follows:

> "You will be shown a series of inkblots, each of which will be projected on the screen before you for one minute or so. Using your imagination, write down in the space provided a description of the first thing the blot looks like or reminds you of.
>
> "Include in your description the particular characteristics or qualities of the inkblot which are important in determining your response--i.e., what about the blot made it look that way? Give as complete an answer as you can in the time available.
>
> "None of these inkblots has been deliberately drawn to look like anything in particular. No two people see exactly the same things in a series of inkblots like these. There are no right or wrong answers.
>
> "(Trial inkblot X is projected on the screen) A common or frequently given response to this inkblot is a "bat or winged creature." (Outline on the screen the area of the inkblot used in this response W, omitting the d's on each side; point out the various parts of the "bat"--head, wings, tail.) As you can see the form of the blot is important in giving us the impression of a winged

creature. On your answer sheets you might write "bat because of form" in the space provided and outline on the diagram the area that you used. Another common response to this inkblot is a "pool of oil." With such a response color and shading would be more important. And another response might be a "steer's head," looking at this area right here. With this response such things as form, color, and shading could enter in.

"On this next card a commonly given response is a "human figure." Here form would be important in determining or suggesting this response. Another response might be a "skeleton" where form and shading could be important. Finally, still another response to this inkblot is "blood." Here color is the main factor in suggesting the response.

The initial instructions are repeated (paraphrased), and the examinees are asked if they have any questions. At specific points during the administration previously given instructions are again emphasized or elaborated upon. The author calls this verbal reinforcement.

Card Two--"Write out as complete a description as you can in the time and space available." Card Three--"Just let your imagination run, and put down what the inkblot suggests to you--what you see in it." Card Six--"This is another one of those blots where you'll have to be careful in outlining that part of the area which you use." Card Eight--"Write out as best you can what characteristics of the inkblot were deciding factors in your response." Card Nine--"Be sure to draw a line around that part of the blot that suggested your response." Card Fourteen--"We're particularly interested in knowing what aspects of the inkblot influenced your response." Card Nineteen--Same as for Card Nine. Card Twenty-Four--Same as for Card Two.

Inkblots 1, 2, and 3 are each exposed for 120 seconds; inkblots 4, 5, and 6 for 100 seconds; inkblots 7, 8, and 9 for 90 seconds; and the remaining thirty-six inkblots are each exposed for 75 seconds.

Lastly, but most importantly, the Holtzman was used

because it is a well-standardized, psychometrically sophisticated instrument, an inkblot technique developed expressly to correct some of the deficiencies of the Rorschach (Buros, 1965).

Approximately two hundred students were tested before the criteria of high or low barrier and penetration score was assigned. Any score which fell in the upper thirty-fifth percentile was called high and a score which fell in the bottom thirty-fifth percentile was considered to be a low score. (See Appendix G for Holtzman scores of the eight treatment groups) Some thought was given to using the upper and bottom quartiles as cut off scores, however, Scott & Wertheimer (1962) caution against using very extreme groups when the variables being related are not necessarily linearly related as is the case with the concepts of barrier and penetration. The choice was, therefore, between selecting for very extreme groups, i.e., upper and lower quartiles, or choosing less extreme groups as was done in this case. By so choosing it was further assumed that the relationships which would emerge would be more definite and generally applicable.

Stimulus displays

The problem materials consisted of two 28 x 44-in. white posterboards, each containing a 6 x 8 array of 48 4 x 7-in. cards drawn in colored ink. (See Appendices A & B) The 48 cards represented all possible combinations of four attributes with two values each. On one side of the posterboard the stimuli were presented verbally and on the other side of the board the same stimuli were presented in pictorial form. The presentation of verbal and pictorial stimuli was done to determine if body image groups respond differentially to manner

of stimulus presentation. The four attributes and values to be considered included the following: (a) size--large or small; (b) number--one or two; (c) color--red or green; (d) borders--one or two. (See Appendix C for all possible conjunctive concepts) The verbal or pictorial stimuli consisted of eight words defined as penetration words, eight words defined as barrier words, and eight words defined as neutral words. The barrier and penetration words are taken from Fisher and Cleveland (1958). The neutral words are provided by the present writer. An empirical validation of the neutrality of the words chosen by this writer was conducted. For the results of this validation study see Appendix I. Analysis of this table reveals that 10 graduate students in clinical psychology were able to sort barrier, penetration, and neutral words with the same degree of proficiency for barrier and neutral words and somewhat greater proficiency for penetration words. All words were equated for length and frequency of occurrence in the English language as specified in the Lorge and Thorndike work (1944) on word frequency. (See Appendix H) On the pictorial task one-half of all objects presented were pictured as broken or otherwise damaged. Fisher (1965) found a discrepancy in recall between words or objects indicating poor boundaries and those depicting actual mutilation. The purpose in presenting one-half of all objects as actually broken was to determine if the subject would show differential memory for poor body boundaries and/or actual mutilation of objects. The arrangement of cards in the stimulus displays was an ordered one; that is each of the 48 stimulus cards was systematically varied with respect to attributes and values. All cards were arranged in rows and the numbers from 1 to 48 were placed in the upper left corners of

the cards.

Problems

One-half of the subjects in each group were presented with the three verbal concept problems first and then the three pictorial concepts; the other half of the group received pictorial first and verbal problems second. All Ss within the verbal or pictorial display received the six problems in a randomized order. As can be noted in Appendix C, there are 22 different problems or concepts that can be used. These problems quite possibly involve different levels of complexity. To insure that level of complexity among problems would not confound the performance of the eight treatment groups, the six problems were randomized for all subjects in all groups using a table of random numbers. In order to control for the possible influence that the particular start-off card and the board sector might have on a subject's subsequent card choices, the three sectors of the board were also randomized for all subjects. It was felt that randomization would insure that adherence to a particular board sector was probably due to personality rather than procedural variables.

Procedure

The instructions used explained the meaning of conjunctive concepts and the nature of the task, pointing out the attributes and values and the ordered or random arrays and emphasizing that the problems were to be solved in as few card choices as possible, regardless of time (Laughlin, 1964). The specific instructions used were as follows:

> "This is an experiment in thinking. There are 48 cards on this board, arranged in 6 rows of 8 cards each and

numbered from 1 to 48. These cards are all the possible combinations made by taking 2 colors (red or green); 2 sizes of words or objects (large or small); number of words or objects (one or two); and number of borders on card (one or two). In other words, we have 4 attributes (color, size, number, border). Each of these 4 attributes has two qualities, i.e., for size the two values are large and small. The 8 values mentioned can be combined in a number of various ways.

"Now these cards can be categorized or grouped together in a large number of possible ways by following a specified rule. This rule defines a concept, and a concept is the group of all cards that satisfy the rule. The rule is that the card must have both a particular value, i.e., red in combination with another value, i.e., one border. That is, one concept might be 'red and one border.' Example--Could you tell me what all the values are on card #20?

"In the problem that I will present to you I will have some concept in mind and your job will be to determine what it is. I will start you off by giving you the number of one of the cards that is included in the concept; that is, one of the group of cards that exemplify the concept that I have in mind. Then you will select any card you wish to in order to get information as to whether the card you select is also included in the concept.

"If the card you selected is included in the concept, I will say, 'yes' and if the card you selected is not included in the concept I will say 'no.' To be included it must exactly satisfy the rule.

"Then you will make a hypothesis as to what concept you think I have in mind. If your hypothesis is correct, I'll say 'yes' and you will have solved the problem. If your hypothesis is not correct, I'll say 'no'.

"If I say 'no' you select another card, and again I'll say 'yes' or 'no' depending upon whether the card you select is included in the concept, and again you will make a hypothesis and I'll say 'yes' or 'no' to the

hypothesis. So you keep repeating the procedure of selecting a card and making a hypothesis until you've solved the problem. If you do not wish to make a hypothesis after each card choice you need not do so.

"The object is to solve the problem in as few card choices as possible, regardless of time."

Now that the materials, problems, and procedure of the concept formation task have been described, the incidental learning phase of the experiment will be discussed. (See Appendices D & E for some scoring sheets for problems and incidental learning) McLaughlin (1965) states that a recall task is a more discriminating test of incidental learning than is a recognition type of task. For this reason a recall task was employed in this study. The subjects were told that they had ten minutes to recall and write on a sheet of paper as many of the words and/or objects that they could recall from the concept formation phase of the study. In addition, the subjects were asked to check whether or not the object recalled was pictured as distorted. For all subjects the incidental learning task followed immediately after the completion of the concept formation task.

CHAPTER IV

RESULTS

The results of this study will be presented and discussed in terms of the three hypotheses that this research sought to test. Findings that emerged incidentally or as "by-products" will also be discussed with reference to these three hypotheses.

Before presenting the results of this study, focusing strategy and untenable hypotheses will be defined and scored. The rules for focusing strategy were those used by Laughlin (1965, 1966). The three rules are: 1) Each card choice will have to obtain information on one new attribute and new information is considered obtained if the card altered only one attribute not previously proven irrelevant (conservative focusing) or, if more than one attribute was altered (focus gambling) or, the ambiguous information correctly resolved on the next card choice by altering only one attribute. 2) If a hypothesis is made it has to be tenable considering the information available. Untenable hypotheses are of two types: (a) a hypothesis for a value of an attribute when the other value had previously occurred on a positive instance. (b) a hypothesis for a value which had previously occurred on a negative instance. 3) Neither the card choice nor hypothesis can be a repetition of a previous card choice or hypothesis. Card choices and their accompanying hypotheses which satisfied these three rules were counted as instances of focusing and the total number of such instances was divided by the total number of card choices to give a continuous focusing score from 0

to 1.00. In order to control for the fact that the number of hypotheses varies from problem to problem, the number of untenable hypotheses was divided by the number of hypotheses. For each problem it was then possible to compute what percentage of all hypotheses made were untenable.

