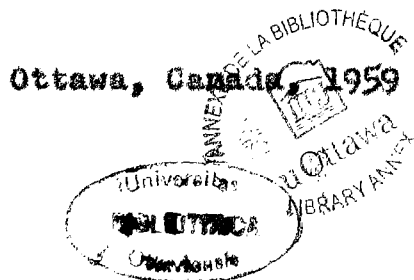


THE HYPOTHESIS THEORY AND PERCEPTUAL
RESPONSES TO INKBLOTS

by Arthur G. Nikelly

Thesis presented to the School of
Psychology and Education of the
University of Ottawa as partial
fulfillment of the requirements
for the degree of Doctor of
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CURRICULUM STUDIORUM

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INTRODUCTION

Theories of cognition in modern experimental psychology have been lacking in strength and validity, because they were unable to order and systematize properly a considerable portion of the experimental data. These shortcomings could be attributed mainly to the theorists' attitude in that they were denying or minimizing the role of certain factors that were essential for a theoretical model designed to account for all the phenomena of the cognitive processes. Generally, a theory is most likely to be retained and used when it is able to explain meaningfully all the experimental data, and to interpret findings without contradicting any established facts. Furthermore, it should be broad and generic to permit a sufficiently large amount of logically deducible propositions that eventually can be tested experimentally.

About a decade ago, a new movement began in this direction. A reconstructed theoretical model was formulated, mainly by borrowing some of the concepts found in the older theories, so that it could account for as large an amount of data as possible, and also provide explanations for phenomena in the field that the other theories were unable to furnish. The model has been called Hypothesis Theory, and it was originally conceived by Bruner and Postman around the turn of the present decade.

The theory holds that perception is jointly determined by both the internal factors (needs, values, attitudes, etc.), and by external conditions, i.e., the stimuli. The first factors have been referred to generically as "hypotheses", and the later as stimulus information. The task of the experimentalist, then, is to vary in a systematic way the internal and the stimulus factors, and to establish the functional relationships between them; these relationships are now understood as products of both factors operating together. One of the experimentally proven theorems from this general relationship, is that the more ambiguous the stimulus, the easier the "hypotheses" will come into play. A few more propositions have been deduced from the assumptions of the Hypothesis Theory which have been supported by experimental evidence.

The importance of this theory lies in its attempt to explain nomothetically all cognitive phenomena. Studies should manipulate experimentally as many types of stimuli as possible, to discover if the general laws - already valid with some stimuli - are still applicable. It is apparent that this area requires further investigation. Since all possible types of stimuli have not been properly accounted for, the present research was undertaken specifically to solve this timely problem.

The sections of the present experimental study have been methodologically arranged in order to cover all the aspects

of the theory and to pave the way for the design, the results and conclusions of the research. The first chapter analyzes the limitations of the older attempts of formulating theories of cognition, and discusses some of the proposed solutions and alternatives. Following, there is an historical account of some old concepts in experimental psychology that have not been investigated properly and were considered hitherto relatively unimportant. These concepts are now the cornerstones of the new theory. After all the earlier predisposing factors that contributed to the formation of the theory are enumerated in historical sequence, the structure and operation of the Hypothesis Theory is presented with some of the axioms that lend their support.

The second and the largest of all the chapters in the study deals with the experimental investigations in this area. Its purpose is twofold: first, to present as completely as possible all the accumulated evidence in favor of the Hypothesis Theory, as well as the findings that do not render any support, and secondly, to reveal areas for study that have not been so far investigated systematically. The material is organized under six headings, with each presenting the conditions under which "hypotheses" are formed and the way they operate. These headings deal with the strengthening of "hypotheses" from past experience, from directive factors (i.e., physiological need, values, anxiety, reward and punishment), from the meaningfulness

of the situation, from the support of the social milieu, and from the number of "hypotheses" the individual has at his disposal. There is also a section in this chapter offering a new interpretation to the controversial perceptual defense studies, and attempting to link them with the rationale of the Hypothesis Theory.

The third chapter contains all the information on the experimental design of the study. It begins with a clear exposition of the four experimental problems to be tested, and the underlying rationale. It includes the description of the tools and their technique of application, the nature of the subjects, the description of the "hypotheses" in each group, and the scoring technique. There are also some helpful definitions of the terms used in the study, and a more detailed explanation of the purpose and need for this type of investigation.

Finally, the fourth chapter presents the results of the study. The data from each experimental group are summarized in separate tables. The last portion of this chapter is devoted to the analysis and discussion of the data, with few speculations and some suggestions for further research.

CHAPTER I

THE HYPOTHESIS THEORY

Nearly a decade ago, a significant theoretical contribution has been advanced in the field of cognition, in an effort to reconcile the principles operative in explaining the role of past experience, with those formulated to account for sensory organization. The present chapter will endeavor to present an historical genesis to this new approach along with some other proposed alternative solutions, and will end with an exposition of the theory whose framework will serve as a guide in constructing the design for the present research.

1. General Overview.

Psychology has always been diverted along two basically opposite views: nativism and empiricism. This controversy - an outgrowth from philosophy - has certainly added some knowledge to the perplexity of human behavior, but to say that one view alone can explain all psychological phenomena to the exclusion of the other, has not been helpful in settling the issue. The attempts toward this direction were usually by reducing the variables of phenomena of one view in the other, rather than converting them into a unified theory in terms of both.

A. Major Dichotomies of Perceptual Determinants.

Modern theories of cognition diverge along the same dichotomies. Bruner and Postman¹ have pointed out two contrasting approaches to the study of cognition: the formal and the functional. In terms of factors that determine perception, they are also known as autochthonous or structural, and behavioral or motivational.

The first is concerned with the nature of the stimulus, and its effects upon the sensory organs and the nervous system. It includes the so called autochthonous factors of Gestalt psychology, and it deals with the more or less innate and stable activity of the process of perceiving. Motivational states, such as value, need, set, past learning, etc., are held constant, and there is practically no concern with the role of perception regarding the adjustment of the organism to its environment. The second dichotomy maintains that perception is an instrumental activity, and by no means it disregards the formal study of perception. Indeed, it goes beyond this position, and it maintains that the central motivational predispositions should be varied systematically, just as the physical stimuli and sensory states. It holds that

¹ Jerome S. Bruner and Leo Postman, "Perception, Cognition and Behavior", in the Journal of Personality, Vol. 18, No. 1, issue of September 1949, p. 14-31.

perception is influenced by other forms of psychological functioning, in the sense that it involves factors other than the autochthonous ones.

Functional determinants of perception include such variables as defenses, needs, values, emotions, wishes, tensions and past experience. Together, they form a central directive state, and the theory that utilizes these concepts has been termed - besides motivational or behavioral as cited previous - by Allport,² Directive State Theory. The directive stateists believe that these variables are important for a fuller understanding of perceptual phenomena. If these variables are part of the total personality structure, why should they be excluded from the scrutiny of the experimental psychologist, especially when such variables are certainly found to be related to perceptual behavior? On the other hand, the structuralists generally ignored these variables by holding them constant, in order to get at the purely autochthonous determinants of perception. They felt that these factors distort "pure" perception, and were not concerned with manipulating them systematically in order to observe concomitant change in perceptual behavior.

Basically, the advent of Gestalt psychology with the formal approach to perception, was mainly an attack against

² Floyd H. Allport, Theories of Perception and the Concept of Structure, New York, Wiley, 1955, xxii-709 p.

the atomism and associationism of the Nineteenth Century, which regarded perception as essentially a process of passive registration of impinging stimuli. Gestalt psychology considered perception as a process governed mainly by principles inherent in the perceiving apparatus, but did not take fully into account other factors, such as past learning and expectancy. In other words, they have not been good Gestaltists in the broad sense, since they failed to include the total field by neglecting the perceiver with his motivational states. In addition to this, Gestalt principles, such as closure, organization, wholeness, form, etc., do constitute a highly fructified phenomenological system, but experimentation has not lent ample support for such a model.

Krech,³ who has given his own label to the functionalists as the New Look approach, maintains that they have attempted to rectify the shortcomings of the formalists. This New Look Movement, grew out from the need for a psychological approach that was not confined to the laboratory, but desired to take into consideration everyday real life situations. For the, "pure" perception had no meaning; other variables had to be taken into account in order to explain behavior more adequately, and now their approach to the problem became socially oriented. This movement has shown that needs, values,

³ David Krech, "Notes Toward a Psychological Theory", in the Journal of Personality, Vol. 18, No. 1, issue of September 1949, p. 66-87.

reward, punishment, all affect perceptual recognition and thresholds, and that emotionally disturbing stimuli likewise, affect the process of perception. The New Look theorists have made enormous contributions in their investigation of perceptual phenomena. But they also had their share of shortcomings, by unduly overemphasizing what the Gestaltists allegedly did not emphasize. In addition, many of their results were inconsistent, some controls were inadequate or did not meet all the methodological requirements, and variables other than the motivational ones were neglected. Finally, insufficient and unwarranted mediating explanatory mechanisms that had been postulated to account for the relation between perceptual and motivational variables, precipitated the attack on the New Look movement. Thus, a more consistent and refined methodology, and a theory that could take into account all the factors that determine cognition with an overall explanatory principle, had to be formulated.

B. Attempts for Reconciliation of Dichotomies.

Some programmatic theoretical models toward a monistic solution of this problem have already been advanced.

Hochberg and Gleitman⁴ attempted to close the cleavage between perception and motivation, and have suggested a model

⁴ Julian E. Hochberg, and Henry Gleitman, "Towards a Reformulation of the Perception-Motivation Dichotomy", in the Journal of Personality, Vol. 18, No. 2, issue of December 1949, p. 180-191.

for describing more adequately cognitive phenomena ". . . by laws formulable within the framework of perception psychology than by those of need theory".⁵ In addition to this, the authors propose the possibility of a theoretical system ". . . which subsumes motivational phenomena under the general organizational principles of Gestalt theory. In this system at least, there is no need for needs".⁶ The present status of the psychology of cognition indicates readily that perceptual laws have been more stable and universal, whereas, the results of motivation theory, albeit abundant, have not been satisfactorily consistent and systematic. In the same paper, the authors indicate that motivational phenomena can be translated into a brain field model, whereby, the effects of stimulation produce disequilibrium in the isomorphic field, which reacts almost immediately to restore and maintain equilibrium.

Similarly, another model along principles of Gestalt field theory has been offered by Krech.⁷ He disregards the distinctions between "perception", "motivation", and "learning", and treats them as aspects of hypothetical constructs which he calls "dynamic systems". These are ultimately the

5 Id., Ibid., p. 185.

6 Id., Ibid., p. 191.

7 David Krech, Op. cit., p. 66-87.

result of neural events, and vary along three basic dimensions: isolation, differentiation and tension; thus, learning, perception and motivation were said to be related with variations along these three dimensions. In this way, the dualism between formal and instrumental variables becomes extinct, since they are converted into these "dynamic systems". However, actual isolation and manipulation of these dimensions, seem to render this model inaccessible to experimental treatment.

In a more recent paper, Gibson and Gibson⁸ have proposed a similar dichotomous interpretation of perceptual processes. They advanced the Enrichment Theory on the one hand, to imply the influence of past experience in determining present perceptual learning in the familiar associationistic sense, and the Specificity Theory on the other, whereby, perception is mainly a process of elaboration and discrimination, and it assumes psychophysical correspondence. The authors claim the validity of the later theory, to the effect that veridical perception does not necessitate accumulated traces of past experience. Such a theory, however, has certain limitations, as the authors already admit, since it does not take into account imaginative processes, nor can this theory be applied to abnormal behavior.

⁸ James J. Gibson, and Eleanor J. Gibson, "Perceptual Learning: Differentiation or Enrichment?" in the Psychological Review, Vol. 62, No. 1, issue of January 1955, p. 32-41.

Postman⁹ has challenged the later theory in favor of the former. He has argued, for example, that the Specificity Theory does not provide any mediating mechanism to explain how perceptual discrimination takes place, and that signs and symbols cannot be understood without association.

Contrary to these views whereby, motivational variables were reduced to structural determinants, Brunswik¹⁰ maintains that psychology should eschew its former methodological ideology, and concentrate its research on the analysis of the organism's achievements and of the environment, in which these achievements take place, with the fullest account of a truly representative sample of the organism's natural conditions. The author states:

Situations in which food can be found always to the right and never to the left, or always behind a black door and never behind a white one, are not representative of the structure of the environment, but are based on an idealized black-white dramatization of the world, somewhat in a Hollywood style. They are thus not sound as experimental devices from the standpoint of a psychology which wishes to learn, above all other things, something about behavior under conditions representative of actual life.¹¹

⁹ Leo Postman, "Association Theory and Perceptual Learning" in the Psychological Review, Vol. 62, No. 6, issue of November 1955, p. 438-446.

¹⁰ Egon Brunswik, "Organismic Achievement and Environmental Probability", in the Psychological Review, Vol. 50, No. 3, issue of May 1943, p. 255-272.

¹¹ Id., Ibid., p. 261.

In the same paper, the author goes on to say that one cannot be as certain with perceptual phenomena as he is with the nomothetic study of the natural laws. In perceptual phenomena, one can only know the characteristic probability relationships between organism and environment, which can then be expressed quantitatively by correlation statistics. Brunswik attempts to give emphasis upon the organism's achievements, whereby cues and mean-end relationships serve as stimuli, by which the organism achieves its goal in terms of functional probability relationships. Once these correlations with the environment are found, they can be statistically analyzed in terms of their basic dimensions.

Other authors have suggested a possible convergence of these two dichotomies. Luchins¹² maintains that there is no boundary between structure and function, and that such a division results in semantic confusion which ". . . is based largely on arbitrary and misleading distinctions".¹³ In the same paper, he asserts that there is no need to study in what way these two sets of principles of perceptual determinants are related to each other ". . . until it is established that

¹² Abraham S. Luchins, "An Evaluation of Some Current Criticisms of Gestalt Psychological Work on Perception", in the Psychological Review, Vol. 58, No. 2, issue of March 1951, p. 69-95.

¹³ Id., Ibid., p. 78.

there are two sets to be interrelated".¹⁴ It is conceivable that one cannot deal with structural and functional factors in perception separately. Krech and Crutchfield¹⁵ maintain ". . . that these two sets of factors are intimately related and that every perception is a function of both".¹⁶ Bruner¹⁷ agrees with the above and states that the autochthonous factors or "capacity laws" as Tolman would call them, are built in the nervous system which make it operate only within certain limits. Thus, perceptual processes are not entirely at the mercy of functionalistic or motivational variables. One might say that these variables influence perceptual processes to a certain extent, but do not determine perception.

From these accounts, one begins to notice a new phase in cognitive theory to close the existing cleavage concerning the alleged exclusive role in the process of perception, whether it is that of motivational variables, such as need, value, and the like on the one hand, or perceptual variables as form and closure on the other. Structural factors determine the range of availability of response patterns and the

14 Abraham S. Luchins, Op. cit., p. 81.

15 David Krech, and Richard S. Crutchfield, Theory and Problems of Social Psychology, New York, McGraw-Hill, 1948, xv-639 p.

16 Id., Ibid., p. 107.

17 Jerome S. Bruner, "One Kind of Perception: A Reply to Professor Luchins", in the Psychological Review, Vol. 58, No. 4, issue of July 1951, p. 306-312.

capacity of the nervous system. On the other hand, directive variables, such as need and past experience, do influence cognitive behavior. From the aforementioned authors as well as from the forthcoming literature, it becomes evident that in cognitive processes, one cannot conceive of stimulus factors alone, or directive divorced from stimulus factors; they determine perception mutually. Such an arbitrary and unwarranted distinction is, of course, useful for experimental purposes only, since it has some heuristic value. In general, it appears sufficiently evident that cognition is determined by both: the type of the particular individual involved, and the characteristics of the stimulus situation.

According to Bruner and Postman,¹⁸ the main obstacle that has prevented these trends to converge has been mainly due to the unsystematic manipulation and control of experimental variables from the functional point of view. Now the authors are attempting to solve this problem, by outlining the necessary objectives in future experimental work, as follows:

(1) To select central, nonperceptual variables, changes in which can be shown to bring about systematic changes in perceptual functioning. (2) To select these variables from various theoretical systems - learning theories, motivational theories, theories of personality - so that these theories may be made continuous with the body of perceptual

¹⁸ Jerome S. Bruner, and Leo Postman, Op. cit., p. 14-31.

theory. (3) To postulate and then study those intervening mechanisms which account for the changes in perception which occur when we change the central state of the organism. (4) Finally, to emerge with a unified theory of behavior which treats the organism as an organized whole and which contains laws stating the manner in which perceiving is an instrument of adjustive activity.¹⁹

It is easily conceivable that in order to arrive at a comprehensive theory of cognition, motivational and perceptual variables should ultimately be accounted for within the framework of principles of behavior and theories of learning. The next problem is the postulation of intervening mechanisms between perception and motivation.