Hypothesis I predicted that barrier score would be significantly related to efficiency on problem solving and incidental learning, with individuals high on the barrier dimension being more efficient than those who are low on this dimension. Barrier score in itself did not affect overall problem solving and/or incidental learning efficiency. However, on two of the efficiency measures--card choices and time--a main effect of sex was found. On card choices males required fewer card choices to solve problems $F(1,88) = 7.50$, $p < .01$. For group means for problem solving tasks refer to Table 5. The same relationship was noted for problem solving time with males requiring less total time for the six problems $F(1,88) = 5.18$, $p < .05$. These findings suggest that males do better than females on this type of concept task. Also, on the measure of time, a main effect of penetration was discovered pointing to the fact that individuals high on penetration require less problem solving time $F(1,88) = 8.37$, $p < .01$. This finding is opposite to what was predicted in Hypothesis I. In view of other results still to be presented this finding could suggest that individuals high on penetration are more open to the emotional impact of all stimulus words and objects than are persons who must defend themselves especially against penetration and/or broken objects. The results thus far presented can be found in Table I.

The majority of significant findings related to problem

TABLE 1

ANALYSIS OF VARIANCE OF PROBLEM SOLVING EFFICIENCY MEASURES

Source	df	Card Choices MS	F	Untenable Hypotheses MS	F	Focusing MS	F	Time MS	F
Between Subjects									
Barrier (B)	1	.03		.04		.04		6.02	
Penetration (P)	1	22.56		.07		.06		207.60	8.37**
Sex (S)	1	81.00	7.50**	.12		.25		128.39	5.18*
B X P	1	3.36		.04		.12		57.57	
B X S	1	3.06		.01		.11		7.08	
P X S	1	7.11		.21		.24		78.33	
B X P X S	1	.03		.29	4.15*	.03		1.14	
Error (B)	88	10.80		.07		.23		24.80	
Within Subjects									
Trial (T)	5	8.18		.11		.32	2.63*		
T X B	5	15.83	2.39*	.06		.03			
T X P	5	12.62		.10		.06			
T X S	5	11.56		.09		.10			
T X B X P	5	3.80		.02		.04			
T X B X S	5	1.72		.02		.05			
T X P X S	5	2.53		.30	4.65**	.10			
T X B X P X S	5	3.83		.12		.13			
Error (W)	440	6.61		.06		.12			

*p < .05

**p < .01

solving efficiency are in terms of interactions where the effect of barrier on efficiency is dependent on its relationship to the variables of sex, penetration, and efficiency over trials. A significant three way interaction of barrier, penetration, and sex exists for untenable hypotheses $F(1,88) = 4.15$, $p < .05$. Inspection of Figure 1 shows that the interaction effect of barrier and penetration is completely reversed for the sexes. Using Duncan multiple-range comparisons and summing over barrier, penetration, and sex, the following findings were obtained. Males who are high on both barrier and penetration make fewer untenable hypotheses ($p < .01$) than females who are high on these two dimensions. With subjects who are low on the penetration dimension, sex interacts with barrier in such a way that females who are high on barrier make fewer untenable hypotheses ($p < .01$) than their male counterparts. For subjects who are low on both barrier and penetration, males did better than females ($p < .05$). Finally, males low on barrier and high on penetration made fewer untenable hypotheses than their female counterparts ($p < .05$). The interaction effect just described is not merely one isolated finding, but rather is characteristic of several interactions suggesting that problem solving efficiency can be considered not only in terms of high and low barrier but in terms of complex interactions of barrier, penetration, and sex. As was mentioned previously barrier, when considered separately, does not differentiate efficient from inefficient problem solvers any better than do the factors of sex and penetration taken individually. Yet, barrier does interact with penetration and sex to affect problem solving efficiency. For the measure of total incidental words recalled

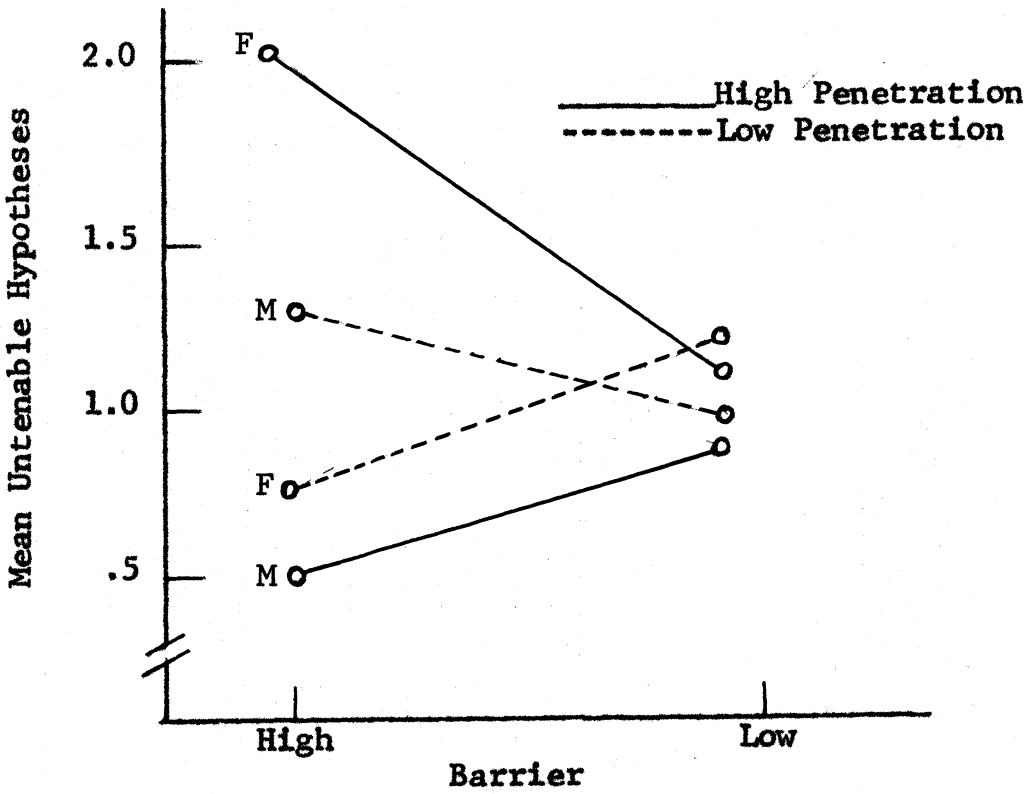


FIGURE 1. Mean number of untenable hypotheses made as a function of barrier and penetration levels.

there is significant interaction of barrier and penetration $F(1,88) = 6.45$, $p < .05$. Figure 2 draws attention to the fact that individuals who are high on barrier show greater recall when they are also high on penetration than when they are low on the latter dimension. Subjects who are low on barrier demonstrate greater recall when they are also low on penetration than when they are high on this measure. It should be noted that persons who are high on both barrier and penetration show the greatest amount of incidental learning over all. For group means for incidental learning tasks refer to Table 6. The barrier and penetration interaction just described exists not only for total words recalled but also for barrier words recalled $F(1,88) = 4.93$, $p < .05$, and for penetration words recalled $F(1,88) = 5.11$, $p < .05$ (See Table 3). Efficiency on incidental learning tasks, therefore, seems to be related not to barrier score or penetration score taken separately but rather on their interrelationship. Persons who have like barrier and penetration scores tend to perform more efficiently on incidental learning tasks than do persons with dissimilar barrier and penetration scores. On another measure of efficiency, ability to correctly specify from memory which objects were pictured as broken and/or mutilated, a three way interaction of barrier, penetration, and sex was found (See Table 3). In this instance all groups who were low on barrier were more accurate in specifying brokeness or wholeness than the groups who were high on barrier. This finding was, however, not true for high barrier males who were also low on penetration. This group showed the greatest accuracy on object specification. With the exception of this group, individuals who were high on penetration and low on barrier were more accurate than those

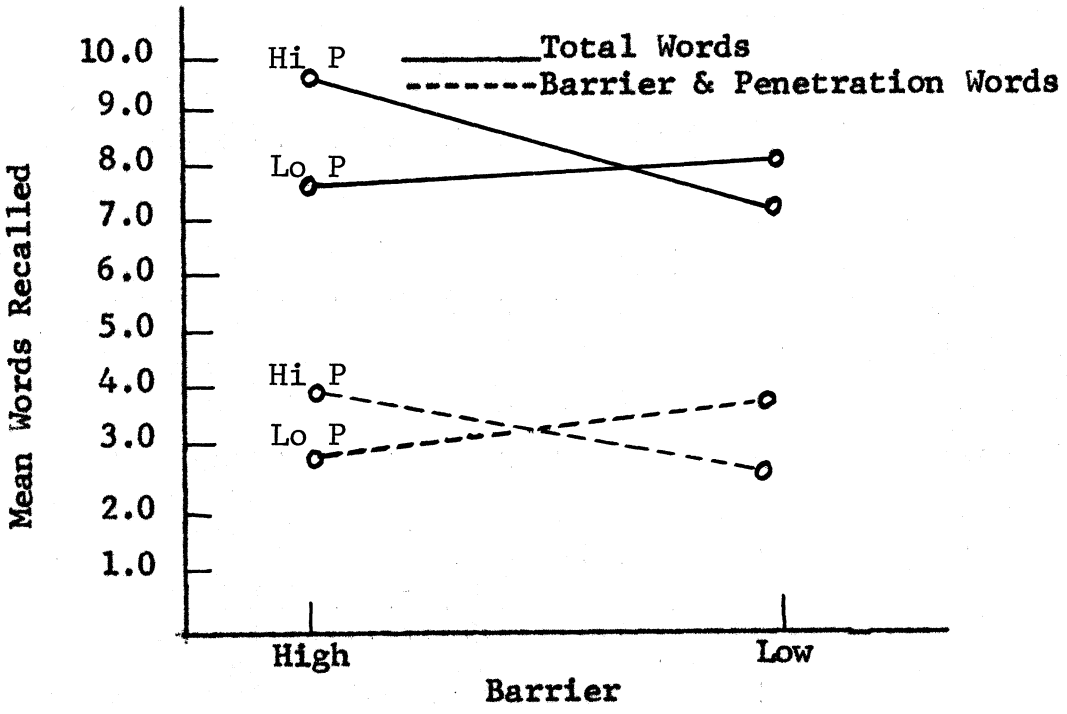


FIGURE 2. Mean total words, barrier words, and penetration words recalled as a function of barrier and penetration levels.