The investigation of perceptual phenomena can be broadly classed into two areas: phenomena of attributive perception and of perceptual recognition. In the case of phenomena of attributive perception, i.e., studies of judgments of size, brightness or movement, accentuation has been postulated as the intervening mechanism. It is tied to such antecedent conditions as, range of values and needs in the organism or frequency of reinforcement, and the consequent results are the attributive judgments. The aforementioned authors, however, believe that such an explanation is limited. To them, accentuation appears to be rather a function of the organism's adaptation level, being higher for certain stimuli

¹⁹ Ibid., p. 16.

because of some personal relevance or importance due to commerce with such stimuli in the past. "Adaptation level, in short, is the organism's subjective probability ("expectation") about the middle of the range of sizes. . ."²⁰

For recognition phenomena on the other hand, where perceptual thresholds are in inverse covariation with the motivational states of the organism, the intervening mechanism appears to be the availability of the various response systems which the organism disposes to impinging stimuli. The authors have clearly pointed this out in the following way:

When a stimulus "fits" or is appropriate to the prevailing state, it is recognized more readily. That which is incongruent with the prevailing state of the organism is recognized more slowly and with greater difficulty. All of which is not to say that recognition is always wishful, for it is apparent that all prevailing states of the organism are not instances of primitive desire for pleasure.²¹

One begins to notice a new step for a better explanation of cognitive phenomena. The investigators in this area have always been in search for adequate explanatory intervening mechanisms, but up to almost a decade ago, had failed to utilize principles which were already in use in other psychological systems, and which had quite a reasonable amount of experimental validity. The need for a ubiquitous mechanism that could explain all phenomena, instead of

20 Ibid., p. 22

21 Ibid., p. 23.

invoking different ad hoc mechanisms, each being applicable to a different phenomenon as the New Look adherents espoused, appears now to be fulfilled. Familiarity, either leading to some sort of expectancy or making more possible responses available, seems to be the key to the accentuation and recognition phenomena. Motivational variables that were regarded earlier as the central processes in perception, are now seen as only a dimension of these processes, and it has now become evident that other variables, hitherto neglected, play an equal role. In the following pages, the development of the new theory of cognition with its historical antecedents will be presented.

2. Historical Antecedents.

Traditionally, the task of the experimental psychologist has been to investigate the relationship between variables, and to establish laws in order to predict. However, in these experimental conditions, there are variables which he either cannot control or merely ignores. It is commonly observed that the most important of these variables is the concept of "set". It has appeared frequently in the psychological literature, and it has been used indiscriminately as a term with an indefinite meaning.

According to Woodwerth²², over twenty years before the Wurzburg School began, Exner, in his reaction time experiments noticed that the subject has a strong attention to react quickly, but this effort for attention declines as the stimulus object is presented. He concluded that the preparation of the act is voluntary, but the reaction itself involuntary, inasmuch as, with proper preparation the response runs off automatically upon presentation of the stimulus. Later, Cattell confirmed this phenomenon and called it a "prepared reflex". With the advent of the Wurzburg School around the turn of the century, Watt, according to Boring²³, attempted to systematize and clarify the process of introspection by dividing it into four moments: the preparatory period, the event of the appearance of the stimulus, the search for the proper response and the moment of the response. It is in the preparatory period where the acceptance of the task or Aufgabe was introduced, a term meaning ". . . conscious task or purpose that precedes a conscious course"²⁴. The Aufgabe, then, brings forth an Einstellung or "set" in the subject.

22 Robert S. Woodwerth, Experimental Psychology, New York, Holt, 1938, xi-889 p.

23 Edwin G. Boring, A History of Experimental Psychology, New York, Appleton-Century, 1929, xvi-699 p.

24 Ibid., p. 397.

The importance of the concept of "set", however, had already emerged from the early reaction time studies when it was observed that the threshold decreased when a preliminary "tuning" or warning was induced. Similarly, the "error of expectation" was noticed in the psychophysical experiments, whereby, when the subject was told that his response will change, he will change it prematurely. Kulpe, one of the investigators of the Würzburg School showed, according to Gibson²⁵, that although there can be many possible sensory qualities of a stimulus situation that can be perceived, only special features are selected, and after the subject has made the report, the other features are forgotten when the subject is asked to report on them.

Numerous other experiments have been performed following the investigators of the Würzburg School. In some of these investigations Whipple's²⁶ inkblots were used as stimuli. Feingold,²⁷ for example, found that judgments to Whipple's inkblots were related to pictures shown previously.

²⁵ James J. Gibson, "A Critical Review of the Concept of Set in Contemporary Experimental Psychology", in the Psychological Bulletin, Vol. 38, No. 9, issue of November 1941, p. 781-817.

²⁶ Guy Montrose Whipple, Manual of Mental and Physical Tests, Baltimore, Warwick & York, 1915, v-336 p.

²⁷ Gustave A. Feingold, "The Influence of Suggestion on Imagination", in The American Journal of Psychology, Vol. 26, No. 4, issue of October 1915, p. 540-549.

White²⁸ found similar results when he asked leading questions concerning the inkblots. Sarbin²⁹ obtained the same results using hypnotic suggestion.

In a similar manner, Coffin³⁰ used Rorschach's inkblots. After assessing his subjects regarding their occupational preference, he told each subject how members of the occupation he showed preference responded in a given situation. When Rorschach's inkblots were shown to these subjects, they responded in a manner similar to the group they preferred.

Baker³¹ has also shown how a set or attitude given verbally can affect the results of distracting conditions. Siipola³² demonstrated that an instructional set determines the manner by which an ambiguous word is perceived. Likewise,

28 R. White, "Influence of Suggestibility on Responses in the Ink Spot Test", in Child Development, Vol 2, No. 1, issue of January 1931, p. 76-79.

29 T. R. Sarbin, "Rorschach Patterns Under Hypnosis", in The American Journal of Orthopsychiatry, Vol. 9, No. 2, issue of April 1939, p. 315-319.

30 Thomas E. Coffin, "Some Conditions of Suggestion and Suggestibility: A Study of Certain Attitudinal and Situational Factors Influencing the Process of Suggestion", in the Psychological Monographs, Vol. 53, No. 4, (Whole No. 241), issue of 1941, ix-125 p.

31 Kenneth H. Baker, "Pre-experimental Set in Distraction Experiments", in The Journal of General Psychology, Vol. 16, Second Half, issue of April 1937, p. 471-488.

32 Elsa M. Siipola, "A Group Study of Some Effects of Preparatory Set", in the Psychological Monographs, Vol. 46, No. 6, (Whole No. 210), issue of 1935, p. 27-38.

Rees and Israel³³ investigated the effect of various mental sets in solving anagrams. When instructions were given concerning an expected type of word, the percent for such words increased. Zangwill³⁴ has demonstrated experimentally that the reproduction of a previously shown ambiguous stimulus pattern will vary in the direction of the given set of the moment. It seems plausible that the same trend will be found with word association experiments. Luchins³⁵ has demonstrated further the role of Einstellung in the facilitation of problem solving. Finally, Haggard and Rose³⁶ have established experimentally the importance of set as a factor in the conditioning of the auto-kinetic phenomenon. As the experimental investigation of this concept increased, it was found to be operative in processes other than the cognitive ones. The Zeigarnik Effect, for example, whereby,

³³ H. J. Rees, and H. E. Israel, "An Investigation of the Establishment and Operation of Mental Sets", in the Psychological Monographs, Vol. 46, No. 6, (Whole No. 210), Issue of 1935, p. 1-26.

³⁴ O. L. Zangwill, "A Study of the Significance of Attitude in Recognition", in the British Journal of Psychology, Vol. 28, Part 1, issue of July 1937, p. 12-17.

³⁵ Abraham S. Luchins, "Mechanization in Problem Solving - The Effect of Einstellung", in the Psychological Monographs, Vol. 54, No. 6, (Whole No. 248), Issue of 1942, vii-95 p.

³⁶ E. A. Haggard and G. Rose, "Some Effects of Mental Set and Active Participation in the Conditioning of the Autokinetic Phenomenon", in the Journal of Experimental Psychology, Vol. 34, No. 1, issue of February 1944, p. 45-59.

interrupted activities are more readily recalled as due to some persisting tension in the organism, is another instance of the phenomenon of "set".

Dashiell³⁷ believes that all these factors of "set" should be taken into consideration where experimental controls are concerned. These predispositions, anticipations, expectancies, etc., ". . . lie along another dimension in which the description of human behavior must eventually be drawn".³⁸ That the concept of "set" should play an important role in modern psychology appears evident. Investigators were becoming increasingly aware that an organism in a given situation does not release all its potential behavior but, instead, it responds to only a selected number of features or stimuli of that situation in a somewhat systematic manner. The stimulus object appears to be a cue which arouses in the organism a state of preparedness to expect some sort of outcome or result. One might proceed a step further and say that selectivity in perception may be due more or less to the significant, role, importance or relevance that these objects have for the organism because of some persisting after-effect from some type of association and past experience.

³⁷ J. F. Dashiell, "A Neglected Fourth Dimension to Psychological Research", in the Psychological Review, Vol. 47, No. 4, issue of July 1940, p. 289-305.

³⁸ Ibid., p. 294.

Gibson³⁹ points out that the majority of American psychologists attribute the concept of "set" to some type of past experience and habit, whereas others, mostly Europeans, have been maintaining that it is due to some principle of sensory organization.

In learning theory, Woodworth⁴⁰ observes that the conditioned response occurs after a number of repeated reinforcements. In order to explain what is reinforcement acting upon during these early trials before the appearance of the conditioned response, he maintains that expectancy is being reinforced. Thus, when the first sound of the bell takes place, it arouses in the animal a state of indefinite expectancy as to what will happen next. The animal was on its "toes" so to speak and maintained an attitude of readiness. When the food appeared, this diffused expectancy became specific and took a definite and well-defined shape. The author states in the same paper that when we perceive our already known environment, we perceive it almost immediately and with a sufficient amount of certainty. But when we perceive something for the first time and have to decipher the cue which is ambiguous in nature or not well known, and we have to discover its meaning in terms of our own experiences,

39 James J. Gibson, Op. cit., p. 781-817.

40 Robert S. Woodworth, "Reinforcement of Perception", in The American Journal of Psychology, Vol. 60, No. 1, issue of January 1947, p. 119-124.

there is a two-phase process involved. It is a trial-and-check process. As Woodworth puts it:

The trial phase is a tentative reading of the sign, a tentative decipherment of the puzzle, a tentative characterization of the object; and the check phase is an acceptance or rejection, a positive or negative reinforcement of the tentative perception.⁴¹

These selective features and expectancy dispositions in perceptual behavior, had already led Tolman⁴² to introduce the concept of "means-end-readiness" or "sign-geatalt-readiness". Both denote a selective condition being attributed to either an innate constitution, previous training, or physical demands of the moment which the organism conveys to various stimulus situations. This notion of "means-end-readiness" implies a subordination of secondary demands to superordinate ones. As the author states:

". . . subordinate objects remain ends only in so far as they prove in the long run to be appropriate routes for getting to or from those more ultimate goals. A hungry rat demands hunger-satiation; more secondarily he demands food as the route to hunger-satiation; and still more secondarily he demands open, leading-on alleys as the route to food.⁴³

From the above account, events are not meaningless parts of the total structure. On the contrary, they are seen

⁴¹ Ibid., p.124.

⁴² Edward C. Tolman, Purposive Behavior in Animals and Men, New York, Century, 1932, xiv-463 p.

⁴³ Ibid., p. 29.

as interdependent, and interconnected with each other, and this whole chain of events leads to the final "goal".

Krechevsky⁴⁴ independently and in the same year introduced the notion of "hypothesis" in order to explain what is going on in the rat during its selective responses of its trial and error behavior in the maze. The author maintains that the organism is not entirely passive to its given stimulus condition, since a given stimulus does not necessarily elicit a given type of reaction. The organism comports experiences due to past behavior, and it is conceivable that in any new situation it is ready to apply them. These responses the author calls "hypotheses". If a "hypothesis" is verified by the animal in terms of what it expected from that situation, it is reinforced; but it is soon abandoned if it does not lead to the expected results. The organism is behaving in an "if - then" manner when it has a "hypothesis". The organism's reasoning when confronted to respond in a given situation appears to be roughly in the following anthropomorphic manner: "If this response is correct, then, I should have such and such an outcome; if I do not obtain such and such an outcome, then, I should change my response". Although this may be plausible for the human organism, the author postulates the same process as taking place in the animal.

⁴⁴ I. Krechevsky, "Hypotheses in Rats", in the Psychological Review, Vol. 39, No. 6, issue of November 1932, p. 516-532.

A year later, Tolman and Krechevsky⁴⁵ felt that these concepts were similar. They agreed that the terms "hypothesis" and "means-end-readiness" ". . . designate systematic, docile, selective, self-initiated, limitations which appear in the general stimulus-response equation . . ."⁴⁶ Furthermore, it was understood that "means-end-readiness" forms a more general hierarchy, whereas "hypothesis" was said to be a more specific one. About two years later, Tolman in collaboration with Brunswik,⁴⁷ clarified and elaborated upon these concepts. It was now shown that a goal could be reached by more than one type of "means-object"⁴⁸ and that a given type of "means-object" can lead to more than one goal. Similarly, a sensory cue can be caused by more than one type of "means-object", and the later can cause more than one type of sensory cue. Thus, the organism has to form "hypotheses" as to what goal a given "means-object" will lead to, and by what objects and events the cues were caused. There were several alternatives for each probability relationship, and the organism has to "figure out" the right one, so to speak.

⁴⁵ E. C. Tolman and I. Krechevsky, "Means-end-readiness" and Hypothesis - A Contribution to Comparative Psychology", in the Psychological Review, Vol. 40, No. 1, issue of January 1933, p. 60-70.

⁴⁶ Ibid., p. 69.

⁴⁷ E. C. Tolman and E. Brunswik, "The Organism and the Causal Texture of the Environment", in the Psychological Review, Vol. 42, No. 1, issue of January 1935, p. 43-77.

⁴⁸ An object or situation by which an organism gets to or from some further object.

To give some order in this system, the "mean-objects" were classified into four types: good, ambivalent, indifferent and bad, and the cues were classed as: reliable, ambiguous, non-significant and misleading. Now, in a given stimulus situation, the organism has to bring forward the right kind of "hypothesis" to fit the real situation. It was believed that such "cue-systems" and "means-end-systems" with their "hypotheses" were not restricted to perception only, but to all the problems of psychology.

These "hypotheses" and "systems" can now be seen as synonymous with the term expectancy, and can be understood as equivalent with the concept of "set" or Aufgabe. Within the last decade, these concepts have emerged from a status of moderate curiosity to a focal point in the study of perceptual behavior. But ever since the later part of the past century, experimentalists were becoming aware of this determining and relatively uncontrolled variable of "set", which frequently altered the results toward an unexpected direction. The result was that it became absorbed by different theories. It was recognized as being present in almost all experimental situations, and as an undesirable variable it tended to upset the predictability of the various theories. Thus, until about a decade ago, the concept of "set" was not integrated into any systematic theory of behavior. It is conceivable that this might be considered a blessing in disguise, since

it appears at a time when the psychology of cognition needed a new unifying concept to save her from being torn along diverging paths. The modern theory of perception that has emerged during the last decade centers around the revival of this concept of "set", and it appears to be a promising panacea for the reconciliation between the formalists and the functionalists. But it still awaits for more efforts of the research psychologist to demonstrate the validity and universality of such a theory.

3. Description of the Hypothesis-Theory.

This theory has been initially outlined by Bruner and Postman, and these authors have been greatly aided toward its formulation by the influence and contribution of the concepts that have been cited above. The most general concept of this new theory is that of "hypothesis" as it was originally conceived by Krechevsky.⁴⁹ Thus, Postman⁵⁰ defines this concept as ". . . expectancies or predispositions of the organism which serve to select, organize, and transform the stimulus information that comes from the environment".⁵¹ When an

⁴⁹ Krechevsky, Op. cit., p. 516-532.

⁵⁰ Leo Postman, "Toward a Theory of Cognition", found in Social Psychology at the Crossroads, ed. by John H. Rohrer, and Muzaffer Sherif, New York, Harper, 1951, viii-437 p.

⁵¹ Ibid., p. 249.

organism is placed in a given situation, it does not perceive "out of nothing" so to speak, but it brings with itself an array of past experiences and different "sets", and all these have created a state of preparedness and readiness to respond selectively from a variety of environmental stimuli, and to set the organism as to what to expect. The terms "set", Aufgabe, determining tendency, perceptual readiness, cognitive predisposition, expectancy, etc., all denote the same meaning as that given to the term "hypothesis".

Stimulus information refers to cues in the environment which either confirm or deny the perceptual "hypothesis". It is seen as appropriate when it can be demonstrated that the characteristics or clues of the stimulus object are related to the organism's expectation or perceptual "hypothesis". In other words, a condition is reached, wherein, an expectancy in the organism concerning a particular stimulus or event, "matches" and "fits" with the perceived data. If a "hypothesis" is confirmed by the stimulus information, a stable perceptual organization results. Should the stimulus information deny the existing "hypothesis", i.e., should it not agree with what is expected and thus appear inappropriate or incongruous, the "hypothesis" is rejected or changed and other ones are set up, until one is found that becomes confirmed and verified by the stimulus information, so that a stable perceptual organization can be reached. This shifting

of "hypotheses" until an appropriate one is found to agree with the expected stimulus information is an adaptation of Woodworth's notion of "trial-and-check", cited earlier.⁵² Similarly, the shifting of "hypotheses" in the direction of attaining a state of stability and equilibrium can be understood to be analogous to some type of persisting homeostasis in the organism.

This new approach to the problem of perception and personality has been more appropriately termed the Hypothesis-Information-Confirmation Theory. Bruner⁵³ ascribes perception a three stage cycle, and this is what the above term implies. First, perceiving begins with an expectancy - a "hypothesis". Second, is the input of information from the environment. Finally, the third step involves the confirmation of the "hypothesis" on the basis of the stimulus information, although before the confirmation, other previously invoked "hypotheses" may have been infirmed during the process of "trial-and-check".

Operationally, the term "hypothesis" can be defined as an intervening construct which serves to explain the relationship between stimulus information on the one hand,

⁵² Robert S. Woodworth, Op. cit., p. 119-124.

⁵³ Jerome S. Bruner, "Personality Dynamics and the Process of Perceiving", in Perception - An Approach to Personality, ed. by Robert R. Blake, and Glenn V. Ramsey, New York, Ronald, 1951, p. 121-147.

and the organism's behavior on the other. Motivational states, needs, values, etc., do not influence perception directly as it was postulated by the directive stateists, but they first influence and strengthen the intervening "hypothesis", pertaining to certain expected events or appearance of things, and then, in turn, the "hypothesis" influences perception. The general proposition of this theory is that any experimentally found lawful relationship between perception and motivational states, can be explained by the operation of intervening "hypotheses". These can be readily implicated by the antecedent and consequent events, as is often seen, simply with prior instruction and the resultant reduction in threshold. As Bruner puts it:

The selectivity of remembering, problem solving, perceiving, imagining, in so far as they show a unity or consistency at a given time, are in this formulation assumed to be governed jointly by the intervening variable, the hypothesis.⁵⁴

Systems of "hypotheses" have been referred to as schemata connoting the assimilation and organization of past experiences that continue to grow and change through incoming sensory experience. Bartlett⁵⁵ had initially proposed this concept in order to account for the processes in memory. These schemata serve as the bases for memory and activate

⁵⁴ Jerome S. Bruner, Op. cit., p. 125.