TABLE 2

ANALYSIS OF VARIANCE OF PROBLEM SOLVING RESPONSE MEASURES

Source	df	Verbal-Pictorial Barrier Cards MS	F	Penetration Cards MS	F	Neutral Cards MS	F
Between Subjects							
Barrier (B)	1	.08		10.01		6.00	
Penetration (P)	1	67.68		17.51		37.50	
Sex (S)	1	243.00		61.76	5.86*	37.50	
B X P	1	10.08		3.76		.17	
B X S	1	9.18		71.76	6.81*	6.00	
P X S	1	21.33		3.76		48.17	4.17*
B X P X S	1	.06		33.85		8.17	
Error (B)	88	325		10.54		11.54	
Within Subjects							
Trial (T)	1	35.04					
T X B	1	44.08	4.29*				
T X P	1	7.52					
T X S	1	.08					
T X B X P	1	5.40					
T X B X S	1	58.53	5.70*				
T X P X S	1	.35					
T X B X P X S	1	31.93					
Error (W)	88	10.27					

*p < .05

**p < .01

TABLE 3

ANALYSIS OF VARIANCE OF INCIDENTAL LEARNING MEASURES

Source	df	Total Inc. Words		Barrier Words		Penetration Words		Neutral Words	
		MS	F	MS	F	MS	F	MS	F
Barrier (B)	1	20.16		1.54		5.10		1.76	
Penetration (P)	1	15.04		.21		.77		7.59	4.93*
Sex (S)	1	1.50		.17		.51		6.51	
B X P	1	35.04	6.45*	6.95	4.93*	14.82	5.11*	1.26	
B X S	1	13.50		7.00	4.96*	.33		.66	
P X S	1	.04		1.00		.50		.50	
B X P X S	1	5.05		.23		4.10		.47	
Error (B)	88	5.43		1.41		2.90		1.84	

*p < .05

**p < .01

who were low on penetration. However, using Duncan multiple-range comparisons and summing over barrier, penetration and sex, none of these groups differed significantly from one another. The data just presented supports Hypothesis I only in the case of high barrier-low penetration males. It therefore seems that for most of the subjects keen awareness to the integrity or lack of integrity of objects is related to having a high penetration score.

Not only do the variables of barrier, penetration, and sex interact to affect overall problem solving efficiency but they also interact to affect a person's performance over problems. An analysis of variance for cubic trends reveals a significant difference ($F(1,5) = 30$, $p < .01$) of profiles for high and low barrier subjects over problems. Generally speaking, high and low barrier subjects differ in the number of card choices they make as they are exposed to more and more problems. Inspection of Figure 3 shows that low barrier subjects initially require fewer card choices to solve concept problems than do high barrier subjects. However, as exposure to problems takes place, high barrier individuals improve substantially whereas, low barrier persons become less efficient. Eventually then, high barrier persons require fewer card choices to solve a problem than do persons low on the barrier dimension. The degree of significance of this trial x barrier interaction is $F(5,440) = 2.39$, $p < .05$. On another problem solving measure--untenable hypotheses--a three way interaction of trial, penetration and sex was found. Table 1 shows that this interaction is significant $F(5,440) = 4.65$, $p < .01$. An analysis of linear trends shows a singificant difference ($F(1,7) = 26$, $p < .01$) of un-

TABLE 4

ANALYSIS OF VARIANCE OF INCIDENTAL LEARNING MEASURES

Source	df	Whole Objects		Broken Objects		Barrier Minus Penetration		Whole Minus Broken		Percent Correct	
		MS	F	MS	F	MS	F	MS	F	MS	F
Barrier (B)	1	2.66		8.76	5.47*	.66		1.26		1.12	
Penetration (P)	1	.38		5.51		.01		3.76		1.07	
Sex (S)	1	1.50		.84		.04		5.51		9.01	
B X P	1	7.04		12.86	8.04**	1.50		.51		2.75	
B X S	1	6.00		.80		5.04		3.04		1.62	
P X S	1	1.83		1.26		2.04		3.76		1.05	
B X P X S	1	1.63		.21		7.04		1.26		13.00	5.37*
Error (B)	88	3.25		1.60		4.27		3.97		2.42	

*$p < .05$

**$p < .01$

TABLE 5

MEANS FOR PROBLEM SOLVING TASKS

	Groups							
	1 HHM	2 HHF	3 HLM	4 HLF	5 LLM	6 LLF	7 LHM	8 LHF
Card Choices	3.15	4.23	3.89	4.59	3.91	4.25	3.42	4.36
Unten. Hypot.	.082	.183	.197	.148	.156	.187	.150	.184
Focusing	.583	.624	.628	.559	.655	.559	.579	.536
Verbal	9.17	10.58	11.33	13.17	11.66	13.25	9.50	13.93
Pictorial	9.75	15.08	12.25	14.42	11.92	12.66	11.33	11.92
Barrier Cards	4.92	9.83	7.75	9.50	7.25	7.92	7.58	6.66
Pen. Cards	6.50	8.08	8.66	8.58	9.17	8.92	6.00	9.75
Neutral Cards	7.58	7.66	6.66	9.58	7.17	9.00	7.42	9.33
Time	14.16	17.83	19.41	20.25	19.00	20.00	15.75	20.50

TABLE 6

MEANS FOR INCIDENTAL LEARNING TASKS

	1 HHM	2 HHF	3 HLM	4 HLF	5 LLM	6 LLF	7 LHM	8 LHF
Tot. Inc. Words	9.92	10.00	7.50	8.41	9.00	7.50	8.08	7.58
Barrier Words	2.75	3.66	2.42	2.75	3.16	2.58	2.58	2.25
Pen. Words	3.75	4.00	2.50	3.16	3.42	3.00	2.33	2.83
Neutral Words	3.42	2.58	2.58	2.50	2.42	1.92	3.17	2.50
Whole Objects	4.92	4.66	3.75	4.50	4.83	3.83	4.17	3.66
Broken Objects	4.66	5.17	3.58	3.83	3.47	3.75	4.00	3.66
Barrier-Pen.	3.83	5.17	4.92	4.58	4.75	4.58	5.25	4.58
Whole-Broken	5.25	4.50	5.17	5.66	5.83	5.17	5.75	4.75
Percent Correct	6.75	6.92	7.50	6.42	6.58	6.83	7.25	7.17

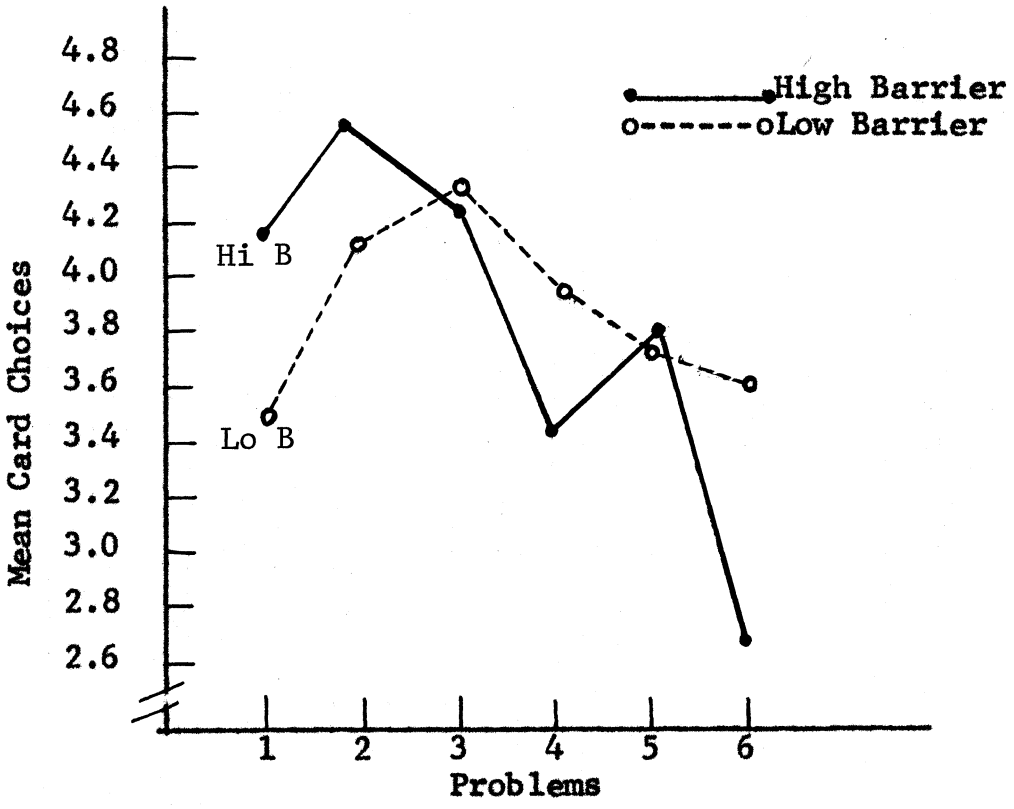


FIGURE 3. Mean number of card choices made for each of six concept problems as a function of barrier level.

tenable hypotheses at different levels of penetration, sex and trials. More specifically, if a best fitting straight line were drawn for untenable hypotheses over trials it would have a different slope for males than it would for females and a different slope for high penetration individuals than it would for those low on the penetration dimension. A view of Figure 4 reveals that both high and low penetration males do at least as well on the sixth problem as they did on the first. The low penetration males make many more untenable hypotheses initially but then improve to the point where they surpass the performance of the high penetration male groups. Just as both high and low penetration males finish at the same level of efficiency so both high and low penetration females achieve the same degree of proficiency. Here again, however, the route taken by the low penetration groups is different than that taken by the high penetration groups. Unlike their male counterparts, females who are low on penetration begin by making relatively few untenable hypotheses but their performance then shows a sharp decline followed by a moderate recovery. Females who are high on penetration show little variations in their performance over problems beginning at an intermediate level of efficiency and concluding at a somewhat less efficient level. Duncan multiple-range comparisons summing over penetration, sex, and problems, produced the same significant differences among the 8 treatment groups. These findings were mentioned previously when discussing untenable hypotheses.