⁵⁵ Frederic C. Bartlett, Remembering, Cambridge, Cambridge University Press, 1932, x-317 p.

"hypotheses" for trial and check, just as "hypotheses" are aroused and strengthened by information and cues emanating from exteroceptive stimuli. In other words, "hypotheses" are confirmed or rejected depending upon their agreement with memory or trace information in the same manner as they do with stimulus information.

Directive State Theory has now been reformulated.

Motivational states are no longer central and directive with respect to perceptual variables in a one to one relationship. As we shall see, they constitute only one, out of the other possible factors that play the same important role in determining a central intervening "hypothesis". There are altogether four factors that determine the strength of a hypothesis".

The first determiner pertains to the frequency by which a "hypothesis" has been confirmed in the past. Such a strong "hypothesis" is more easily aroused, needs little stimulus information to be confirmed but more contradictory information to be infirmed. The second determiner is the number of alternative "hypotheses". When many are available, there will be more appropriate stimulus information needed to confirm any one of these. On the contrary, the fewer the alternative "hypotheses", the stronger they will be, and thus, more easily confirmed. This determiner has also been referred to as monopoly. A strong "hypothesis" amidst weaker ones will be far easier aroused and confirmed. By the same token, a

single "hypothesis" would be stronger and more easily confirmed than with the presence of other ones. The third condition that strengthens a "hypothesis" is cognitive support. By this is meant that a "hypothesis" becomes strong and more easily confirmed when it is imbedded or part of a larger context of supporting "hypotheses". Finally, the fourth determiner is motivational support. This refers to the consequences that either confirmation or infirmation of a "hypothesis" may have for the organism. When there is reinforcement or some goal striving activity involved, "hypotheses" become stronger and more easily aroused and confirmed with a smaller amount of stimulus information, than with a "hypothesis" that has no such motivational assistance. Wishfulfillment is no longer considered a factor for motivational support, but is seen only as an instrumental activity of the organism.

Aside from these four determiners for the strengthening of "hypotheses", Postman⁵⁶ states two related propositions concerning the confirmation of a "hypothesis" when there is a smaller availability of appropriate stimulus information. The first of these pertains to the dominance of a "hypothesis" when there is insufficient stimulus information available for the proper checking of "hypotheses" to occur. Projective

⁵⁶ Lee Postman, Op. cit., p. viii-437.

techniques such as Rorschach's test illustrate this point, and the present research will be concerned precisely with these techniques, as being the sources of inadequate stimulus information. The second instance, whereby, a "hypothesis" becomes valid when there is insufficient stimulus information, the "hypotheses" of the members of the social milieu may serve to influence and validate a "hypothesis" of a particular individual. This process has been termed consensual validation. Bruner⁵⁷ gives a succinct and rather effective summary of the above "hypothesis" determinants with the following example:

If we may indulge our fantasies for a moment, let us assume that if a hypothesis, say "if A then B", had been frequently confirmed in the past, was the only one operative at the moment, was strongly supported by the beliefs of the perceiver, had immense consequences for the individual's adjustment, and was widely agreed on within his circle - if all these strengthening conditions prevailed, the hypothesis would be tediously evident in the behavior of the person, would be confirmed by the very least pip of confirming information, and would be obdurately resistant to rejection by contradictory evidence.⁵⁸

From the above account, the Hypothesis Theory constitutes a workable model that serves as a framework for the better understanding of the phenomena of perception and personality. It has resolved the bipolar concept of perception by classifying the motivational factors as "hypotheses" and

57 Jerome S. Bruner, Op. cit., viii-442 p.

58 Ibid., p. 127.

the external stimuli as "information". Perception is now better understood through the investigation of the relationship of these two variables combined and by their systematic variation.

From such a general postulate, theorems can be logically deduced and experimentally verified. In the present model, these theorems have been referred to as covariation theorems, for they represent certain operationally lawful relationships between varying degrees of "hypothesis" strength and variations in the appropriateness of the stimulus information. They can be stated as follows:

1. The stronger a "hypothesis", the greater its likelihood of arousal in a given situation.

2. The stronger a "hypothesis", the less the amount of appropriate stimulus information necessary to confirm it.

3. The stronger a "hypothesis", the more the amount of inappropriate or contradictory stimulus information necessary to infirm it.

4. The weaker a "hypothesis", the less inappropriate or contradictory stimulus information necessary to infirm it.

5. The stronger an invalid "hypothesis", the more (or the wider the range of) inappropriate information necessary in order to reject it.

There is sufficient experimentation to support these theorems, and more is being accumulated. The subsequent chapter will be specifically devoted to the experimental evidence.

CHAPTER II

EXPERIMENTAL FINDINGS

This section will deal with the supporting evidence concerning the factors and conditions upon which the strength and dominance of a "hypothesis" depends. Parallel to these findings, and from the same experiments, the validity of the covariation theorems will also be demonstrated, since the strength of a "hypothesis" is defined in terms of the structuring and appropriateness of the situation, and the latter is an essential element in experiments designed to demonstrate how "hypotheses" become strong and sustained.

Under this heading, the literature will be classified according to the six factors that determine the strengthening of "hypotheses", as they have been cited earlier according to the way the authors of the theory have stated them.

1. Frequency of Past Confirmation.

Marbe and his followers, according to Woodworth,¹ had noticed in their reaction time and word association experiments that the higher the frequency of different words to the same stimulus word, the lower was the reaction time threshold. This phenomenon has since been referred to as

¹ Robert S. Woodworth, Experimental Psychology, New York, Holt, 1938, xi-889 p.

Marbe's Law. Although different interpretations were given to explain this relationship in the light of the Hypothesis Theory, it can be easily seen that the greater the usage and familiarity of a word, the easier and more readily it will be evoked in tasks involving association and recall.

About a quarter of a century later, Gottschaldt, according to Gibson,² attempted to find whether perception of form is a function of familiarity and past experience. After the learning of simple geometrical figures by repeated exposures, they were concealed in more complex figures. The criterion was that the easier these simple figures would be perceived from their concealment, the more the influence of past experience. He found that under these conditions, past experience had no effect. However, some of the more complex figures had analyzable parts which were more familiar than the exposed simple figures. It seems more likely that Gottschaldt's experiment merely demonstrates that familiar figures can be successfully camouflaged, since subsequent experiments on form perception have refuted Gottschaldt's conclusions. Furthermore, one could expect that experience and familiarity with simple figures in isolation will be obscured when concealed into a totally new configuration, because it is altogether different from the initial experience of simple figures.

² James J. Gibson, Op. cit., p. 781-817.

Moore³ is quite sceptical of Gottschaldt's experiment. Inspecting the series of simple figures which varied on a continuum from easy to difficult ones, he noticed that if only a part of the complex figure was seen as similar to a previously experienced simple geometrical figure, the later was easier and more quickly perceived. In addition, difficulty increased when the complexity of the complex figure increased, which Moore attributes to the formation of smaller geometrical figures within the simple figures. According to Moore, this demonstrates ". . . that experience is not wholly without effect even under Dr. Gottschaldt's conditions".⁴ In the same paper, Moore states that the conclusion of Gottschaldt's research is ". . . that for adult Os visual objects or units are delimited by lines or contours".⁵

A few years later, Braly⁶ attempted to rectify Gottschaldt's shortcomings by making the figures simpler and keeping them distinct instead of concealing them into more complex patterns. Using polygonal dot figures, he showed that

³ M. G. Moore, "Gestalt vs. Experience", in The American Journal of Psychology, Vol. 42, No. 3, issue of July 1930, p. 453-455.

⁴ Ibid., p. 454.

⁵ Ibid., p. 454.

⁶ K. W. Braly, "The Influence of Past Experience in Visual Perception", in the Journal of Experimental Psychology, Vol. 16, No. 5, issue of October 1933, p. 613-643.

what is perceived when inadequate conditions are given, will be influenced by the type of dot figures previously shown. His results indicated that past experience of perception of visual forms ". . . influences significantly the perception of succeeding forms".⁷

One can easily notice how the results of this experiment validate some of the covariation theorems cited earlier. If visual experience can be understood as recency and frequency of exposure of a particular stimulus, then, it will build and strengthen a "hypothesis" and expectancy concerning that particular stimulus. Even when ambiguous or inadequate conditions are given, a strong "hypothesis" concerning these conditions, being formed by commerce with the same stimuli in the past, is more readily aroused and confirmed; it would also require more inappropriate conditions to be infirmed, than with a "hypothesis" that was not strengthened and confirmed in the past. The following experimental literature will serve to clarify and illustrate further this point.

Djang,⁸ likewise, attempted an investigation of the role of past experience of learned simple figures in complex

7 Ibid., p. 642.

8 Siao-Sung Djang, "The Role of Past Experience in the Visual Apprehension of Masked Forms", in the Journal of Experimental Psychology, Vol. 20, No. 1, issue of January 1937, p. 29-59.

wholes in which there was more than one organization possible. On the basis of her results she concludes that ". . . past experience plays an important role in our visual organization".⁹ In a recent paper, however, Zuckerman and Rock¹⁰ have challenged Djang's findings on the grounds that her subjects were instructed to find individual units within a complex figure; furthermore, these individual units were isolable within the complex figure and had good continuation. These authors also pointed out that subjects recognized simple forms in complex figures without being previously exposed to simple forms; this phenomenon they attribute to recognition which, in turn, is due to good continuation. Most investigators in this area, however, have been reluctant to accept this conclusion, since recognition does not depend only on good continuation; it is greatly influenced by familiarity and past experience, as the subsequent experiments will show.

Henle¹¹ investigated further this dilemma by holding structure constant and utilizing the already existing ordinary life experience instead of producing it experimentally.

9 Ibid., p. 58.

10 C. B. Zuckerman and Rock Irvin, "A Reappraisal of the Roles of Past Experience and Innate Organizing Processes in Visual Perception", in the Psychological Bulletin, Vol. 54, No. 4, issue of July 1957, p. 269-296.

11 Mary Henle, "An Experimental Investigation of Past Experience as a Determinant of Visual Form Perception", in the Journal of Experimental Psychology, Vol. 30, No. 1, issue of January 1942, p. 1-22.

Briefly, when obverse and reverse letters were presented tachistoscopically, there was a noticeable reduction of threshold in the reproduction of the obverse letters. Here again, the results speak for themselves. "Hypotheses" about obverse letters are stronger than those for reverse ones because of frequency of past experience, and with the presence of appropriate information from letter-stimuli they become easily reconfirmed. Henle believes that the inconsistent results in experiments of visual form perception, such as Gettschaldt's with Djang's, namely, whether autonomous factors or past experience play the determining role, is due to the possibility that one factor may be more dominant when the other is comparatively weaker. The major trend of literature, however, points more towards the evidence that perceptual behavior is, by and large dependent upon past experience.

Earlier, Dunker¹² had also utilized established experiences in order to determine their role upon a present perceptual experience. The shape of a donkey was cut from artificial green leaves, and an artificial leaf from the same material. After being exposed to red illumination to conceal their greenness, S's were asked to match for color

¹² Carl Dunker, "The Influence of Past Experience Upon Perceptual Properties", in The American Journal of Psychology, Vol. 52, No. 2, issue of April 1939, p. 255-265.

on a color-wheel. If memory traces do influence present perception, then, since the leaf is known as green should appear greener than the donkey, the later being associated in the past with gray. The author concludes ". . . that there are conditions under which past experience (some trace system) affects sensory material, no search (or vector) being involved".¹³ Leeper¹⁴ arrived at the same conclusion by utilizing a verbal set. Ambiguous figures and completion-test pictures presented on a projection screen appeared meaningless; but, with some suggestion and verbal preparation from the experimenter, a better organization resulted, whereby, the ambiguous objects were perceived in a more meaningful form. The effect of this experience of form perception was quite persistent, since, once it was achieved it was difficult for some other type of form to be perceived when the same meaningless form was shown again. This indicates how a "hypethesis" becomes strong, and its readiness of confirmation in the presence of insufficient stimulation. Likewise, Carmichael et al.¹⁵ have established that if a visual

13 Ibid., p. 264.

14 Robert Leeper, "A Study of a Neglected Portion of the Field of Learning - The Development of Sensory Organization", in the Journal of Genetic Psychology, Vol. 46, No. 1, issue of March 1935, p. 41-75.

15 L. Carmichael, H. P. Hogan, and A. A. Walter, "An Experimental Study of the Effect of Language on the Reproduction of Visually Perceived Form", in the Journal of Experimental Psychology, Vol. 15, No. 1, issue of February 1932, p. 73-86.

form similar to two familiar shapes, such as eyeglasses and dumbbell, was shown to various subject groups with suggestions that the form would resemble one of these alternatives, the results were in the direction of the suggestions. Hanawalt¹⁶ demonstrated the role of verbal and perceptual pretraining in increasing and sharpening expectancies. Instructions and repetition were found to be stronger than organizational principles when subjects were shown a simple design and asked to find the same in a more complex one. The same point was corroborated by Hastorf¹⁷ when he demonstrated how the experience of distance changed as a function of the size of the stimulus. The distance of a circle, for example, changed when the suggestions were altered from "ping-pong ball" to "billiard ball". It is evident that these experiments are similar to those reported in the previous section where the role of set upon perceptual behavior was designated. This section attempts to illustrate that past experience is a determinant of perception and to show that verbal sets and past experience, both strengthen perceptual "hypotheses".

¹⁶ Nelson G. Hanawalt, "The Effect of Practice Upon the Perception of Simple Designs Masked by More Complex Designs", in the Journal of Experimental Psychology, Vol. 31, No. 2, issue of August 1942, p. 134-148.

¹⁷ Albert H. Hastorf, "The Influence of Suggestion on the Relationship Between Stimulus Size and Perceived Distance", in The Journal of Psychology, Vol. 29, First Half, issue of January 1950, p. 195-217.

The same trend was found by Jones and Bruner¹⁸ concerning motion. When apparent movement was produced by successive exposures of pictorial material on a screen, the perception of motion increased with objects that were more frequently seen and associated with motion in ordinary life situations than with objects not usually associated with motion.

In a study of perceptual assimilation, whereby, objects appear more "normal" of that class in which they are usually perceived and ordinarily related due to past experiential associations, Bruner, Busiek and Minturn¹⁹ have shown that ambiguous figures labeled prior to their exposure have a tendency to be reproduced by their given label, as compared to ambiguous figures not labeled before exposure. Previous labeling facilitates identification of ambiguous objects, and their relation to more or less specific categories. When stimulus conditions are made inadequate through brief exposures, ". . . the resulting percept will be assimilated toward the typical instance of a category".²⁰

18 E. E. Jones, and J. S. Bruner, "Expectancy in Apparent Visual Movement", in The British Journal of Psychology, Vol. 45, Part 3, issue of August 1954, p. 157-165.

19 J. S. Bruner, R. D. Busiek, and A. L. Minturn, "Assimilation in the Immediate Reproduction of Visually Perceived Figures", in the Journal of Experimental Psychology, Vol. 44, No. 3, issue of September 1952, p. 151-155.

20 Ibid., p. 155.

Costiloe,²¹ in an unpublished Ph.D. thesis, by assuming that a preparatory set arouses the same adjustment in the organism as increased stimulation does, she attempted to test the hypothesis that, for familiar material under reduced stimulation, an adjustment can be brought about in another way, such as with the introduction of a specific set in order to form a definite perceptual experience. She showed that a set can facilitate the perception of familiar material of below perceptual threshold, by asking subjects to choose words placed at a distance slightly farther from the position where they were unrecognized.

In spite of the abundant evidence concerning the decisive role of past experience in forming and strengthening "hypotheses" to be confirmed, depending upon the amount of available appropriate stimuli of a particular situation, Zuckerman and Rock²² have asserted that perceptual organization is not the result of learning alone, and that ". . . past experience cannot carve visual form out of initially formless perception".²³ They believe that ". . . it is only when some degree of innate organization is granted that the

21 Carol Spencer Costiloe, A Study of the Facilitation of the Perceptual Process Through the Introduction of a Specific Set, unpublished Ph.D. thesis presented to the Graduate Faculty of the University of Oklahoma, 1955, 71 p.

22 Carl B. Zuckerman, and Rock, I., Op. cit., p. 269-296.

23 Ibid., p. 291.

effects of learning can be more clearly understood".²⁴ A recent experiment by Bruner and Minturn²⁵ has shown that organization is not a necessary prerequisite in perception. By showing tachistoscopically a broken B letter, subjects will perceive it as a B letter when asked to see letters, and as number 13 when asked to see numbers. This seems to indicate clearly that the processes of recognition and identification do not depend primarily upon the laws of closure and organization as the Gestalt psychologists advocate. In an earlier experiment, Postman and Bruner²⁶ have shown that even a closure response can be a function of training, and that supporting "hypotheses" can either inhibit or facilitate perceptual closure. Thus, under difficult discriminatory conditions, training with closed circles strengthens perceptual "hypotheses" that circles will appear complete, and open circles to appear incomplete. Another study by Wallach et al.²⁷ indicates the effect of a memory trace that arouses

24 Ibid., p. 291.

25 J. S. Bruner, and A. L. Minturn, "Perceptual Identification and Perceptual Organization", in The Journal of General Psychology, Vol. 53, Vol 53, (no No.), issue of July 1955, p. 21-28.