As was mentioned in the introduction to this chapter, several incidental findings relating to problem solving efficiency were found. These findings will now be presented. On

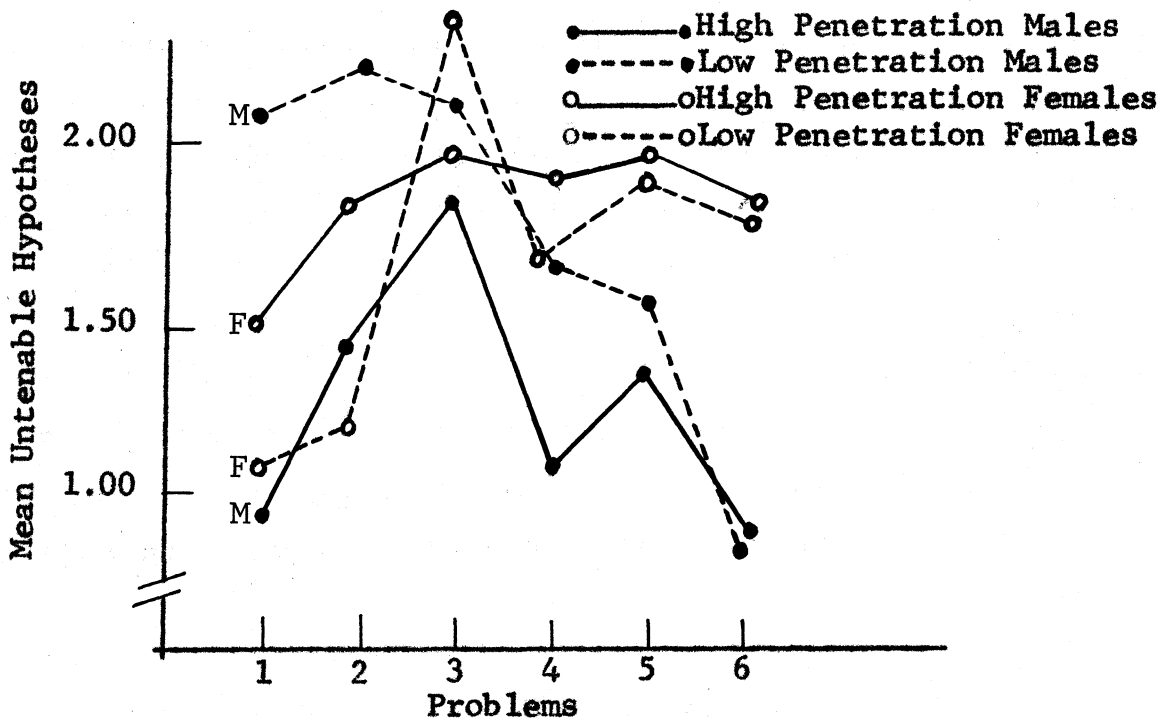


FIGURE 4. Mean number of untenable hypotheses made for each of sex concept problems as a function of sex and penetration levels.

the measure of focusing, a significant main effect of trials was found $F(5,440) = 2.63$, $p < .05$. Inspection of the means for focusing for the six concept problems shows that all subjects used more focusing as they went along. A significant analysis of variance for linear trends ($F(1,41) = 18.7$, $p < .001$) exists. This suggests that if a best fitting straight line were drawn for amount of focusing, the slope of this line would be different for the first, third and sixth problems. This finding underlines the fact that while subjects used more focusing as they went along but the increase in focusing was not a consistent one. For example, subjects used less focusing on the second problem than they did on the first. That is, individuals become more efficient problem solvers with practice. The intercorrelation matrices to be found in Appendix J reveal some significant relationships among the various measures of problem solving efficiency. Some of the more notable relationships to emerge are the following: The more card choices made by a person, the more time is needed to solve the problem ($r = .54$). There is also a positive relationship between number of card choices and untenable hypotheses ($r = .69$). Some findings that relate to body image measures are the positive relationships between penetration cards and total card choices ($r = .63$) and pictorial concepts and untenable hypotheses ($r = .62$). These findings could suggest that subjects who are too responsive to the emotional impact of stimuli are adversely affected in their problem solving as a result. It should be noted that a part-whole correlation (McNemar 1955, p.164) was performed for certain correlations. This correction was done since in certain instances the correlation involved correlating

a subscore with a total score of which the subscore was already a part. To do a Pearson r correlation in such a case would have resulted in obtaining a spuriously high correlation.

A perusal of Appendix K reveals two significant negative relationships between the efficiency measures of total words recalled and percent accuracy with the difference between number of barrier and penetration words recalled. These relationships suggest that the greater differential memory one shows for barrier and penetration words, the fewer total incidental words recalled ($r = -.49$) and the less accurate one is object specification ($r = -.21$). The most significant findings to be presented in Appendix L are the negative correlations that exist between problem solving time and total words recalled ($r = -.25$) and percent correct ($r = -.24$). These results suggest that efficient problem solvers not only require less time to solve problems but also acquire more incidental facts in a shorter time span than do poor problem solvers in a longer period of time. Another finding to be noted in this appendix is the relationship between the choice of barrier cards while solving problems and efficiency in object specification ($r = .25$). It seems that the more one focuses on barrier cards the more accurate one is when asked later to specify whether an object was pictured as broken and/or mutilated.

Hypothesis II states that persons who have well defined images of their bodies or high barrier individuals would select and recall more barrier objects. As was the case with Hypothesis I, significant relationships exist between the predicted variables but not always in the predicted direction and often interacted with other variables. It was predicted that high

barrier individuals would select more barrier cards than persons low on this variable (See Table 2). Apropos to Table 2 it should be noted that only 1 df was used for the verbal-pictorial analysis since there was a summing over barrier, penetration, and neutral words within this analysis. Furthermore, analysis over trials could not be conducted for the other three variables (barrier cards, penetration cards, and neutral cards) due to the fact that priority of choices could not be established for these variables. That is, it was possible to determine how subjects performed on verbal problems and how this was then related to their subsequent performance on pictorial problems. However, since subjects chose barrier, penetration, and neutral cards in differing orders, it was not possible to see how the choice of one of these variables i.e., barrier cards, affected the subsequent choice of another variable i.e., penetration cards. It was discovered that sex and not barrier had a main effect on number of barrier cards chosen with females choosing more such cards $F(1,88) = 5.86$, $p < .05$. Barrier did interact, however, with sex $F(1,88) = 6.81$, $p < .05$ (See Figure 5). This interaction took the form of high barrier females choosing more barrier cards than females who were low on this dimension. This aspect of the interaction is in keeping with what was predicted from Hypothesis II. For males, on the other hand, the results were in the opposite direction to what was predicted. That is, males low on barrier selected more barrier cards than those high on this dimension. With respect to incidental memory for barrier words, the two significant relationships obtained are again in the nature of interactions. The first interaction, that of barrier x penetration has been discussed previously in this chapter. Briefly stated, the number of

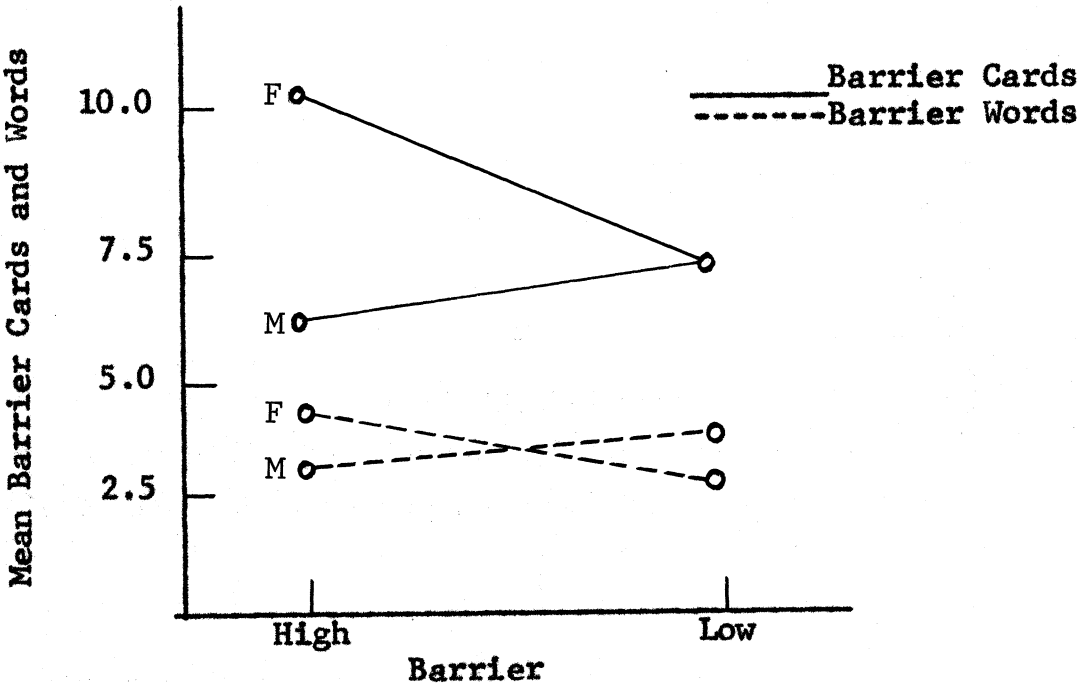


FIGURE 5. Mean number of barrier cards selected and barrier words recalled as a function of levels of barrier score and sex.

barrier words recalled was dependent on the relationship of barrier with penetration. A person who was high on barrier would recall more barrier words if he was also high on penetration. When a person is low on barrier, he has to also be low on penetration in order to recall more barrier words. The barrier x sex interaction was significant $F(1,88) = 4.96$, $p < .05$ (See Table 3). The nature of the interaction is different in this case from that of the barrier x sex interaction on card choices where the emphasis was on the barrier aspect of the interaction. Here the stress is on the sex differences. In this instance, high barrier females recalled more barrier words than high barrier males; for low barrier subjects the reverse relationship obtained with males recalling more barrier words than females. Apropos to Hypothesis II, the results presented thus far show the importance of considering sex as well as penetration when trying to establish a relationship between personal style (high barrier person) and attention and/or memory for words in keeping with such a style. Duncan multiple range comparisons were performed for both barrier cards and barrier words but the results were not statistically significant suggesting that specific groups do not differ significantly from each other. While not a predicted finding, the differential performance of high barrier subjects on verbal and pictorial stimuli is a noteworthy one (See Table 2). A trial x barrier interaction was obtained for the measure of verbal-pictorial stimuli $F(1,88) = 4.29$, $p < .05$. An analysis for linear trends reveals a significant function for trials alone ($F(1,17) = 67.8$, $p < .001$) but the slope of a best fitting straight line would not be significantly different for different levels of penetration or for males and females. This trend analysis means

that stimulus variables (verbal or pictorial stimuli) are more important in the resulting differences in performance then are barrier levels and sex. However, the present analysis shows that high barrier subjects do significantly better on verbal concepts and that low barrier subjects do significantly better on pictorial concepts. A further refinement of this finding is to be found in the significant three way interaction of trial x barrier x sex $F(1,88) = 5.70$, $p < .05$. This interaction suggests that all males and high barrier females do better on verbal concepts. Low barrier females perform very differently from the other groups in as much as they performed better on pictorial than on verbal concepts. It is this group performance that results in the superiority of all low barrier groups on pictorial concepts. Again, Duncan multiple-range comparisons were not significant. The differences of high and low barrier subjects on verbal and pictorial concepts further supports the theory that body image affects the way that people respond to objects in their environment. However, it also underlines the importance of considering body image not only in terms of barrier score but also in terms of its interrelationship to a person's sex and the degree of his penetration score.

Hypothesis III of this study states that persons who have a poorly defined view of their bodies should show a greater response to penetration and/or broken objects. As with the two previous hypotheses, no main effect support for this hypothesis was found. However, penetration does interact significantly with sex $F(1,88) = 4.17$, $p < .05$ (See Table 3 and Figure 6). More specifically, females who are high on penetration select somewhat more penetration cards than those who are low on penetration. With male subjects the relationship is reversed.

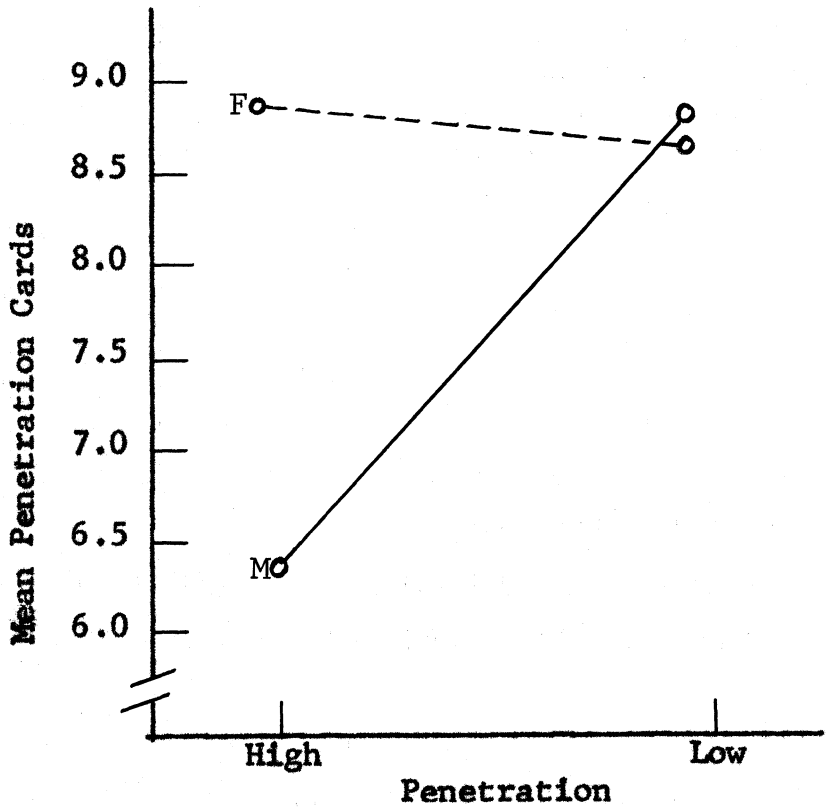


FIGURE 6. Mean number of penetration cards selected as a function of sex and penetration levels.

More specifically, low penetration males select more penetration cards. Since the direction of this interaction is identical to the barrier x sex interaction for barrier cards, it suggests that more weight can be given to the conclusions that are drawn in the discussion section of this paper. Likewise for penetration words recalled, a barrier x penetration interaction similar to that noted for barrier words was obtained. This interaction is significant $F(1,88) = 5.11$, $p < .05$. Just as with barrier words high penetration individuals recalled more penetration words as long as these same subjects were also high on barrier. Those persons who were low on penetration recalled more penetration words if they were likewise low on barrier. With reference to the number of broken objects recalled, the results were in opposition to what was predicted in Hypothesis III (See Table 4). High barrier rather than low barrier subjects recalled more broken objects $F(1,88) = 5.47$, $p < .05$. An interaction of barrier with penetration was also found for broken objects $F(1,88) = 8.04$, $p < .01$. Persons who are high on both barrier and penetration recall the greatest number of broken objects. The fewest number of broken objects are recalled by persons who are low on barrier and high on penetration. This finding again is at variance with the theory that the greatest number of broken objects would be given by persons low on barrier and high on penetration. Using Duncan multiple-range comparisons the differences among the various groups on penetration cards, penetration words, and number of broken objects recalled were not significant.

Now that the results have been presented for the three hypotheses of this study, a few incidental findings remain to be presented. These findings relate to selection and memory

for neutral cards (See Table 2). A significant main effect of sex was found $F(1,88) = 4.98$, $p < .05$. More specifically, females selected more neutral cards than did males. Females made significantly more card choices than did males. This might explain why they selected more barrier and neutral cards.

CHAPTER V

DISCUSSION

The main purpose of this study was to demonstrate how body image enters into the cognitive processes of normal individuals, namely college students. More particularly, this research sought to assess the influence of body image, in the form of Fisher's and Cleveland's (1958) constructs of barrier and penetration, on problem solving efficiency, conceptual style, and incidental memory.

Hypothesis I was specifically concerned with establishing the fact that high barrier individuals (persons with good body image) would be more efficient problem solvers and incidental learners. As in previous research (Brodie, 1959) barrier score proved to be significantly related to criterion measures but the relationships were inconsistent. The only consistent main effect which was found was one of sex. Males were found to require fewer card choices and less time to solve concept problems. These findings are in agreement with those of Burke (1965) who found that females do more poorly than males on certain problems. Hoffman (1965) states that males are usually more interested and more highly motivated to achieve on problem-solving tasks than are females, especially when these tasks are fact-oriented rather than feeling-oriented. What is then suggested is that the sex variable in problem solving is a complex one (Hoffman & Maier, 1966) and that once problems are made less appropriate to the masculine role (as was the case in the incidental learning part of this study) sex differences in problem solving are reduced (Milton, 1959). The results of the present research support previous findings and underline the importance of con-

sidering sex as an experimental variable when doing problem solving research. An isolated main effect of penetration was found for the variable of time. Persons who were high on penetration required significantly less time to solve problems. This finding is in direct opposition to Fisher's theory which considers penetration as an index of pathology. Hirt et al. (1967) and Brodie (1959) using Fisher's paradigm have also obtained results which were significant but in the opposite direction to what was predicted.

Most of the significant relationships between body image and problem solving efficiency measures are in terms of complex interactions of barrier with penetration and sex. These interactions specifically suggest that neither penetration nor sex can be excluded when using Fisher's body image paradigm. Fisher (1958) makes a point of eliminating both penetration and sex as useful discriminants of good and poor body image. However, recent research (Hartley, 1967) supports the view that it is necessary to control, at least, for sex of subjects when using the barrier concept since females tend to produce more barrier responses. Furthermore, other researchers have found notable and consistent differences between the body image of males and females (Calden 1959, Brodie 1959, Jourard & Secord 1954, 1955). In the present research a complex interaction was found for barrier x penetration x sex on untenable hypotheses. More specifically, males who either were high on both barrier and penetration or low on both of these factors made fewer untenable hypotheses than their female counterparts. For the groups whose barrier and penetration score was disparate the females made fewer untenable hypotheses. On the variables of total incidental words recalled, barrier words recalled and penetration words

recalled, high or low barrier scores in themselves were not important. What was crucial, however, was that a person's barrier and penetration score be at the same level. That is, in order to perform efficiently on certain problem solving measures a high barrier individual should also be high on penetration and one who is low on barrier should also be low on penetration.

These findings continue to conflict with Fisher's view of penetration as an index of maladjustment, one that has proven its value only in terms of differentiating clinical groups. Fisher (1964) supports his view of penetration by stating that Holtzman (1961) in the standardization of his test, found penetration to be highly loaded on Factor VI, a factor which measures emotional immaturity, bodily preoccupation and possibly psychopathology. An inspection of the factor table for Factor VI (Holtzman, 1961, p.166) reveals that Holtzman's college samples had a higher loading on penetration than did the schizophrenic samples. This implies that either penetration does not measure only pathology or that if it is taken as a measure of pathology it has to be viewed in the light of other factors. At this point I would like to propose that the latter theory is more appropriate by saying that all individuals have some degree of penetrability, primitive impulses, of maladjustment. The person's level of penetrability in itself is not as important as the concommitant amount of barrier or ego integration that the person has, as Fenichel (1945) puts it, to "tame" affects and to use them for his own purposes. Stated in another way, a person who is high on barrier can afford to permit himself to be strongly affected by his environment. A person who is low on barrier or is somewhat deficient in ego

integration is able to tolerate less affective stimulation without suffering some deficiency in functioning. Furthermore, viewing penetration responses solely as signs of pathology results in a failure to consider the warm, affective aspect of this variable. Compton (1964) found penetration scores of psychotic women to be significantly related to a preference for clothing having warm colors and large patterns.

On one of the problem solving measures, ability to correctly specify from memory which objects were pictured as broken and/or distorted, high barrier low penetration males generally did better than other groups. Otherwise, subjects who were low on barrier and especially those who were also high on penetration were better at object specification. The inconsistent findings for this measure are difficult to reconcile. What continues to be highlighted, however, is the interrelationship of barrier with penetration and sex of subjects.

As has been mentioned previously neither barrier nor penetration levels, considered separately, discriminated between efficient and inefficient problem solvers. What was found, however, was a trial effect showing variations in performance over problems as a function of body image. For example, low barrier subjects initially do better on concept problems i.e., they require fewer card choices to solve a problem. High barrier subjects, on the other hand, improve substantially and conclude by surpassing the low barrier subjects. A similar effect is noted for untenable hypotheses. In the latter case there is a trial x penetration x sex interaction. These effects suggest that body image and sex of subject are important in determining what a person does when first confronted with certain problems and to what extent he

is able to profit from practice or experience with these problems. Generally speaking, persons who are vulnerable to environmental influences do better initially but are then surpassed by persons who are better able to control and integrate environmental stimulation.