26 L. Postman, and J. S. Bruner, "Hypothesis and the Principle of Closure: The Effect of Frequency and Recency", in The Journal of Psychology, Vol. 33, (no No.), issue of January 1952, p. 113-125.

27 H. Wallach, D. M. O'Connell, and U. Neisser, "The Memory Effect of Visual Perception of Three-Dimensional Form", in the Journal of Experimental Psychology, Vol. 45, No. 5, issue of May 1953, p. 360-368.

"hypotheses" when insufficient stimulus information is given. In this case, the trial-and-check process for the confirmation of "hypotheses" is against trace information - in contrast to adequate stimulus information. The shadow of a wire figure was seen as two-dimensional by a control group; to the experimental group, the shadows were made to appear three-dimensional by turning the wire figures back and forth. At later intervals, when the shadows of the wire figures were shown to the experimental group in stationary positions, they were no longer perceived as two-dimensional as the control group did; they were still seen as three-dimensional. This shows again that the effects of the conditions of a previous perceptual experience can alter a later form of perception.

Neisser²⁸ revealed additional evidence. He confirmed that previous tachistoscopic exposure of words established a set which facilitated recognition of the same words when presented again, as compared with their homonyms. Ross et al.²⁹ found the same relationship with words having a structural similarity. The role of past experience was found

28 U. Neisser, "An Experimental Distinction Between Perceptual Process and Verbal Response", in the Journal of Experimental Psychology, Vol. 47, No. 6, issue of June 1954, p. 399-402.

29 Sherman Ross, M. Yarosower, and G. M. Williams, "Recognition Thresholds for Words as a Function of Set and Similarity", in The American Journal of Psychology, Vol. 69, No. 1, issue of March 1956, p. 82-86.

to determine significantly both visual and auditory discrimination of verbal stimuli by Postman and Rosenzweig.³⁰ Furthermore, their results indicated a transfer of recognition from one modality to another with better effects from the visual to the auditory. However, data by Forrest³¹ in a subsequent experiment indicated the reverse relationship. Finally, Baker and Fieldman³² report further that threshold-luminance is also a function of familiarity, in the same way as threshold-duration.

There have been numerous experiments indicating that perception is a function of familiarity, frequency and past experience; these variables account also for the phenomenon of defense in perceptual studies, as we shall see in the forthcoming sections.

Continuing with the role of past experience, Cofer and Shevitz³³ found that subjects gave significantly more

³⁰ Leo Postman, and M. R. Rosenzweig, "Practice and Transfer in the Visual and Auditory Recognition of Verbal Stimuli", in The American Journal of Psychology, Vol. 69, No. 2, issue of June 1956, p. 209-226.

³¹ D. W. Forrest, "Auditory Familiarity as a Determinant of Visual Threshold", in The American Journal of Psychology, Vol. 70, No. 4, issue of December 1957, p. 634-636.

³² K. E. Baker, and H. Fieldman, "Threshold-Luminance for Recognition in Relation to Frequency of Prior Exposure", in The American Journal of Psychology, Vol. 69, No. 2, issue of June 1956, p. 278-280.

³³ C. N. Cofer, and R. Shevitz, "Word-Association as a Function of Word-Frequency", in The American Journal of Psychology, Vol. 65, No. 1, issue of January 1952, p. 75-79.

associations to high than to low frequency words. Postman and Conger³⁴ point out that verbal habits associated with letter sequences determine significantly their speed of recognition as compared to the letters' mere frequency of exposure. Singer³⁵ demonstrated that among the most frequently used words, those with a high association threshold also had a high perceptual threshold. Cofer and Shepp³⁶ found that recognition of words associated with synonyms was easier as compared to unrelated words. Daston³⁷ reports lower recognition thresholds for words used more often in therapy by patient-subjects, as compared to the frequency of words of general usage. Visual recognition thresholds were found to be a function of frequency of prior exposure, according to Newton.³⁸

³⁴ Lee Postman, and Beverly Conger, "Verbal Habits and the Visual Recognition of Words", in Science, Vol. 119, No. 3098, issue of May 1954, p. 671-673.

³⁵ E. R. Singer, "An Experimental Inquiry Into the Concept of Perceptual Defense", in The British Journal of Psychology, Vol. 47, Part 4, issue of November 1956, p. 298-311.

³⁶ Charles N. Cofer, and B. E. Shepp, "Verbal Context and Perceptual Recognition Time", in Perceptual and Motor Skills, Vol. 7, No. 3, issue of September 1957, p. 215-218.

³⁷ Paul G. Daston, "Perception of Idiosyncratically Familiar Words", in Perceptual and Motor Skills, Vol. 7, No. 1, issue of March 1957, p. 3-6.

³⁸ Kenneth R. Newton, "Visual Recognition Thresholds and Learning", in Perceptual and Motor Skills, Vol. 6, No. 2, issue of June 1956, p. 81-87.

These experiments have demonstrated the strengthening and confirmation of single "hypotheses". The next section will deal with the operation of alternative "hypotheses" in a given situation.

2. Number of Alternative Hypotheses.

Woodworth,³⁹ in his discourse on the disjunctive reaction-time experiments, states that during the later part of the past century, Merkel noticed that as the number of alternative responses increased, so did the reaction-time. About two decades later, Henmon found that the more similar the alternative stimuli, the longer the reaction-time required to make a perceptual discrimination, than with stimuli of a mere noticeable variance. Obviously, the greater the similarity among two or more "hypotheses" about a given stimulus situation, the greater is the necessity for a more structured and definite stimulus for any one of these "hypotheses" to be confirmed and for proper discrimination to take place. On the other hand, the greater the variance among stimuli, the easier it is for the proper "hypotheses" to be checked and confirmed.

³⁹ Robert S. Woodworth, Experimental Psychology, New York, Holt, 1938, xi-889 p.

Yokoyama, as reported by Boring,⁴⁰ had Os make comparative judgments concerning the relative intensity and length with pairs of rectangles of light presented tachistoscopically. In one of such series, the O was instructed to report the intensity only. When the experimenter would, at irregular intervals, give a secondary instruction immediately, and ask: "How about extent?" the judgment was delayed. This points out clearly that one "hypothesis" becomes confirmed easier and faster than two.

Chapman⁴¹ obtained similar results. When verbal sets, such as counting or reproducing tachistoscopically presented letters, were given preceding and following the exposures, there were significantly more correct responses where the verbal set preceded the exposure than with the set being given after the letters were exposed. The author points out that lack of preparedness and expectancy in a given perceptual field, brings out simultaneously all the aspects of that field, and their rivalry diminishes its perceptual clarity. In the same paper, Chapman cites that K lpe obtained the same results. When he would introduce a "surprise" Aufgabe

⁴⁰ M. Yokoyama, as reported by E. G. Boring, "Attribute and Sensation", in The American Journal of Psychology, Vol. 35, No. 2, issue of April 1924, p. 301-304.

⁴¹ D. W. Chapman, "Relative Effects of Determinate and Indeterminate Aufgaben", in The American Journal of Psychology, Vol. 44, No. 1, issue of January 1932, p. 163-174.

after the first response was made, the second report was found to be less accurate. Likewise, Henle,⁴² in an experiment reported earlier, demonstrated that although obverse letters are recognized easier than reverse letters due to greater familiarity, the difference was diminished when subjects were set to expect and recognize either one of both types of letters.

An experiment by Postman⁴³ seems to bear additional implications for the multiple "hypothesis" concept, although it was designed for a different purpose. When learned nonsense syllables appeared with unfamiliar syllables, the efficiency in recognizing the former ones decreased as the number of the later increased. He concludes that as the subject's alternatives from which he has to make a choice increase, his recognition ability declines significantly.

Another experiment by Postman and Bruner⁴⁴ illustrates the same point. Subjects were asked to perceive as readily as possible the color words among the list of words presented tachistoscopically. Another series of words presented in the same manner contained color and food words,

⁴² Mary Henle, Op. cit., p. 1-22.

⁴³ Leo Postman, "Choice Behavior and the Process of Prerecognition", in The American Journal of Psychology, Vol. 63, No. 4, issue of October 1950, p. 576-583.

⁴⁴ Leo Postman, and J. S. Bruner, "Multiplicity of Set as a Determinant of Perceptual Behavior", in the Journal of Experimental Psychology, Vol. 39, No. 3, issue of June 1949, p. 369-377.

and the subjects were asked to report in the same manner either words. For the second series where the set was more than one, the perceptual threshold was much higher. The authors conclude that multiplicity of set lowers perceptual selectivity, and the subject will require a longer exposure time to arrive at a meaningful perception of stimuli.

Talland's⁴⁵ data corroborated the findings of Postman and Bruner. The extent to which perception tends to become inadequate when preceded by a variety of unconfirmed hypothesizing has been shown by Wyatt and Campbell.⁴⁶ Slides of real life situations were presented to two groups under different circumstances. In the first group, the slides were shown in eight successive stages, beginning from a blurred and ambiguous stage, and ending serially in the clear slide. The second group was shown only three of the original slides at different stages lying between the two extremes. A comparison of the three slides under the two conditions showed a significant difference regarding correctness of response. The three isolated slides were identified more correctly than the serial ones, since, in the second group, the three slides had been preceded by ambiguous ones which offered a greater

⁴⁵ G. A. Talland, "The Effect of Set on Accuracy of Auditory Perception", in The British Journal of Psychology, Vol. 49, Part Two, issue of May 1958, p. 117-130.

⁴⁶ D. F. Wyatt, and D. T. Campbell, "On the Liability of Stereotype or Hypothesis", in The Journal of Abnormal and Social Psychology, Vol. 46, No. 4, issue of October 1951, p. 496-500.

opportunity for guessing and hypothesizing; the preceding ambiguous slides allowed many expectancies to be formed, but were not confirmed.

It is conceivable that the mechanism of perceptual defense, so much emphasized by the adherents of the New Look movement, whereby, tachistoscopically perceived taboo words have a higher perceptual threshold than neutral words, can be explained in the same fashion. The increase of threshold for the taboo words preceded by the presentation of neutral words can be easily due to the introduction of a new additional expectancy; the two simultaneously operating sets that words could be either taboo or neutral increase the range of competing "hypotheses" and require more time to discern among them, as seen in the threshold increment. This illustrates again that the fewer the "hypotheses", the easier they are confirmed in the presence of a smaller amount of appropriate information, and it refers precisely to the concept of monopoly, reported earlier.

Blum,⁴⁷ however, in an ingenious experiment demonstrated that the "competing hypothesis" theory is a premature concept lacking adequate experimental evidence to explain the process of perceptual defense. He obtained avoidance

⁴⁷ Gerald S. Blum, "Perceptual Defense Revisited", in The Journal of Abnormal and Social Psychology, Vol. 51, No. 1, Issue of July 1955, p. 24-29.

responses to threatening stimuli that could be directly traced to the perceptual process itself, when familiarity, set, and antecedent conditions were all controlled.

By means of the Blacky Pictures, Blum assessed his subjects in terms of conflict and defense. Later, when only four pictures were presented tachistoscopically with subliminal thresholds, the pictures pertaining to their own conflict were recalled significantly less than the neutral ones.

Another experiment by Lawrence and Coles⁴⁸ indicates that either similar or dissimilar alternatives, whether they were given before or after the stimulus, facilitate accuracy of recognition significantly better than a control group without alternatives. The stimuli consisted of black-white pictures and the alternatives were presented in the form of words. Similar results were obtained by Freeman and Engler⁴⁹ when frequency of stimuli was taken into account. They found that single sets have lower perceptual thresholds for low frequency words than multiple sets, and the reverse for high

⁴⁸ Douglas H. Lawrence, and George Coles, "Accuracy of Recognition with Alternatives Before and After the Stimulus", in the Journal of Experimental Psychology, Vol. 47, No. 3, issue of March 1954, p. 208-214.

⁴⁹ James T. Freeman, and J. Engler, "Perceptual Recognition Thresholds as a Function of Multiple and Single Set and Frequency of Usage of the Stimulus Material", in Perceptual and Motor Skills, Vol. 5, No. 3, issue of September 1955, p. 149-154.

frequency words. It becomes evident that further experimentation with better controls will throw more light on this issue.

3. Motivational Support.

When "hypotheses" to be confirmed will be followed by reward or punishment, or if the stimuli involved comport some type of instrumental value or goal-striving activity, such "hypotheses" are motivationally strengthened, and consequently, require less appropriate stimulus information to be confirmed, as compared to "hypotheses" not supported by such reinforcements. It should be noted that motivational support is by no means a wishfulfillment of infantile needs, but rather, in terms of consequences it facilitates learning and emphasizes the direction of behavior. As we shall see, motivational variables such as needs, values, anxiety, reward and punishment, serve to strengthen "hypotheses" of instrumental meaning rather than being a wish for the attainment of goal objects per se. In this section of the present review, experimental literature pertaining to the strengthening of "hypotheses" by motivational factors will be presented, and an attempt will be made to expound the controversial phenomenon of perceptual defense.

A. Physiological Needs in Perception.

Sanford⁵⁰ was among the first investigators who attempted to verify the hypothesis that imaginal processes are functions of the organism's needs. Association responses to food words and ambiguous pictures, before and after a meal, showed that there were significantly more food responses immediately before, than shortly after a regular meal. He concludes that there is a direct relationship between strength of need for food and food responses to ambiguous stimuli. A year later, a similar investigation by the same author⁵¹ revealed that there is no direct ratio, but a variation in frequency, between food responses and abstinence from food.

Levine et al.⁵² found further that increased abstinence from food increases the word responses up to a certain point only, beyond which it has a tendency to decrease again. However, McClelland and Atkinson⁵³ indicate that the increase

50 R. N. Sanford, "The Effects of Abstinence from Food Upon Imaginal Processes: A Preliminary Report", in The Journal of Psychology, Vol. 2, (no No.), (no month), 1936, p. 129-136.

51 -----, "The Effects of Abstinence from Food Upon Imaginal Processes: A Further Experiment", in The Journal of Psychology, Vol. 3, (no No.), issue of Jan. 1937, p. 145-159.

52 R. Levine, I. Chein, and G. Murphy, "The Relation of the Intensity of a Need to the Amount of Perceptual Distortion: A Preliminary Report", in The Journal of Psychology, Vol. 13, (no No.), issue of April 1942, p. 283-293.

53 D. C. McClelland, and J. W. Atkinson, "The Projective Expression of Needs: 1. The Effect of Different Intensities of the Hunger Drive on Perception", The Journal of Psychology Vol. 25, (no No.), issue of April 1948, p. 205-222.

of food-related responses with food deprivation was for instrumental rather than goal objects, (i.e., knives instead of apples). These were responses to various black images on a screen. When these authors⁵⁴ used a similar procedure by employing the Thematic Apperception Test as perceptual material the same results were obtained. These findings have been corroborated in a similar experiment by Wispè.⁵⁵

A study by Brozek et al.⁵⁶ failed to show that need influences to any significant extent the associative and perceptual processes. When subjects had lost one-fourth of their initial body weight in a half year period of the various projective techniques used to elicit any cognitive changes, only the Free Word Association Test revealed a small degree of relationship between need and cognition.

⁵⁴ John W. Atkinson, and D. C. McClelland, "The Projective Expression of Needs. II. The Effect of Different Intensities of the Hunger Drive on Thematic Apperception", in Journal of Experimental Psychology, Vol. 38, No. 6, issue of December 1948, p. 643-658.

⁵⁵ L. G. Wispè, "Physiological Need, Verbal Frequency, and Word Association", in The Journal of Abnormal and Social Psychology, Vol. 49, No. 2, issue of April 1954, p. 229-234.

⁵⁶ J. Brozek, H. Guetskow, and M. V. Baldwin, "A Qualitative Study of Perception and Association in Experimental Semistarvation", in the Journal of Personality, Vol. 19, No. 3, issue of March 1951, p. 245-264.

Taylor's⁵⁷ investigation on the same issue failed to obtain a significant relationship between perceptual duration thresholds and physiological need. Williams⁵⁸ confirms further that retention of need related words and neutral words either associated or not to need related material was not influenced by the induction of a need.

Postman and Crutchfield⁵⁹ report that when subjects under food deprivation were presented with incomplete words that could be completed with either food or non-food words, and also given a set or expectancy for food responses, the results failed to indicate a direct relationship between hunger and food responses, but the degree of set was found to interact significantly with food deprivation.

Gilchrist and Nesberg,⁶⁰ on the other hand, have found that as need increases, such as hunger and thirst, the illumination of food objects is perceived as brighter, compared

⁵⁷ Janet A. Taylor, "Physiological Need, Set, and Visual Duration Threshold", in The Journal of Abnormal and Social Psychology, Vol. 52, No. 1, issue of January 1956, p. 96-99.

⁵⁸ M. Williams, "The Effects of Experimentally Induced Needs Upon Retention", in the Journal of Experimental Psychology, Vol. 40, No. 2, issue of April 1950, p. 139-151.

⁵⁹ L. Postman, and R. S. Crutchfield, "The Interaction of Need, Set, and Stimulus Structure in a Cognitive Task", in The American Journal of Psychology, Vol. 65, No. 2, issue of April 1952, p. 196-217.

⁶⁰ J. C. Gilchrist, and L. S. Nesberg, "Need and Perceptual Change in Need-Related Objects", in the Journal of Experimental Psychology, Vol. 44, No. 6, issue of December 1952, p. 369-376.

to non-need-related objects. One begins to wonder in what way brightness of color is accentuated by need. The conclusion here seems untenable, since the mediating mechanism is far from known, and other experimental evidence already reported contradicts these results. Nor to call on a special ad hoc mechanism as sufficient explanation will do much justice.

Lazarus et al.⁶¹ attempted to account for the inconsistent results of these experiments by proposing two kinds of perceptions; the first is a response oriented toward the stimulus being manipulated and scored by the experimenter, and the second, a perceptual response concentrated on association, imagination and projection.

Another study on the current problem was performed by Wispè and Drambarean.⁶² Their investigation was to find whether need-relevant words projected on an episcotister will be recognized more rapidly than neutral words, in subjects deprived of food. The results indicated that the greater the frequency of usage of the word presented, the lower the threshold. Similarly, as need increased, the

61 Richard S. Lazarus, H. Yousem, and D. Arenberg, "Hunger and Perception", in the Journal of Personality, Vol. 21, No. 3, issue of March 1953, p. 312-328.

62 L. G. Wispè, and N. C. Drambarean, "Physiological Need, Word Frequency, and Visual Duration Thresholds", in the Journal of Experimental Psychology, Vol. 46, No. 1, issue of July 1953, p. 25-31.

recognition-time threshold for food words decreased, but had a slight tendency to increase again at the twenty-four-hour period of food deprivation. The deprivation of food gave motivational support, according to the authors, so that "hypotheses" were confirmed easier with the short exposure of words (i.e. insufficient stimulus information).

Although the evidence is not too conclusive in this area, on the basis of the reported findings, there is a strong indication that need has an instrumental role in perception, rather than that of a wishfulfillment.

B. Values and Attitudes in Perception.

In a similar way, evaluative and emotional attitudes strengthen "hypotheses" for both, positive and negative stimuli. Postman et al.⁶³ report that individuals perceive more readily value words that are similar to their own major scheme of values, than to contravalent words. Their findings were confirmed by those of Haigh and Fiske.⁶⁴ Solomon and

⁶³ Leo Postman, J. S. Bruner, and E. M. McGinnies, "Personal Values as Selective Factors in Perception", in The Journal of Abnormal and Social Psychology, Vol. 43, No. 2, Issue of April 1948, p. 142-154.

⁶⁴ G. V. Haigh, and D. W. Fiske, "Corroboration of Personal Values as Selective Factors in Perception", in The Journal of Abnormal and Social Psychology, Vol. 47, No. 2, Issue of April 1952, p. 394-398.

Howes,⁶⁵ however, have refuted the study by Postman et al., and have shown that word frequency alone can account for the same results, but they also point out the possibility that frequency might be considerably strengthened by emotional factors.

Postman and Schneider⁶⁶ repeated the Postman, Bruner and McGinnies, and the Solomon and Howes experiments and obtained similar results. They also found that there was a significant relationship of infrequent words between duration thresholds and the extremes of value-rank. On this basis, they maintain that the longer durations for the perception of infrequent words gives more opportunity for the role of values to come into play, which reduces the threshold of high-value but infrequent words.

McGinnies and Bowles⁶⁷ have demonstrated that an individual's dominant scheme of values can affect retention and selection of certain visual symbols that represent their highest values when reward and frequency were controlled.

⁶⁵ R. L. Solomon, and D. H. Howes, "Word Frequency, Personal Values, and Visual Duration Thresholds", in the Psychological Review, Vol. 58, No. 4, issue of July 1951, p. 256-270.

⁶⁶ L. Postman, and B. H. Schneider, "Personal Values, Visual Recognition, and Recall", in the Psychological Review, Vol. 58, No. 4, issue of July 1951, p. 271-284.

⁶⁷ E. McGinnies, and W. Bowles, "Personal Values as Determinants of Perceptual Fixation", in the Journal of Personality, Vol. 18, No. 2, issue of December 1949, p. 224-235.

Vanderplas and Blake⁶⁸ found the same relationship with auditory perception. Words from an individual's high value areas were perceived at lower intensity levels with greater facility, as compared to words of their low value areas.

Further investigation in this area by Bruner and Postman⁶⁹ reveals, similarly, that speed of recognition and associative reaction-time to emotionally charged stimuli in the form of taboo words compared to neutral ones, was significantly higher. In addition, their study showed that the relationship between recognition-time and associative reaction-time is not a stable one, and that although taboo words had a slow reaction-time, their threshold recognition-time was much faster (i.e. a sensitization process occurred). A process somewhat similar to sensitization has been found by McGinnies and Sherman.⁷⁰ When recognition thresholds for neutral words was determined, they had a significantly higher threshold when preceded by a critical or taboo than by a neutral word.

⁶⁸ J. M. Vanderplas, and R. R. Blake, "Selective Sensitization in Auditory Perception", in the Journal of Personality, Vol. 18, No. 2, issue of December 1949, p. 252-266.

⁶⁹ J. S. Bruner, and Leo Postman, "Emotional Selectivity in Perception and Reaction", in the Journal of Personality, Vol. 16, No. 1, issue of September 1947, p. 69-77.

⁷⁰ E. McGinnies, and H. Sherman, "Generalization of Perceptual Defense", in The Journal of Abnormal and Social Psychology, Vol. 47, No. 1, issue of January 1952, p. 81-85.

In a similar way, Mausner and Siegel⁷¹ investigated if perception is a function of value when familiarity was controlled. When subjects learned the values of unfamiliar engravings of postage stamps, there was no significant difference between learned value and recognition thresholds. Earlier, Ansbacher⁷² had demonstrated the role of the symbolic value of stamps and coins in the accentuation of numerical judgments. Finally, Ashley et al.⁷³ found that subjects who had been hypnotically induced with "poor" life histories overestimated the size of coins, and the inverse for those with "rich" hypnotically induced histories.

Although the role of values on perception has not been satisfactorily homogeneous, there is sufficient indication that personal values strengthen value-congruent "hypotheses" which are confirmed easier with the input of appropriate stimuli. Resenthal⁷⁴ points out two weaknesses in these experiments.

71 B. Mausner, and A. Siegel, "The Effect of Variation in 'Value' on Perceptual Thresholds", in The Journal of Abnormal and Social Psychology, Vol. 45, No. 4, issue of October 1950, p. 760-763.

72 H. Ansbacher, "Perception of Number as Affected by the Monetary Value of the Objects", in the Archives of Psychology, Vol. 30, No. 215, issue of June 1937, p. 1-88.

73 W. R. Ashley, R. S. Harper, and D. L. Runyon, "The Perceived Size of Coins in Normal and Hypnotically induced Economic States", in The American Journal of Psychology, Vol. 69, No. 4, issue of October 1951, p. 564-572.

74 D. Resenthal, "The Selection of Stimulus Words for Value: Duration Threshold Experiments", in The Journal of Abnormal and Social Psychology, Vol. 50, No. 3, issue of May 1955, p. 403-404.

The first one is the method of selection of the stimulus words, and the second, whether the term "value" implies "interest" or "preference" should be clarified before the role of values on perception can be more adequately understood. Relations in the visual field, such as the weight and contour characteristics of the objects have been found to influence size distortions by Holzman and Klein.⁷⁵ These investigators conclude that such variables should be controlled prior to attributing size distortions as functions of values and needs. Finally, the position of the object was found to affect the estimation of its size, by Gardner et al.⁷⁶

Similarly, McClelland and Liberman⁷⁷ found that individuals who had been assessed by the TAT to have a high need for achievement, recognized more rapidly achievement-related words, than did individuals with a low need for achievement. They found additionally that those individuals, who were assessed to have a moderate need for achievement showed sensitization to failure words, compared to those with a high need for achievement.

⁷⁵ P. S. Holzman, and G. S. Klein, "Intersensory and Visual Field Forces in Size Estimation", in Perceptual and Motor Skills, Vol. 6, No. 1, issue of March 1956, p. 37-41.

⁷⁶ R. W. Gardner, P. S. Holzman, and R. S. Siegal, "Some Variables Affecting Size Judgments", in Perceptual and Motor Skills, Vol. 6, No. 4, issue of December 1956, p. 285-290.

⁷⁷ D. C. McClelland, and A. M. Liberman, "The Effect of Need for Achievement on Recognition of Need-Related Words", in the Journal of Personality, Vol. 18, No. 2, issue of December 1949, p. 236-251.

Experiments dealing with the phenomenon of accentuation, although at times inconsistent, seem to point out the same conclusion. Bruner and Goodman,⁷⁸ for example, have shown that poor children value the size of coins more than rich children do. But replication of this experiment by Carter and Schooler,⁷⁹ arose doubt whether needs and value systems influence perception, since judgment from memory indicated an underestimation of small coins.

Bruner and Postman⁸⁰ found further that the effects of positive, neutral and negative value-symbols, such as a dollar sign, a square, and a swastika, have a differential effect upon perception. When subjects were asked to make size judgments of these symbols, both, positive and negative value-symbols were positively accentuated, as compared to neutral symbols. Gilchrist et al.⁸¹ obtained similar data.

78 Jerome S. Bruner, and C. C. Goodman, "Value and Need as Organizing Factors in Perception", in The Journal of Abnormal and Social Psychology, Vol. 42, No. 1, issue of January 1947, p. 33-44.

79 L. F. Carter, and K. Schooler, "Value, Need, and Other Factors in Perception", in the Psychological Review, Vol. 56, No. 4, issue of July 1949, p. 200-207.

80 J. S. Bruner, and Leo Postman, "Symbolic Value as an Organizing Factor in Perception", in The Journal of Social Psychology, Vol. 27, issue of May 1948, p. 203-208.

81 J. C. Gilchrist, J. F. Ludeman, and W. Lysak, "Values as Determinants of Word-Recognition Thresholds", in The Journal of Abnormal and Social Psychology, Vol. 49, No. 3, issue of July 1954, p. 423-426.

Klein et al.⁸² repeated Bruner and Postman's experiment cited above, but controlled for the variables of difficulty of the task, intensity and absence or presence of value, and for the figural properties of the value stimuli. They failed to find any significant influence of value on the error of size-estimation; only difficulty of task and the size of the stimulus had an influence on the error of size-estimation. From these data, it can be seen that positive accentuation cannot be a function of needfulfillment and reward alone, and that a negative symbol can have the same effect.

Similarly, Postman and Leytham⁸³ have confirmed these findings. When a group was set to perceive trait words tachistoscopically, desirable traits did not show faster recognition than undesirable traits and, as a matter of fact, there was tendency for desirable traits to have a higher perceptual threshold.

⁸² George S. Klein, H. J. Schlesinger, and D. Meister, "The Effect of Personal Values on Perception: An Experimental Critique", in the Psychological Review, Vol. 58, No. 2, issue of March 1951, p. 96-112.

⁸³ Leo Postman, and G. Leytham, "Perceptual Selectivity and Ambivalence of Stimuli", in the Journal of Personality, Vol. 19, No. 4, issue of June 1951, p. 390-405.

C. The Perceptual Defense Dilemma.

McGinnies'⁸⁴ investigation in this area revealed that emotionally-toned words have higher recognition thresholds than neutral words, and a significantly greater GSR magnitude for the emotional words during the pre-recognition period. Likewise, McCleary and Lazarus⁸⁵ report that in situations where conscious discrimination is difficult, an autonomic discrimination can take place as revealed by the GSR. When tachistoscopic speeds of stimuli are too brief for a correct verbal report, a discriminatory galvanic skin response takes place, and the authors call this process subception. Studies on subception have been reviewed elsewhere.⁸⁶

Although the experimental evidence is not too conclusive at this point, howes and Solomon⁸⁷ have refuted McGinnies' conclusions on the basis that short exposures will increase the GSR responses in terms of magnitude, and that

⁸⁴ E. M. McGinnies, "Emotionality and Perceptual Defense", in the Psychological Review, Vol. 56, No. 5, issue of September 1949, p. 244-251.

⁸⁵ R. A. McCleary and R. S. Lazarus, "Autonomic Discrimination Without Awareness: An Interim Report", in the Journal of Personality, Vol. 18, No. 2, issue of December 1949, p. 171-179.

⁸⁶ J. V. McConnell, R. L. Cutler, and E. B. McNeil, "Subliminal Stimulation: An Overview", in The American Psychologist, Vol. 13, No. 5, issue of May 1958, p. 229-242.

⁸⁷ D. H. Howes and R. L. Solomon, "A Note on McGinnies' 'Emotionality and Perceptual Defense'" in the Psychological Review, Vol. 57, No. 4, issue of July 1950, p. 229-234.

the taboo words had been conditioned to the GSRs during the course of the experiment. Of course, the same could be said for the results of the experiment by McCleary and Lazarus. Howes and Solomon state further that the frequency variable of the words used was not controlled, and the subjects might have seen the taboo words but did not report them soon enough in order to avoid embarrassment. McGinnies⁸⁸ has, in turn, replied to Howes and Solomon and challenged their frequency hypothesis. He states, for example, that these authors rely too much on their personal observations and ignore experimental data that support perceptual defense.

Postman, Bronson and Gropper⁸⁹ have demonstrated that the nature of instructions previously given can alter the perceptual thresholds for neutral and taboo words, when selective verbal report, familiarity and set were all taken into consideration. From these results, the authors have confuted the mechanism of perceptual defense. An investigation by Freeman⁹⁰ revealed that sex differences and ego-involvement have a significant influence upon the phenomenon

⁸⁸ E. McGinnies, "Discussion of Howes' and Solomon's Note on 'Emotionality and Perceptual Defense'", in the Psychological Review, Vol. 57, No. 4, issue of July 1950, p. 235-240.

⁸⁹ L. Postman, W. C. Bronson, and G. L. Gropper, "Is There a Mechanism of Perceptual Defense?" in The Journal of Abnormal and Social Psychology, Vol. 48, No. 2, issue of April 1953, p. 215-224.

⁹⁰ J. T. Freeman, "Set Versus Perceptual Defense: A Confirmation", in The Journal of Abnormal and Social Psychology, Vol. 51, No. 3, issue of November 1955, p. 710-712.

of perceptual defense. Lower thresholds were obtained by male than female subjects to neutral and taboo words. Similarly, ego-involving instructions lowered significantly perceptual thresholds to both types of words.

Lazarus⁹¹ has, in turn, rebutted the argument that there is no sufficient experimental evidence in support of perceptual defense. He cites additional evidence to support his views. Among this is a study by Lazarus and Longo,⁹² where a group of subjects which showed a superior recall of successful tasks, showed a superior recall ability of nonsense syllables not associated with painful electric shock; conversely, those who had shown superior recall to unsuccessful tasks recalled a significantly greater amount of syllables associated with shock.

Another study by Lazarus et al.⁹³ has found a high relationship between auditory perception and a sentence completion test in relation to emotional material.

⁹¹ R. S. Lazarus, "Is There a Mechanism of Perceptual Defense? A Reply to Postman, Bronson, and Grepper", in The Journal of Abnormal and Social Psychology, Vol. 49, No. 3, Issue of July 1954, p. 396-398.

⁹² R. S. Lazarus, and N. Longo, "The Consistency of Psychological Defenses Against Threat", in The Journal of Abnormal and Social Psychology, Vol. 48, No. 4, Issue of October 1953, p. 495-499.

⁹³ R. S. Lazarus, C. W. Eriksen, and C. P. Fonda, "Personality Dynamics and Auditory Perceptual Recognition", in The Journal of Personality, Vol. 19, No. 4, issue of June 1951, p. 471-482.

There is still more evidence in the psychological literature that upholds the perceptual defense theory. Eriksen,⁹⁴ for example, concludes that subjects who obtained disturbance scores on need areas as measured by a word association test, showed higher perceptual thresholds to tachistoscopically presented scenes portraying people expressing these same needs. Another study by the same author points out the same conclusion.⁹⁵ His data showed that subjects who did not manifest emotional disturbance to TAT cards suggestive of aggression had higher recognition thresholds for aggressive than neutral scenes shown tachistoscopically. On the other hand, those who gave aggressive TAT stories had lower thresholds for aggressive scenes. In still another investigation by the same author,⁹⁶ subjects that were ego-involved recalled more completed than incompleted tasks, as compared to non-ego-involved subjects. Williams⁹⁷ found that learning of material

94 C. W. Eriksen, "Perceptual Defense as a Function of Unacceptable Needs", in The Journal of Abnormal and Social Psychology, Vol. 46, No. 4, issue of October 1951, p. 557-564.

95 C. W. Eriksen, "Some Implications for TAT Interpretation Arising from Need and Perception Experiments", in the Journal of Personality, Vol. 19, No. 3, issue of March 1951, p. 282-288.

96 -----, "Individual Differences in Defensive Forgetting", in the Journal of Experimental Psychology, Vol. 44, No. 6, issue of December 1952, p. 442-446.

97 M. Williams, "Rate of Learning as a Function of Ego-Alien Material", in the Journal of Personality, Vol. 19, No. 3, issue of March 1951, p. 324-331.

of neutral connotation is less difficult than of material with hostile connotation. Lindner's⁹⁸ data showed that sexual offenders not only were more sensitive to test stimuli suggestive of sexuality, but also to other test stimuli not basically of a sexual character. Stein⁹⁹ demonstrated experimentally that those individuals who employed either perceptual defense or sensitization in a given situation will continue to demonstrate the same behavior in a similar situation.

Carpenter et al.¹⁰⁰ have found that those individuals, who utilized repressive mechanisms, were significantly slower in perceiving conflict stimuli in that area than those who utilized sensitizing mechanisms. McGinnies and Adornette¹⁰¹ found the same high thresholds with normal and schizophrenic subjects for taboo than for neutral words. Furthermore, the

98 H. Lindner, "Sexual Responsiveness to Perceptual Tests in a Group of Sexual Offenders", in the Journal of Personality, Vol. 21, No. 3, issue of March 1953, p. 364-374.

99 K. B. Stein, "Perceptual Defense and Perceptual Sensitization Under Neutral and Involved Conditions", in the Journal of Personality, Vol. 21, No. 4, issue of June 1953, p. 467-478.

100 E. Carpenter, M. Wiener, and J. T. Carpenter, "Predictability of Perceptual Defense Behavior", in The Journal of Abnormal and Social Psychology, Vol. 52, No. 3, issue of May 1956, p. 380-383.

101 E. McGinnies, and J. Adornette, "Perceptual Defense in Normal and Schizophrenic Observers", in The Journal of Abnormal and Social Psychology, Vol. 47, No. 4, issue of October 1952, p. 833-837.

schizophrenic group showed higher thresholds for both types of words than the normal group.