Some incidental findings for problem solving efficiency measures will now be presented. First, a main effect of trials was found for focusing suggesting that all subjects tended to make more use of the focusing strategy with experience on concept problems. This finding is in agreement with that of Eiferman (1965) who found that individuals became systematic in their response pattern after being exposed to a few problems of the same type. The results of the trend analysis for main effect of trials when considered with the focusing means for each of the six problems supports the findings of Laughlin & Jordan (1967) who found that focusing remained constant on the first two problems, decreased on the third problem and then increased on subsequent problems. Studies by Wells (1963), and Wells and Watson (1965) found no positive interproblem transfer which could not be accounted for in terms of changes in the experimenter's procedure as the experiment proceeded. The present research findings tend to generally support this conclusion. However, certain notable exceptions were noted. Some groups did show marked improvement over trials and this tendency to improve seems to be related to sex and body image variables. Secondly, strong positive correlations were found between total problem solving time and card choices for problems and between card choices and untenable hypotheses. The latter findings are supported in the results of Laughlin and Doherty (1967). Thirdly, a negative correlation was established

between problem solving time and efficiency on incidental learning. More specifically, the more time spent looking at the concept board, the fewer incidental words were recalled and the less accurate the person was in specifying objects as broken and/or distorted. As noted by McLaughlin (1965) increase in presentation interval facilitates both intentional and incidental learning in Type II designs. Since this was not the case in the present study, it is entirely possible, as McLaughlin states, that a task-difficulty variable must be considered. Fourth, relationships were established between efficiency measures and types of stimuli. Broadly speaking, selection of barrier stimuli is related to greater efficiency on problem solving. Whereas, tendencies to select penetration or pictorial cards is related to less efficient problem solving. Finally, for incidental learning differential memory for barrier and penetration results in less efficiency. These findings are in general agreement with Fisher's and Cleveland's theory (1958).

Hypothesis II states that high barrier subjects would select and recall more barrier stimuli since such percepts would be in keeping with their life styles. As with previous findings, barrier was found to be related to criterion measures but it was also confounded with sex and penetration. Two of the three interactions found involved barrier and sex interactions. This type of relationship was found by Brodie (1959) and Hartley (1967). What is further suggested is that high barrier females select more barrier cards and recall more barrier words but males who are high on barrier select fewer cards and words. This fact also agrees with Hartly who found that women respond more to barrier stimuli than do males. Response to barrier words further seems related to homogeneity

of barrier and penetration levels. Persons who are either high on both dimensions or low on both respond more to barrier cards.

Differential response to verbal and pictorial stimuli is related to barrier level and sex. High barrier subjects perform better on verbal concepts while those low on barrier do better on pictorial concepts. Low barrier females as a group show a pronounced tendency to do better on pictorial concepts. These findings are in agreement with barrier theory and especially with the findings of Holtzman (1961) who found that barrier was highly loaded on a conceptual factor. In this instance verbal concepts are considered to be more abstract and conceptual than are pictorial concepts.

Hypothesis III predicted that persons high on the penetration dimension would tend to select more penetration and/or broken objects. The results again show a definite relationship between penetration score and selective response for objects of this type. The findings, however, again show the importance of not considering penetration separately but rather looking at the relationship that this measure has with barrier and sex. As with barrier style, females high on the dimension of penetration respond positively to objects in keeping with their life styles. Males who are high on penetration respond in the opposite direction; that is, they seem to avoid penetration objects. These findings clearly indicate that before further attempts are made to relate these constructs to criterion measures more research on sex differences and response to projective stimuli is needed. Fisher (1965) found that poor boundary articulation facilitated memory for words which conveyed a poor state of boundedness but that it had an opposite effect for words which specifically depicted mutilation of

the body. Such a difference was supported in the present research. More specifically, high barrier subjects recalled more objects which were broken or mutilated. These conflicting results are perplexing especially when looked at in terms of Fisher's bi-polar model where persons high on a factor like barrier or penetration are seen as responding positively to words and objects in keeping with their views of themselves. This model does not permit the view that individuals will respond defensively to stimuli viewed as blatantly representing one's body image. A perceptual defense approach to barrier and penetration is just one more area of research that should be considered before the present theory of body image can be fully understood.

REFERENCES

Amster, Harriett, The relation between intentional and incidental concept learning as a function of type of multiple stimulation and cognitive style., Journal of Personality and Social Psychology, 1965, 1, 217-233.

Blatt, S.J., Allison, J., & Becker, B.L., The Wechsler OA subtest and bodily concerns., Journal of Consulting Psychology, 1965, 29, 223-230.

Brodie, C.W., The prediction of qualitative characteristics of behavior in stress situations using test-assessed personality constructs., Unpublished doctoral dissertation, University of Illinois, 1959.

Brown, G.H., Factors influencing incidental learning, Journal of Experimental Psychology, 1954, 47, 163-169.

Bruner, J.S., Goodnow, J.J., & Austin, G.A., A study of thinking, New York: Wiley, 1956.

Burke, Ronald J., Sex differences in recognizing the correct answer to a problem., Psychological Reports, 1965, 17, 532-534.

Buros, O.K. (Ed.), The sixth mental measurements yearbook, Highland Park, N.J., Gryphon Press, 1965.

Calden, G., Lundy, R. & Schlafer, R., Sex differences in body concepts., Journal of Consulting Psychology, 1959, 23, 378.

Cleveland, S.E., Body image changes associated with personality reorganization, Journal of Consulting Psychology, 1960, 23, 31, 256-261.

Compton, Norma, Body-image boundaries in relation to clothing fabric and design preferences of a group of hospitalized psychotic women., Journal of Home Economics, 1964, 56, 40-45.

Daston, P.G., & McConnell, Owen L, Stability of Rorschach penetration and barrier scores over time, Journal of Consulting Psychology, 1962, 26, 1, 104.

Davis, A.D., Some physiological correlates of Rorschach body image productions., Journal of Abnormal and Social Psychology, 1960, 60, 432-436.

Davis, L.J., The effect of verbal intelligence, task instruction, and anxiety on selection strategies, Dissertation Abstracts, 1965, 26, 500.

Edwards, A.L., Experimental design in psychological research., New York: Rinehart & Company, Inc., 1960.

Eiferman, Rinka, R., Response patterns and strategies in the dynamics of concept attainment behavior., British Journal of Psychology, 1965, 56, 217-222.

Eigenbrode, C., & Shipman, W., The body image barrier concept, Journal of Abnormal and Social Psychology, 1960, 60, 450-452.

Faterson, Hanna F., "Articulateness of experience: an extension of the field-dependence-independency concept" in Messick, S., & Ross, J. (Eds), Measurement in personality and cognition, N.Y., 1962, John Wiley & Sons, Inc.

Fenichel, O., The psychoanalytis theory of neurosis, New York: Norton & Company, 1945.

Fisher, S., A further appraisal of the body boundary concept, Journal of Consulting Psychology, 1963, 27, 62-74.

Fisher, S., Body awareness and relative memory for body versus non-body references, Journal of Personality, 1964, 32, 138-144.

Fisher, S., The body image as a source of selective cognitive sets, Journal of Personality, 1965, 33, 536-552.

Fisher, S., Body sensation and perception of projective stimuli, Journal of Consulting Psychology, 1965, 29, 135-138.

Fisher, S., & Cleveland, S.E., Body image and personality., Princeton: Van Nostrand, 1958.

Gardner, R.W., Cognitive styles in categorizing behavior, Journal of Personality, 1953, 22, 214-233.

Hartley, R.B., The barrier variable as measured by homonyms., Journal of Clinical Psychology, 1967, 23, 196-203.

Head, H., Aphasia and kindred disorders of speech., London: Cambridge University Press, 1925.

Hirt, M. Ross, W.D., & Kurtz, R., Construct validity of body-boundary perception., APA Proceedings, 1967, 187-188.

Hoffman, R.L., "Group problem solving" in Berkowitz, L. (Ed.) Advances in experimental social psychology., Vol. 1, New York: McGraw-Hill, 1965.

Hoffman, R.L., & Maier, W.R., Social factors influencing problem solving in women., Journal of Personality and Social Psychology, 1966, 4, 382-390.

Holtzman, W., Guide to administration and scoring, New York: The Psychological Corporation, 1958.

Holtzman, W.H., Thorpe, J.S., Swartz, J.D., & Herron, E.W., Inkblot perception and personality, Austin: University of Texas Press, 1961.

Holtzman, W.H., "Personality structure" in Annual Review of Psychology, 1965, 16, 119-157, Annual Review, Inc., Palo Alto, California.

Holtzman, W.H., The Holtzman Inkblot Technique, Unpublished monograph, University of Texas, 1966.

Jourard, S.M., & Secord, P.F., Body-size and body cathexis., Journal of Consulting Psychology, 1954, 18, 184.

Jourard, S.M., & Secord, P.F., Body-cathexis and the ideal female figure., Journal of Abnormal and Social Psychology, 1955, 50, 243-246.

Kagan, J., Moss & Sigel, Psychological significance of styles of conceptualization., Monograph of Social Research in Child Development, 1963, 28, 73-112.

Kausler, D.H., & Trapp, E.P., Motivation and cue utilization in intentional and incidental learning, Psychological Review,

1960, 67, 373-379.

Laughlin, P.R., Speed versus minimum choice instructions in concept attainment., Journal of Experimental Psychology, 1964, 67, 596.

Laughlin, P.R., Selection strategies in concept attainment as a function of number of persons and stimulus display., Journal of Experimental Psychology, 1965, 70, 3, 323-327.

Laughlin, P.R., Selection strategies in concept attainment as a function of number of relevant problem attributes, Journal of Experimental Psychology, 1966, 71, 773-776.

Laughlin, P.R., & Doherty, Mary Austin, Discussion versus memory in cooperative group concept attainment, Journal of Educational Psychology, 1967, 58, 123-128.

Laughlin, P.R., & Jordan, R.M., Selection strategies in conjunctive, disjunctive, and biconditional concept attainment., Journal of Experimental Psychology, 1967, 75, 2, 188-193.

McLaughlin, B., "Intentional" and "incidental" learning in human subjects: The role of instructions to learn and motivation, Psychological Bulletin, 1965, 63, 359-376.

McNemar, Q., Psychological statistics., New York: John Wiley & Sons., 1955

Mednick, S., "The body's barriers go Rorschach", Contemporary Psychology, 1959, 4, 276-277.

Milton, G.A., Sex differences in problem solving as a function of role appropriateness of the problem construct., Psychological Reports, 1959, 5, 705-708.