Blum,¹⁰² in another experiment, illustrated that vigilant subjects responded more frequently to traumatic psychosexual stimuli of the Blacky Pictures, whereas, defensive subjects experienced more difficulty. When Smack¹⁰³ repeated Blum's experiment with some variation, he obtained indications for perceptual vigilance, but there was no evidence for perceptual defense. He attributes Blum's findings to certain similarities in the chosen figures of the Blacky Pictures. Blum's results have been supported by Pustell's¹⁰⁴ investigation. He found that females more frequently utilized defensive mechanisms to threat situations, while males were more vigilant. He maintains that mild anxiety serves as a cue and promotes perceptual vigilance, whereas, strong anxiety serves as a drive in fostering perceptual defense.

102 Gerald S. Blum, "An Experimental Reunion of Psychoanalytic Theory with Perceptual Vigilance and Defense", in The Journal of Abnormal and Social Psychology, Vol. 49, No. 1, issue of January 1954, p. 94-98.

103 C. D. Smack, "Replication and Comments: 'An Experimental Reunion of Psychoanalytic Theory with Perceptual Vigilance and Defense'", in The Journal of Abnormal and Social Psychology, Vol. 53, No. 1, issue of July 1956, p. 68-73.

104 Thomas Pustell, "The Experimental Induction of Perceptual Vigilance and Defense", in the Journal of Personality, Vol. 25, No. 4, issue of June 1957, p. 425-438.

By using a similar procedure, Nelson¹⁰⁵ confirmed further Blum's findings. He reports that high-conflict subjects were more vigilant than low-conflict subjects. Those who were assessed as repressors showed defensive behavior to those Blacky Pictures that were relevant to their defenses. Aronfreed et al.¹⁰⁶ also noted that emotionally toned words required longer exposure time to be recognized than neutral words. Goodstein,¹⁰⁷ however, reports that the frequency of usage of the words used in the above experiment was not controlled which certainly rules out a perceptual defense interpretation of the above findings. In order to eliminate the possibility of a conscious verbal suppression as due to fear of embarrassment to taboo words that could account for their delayed recognition, Newton¹⁰⁸ presented tachistoscopically unpleasant words. He rules out the possibility of any response suppression, since he found significantly longer visual recognition thresholds for unpleasant than pleasant words.

105 S. E. Nelson, "Psychosexual Conflicts and Defenses in Visual Perception", in The Journal of Abnormal and Social Psychology, Vol. 51, No. 3, issue of November 1955, p. 427-433.

106 J. M. Aronfreed, S. A. Messick, and J. C. Diggory, "Re-examining Emotionality and Perceptual Defense", in the Journal of Personality, Vol. 21, No. 4, issue of June 1953, p. 517-528.

107 L. D. Goodstein, "Affective Tone and Visual Recognition Thresholds", in The Journal of Abnormal and Social Psychology, Vol. 49, No. 3, issue of July 1954, p. 443-444.

108 K. R. Newton, "A Note on Visual Recognition Thresholds", in The Journal of Abnormal and Social Psychology, Vol. 51, No. 3, issue of November 1955, p. 709-710.

Kleinman¹⁰⁹ reports that subjects with a psychogenic hearing loss have a significantly greater difficulty perceiving auditory crucial stimuli, than those with an organic hearing loss. The author invokes the mechanism of defense to explain this difference.

Dauids¹¹⁰ found that subjects with unhappy past experiences are significantly more sensitive to pessimism, distrust, anxiety, egocentricity and resentment, when these variables were presented to these subjects in the form of ambiguous auditory stimuli. Daston¹¹¹ has provided evidence for the psychoanalytic assumption of the relationship between paranoid schizophrenia and homosexual impulses. His experiment revealed that paranoid schizophrenics perceived homosexual words significantly faster as compared to unclassified schizophrenics and normals. One can readily notice the effect of strong "hypotheses" that result in these low recognition thresholds.

109 M. L. Kleinman, "Psychogenic Deafness and Perceptual Defense", in The Journal of Abnormal and Social Psychology, Vol. 54, No. 3, issue of May 1957, p. 335-338.

110 Anthony Dauids, "Past Experience and Present Personality Dispositions as Determinants of Selective Auditory Memory", in the Journal of Personality, Vol. 25, No. 1, issue of September 1956, p. 19-32.

111 Paul G. Daston, "Perception of Homosexual Words in Paranoid Schizophrenia", in Perceptual and Motor Skills, Vol. 6, No. 1, issue of March 1956, p. 45-55.

Continuing with the investigations of the variables of personality upon perception, Chodoroff¹¹² reported an inverse relationship between personal adjustment and perceptual defense to threatening words. From these results he implies that the inadequately adjusted individual has a set which retards him from differentiating and symbolizing threat material, as contrasted to the better adjusted individual. Kissin et al.¹¹³ have demonstrated that subjects manifesting inhibition on projective tests were also inhibited in perceiving sexual words shown tachistoscopically. The reverse was found for uninhibited subjects. Finally, Cowen and Beier¹¹⁴ found that either direct threat or threat-expectancy lowers perceptual efficiency.

The lack of proper experimental controls and the variety of methods used may account considerably for some of the inconclusive findings on perceptual defense. If, on the other hand, we assume that high thresholds to negative stimuli

112 B. Chodoroff, "Self-Perception, Perceptual Defense and Adjustment", in The Journal of Abnormal and Social Psychology, Vol. 49, No. 4, Part 1, issue of October 1954, p. 508-512.

113 B. Kissin, H. Gottesfeld, and R. Dickes, "Inhibition and Tachistoscopic Thresholds for Sexually Charged Words", in The Journal of Psychology, Vol. 43, Second Half, issue of April 1957, p. 333-339.

114 E. L. Cowen and E. G. Beier, "Threat-Expectancy, Word Frequencies, and Perceptual Prerecognition Hypotheses", in The Journal of Abnormal and Social Psychology, Vol. 49, No. 2, issue of April 1954, p. 178-182.

are due to an intervening positive "hypothesis", and vice versa, then we will have opened the path for a theory that could account for the inconsistent data. However, more investigations are required to determine how positive and negative "hypotheses" become strong and dominant. Undoubtedly, "hypotheses" may stem from personality characteristics as the literature in this section suggests.

The next section will deal with alternative explanations of the defense phenomenon, some of which are in essential agreement with the Hypothesis Theory.

D. Alternative Explanations of Perceptual Defense.

In spite of these findings that apparently constitute evidence to support the perceptual defense theory, there is still sufficient experimentation indicating that the obtained high thresholds to inimical stimuli - presumably the criterion of defense against such stimuli - can be a function of other variables. Howes and Solomon,¹¹⁵ for example, report that the size of a perceptual threshold varies inversely with the relative frequency of the word's usage.

¹¹⁵ D. H. Howes and R. L. Solomon, "Visual Duration Threshold as a Function of Word-Probability", in the Journal of Experimental Psychology, Vol. 41, No. 6, issue of June 1951, p. 401-410.

Subsequent studies by Solomon and Postman,¹¹⁶ and Postman and Resenzweig¹¹⁷ indicate similar conclusions. Noble¹¹⁸ reports the same relationship between the frequency of words presented during a training period and the subsequent ratings of these words on a familiarity scale. Arnault,¹¹⁹ by utilizing nonverbal stimuli, i.e., nonsense shapes during a training period, found that familiarity is a negatively accelerated function of frequency of prior exposure.

McGinnies et al.,¹²⁰ confirmed the study by Howes and Solomon, and found further that the length of word and frequency interact significantly - a fact which Howes and Solomon assumed to have a negligible effect on word frequency. In addition, McGinnies et al. found that the inverse relationship

116 R. L. Solomon and Leo Postman, "Frequency of Usage as a Determinant of Recognition Thresholds for Words", in the Journal of Experimental Psychology, Vol. 43, No. 3, issue of March 1952, p. 195-201.

117 L. Postman and M. R. Rosenzweig, "Perceptual Recognition of Words", in The Journal of Speech and Hearing Disorders, Vol. 22, No. 2, Issue of June 1957, p. 245-253.

118 Clyde E. Noble, "The Familiarity-Frequency Relationship", in the Journal of Experimental Psychology, Vol. 47, No. 1, issue of January 1954, p. 13-16.

119 M. D. Arnault, "Familiarity and Recognition of Nonsense Shapes", in the Journal of Experimental Psychology, Vol. 51, No. 4, issue of April 1956, p. 269-276.

120 E. McGinnies, P. E. Comer, and O. L. Lacey, "Visual-Recognition Thresholds as a Function of Word Length and Word Frequency", in the Journal of Experimental Psychology, Vol. 44, No. 2, issue of August 1952, p. 65-69.

between frequency and recognition thresholds is more pronounced with long words. When Taylor¹²¹ controlled frequency and varied the degree of meaningfulness of the perceived stimuli, she found no significant effect of meaning on the recognition thresholds. These facts concerning the role of experience, past confirmation and frequency, overlap with those in the previous sections, but have been presented here to show that they are important variables that could account for an explanation of perceptual defense.

Aside from word frequency, Lacy et al.¹²² have shown that perception and reaction time are a function of the immediate past experience, and they may alter a dominant expectancy to perceive and recognize emotion-arousing words. They demonstrated that taboo words were recognized just as easily as neutral words, when the former ones were preceded by information as to what was to be expected tachistoscopically. An increase in learning when the subject has a knowledge of his success had also been verified earlier by Eisenson.¹²³

121 Janet A. Taylor, "Meaning, Frequency, and Visual Duration Threshold", in the Journal of Experimental Psychology, Vol. 55, No. 4, issue of April 1958, p. 329-334.

122 O. W. Lacy, N. Lewinger, and J. P. Adamson, "Foreknowledge as a Factor Affecting Perceptual Defense and Alertness", in the Journal of Experimental Psychology, Vol. 45, No. 3, issue of March 1953, p. 169-174.

123 J. Eisenson, "Confirmation and Information in Rewards and Punishments", in the Archives of Psychology, Vol. 27, No. 181, issue of May 1935, p. 1-37.

The role of expectancy in the form of verbal instructions has been demonstrated by Ellson.¹²⁴ Subjects who were conditioned to hear a 'tone' when a light was presented, underwent extinction when told that the tone will no longer be heard at the presentation of the light. Cowen and Obrist¹²⁵ tested further the "hypothesis" theory by varying systematically the strength of set in the perceptual reaction to threat and neutral words matched for frequency of usage, and their results were consistent with previous findings. Their study revealed that the discrepancy of thresholds between threat and neutral words decreased as the "hypotheses" about threat words increased. Furthermore, although frequency of word usage was controlled, threat words still elicited a higher but not significant perceptual threshold than neutral words. In a similar manner, Greenbaum's¹²⁶ investigation revealed lower thresholds for hostile faces presented tachistoscopically when his anxiety laden subjects were told that

124 D. G. Ellson, "Hallucinations Produced by Sensory Contitioning", in the Journal of Experimental Psychology, Vol. 28, No. 4, issue of April 1941, p. 350-361.

125 E. L. Cowen and P. A. Obrist, "Perceptual Reactivity to Threat and Neutral Words Under Varying Experimental Conditions", in The Journal of Abnormal and Social Psychology, Vol. 56, No. 3, issue of May 1958, p. 305-310.

126 M. Greenbaum, "Manifest Anxiety and Tachistoscopic Recognition of Facial Photographs", in Perceptual and Motor Skills, Vol. 6, No. 3, issue of September 1956, p. 245-248.

their ability will be evaluated. Taylor¹²⁷ also obtained lower thresholds for words that were associated with a key word through past experience, when her subjects were instructed to expect such words, as compared to a control group without expectations.

Dauids¹²⁸ cites that the frequency variable in these experiments becomes significant when it is in interaction with other variables. Subjects with alienation tendencies (i.e., distrust, pessimism, egocentricity, anxiety and resentment) react differently to high and low frequency words that represent their alienation traits. Furthermore, a rare word conveying an emotional disposition characteristic of the perceiver might produce associations to the same degree as to high frequency words. DeLucia and Stagner¹²⁹ found that word recognition thresholds can be affected by both, frequency of usage and emotionality. They state further that if perception is assumed to be a process favorable in maintaining the organism's homeostasis, stimuli that either disturb or restore homeostatic

127 Janet A. Taylor, "Effect of Set for Associated Words on Duration Threshold", in Perceptual and Motor Skills, Vol. 6, No. 2, issue of June 1956, p. 131-134.

128 Anthony Dauids, "Personality Dispositions, Word Frequency, and Word Association", in the Journal of Personality, Vol. 24, No. 3, issue of March 1956, p. 328-338.

129 Joseph T. DeLucia, and R. Stagner, "Emotional vs. Frequency Factors in Word-Recognition Time and Association Time", in the Journal of Personality, Vol. 22, No. 3, issue of March 1954, p. 299-309.

balance will be perceived more rapidly. Similar data have been reported by King-Ellison and Jenkins.¹³⁰

Eriksen¹³¹ has refuted the frequency hypothesis to account for perceptual defense. He states that frequency cannot explain why failure results in high and success in low thresholds. On the other hand, Dulany¹³² demonstrated that defense and vigilance constitute learned avoidance. When a perceptual response is followed by punishment, other available responses that alleviate threat will be reinforced; this is a learned defensive reaction. Vigilance, on the other hand, results if a response is followed by threat reduction while other responses are punished. Whittaker et al.¹³³ have suggested that the perceptual defense phenomenon can be explained more adequately as a withholding of responses.

130 P. King-Ellison, and J. J. Jenkins, "The Durational Threshold of Visual Recognition as a Function of Word Frequency", in The American Journal of Psychology, Vol. 67, No. 4, issue of December 1954, p. 700-703.

131 C. W. Eriksen, "The Case for Perceptual Defense", in the Psychological Review, Vol. 61, No. 3, issue of May 1954, p. 175-182.

132 Don E. Dulany, Jr., "Avoidance Learning of Perceptual Defense and Vigilance", in The Journal of Abnormal and Social Psychology, Vol. 55, No. 3, issue of November 1957, p. 333-338.

133 E. M. Whittaker, J. C. Gilchrist, and J. W. Fisher, "Perceptual Defense or Response Suppression"? in The Journal of Abnormal and Social Psychology, Vol. 47, No. 3, issue of July 1952, p. 732-733.

Another way to explain perceptual defense has been suggested by Hochberg et al.,¹³⁴ who have reported that a high recognition threshold of nonsense syllables is due to the startle response which interferes with recall and recognition. For example, when a stimulus is conditioned to electric shock, it produces an interfering response which increases recognition of neutral stimuli not associated with shock.

Finally, Vanderplas¹³⁵ has shown that a kind of an organized perceptual experience can also account for reduction in threshold, by controlling frequency and affectivity, he found that paralog associated with geometric forms in a consistent way had lower recognition thresholds than those associated inconsistently. Since, frequency, structural differences and affectivity were all controlled, the author invokes the principles of trace theory.

Freeman¹³⁶ has shown in a similar way that perceptual defense does not occur when an expectancy for taboo material

¹³⁴ Julian E. Hochberg, S. L. Haber, and A. T. Ryan, "Perceptual Defense' as an Interference Phenomenon", in Perceptual and Motor Skills, Vol. 5, No. 1, issue of March 1955, p. 15-17.

¹³⁵ J. M. Vanderplas, "Frequency of Experience Versus Organization as Determinants of Visual Thresholds", in The American Journal of Psychology, Vol. 66, No. 4, issue of October 1953, p. 574-583.

¹³⁶ James T. Freeman, "Set or Perceptual Defense"? in the Journal of Experimental Psychology, Vol. 48, No. 4, issue of October 1954, p. 283-288.

has been established. Likewise, Wylie¹³⁷ concludes that lower visual thresholds are obtained when preceded by an auditory presentation of the same stimulus, but failed to obtain longer thresholds for stimuli indicating failure, in subjects motivated to succeed; however, there was some evidence that these subjects, motivated to succeed, showed a "wish" for success in their prerecognition "hypotheses".

The extent to which prerecognition "hypotheses" depend upon the structural characteristics of the stimulus object, has been demonstrated by Boardman.¹³⁸ Two lists of words, different in structural similarity to socially offensive ones but similar in length and recognition, were shown tachistoscopically before and after the offensive words. Results failed to indicate any higher perceptual threshold concerning offensive words to suggest the operation of perceptual defense. Furthermore, prerecognition "hypotheses" were formed prior to the recognition of the word by utilizing its structural characteristics, i.e., perceived letters, whether the words were socially offensive or not.

137 R. C. Wylie, "Cognitive Set and Motivation Factors in the Perception of Neutral and Threat-Related Stimuli", in The Journal of Abnormal and Social Psychology, Vol. 55, No. 2, Issue of September 1957, p. 227-231.

138 W. K. Boardman, "Utilization of Word Structure in Prerecognition Responses", in The Journal of Personality Vol. 25, No. 6, issue of December 1957, p. 672-685.

Spielberger¹³⁹ reports that there was no evidence of perceptual defense among stutterers. When taboo words were used as the stuttered words which were controlled for frequency and length, he failed to find any significant recognition thresholds or recall scores for the taboo words as compared to neutral ones, but he did find evidence for response suppression - a concept already suggested earlier by Howes and Solomon.

E. Anxiety in Perception.

Anxiety has also been considered as a motivational determinant in perception as Pustell's study revealed, although, at times, the results appear to be inconclusive. For example, a significant relationship between level of anxiety and recognition thresholds of neutral words has been reported by Smock.¹⁴⁰ He also states that delayed recognition of neutral words increased when these words were preceded by a threat-expectancy condition, but this difference was not observed between high and low anxiety groups, that is, anxiety

¹³⁹ Charles D. Spielberger, "The Effects of Stuttering Behavior and Response Set on Recognition Thresholds", in the Journal of Personality, Vol. 25, No. 1, issue of September 1956, p. 33-45.