Nuttin, J., "Personality and cognition" in Annual Review of Psychology, 1955, Annual Review Incorporated, Palo Alto, Calif.

Postman, L., "Short-term memory and incidental learning" in Melton, A.W., Categories of human learning, New York, Academic Press, 1964, 145-201.

Reich, W., Character analysis, New York, Orgone Institute Press,

1949.

Romanow, Concetta V., Anxiety level and ego involvement as factors in concept formation, Journal of Experimental Psychology, 1958, 56, 2, 166-173.

Schilder, P., The image and appearance of the human body., London: Keegan, Paul, Trench, Trubner & Co., 1935.

Scott, W.A., & Wertheimer, M., Introduction to psychological research., New York, John Wiley & Sons, 1962, 38-40.

Shipman, W.G., The validity of the barrier score, Proceedings of the APA Convention, 1965.

Swartz, J.D., & Holtzman, W.H., Group method of administration for the Holtzman Inkblot Technique, Journal of Clinical Psychology, 1963, 19, 433-441.

Teitelbaum, H.A., Psychogenic body image disturbances associated with psychogenic aphasia and agnosia, Journal of Nervous & Mental Disturbances, 1941, 93, 581-612.

Thorndike, E.L., & Lorge, I., The teacher's word book of 30,000 words, New York: Columbia University Press, 1944.

Wells, H., Effects of transfer and problem structure in disjunctive concept formation., Journal of Experimental Psychology., 1963, 65, 63-70.

Wells, H. & Watson, D., Strategy training and practice in disjunctive concept attainment., Psychological Reports, 1965, 17, 925-926.

Winer, B.J., Statistical principles in experimental design, New York: McGraw-Hill, 1962.

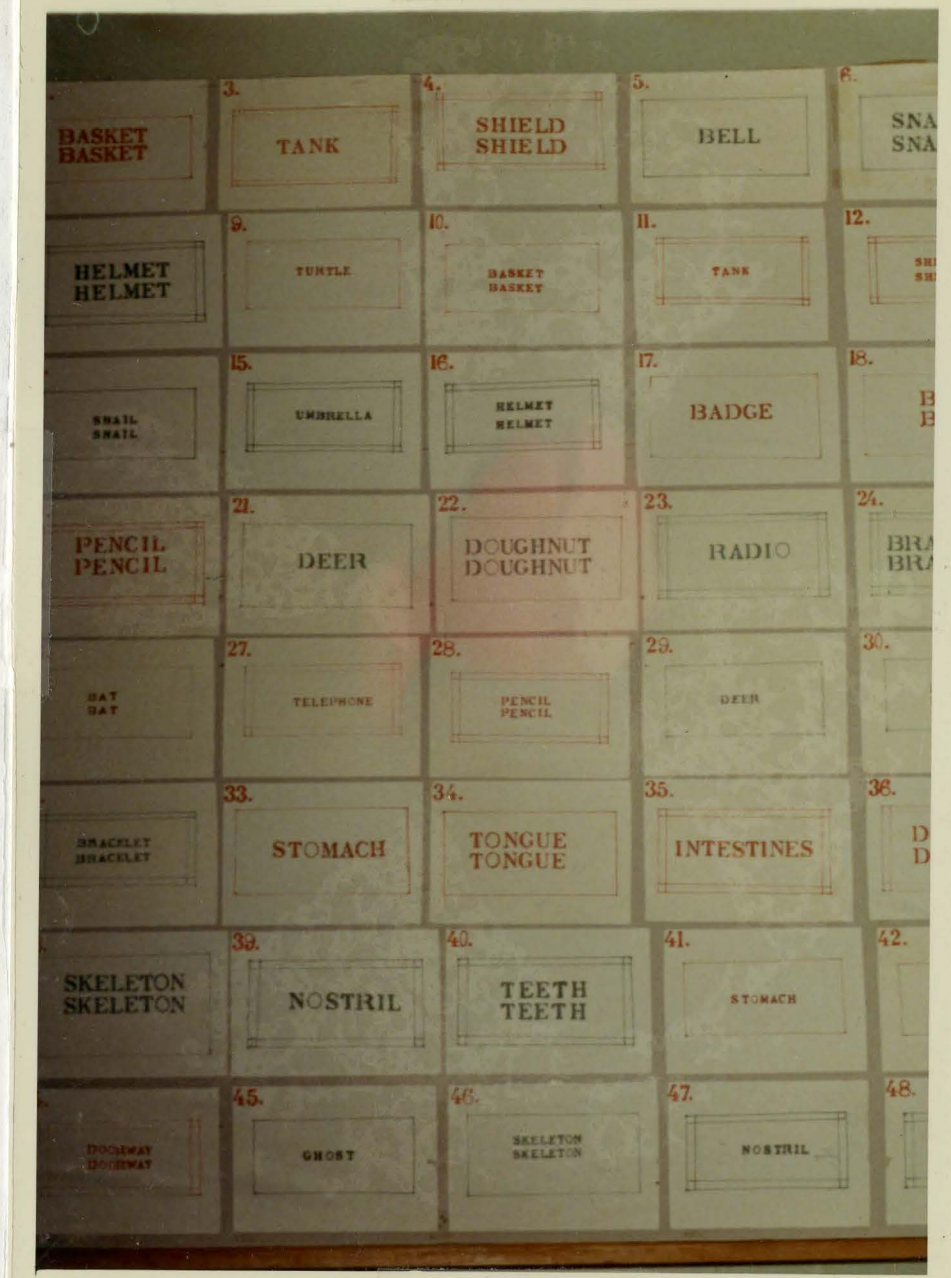
Witkin, H.A., Lewis, H.B., Hertzman, M., Machover, Karen, Meissner, P.B., and Wapner, S., Personality through perception, New York, Harper, 1954.

Wylie, Ruth, C., The self concept, Lincoln: University of Nebraska Press, 1961.

Zimny, G.H., Body image and physiological responses, Journal of Psychosomatic Research, 1965, 9, 185-188.

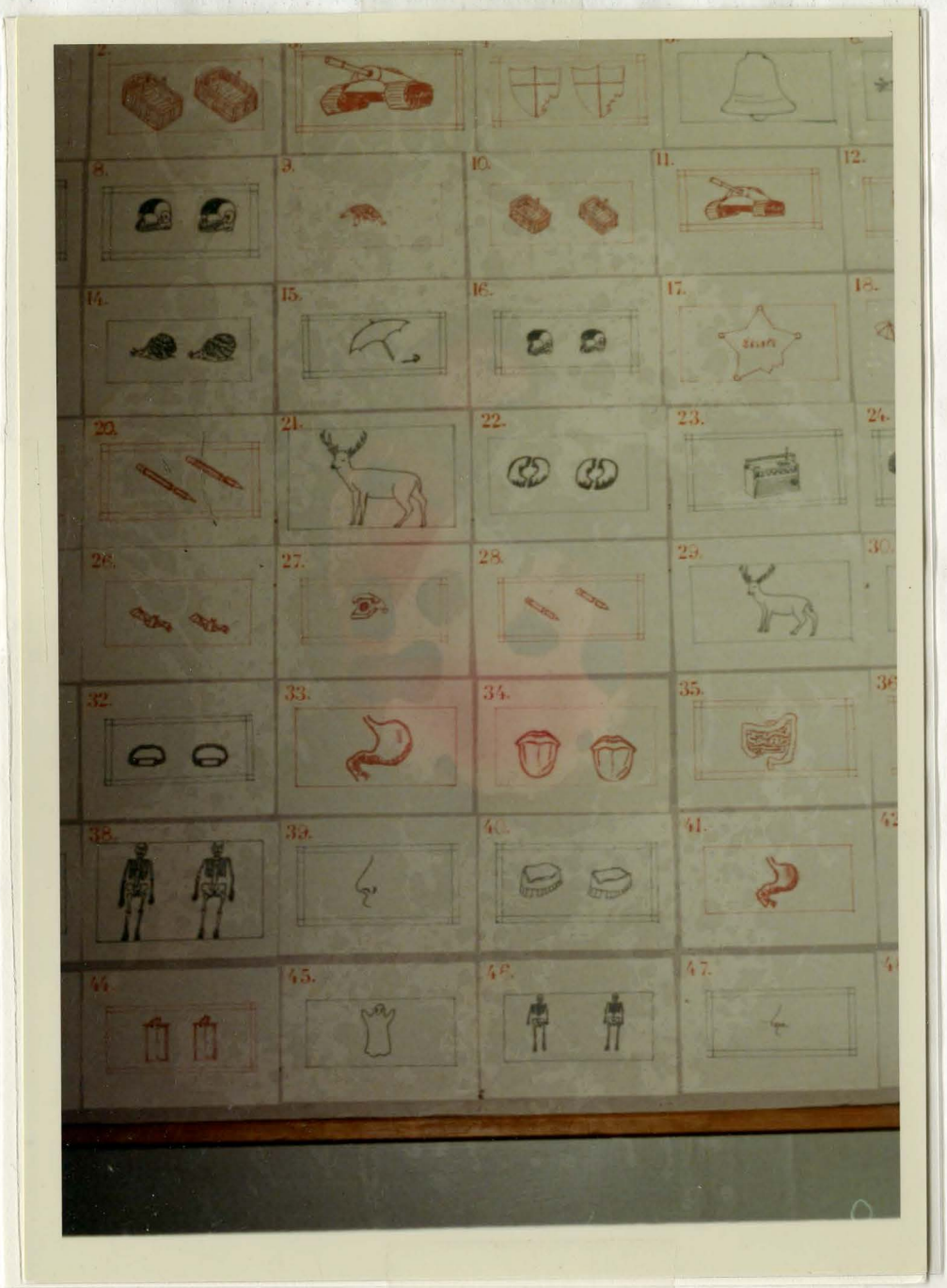
Appendix A

Verbal Concept Board



Appendix B

Pictorial Concept Board



Appendix C

Conjunctive Concepts Used in Present Research

1. Large and Red
2. Large and Green
3. Large and One Border
4. Large and Two Borders
5. Large and One Word or Object
6. Large and Two Words or Objects
7. Small and Red
8. Small and Green
9. Small and One Border
10. Small and Two Borders
11. Small and One Word or Object
12. Small and Two Words or Objects
13. Red and One Border
14. Red and Two Borders
15. Red and One Word or Object
16. Red and Two Words or Objects
17. Green and One Border
18. Green and Two Borders
19. Green and One Word or Object
20. Green and Two Words or Objects
21. One Border and One Word or Object
22. One Border and Two Words or Objects

Sample Scoring Sheet
for Problems

Group # 7

Problems # (1) [illegible] (2) [illegible] (3) [illegible]

Sex: M

Initial Cards (1) 1311 (2) 2311 (3) P (10)

Subject: [illegible]

ORDER 1 → C

TIME 1:10 - 12:51 = 11 min.