¹⁴⁰ Charles D. Smock, "The Relationship Between Test Anxiety, 'Threat Expectancy', and Recognition Thresholds for Words", in the Journal of Personality, Vol. 25, No. 2, issue of December 1956, p. 191-201.

and threat-expectancy did not interact. Bitterman and Kniffin,¹⁴¹ however, failed to find a significant relationship between anxiety as measured by the Taylor Scale of Manifest Anxiety and recognition thresholds for either taboo or neutral words. Both, the anxiety and non-anxiety groups, however, showed higher thresholds to taboo words as a whole, but this threshold declined as a function of order of presentation. The authors explained this lowering threshold to taboo words as the result of insight their subjects developed which increased their expectancy for such words. These findings were supported by those of Cowen et al.¹⁴² Chodorkoff,¹⁴³ on the other hand, has replied to Bitterman and Kniffin, and questions whether the anxiety elicited by each taboo word is really the same with the general level of anxiety as measured by Taylor's Manifest Anxiety Scale. He questions further the fact that insight failed to lower the recognition thresholds of taboo words down to the same level for

141 M. E. Bitterman, and C. W. Kniffin, "Manifest Anxiety and 'Perceptual Defense'", in The Journal of Abnormal and Social Psychology, Vol. 48, No. 2, issue of April 1953, p. 248-252.

142 E. L. Cowen, F. Hellizer, H. S. Axelrod, and S. Alexander, "The Correlates of Manifest Anxiety in Perceptual Reactivity, Rigidity, and Self Concept", in the Journal of Consulting Psychology, Vol. 21, No. 5, issue of October 1957, p. 405-411.

143 B. Chodorkoff, "A Note on Bitterman and Kniffin's 'Manifest Anxiety and Perceptual Defense'", in The Journal of Abnormal and Social Psychology, Vol. 50, No. 1, issue of January 1955, p. 144.

neutral words. Moffitt and Stagner¹⁴⁴ demonstrated that anxiety increases perceptual closure, rigidity, the sharpening or contrast effect and the attainment of a stable configuration. Eriksen¹⁴⁵ maintains that perception is a problem-solving process of reconstructing isolated cues. Consequently, anxiety provoking stimuli should require more cues for veridical perception to occur, if it is assumed that anxiety interferes with the availability of "hypotheses". An experimental investigation by Eriksen and Browne¹⁴⁶ revealed that frequency and regency lowered recognition thresholds for anagram words; when anxiety was associated with these words, however, higher recognition thresholds were obtained. Finally, Spence¹⁴⁷ concludes that the anxiety aroused by failure in an anagram-solving task correlated significantly with the absolute difference of threshold deviation but neither to vigilance nor defense alone.

¹⁴⁴ W. J. Moffitt, and R. Stagner, "Perceptual Rigidity and Closure as Functions of Anxiety", in The Journal of Abnormal and Social Psychology, Vol. 52, No. 3, issue of May 1956, p. 354-357.

¹⁴⁵ C. W. Eriksen, "The Case for Perceptual Defense", in the Psychological Review, Vol. 61, No. 3, issue of May 1954, p. 175-182.

¹⁴⁶ C. W. Eriksen, and C. T. Browne, "An Experimental and Theoretical Analysis of Perceptual Defense", in The Journal of Abnormal and Social Psychology, Vol. 52, No. 2, issue of March 1956, p. 224-230.

¹⁴⁷ D. P. Spence, "A New Look at Vigilance and Defense", in The Journal of Abnormal and Social Psychology, Vol. 54, No. 1, issue of January 1957, p. 103-108.

F. Reward and Punishment in Perception.

Likewise, reward and punishment influence selectivity in perception. Although reward has greater priority and preference over punishing conditions, negative reinforcement has the same effect over neutral conditions.

Proshansky and Murphy¹⁴⁸ investigated this relationship by rewarding the estimation of certain stimuli with money, and withdrawing it (i.e., punishment) with the estimation of a different type of stimuli. Results showed a significantly greater shift of stimuli toward those that had been rewarded when the procedure was repeated without any reward or punishment, while the control group showed no shifts.

Similarly, Lambert et al.¹⁴⁹ confirmed these findings by the fact that when a reward was attached to a neutral object, it increased its subjective size, but there was no such increase following extinction of the reward. According to Rigby and Rigby¹⁵⁰ positive reinforcement was superior to

¹⁴⁸ H. Proshansky, and G. Murphy, "The Effects of Reward and Punishment on Perception", in The Journal of Psychology, Vol. 13, (no No.), issue of April 1942, p. 295-305.

¹⁴⁹ W. W. Lambert, R. L. Solomon, and Peter D. Watson, "Reinforcement and Extinction as Factors in Size Estimation", in the Journal of Experimental Psychology, Vol. 39, No. 5, issue of October 1949, p. 637-641.

¹⁵⁰ W. K. Rigby, and M. K. Rigby, "Reinforcement and Frequency as Factors in Tachistoscopic Thresholds", in Perceptual Motor Skills, Vol. 6, No. 1, issue of March 1956, p. 29-35.

frequency alone, but negative reinforcement did not have the same effect. The effect of stress on the delayed recognition of stimuli has been demonstrated in two experiments by Smock.^{151,152} Likewise, the role of failure instructions on the impairment of learning has been reported by Smith.¹⁵³ Russell's¹⁵⁴ investigation, however, revealed that the effect of verbally-induced failure instructions had a disruptive influence only on the first trial of a verbal retention task.

Schafer and Murphy¹⁵⁵ investigated whether autism is related to the determination of a visual figure-ground relationship. They created an ambiguous situation with contour lines seen as faces, and each contour line of the profile was made the boundary of a vertical semicircle. After a preliminary

151 C. D. Smock, "The Influence of Psychological Stress on the 'Intolerance of Ambiguity'", in The Journal of Abnormal and Social Psychology, Vol. 50, No. 2, Issue of March 1955, p. 177-182.

152 -----, "The Influence of Stress on the Perception of Incongruity", in The Journal of Abnormal and Social Psychology, Vol. 50, No. 3, issue of May 1955, p. 354-356.

153 J. G. Smith, "Influence of Failure, Expressed Hostility, and Stimulus Characteristics on Verbal Learning and Recognition", in the Journal of Personality, Vol. 22, No. 4, issue of June 1954, p. 475-493.

154 W. A. Russell, "Retention of Verbal Material as a Function of Motivating Instructions and Experimentally-Induced Failure", in the Journal of Experimental Psychology, Vol. 43, No. 3, issue of March 1952, p. 207-216.

155 R. Schafer, and G. Murphy, "The Role of Autism in a Visual Figure-Ground Relationship", in the Journal of Experimental Psychology, Vol. 32, No. 4, issue of April 1943, p. 335-343.

training period, whereby, some of the contours were associated with reward and their opposing aspects with punishment, the contour line was shown in a complete circle. The effect of autism was demonstrated by the significantly higher number of faces seen which had been rewarded during the training period.

Smith and Hochberg¹⁵⁶ obtained data that supported the Schafer and Murphy study. When one of the two profiles was associated with shock, it was more difficult to be perceived later; in other words, shock had a detrimental effect upon later perception. However, a similar experiment by Rock and Fleck¹⁵⁷ failed to produce the same results. When Jackson¹⁵⁸ replicated the experiments by Schafer and Murphy, and Rock and Fleck by using two distinct experimental groups, his results supported the original findings of Schafer and Murphy, and he attributes the discrepancy of these findings partly to the different tachistoscope used in the second study.

¹⁵⁶ Donald E. P. Smith, and J. E. Hochberg, "The Effect of 'Punishment' (Electric Shock) on Figure-Ground Perception", in The Journal of Psychology, Vol. 38, (no No.), issue of July 1954, p. 83-87.

¹⁵⁷ I. Rock, and F. S. Fleck, "A Re-examination of the Effect of Monetary Reward and Punishment on Figure-Ground Perception", in the Journal of Experimental Psychology, Vol. 40, No. 6, issue of December 1950, p. 766-776.

¹⁵⁸ D. N. Jackson, "A Further Examination of the Role of Autism in a Visual Figure-Ground Relationship", in The Journal of Psychology, Vol. 38, (no No.), issue of October 1954, p. 339-357.

A recent experiment, similar to that of Schafer and Murphy by Solley and Long,¹⁵⁹ failed to indicate that perception of ambiguous situations depends on the "hypotheses" and "sets" of the perceiver.

Postman¹⁶⁰ points out further that evidence is not sufficient for the operation of autism, and that perception does not serve to satisfy a wish or need-satisfaction. For example, Postman and Solomon¹⁶¹ found that recognition thresholds associated with completed and incompleting tasks, (i.e., success and failure), showed no significant difference as a group, but some individual thresholds were significantly lower for either success or failure words. Likewise, Postman and Brown¹⁶² indicate that perceptual selectivity does not always favor success over failure, but the situational context can alter the results. They found a low perceptual threshold for words connoting failure when amidst a situational context of failure, and the same relationship with words connoting success in a situational context of success.

159 C. M. Solley, and J. Long, "Perceptual Learning Versus Response Set Learning", in Perceptual and Motor Skills, Vol. 8, No. 3, issue of September 1958, p. 235-240.

160 L. Postman, "The Experimental Analysis of Motivational Factors in Perception", in Current Theory and Research in Motivation: A Symposium, Lincoln, University of Nebraska Press, 1953, p. 59-108.

161 L. Postman, and R. L. Solomon, "Perceptual Sensitivity to Completed and Incompleted Tasks", in the Journal of Personality, Vol. 18, No. 3, issue of March 1950, p. 347-357.

162 L. Postman, and D. R. Brown, "The Perceptual Consequences of Success and Failure", in The Journal of Abnormal and Social Psychology, Vol. 47, No. 2, issue of April 1952, p. 213-221.

Spence's¹⁶³ results agree with these findings. He found that words associated with success had a higher recognition threshold than words associated with failure; in other words, experience of failure makes the individual sensitive to expect failure.

Eriksen¹⁶⁴ reports similar results. He found that subjects who are apt to avoid ego-threatening situations are also prone to manifest defensiveness at the perceptual level, as compared to subjects who are not affected by ego-threatening situations.

Parallel results were obtained by Postman and Bruner.¹⁶⁵ When stress and frustration were induced during a difficult perceptual task, behavior tended to persist in a non-adaptive way in a similar subsequent situation. In another study by the same authors,¹⁶⁶ judgment of size during electroshock was accurate as the control group, but the judgment became inaccurate when the shock was removed. Thus, motivational conditions, whether success or failure, affect perceptual selectivity.

¹⁶³ Donald P. Spence, "Success, Failure, and Recognition Threshold", in the Journal of Personality, Vol. 25, No. 6, issue of December 1957, p. 712-720.

¹⁶⁴ C. W. Eriksen, "Defense Against Ego-Threat in Memory and Perception", in The Journal of Abnormal and Social Psychology, Vol. 47, No. 2, issue of April 1952, p. 230-235.

¹⁶⁵ L. Postman, and J. S. Bruner, "Perception Under Stress", in the Psychological Review, Vol. 55, No. 6, issue of November 1948, p. 314-323.

¹⁶⁶ L. Postman, and J. S. Bruner, "Tension and Tension Release as Organizing Factors in Perception", in the Journal of Personality, Vol. 15, No. 4, issue of June 1947, p. 300-308.

Beier and Cowen¹⁶⁷ point out similar results. They found a lower recognition threshold to threat with alerted subjects, than with non-alerted subjects. "Hypotheses" that stimuli in a given situation will appear threatening were confirmed easier and sooner than with subjects lacking such "hypotheses".

Similarly, Reece¹⁶⁸ found that when nonsense syllables were associated with electric shock, the recognition threshold of these syllables increased when the subject was able to escape from shock, as compared to conditions where escape from pain was not feasible. Besides shock, the estimation of distance of threatening words under conditions of minimum distance cues was not greater as Gordon¹⁶⁹ hypothesized, when compared to neutral words.

The fact that both, positive and negative consequences can strengthen "hypotheses", has been further confirmed by more recent studies.

167 E. G. Beier, and E. L. Cowen, "The Influence of 'Threat-Expectancy' on Perception", in the Journal of Personality, Vol. 19, No. 1, issue of September 1950, p. 85-94.

168 M. M. Reece, "The Effect of Shock on Recognition Thresholds", in The Journal of Abnormal and Social Psychology, Vol. 49, No. 2, issue of April 1954, p. 165-172 .

169 J. E. Gordon, "Distance Judgments of Threat-Related and Neutral Words", in Perceptual and Motor Skills, Vol. 7, No. 4, issue of December 1957, p. 316.

Kurland¹⁷⁰ found a significantly lower auditory perceptual threshold to emotional words among patient groups, as compared to normal subjects. However, the members of the patient group, which used the defense of intellectualization to cope with their anxiety, did not show a lower perceptual threshold, than those who predominantly utilized repressive mechanisms, as he had originally hypothesized. He concludes that whether a situation is perceptual or nonperceptual may account for the operation of a specific type of defense mechanism.

Wiener¹⁷¹ attempted to test the hypothesis that perceptual defense cannot be the result of word frequency alone. Words with identical frequency of usage and structural determinants, but having both a threat and a neutral meaning (i.e., fairy), were placed in two different groups of words, one emphasizing their neutral and the other their threat meaning. Motivation did seem to play the determining role in this case, since the words in the threat group were deciphered much sooner than the ones in the neutral group.

¹⁷⁰ S. H. Kurland, "The Lack of Generality in Defense Mechanisms as Indicated in Auditory Perception", in The Journal of Abnormal and Social Psychology, Vol. 49, No. 2, issue of April 1954, p. 173-177.

¹⁷¹ M. Wiener, "Word Frequency or Motivation in Perceptual Defense", in The Journal of Abnormal and Social Psychology, Vol. 51, No. 2, issue of September 1955, p. 214-218.

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Cohn's¹⁷² results appear somewhat similar. After she trained subjects with nonsense words, she associated the words, at different frequency levels, with either monetary reward, loss or neither. Upon tachistoscopic recognition of these words, it was confirmed that frequency of exercise was more effective than the consequences, and that either negative or positive consequences had the same effect.

Finally, Sommer¹⁷³ confirmed further that punishment as well as reward affect perception. Using reinforcement

171 M. Wiener, "Word Frequency or Motivation in Perceptual Defense", in The Journal of Abnormal and Social Psychology, Vol. 51, No. 2, issue of September 1955, p. 214-218.

172 Barbara N. Cohn, "Projective Methods and Verbal Learning", in The Journal of Abnormal and Social Psychology, Vol. 49, No. 2, issue of April 1954, p. 290, 297.

173 R. Sommer, "The Effects of Rewards and Punishments During Perceptual Organizations", in the Journal of Personality, Vol. 25, No. 5, issue of September 1957, p. 550-558.

conditions in perceiving ambiguous figures, the rewarding condition was more frequent over the punishing one, but the later was more frequent than the neutral condition. He concludes that intensity of affect is the important factor in perceptual selectivity - whether it be positive or negative.

The conclusion that emerges from the experimental findings on motivational support indicate that there is not only a positive relationship between evaluative attitudes, needs, rewards, and even punishments upon perceptual behavior, but that these variables increase sensitivity in either direction. Whether this direction is positive or negative, on the basis of the majority of experimental data that have shown to be consistent, it lends ample support to the Hypothesis Theory, that motivational variables strengthen perceptual "hypotheses" whose confirmation depends upon the appropriateness and congruency of incoming information that stimuli will comport in a given situation.

Also, it becomes clear that either multiple expectancies or past experience may account more parsimoniously for the perceptual defense phenomenon. On this basis, one might proceed to the point where perceptual defense may no longer be looked upon as a motivational need, since, as we have seen, such a mechanism can be readily reduced to other factors, such as, the characteristics of the stimulus or its frequency of usage.

"Hypotheses" not only gain strength on account of the instrumental consequences that their confirmation may imply, but become strengthened by the very fact that they are merely a component of a larger cognitive field. The next section will deal with this type of process in the strengthening of "hypotheses".

4. Cognitive Support.

"Hypotheses", that are part of a larger cognitive organization or are imbedded in meaningful configurations, are more easily confirmed with less appropriate stimulus information, and will require more inappropriate information to be infirmed.

Cattell, according to Woodworth¹⁷⁴ as early as the later part of the past century, had first noticed that letters are more easily perceived tachistoscopically when they form a word. He showed that a familiar unit, such as a word, can be easily reconstructed from a minimum of cues, since there are fewer alternatives for completing the ambiguous portions of an already familiar word.

174 Robert S. Woodworth, Op. cit., xi-889 p.

The role of cognitive support was again demonstrated by Bruner and Postman¹⁷⁵ in incongruous situations involving the violation of well-established expectancies being attached to larger meaningful perceptual organizations. Such "hypotheses" are less resistant to change and more easily confirmed. When incongruous stimuli were presented tachistoscopically for recognition, such as black hearts and diamonds, and red clubs and spades (i.e., same shape but different color), they showed a higher recognition threshold, as compared to normal cards. Some cases required over fifty trials, in order that the contradictory information about cards could change the well-established "hypotheses" concerning the shape-color inter-relationship. This shows again that a specific "hypothesis" (i.e., color), when imbedded in a larger and superordinate "hypothesis" (i.e., shape), will require a greater amount of contradictory stimulus information to be rejected; in addition, such a process of "hypothesis" infirmation necessitates longer time. Postman et al.¹⁷⁶ tested the effectiveness of cognitive support by reversing a letter in a meaningful word and in a

175 Jerome S. Bruner, and Leo Postman, "On the Perception of Incongruity: A Paradigm", in the Journal of Personality, Vol. 18, No. 2, issue of December 1949, p. 206-223.