	Problems	Yes or No	Hypotheses	Scoring	
			2357	H	F
I.	(1) LG2B10 23	N	✓2357	3/4	5/6
C	(2) SG2B10 15	N	✓ [illegible]		
A	(3) LG2B20 19	N	✓ [illegible]		
R	(4) SG1B20 30	N	✓ [illegible]		
D	(5) SG1B20 [illegible]	N	[illegible]		
	(6) SG1B10 [illegible]	N	[illegible]		
C	(7) SR1B10 [illegible]	Y	✓ [illegible]		
H	(8) LR1B10 17	Y	✓ [illegible]		
O	(9)				
I	(10)				
C	(11)				
E	(12)				
			2468		
II.	(1) LG2B20 24	N	✓2360	5/6	3/6
C	(2) LR2B20 [illegible]	N	✓ 1360		
A	(3) SG1B10 [illegible]	Y	GIB 12457		
R	(4) LG1B10 21	N	✓ 2367		
D	(5) SR1B10 [illegible]	N	SIB 1457		
	(6) SG1B10 29	Y	SG 2457		
C	(7)				
H	(8)				
O	(9)				
I	(10)				
C	(11)				
E	(12)				
			2368		
III.	(1) LG1B20 38	Y	GIW 2367	1/2	1/2
C	(2) LG1B20 32	Y	LIW 2367		
A	(3)				
R	(4)				
D	(5)				
	(6)				
C	(7)				
H	(8)				
O	(9)				
I	(10)				
C	(11)				
E	(12)				

M = 3.8

Group #

Sex:

Subject:

Problems # (1) (2) (3)

Initial Cards (1) (2) (3)

	Problems	Yes or No	Hypotheses		Scoring	
				1462		
I.	(1) SR1B20 4/2	Y	SR	1462	1/2	1/2
C	(2) SR1B20 10	Y	S2W	1467		
A	(3)					
R	(4)					
D	(5)					
	(6)					
C	(7)					
H	(8)					
O	(9)					
I	(10)					
C	(11)					
E	(12)					
				2462		
II.	(1) L62B20 24	Y	2B2W	✓2362	1/2	1/2
C	(2) L62B10 23	Y	S2B	✓2357		
A	(3)					
R	(4)					
D	(5)					
	(6)					
C	(7)					
H	(8)					
O	(9)					
I	(10)					
C	(11)					
E	(12)					
				1457		
III.	(1) LR2B10 2/5	N		1357	0/1	2/2
C	(2) SR2B10 4/3	N		✓1458		
A	(3) SG1B10 1/5	Y	S1B	✓3457		
R	(4)					
D	(5)					
	(6)					
C	(7)					
H	(8)					
O	(9)					
I	(10)					
C	(11)					
E	(12)					

Group #

Sex:

Subject:

Sample Scoring Sheet for

Incidental Words

During the next 10 minutes please write down as many of the objects as you can recall from the previous task. Also, check in the square next to the object whether the object was pictured as distorted or not.

	Objects	Distorted or Broken	
example	Telephone	Yes	No ✓
1.	[illegible]	✓	
2.	[illegible] helmet		✓
3.	radio		✓
4. 5 star	[illegible]	✓	
5.	[illegible]		✓
6.	stomach		✓
7.	intestine		✓
8.	ghost		✓
9.	skeleton	✓	X
10.	cards		✓
11.	bell	✓	X
12.			
13.	BARRIER= 3		BR[illegible]= 4
14.	PRESERVATION= 5		
15.	NEUTRAL= 2		
16.	X = 1		
17.			
18.			
19.			
20.			

77

Appendix F

Table of Means, Median Ages, and Standard Deviations for Eight Treatment Groups

		Groups							
		1	2	3	4	5	6	7	8
		HHM	HHF	HLM	HLF	LLM	LLF	LHM	LHF
Age	M	19.91	19.75	21.50	20.00	20.83	21.42	20.25	21.42
	Md	19.00	19.50	21.00	20.00	21.00	21.00	20.50	22.00
	SD	2.25	1.53	1.90	1.47	1.28	1.66	1.69	2.46

Appendix G

Table of Means, Medians, and Standard Deviations for Barrier, Penetration and Total Responses on the Holtzman Inkblot Test for Eight Treatment Groups

		Groups							
		1 HHM	2 HHF	3 HLM	4 HLF	5 LLM	6 LLF	7 LHM	8 LHF
Barrier Score	M	11.33	10.92	10.33	11.92	4.33	4.50	4.25	3.58
	Md	11.00	10.00	10.00	11.50	5.00	5.50	4.00	4.00
	SD	1.18	1.50	0.62	1.75	1.37	1.75	1.59	1.26
Penetration Score	M	8.58	8.25	3.42	3.17	3.17	3.67	10.83	10.42
	Md	8.00	7.50	3.50	3.00	3.00	4.00	10.00	12.00
	SD	1.89	2.31	0.64	1.14	0.90	0.47	3.34	2.84
Total Score	M	44.92	44.67	44.75	44.67	43.25	44.75	44.58	44.17
	Md	45.00	45.00	45.00	45.00	44.00	45.00	45.00	45.00
	SD	0.29	0.85	0.43	0.63	1.88	0.60	1.12	1.14

Appendix H

Barrier, Penetration, and Neutral Stimulus Words Equated for Average Word Length and Frequency of Occurrence in English Language

Barrier			Penetration			Neutral		
Barrier	Freq.	WL	Penetration	Freq.	WL	Neutral	Freq.	WL
Turtle	13	6	Stomach	30	7	Badge	28	5
Basket	50	6	Tongue	50	6	Bat	19	3
Tank	19	4	Intestine	4	9	Telephone	50	9
Shield	47	5	Doorway	30	7	Pencil	40	6
Snail	8	5	Ghost	32	5	Deer	35	4
Umbrella	13	8	Nostril	15	7	Doughnut	5	8
Helmet	21	6	Teeth	50	5	Radio	41	5
Bell	50	4	Skeleton	11	8	Bracelet	10	8
	Σ=221	44		Σ=222	54		Σ=208	48
	M=27.5	5.5		M=27.7	6.7		M=26.0	6.0

Appendix I

A Measure of Face Validity for Barrier, Penetration, and Neutral Stimulus Words

Barrier		Penetration		Neutral	
Words	Misclassified (Number of times)	Words	Misclassified (Number of times)	Words	Misclassified (Number of times)
Turtle		Stomach	1	Badge	7
Basket	9	Tongue	1	Bat	4
Tank	1	Intestine	1	Telephone	3
Shield		Doorway	2	Pencil	3
Snail	1	Ghost	1	Deer	3
Umbrella	6	Nostril	1	Doughnut	6
Helmet		Teeth	5	Radio	1
Bell	9	Skeleton	3	Bracelet	3
Total Errors	26		15		30
Accuracy of Sorting	67.50%		80.00%		66.25%

Note: The raters were 10 graduate students in Clinical Psychology.

Appendix J

Intercorrelation Matrix for Problem Solving Measures

	Card Choice	Time	Unten. Hypot.	Foc.	Verb Con.	Pic. Con.	Barrier Words	Pen. Words
Time	.54							
Unten. Hypot.	.69	.36						
Focusing	-.20	-.06	-.18					
Verbal Con.	.36*	.44	.43	-.14				
Pic. Concept	.28*	.41	.62	-.19	.21			
Barrier Cards	.56*	.35	.51	-.20	-.46*	.18*		
Pen. Cards	.63*	.52	.48	-.05	-.33*	.05*	.24	
Neutral Cards	.61*	.37	.53	-.14	-.40*	.17*	.36	.45

Note--Asterisks refer to part-whole correlations. (McNemar, 1955)

Appendix K

Intercorrelation Matrix for Incidental Learning Measures

	Total Words	Barrier Words	Pen. Words	Neutral Words	Whole Objects	Broken Objects	Barrier-Pen.	Whole-Broken
Barrier Words	-.18*							
Pen. Words	.30*	.05						
Neutral Words	.11*	-.11	.13					
Whole Objects	.34*	-.62*	-.41*	-.58				
Broken Objects	.40*	-.57*	-.42*	-.60	.25			
Barrier-Pen.	-.49*	.52	-.79	-.18	-.38	-.18		
Whole-Broken	.31	.05	.30	.20	.75	-.44	-.22	
Percent Corr.	.14	-.17	.18	.20	.20	-.05	-.21	.23

Note--Asterisks refer to part-whole correlations. (McNemar, 1955)

Appendix L

Intercorrelation Matrix for Problem Solving With Incidental Learning Measures

	Total Wds.	Barrier Wds.	Pen. Wds.	Neut. Wds.	Whole Objs.	Broken Objs.	Barrier-Pen.	Whole-Brkn.	Percent Corr.
Card Choices	.01	-.07	-.06	.16	-.07	.12	-.03	-.16	-.12
Time	-.25	-.08	-.29	-.07	-.20	-.16	.16	-.07	-.24
Unten. Hypot.	-.006	.07	-.09	.07	-.08	.07	.09	-.13	-.04
Focusing	.12	.06	.13	.04	.09	.05	-.04	.03	-.002
Ver. Concepts	-.10	-.16	-.08	.06	-.12	-.02	-.04	-.09	-.19
Pic. Concepts	.07	.02	-.02	.15	-.02	.20	-.01	-.16	-.03
Barrier Cards	.02	.16	-.08	.02	-.14	.23	.13	-.29	.25
Pen. Cards	-.09	-.23	-.02	.04	-.06	-.09	-.14	.002	-.07
Neutral Cards	.07	-.10	-.02	.27	-.003	.16	-.07	-.11	-.02

APPROVAL SHEET

The dissertation submitted by Richard G. Doiron has been read and approved by members of the Department of Psychology.

The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now given final approval with reference to content and form.

The dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

February 14, 1968
Date

Frank H. Kobler
Signature of Adviser