176 L. Postman, J. S. Bruner, and R. D. Walk, "The Perception of Error", in The British Journal of Psychology, Vol. 42, Parts 1 & 2, issues of March and May 1951, p. 1-10.

series of unrelated consonants. The results indicated that reversed letters, whether imbedded in a meaningful word or unrelated consonants, were identified correctly at longer exposure thresholds than printwise letters. Furthermore, the recognition of reversed letters was slower in the meaningful word than in the series of disjointed consonants. Clearly, the more meaningful a "hypothesis", the greater its interference with the confirmation of an incongruous situation. It is obvious that the results of this experiment can be explained by the Gestalt principle as well, whereby, parts of a substructure are determined by the properties of the whole. The authors point out, however, that the laws of organization are not necessarily contradictory to the Hypothesis Theory. Principles of organization can be understood as determining the strength of "hypotheses", in the manner likewise to motivational support and frequency of past confirmation. It was also noted in this experiment that not only reversed letters were perceived more slowly within the meaningful words, but the whole word tended to be perceived as reversed - a phenomenon which the authors call irradiation. It suggests that the formation of a "hypothesis" of reversal generalizes to the total word. This phenomenon was confirmed earlier by Aveling.¹⁷⁷

F. Aveling, "The Perception of Tachistoscopically Exposed Symbols", in The British Journal of Psychology, Vol. 22, Part 3, issue of January 1932, p. 193-199.

Finally, Miller et al.¹⁷⁸ have shown again that familiarity of context improves perceptual recognition. When letter sequences were projected on a screen, there was an increase in the number of correctly identified letters, as the context of the sequence became more familiar (i.e., was less nonsense).

Thus far, the four determinants that strengthen "hypotheses" have been presented. The following two propositions will be concerned with the dominance and confirmation of "hypotheses" that are still persistent and continue to operate in situations with ambiguous and inappropriate stimulus information.

5. Dominance of Hypotheses.

Strong and dominant "hypotheses" confronted by a smaller than ordinary amount of stimulus information will determine largely the organization of a perceptual field. Bruner et al.¹⁷⁹ have investigated this proposition by utilizing strong "hypotheses" on the one hand, and by varying systematically the amount of stimulus information, on the other.

¹⁷⁸ G. A. Miller, J. S. Bruner, and L. Postman, "Familiarity of Letter Sequences and Tachistoscopic Identification", in The Journal of General Psychology, Vol. 50, (no No.), issue of January 1954, p. 129-139.

¹⁷⁹ J. S. Bruner, L. Postman, and J. Rodrigues, "Expectation and the Perception of Color", in The American Journal of Psychology, Vol. 64, No. 2, issue of April 1951, p. 216-227.

These authors demonstrated again the role of past experience in organizing less optimal stimulus conditions. In other words, a "hypothesis" being strengthened through past experience will become confirmed even when environmental conditions do not completely agree nor fit with the "hypothesis".

Subjects were required to make a color match of a variable color mixer with a stimulus patch. These stimulus objects were four ovaloid patches representing a tomato, tangerine, lemon and a neutral oval, and also four elongated ellipsoid patches representing a boiled lobster, claw, carrot, banana, and a neutral elongated ellipse. Results indicated that subjects tended to overemphasize the color of these objects, when the only cue they had was their shapes. But as the variance in hue from red to yellow (i.e., unstable orange color) became more definite with the provision of more appropriate conditions by using orange paper for the matching of all the objects, the effect of the dominance of a "hypothesis" was reduced, as the ambiguity was diminished. Fisher et al.¹⁸⁰ obtained data which were in close agreement with those of Bruner et al. These experiments have demonstrated that "hypotheses" tend to persist in unstructured and ambiguous situations where there is no room for trial and check, but they change, as the input

¹⁸⁰ Carolyn S. Fisher, Chester Hull, and Paul Holtz, "Past Experience and Perception: Memory Color", in The American Journal of Psychology, Vol. 69, No. 4, issue of December 1956, p. 546-560.

of stimuli becomes more appropriate. Such is the condition upon which the Rorschach technique is based. An individual's dominant "hypotheses" determine the inadequate and ambiguous stimulus information which the ink blots of the Rorschach plates provide. The investigation to be reported in the next chapter is to test this relationship under varying experimental conditions.

In a social situation where there are not enough clues to validate "hypotheses", confirmation may take place through the influence of the judgments of the other members of a group.

6. Consensual Validation.

"Hypotheses" can be confirmed by the consensus of the social milieu, when there is lack of appropriate stimulus information. A subject alone in an autokinetic experiment has to create his own reference point, and forms "hypotheses" concerning the extent of movement in his own subjective way, since he has no objective norms with which to check and confirm his "hypotheses".

A study by Sherif¹⁸¹ has shown that in a group situation, individual judgments are replaced by a reference point

181 M. Sherif, "A Study of Some Social Factors in Perception", in the Archives of Psychology, Vol. 27, No. 187, issue of July 1935, p. 1-60.

or norm, characteristic of that group. Once such a reference point is established, it validates and strengthens "hypotheses" by consensus, so that it tends to persist in the subjects when confronted with similar situations outside the group. When individual norms have already been established, a group situation will converge them into a common group norm, but this later process will require a longer time for the individual "hypotheses" to be infirmed and for new ones to be formed and strengthened in order to confirm the consensual expectation.

Luchins¹⁸² has also shown how individual "hypotheses" become strong through the influence of the "hypotheses" of others. A series of pictures beginning with an ambiguous sketch and ending with a picture of a bottle were shown to pairs of grade-school subjects. When one member of the pair was instructed to state that he saw a face, the second member gave more responses to "face" than "bottle" as compared to a control group.

182 A. S. Luchins, "Social Influences on Perception of Complex Drawings", in The Journal of Social Psychology, Vol. 21, issue of May 1945, p. 257-273.

Conclusion.

The purpose of this review was to expose the experimental evidence in support of the Hypothesis Theory. In some of these experiments the results were either negative or inconclusive, but the majority were in favor the theory. Almost all the supporting investigations were not conducted under the framework of the Hypothesis Theory, but rather their data were related to it.

It is conceivable that the ideal method to approach this problem is to specify the "hypotheses" in a particular situation, and to describe the stimulus information on which they operate. In such a way, the theorems as formulated by the authors can be tested more directly. A case in point is an experiment by Blake and Vanderplas.¹⁸³ They tested the hypothesis that more inappropriate information will be required to reject a strong invalid "hypothesis", by presenting words aurally to their subjects at increasing intensity levels. They found that those subjects, whose nonveridical report was confirmed prior to their veridical report, needed more information to give the veridical report than those who received only veridical confirmation. When research is

¹⁸³ Robert R. Blake, and James M. Vanderplas, "The Effect of Prerecognition Hypotheses on Veridical Recognition Thresholds in Auditory Perception", in the Journal of Personality, Vol. 19, No. 1, issue of September 1950, p. 95-115.

defined in such terms and has a direct reference to the major premise of the Hypothesis Theory, many of the difficulties in methodology might be overcome and the diversified data understood more adequately.

Concerning the nature of the stimulus information, only few of all the existing possible stimulus ambiguities have been investigated. It appears justifiable that a further attempt should be conducted in order to explore the influence of various classes of "hypotheses" in the form of induced instructional sets by utilizing a different type of ambiguous information than has been investigated previously. These are the problems that have prompted the undertaking of the present investigation.

CHAPTER III

THE EXPERIMENTAL DESIGN

This section will be devoted to the purpose and assumptions of the present study from which the research problems to be tested have been derived. Following will be the description of the tools and their method of application. Finally, the description, conditions and procedure concerning each experimental group will be stated.

1. Rationale of the Study.

Investigation of the effect of the dominant "hypotheses" of a subject on his manner of perceiving at a given moment can be brought about by reducing the stimulus information to marginal conditions. The creation of conditions of reduced stimulation for the elicitation of perceptual discrimination has been attained in several ways: by subliminal exposure of the stimulus, by destroying the form of the percept in making it similar to out-of-focus picture slides, by varying the duration or intensity of illumination, and in some cases by showing ambiguous drawings. Still another possibility are the ordinary inkblot stimuli used in projective techniques. The resulting uncertainty and ambiguity afford more opportunity for the operation of "hypotheses" to come into play and make available the occurrence of the trial-and-check process.

This is precisely the condition upon which the rationale of Rorschach's test is based, whereby the process of visual recognition involves categorization of perceived cues to different classes. A class name is assigned to a percept when sufficient cues have been accumulated which will enable the subject to properly distinguish and identify it. Thus, it becomes evident that the more cues available, the smaller will be the number of classes over which the responses will be distributed, and the reverse can be expected when the availability of cues diminishes.

In a more recent elaboration of the Hypothesis Theory, Bruner¹ maintains that such a process is operative in the visual discrimination of ambiguous situations. In the same paper he states further that this method of categorizing through inferences, by identifying the object from its cues, is the same at the cognitive as it is at the perceptual level.

It is easily conceivable that the stronger is a congruous "hypothesis", - either by verification through past experience or by verbal instruction, - the more such sub-standard information would be utilized in order to be fitted and conformed to the specific "hypothesis". As the stimulus becomes more structured or redundant, however, the role of

¹ Jerome S. Bruner, "On Perceptual Readiness", in the Psychological Review, Vol. 64, No. 2, issue of March 1957, p. 123-152.

congruous "hypotheses" becomes less important for confirmation to occur; conversely, confirmation becomes more difficult when structured stimuli are confronted with incongruous "hypotheses", i.e., inappropriate "hypotheses" require more cues in order to categorize the percept properly. In this experiment, incongruity implies a conflict between the subject's expectancies or "hypotheses" and the perceived stimulus configuration; the resulting perceptual report is referred as nonveridical. Congruity, on the other hand, denotes agreement between these two variables, and the perceptual report is called veridical. These operational definitions and preliminary theoretical considerations have been cited, because of their role in guiding and formulating the research problems.

According to the Hypothesis Theory, it is hypothesized that the proposed inverse relationship between the strength of "hypotheses" and the ambiguity of stimuli will be the same with the ambiguity of inkblot stimuli, as it has already been found with other forms of ambiguity. The experiment presently to be reported was designed to demonstrate the same relationship under different stimulus conditions.

This experimental model leads to the prediction that under vague and uncertain conditions, perceptual behavior will be determined by the dominant "hypotheses" of the subject during the moment of perceiving, being strengthened either by prior immediate experience or instructional expectancy.

2. Purpose of the Study.

The purpose of the present investigation is twofold. First, to establish a lawful relationship between systematic variation in the gradients of the structure of inkblot stimuli and the extent of its inverse relationship with the strength of "hypotheses". Or, said in another way, to investigate the effect of the systematic manipulation of "hypotheses" as they are inversely related with gradients of ambiguity in inkblots. The criterion of "hypothesis" strength will be determined as a function of the very nature of the instructional sets and verbal expectancies given prior to the projection of the inkblot stimuli.

Secondly, to test the universality and applicability of the Hypothesis Theory with classes or categories of stimulus information other than the ones already used. Furthermore, to investigate possible implications that responses elicited by projective techniques can be interpreted in view of the larger body of experimental data derived from a more general theory of cognition. This suggested approach has grown mostly from failing in the past to state the large amount of perceptual research data in a particular theoretical context.

Bruner² stresses the importance of experimental evidence by testing assumptions which stem from a more comprehensive perceptual theory, and maintains that perceptual theory should contribute to the understanding of the processes involved in projective techniques. He states:

Ink blots are no separate species of perceptual stimulus. There cannot be an independent theory of the perception of ink blots any more than there can be independent theories of the perception of Picasso collages, the phi phenomenon, or autokinetic movement. Our objective, and we must repeat it however tiresome it may come to sound, is a general theory of perception capable of dealing with the perception of any and all kinds of stimuli by any and all kinds of organisms under any and all conditions.³

The previous chapter has been replete with various forms of ambiguous stimuli, but utilization of the ambiguity conveyed from inkblots has not been hitherto demonstrated as a further verification of the Hypothesis Theory. In more general terms, this research is an attempt to test experimentally some of the previous findings by utilizing degrees of ambiguity of inkblot material as the source of unstructured stimulus information.

² Jerome S. Bruner, "Perceptual Theory and the Rorschach Test", in the Journal of Personality, Vol. 17, No. 2, issue of December 1948, p. 157-168.

³ Ibid., p. 158.

3. The Research Problem.

On the basis of this reasoning, the main problem has been formulated as follows: there is no significant difference between the class of perceptual responses to either ambiguous or structured inkblot stimuli on the one hand, and the nature of the immediately preceding verbal instructional set on the other.

From the above main thesis problem, four experimentally testable corollary problems have been logically derived which are directly patterned according to the covariation theorems cited at the end of the first chapter. The first three have been designed to demonstrate the effect of past experience and of various classes of verbal instructions upon the strengthening of "hypotheses". The fourth pertains to the same relationship but with the effect of motivational support. The criterion used were the observed changes of the verbal responses to differentiated degrees of stimulus ambiguity. A control group was also used for comparison. The four sub-experiments are as follows:

Problem I: There is no significant difference between veridical perception of ambiguous and structured inkblot stimuli, when the former have been preceded by the later.

Perception of structured inkblot stimuli form strong "hypotheses" which will tend to be confirmed when followed by the presence of less structured inkblot stimuli.

Problem II: There is no significant difference between veridical perception of ambiguous and structured inkblot stimuli, when the former have been preceded by a strong and congruous verbally induced "hypothesis".

As strong expectancies are built concerning unstructured situations, perceptual confirmation takes place just as easily as if the stimuli were structured. The stronger the "hypothesis", the greater its likelihood of prevailing over inappropriate and ambiguous conditions.

Problem III: There is no significant difference between nonveridical perception of ambiguous and structured inkblot stimuli, when the later have been preceded by a strong and incongruous verbally induced "hypothesis".

Expectancies that do not agree with structured situations tend to inhibit and distort perceptual confirmation. Perceptual recognition becomes just as difficult as if the stimuli were ambiguous. With reference to the theorems, the stronger an incongruous "hypothesis", the more the amount of appropriate information required to infirm such an "hypothesis".

Problem IV: There is no significant difference between nonveridical perception of ambiguous and structured inkblot stimuli, when the former have been preceded by induced failure-expectancy.

Previous association to failure will create expectancies of failure and inhibit perceptual confirmation. A strong inadequate "hypothesis" will continue to operate regardless of the available amount of stimulus information or how redundant is the percept.

4. The Research Tools.

Replication of Rorschach's plates was achieved in order to provide a basis and to facilitate the scoring of responses. This was accomplished by reproducing Rorschach's inkblots on white nonreflective Peterborough cardboard of the same size, by using nontransparent watercolors. Two subsequent series were also made, each deviating structurally from the standard set. One series conveyed the popular areas

with better form and more outstanding content features. In the other series, the blot areas were blurred and the form qualities made more ambiguous than the standard series. They are shown in the Appendix 1. Although they appear achromatic, the color was present in the original slides. The first sheet contains the ambiguous slides and the structured ones appear on the third sheet. Those identical to Rorschach's plates are on the second sheet of the Appendix 1.

All the cards were reproduced into 2x2 Kodachrome color slides. There were a total of thirty slides - ten slides for each of the ten series. Thus, three degrees of stimulus ambiguity were available.

The slides were shown on a white screen with a Bausch and Lomb Balomatic 300 automatic slide projector. Exposure time was .10 sec. for each slide. The necessity for a standard exposure duration for each slide was to control any changes in the quality of perceptual responses that may be due to a function of exposure time alone. The standard duration of exposure was achieved with a Kodak Supermatic shutter attached on the lens of the projector and operated by a cable release.

An answer sheet with numbered spaces was provided to each subject who was requested to write down the answer after the slide was shown on the screen. The answer sheets were given code numbers prior to scoring so that the responses were all anonymous; only sex and age were requested on the answer sheet.

5. Experimental Procedure.

The projector was placed six feet away from the screen and the subjects were seated three feet behind it. The experimenter operated the projector and gave the instructions verbally. Illumination of the experimental room was found to be an average of .6 foot candles ranging from .4 to .9, as measured by a Photovolt Model 200 lightmeter.

The procedure for each experimental group was the same except for the instructions and the order of presentation of slides. The subjects were led into the testing room in groups of six or less each time, and were not aware of the purpose of the experiment. When they were asked if they knew what was expected, in all instances they had no idea what was to be shown to them. After each session, queries about the nature of the slides or the experiment were not answered directly in order to avoid any foreknowledge of the contents of the slides by personal contact with other subjects. For the same reason, the instructional sets alternated in each experimental group with the result that all the experimental problems were being tested simultaneously. The subjects had been told not to communicate to other students any of their experiences from the experiment until it was announced in their classes that the project was over, at which time their questions about the experiment would be explained.

A restriction was made in the selection of subjects concerning normal vision. They were asked if their vision was normal as far as they knew. Those wearing glasses were allowed to participate. Before the instructions began, the subjects were requested to maintain absolute silence and to take into account the whole picture in the slide; the reason for this was to enhance the validity of scoring as far as the area of the inkblot was concerned. Questions concerning the procedure of the experiment were answered after all the instructions had been given. Following the instructions, the lights were put out and the experiment would begin. Prior to the projection of each slide the reminder "Ready?" was given to make certain that every subject was watching the center of the screen during the exposure and was attentively anticipating the showing of the slide. No slide was shown twice, in spite of an occasional request from subjects who wanted to see it again because they were unable to recognize anything during its exposure. To insure that all subjects had sufficient time to record their responses, the time interval between the exposure of the slides was not held constant.

6. The Subjects in the Study.

One hundred and thirty five subjects volunteered in the over-all plan which included the four subexperiments and the control group. All subjects were psychologically unsophisticated undergraduate students from the Teacher's College and the Arts and Sciences of the University of Ottawa, Canada, and most of them were enrolled in a beginning psychology course.

The majority of subjects were students majoring in elementary education while the remaining came from a variety of other academic fields; all were assigned randomly to each experimental group. They were told during a class meeting that subjects were needed for an experiment in perception, and the groups were sent for testing after the class. Those assigned to problem IV were tested individually after making appointments during a class session. The distribution of subjects in the over-all project is presented in Table I.

The mean age of the total population tested was 19.26 and the mean standard deviation 2.08. Due to the nature of the instructional set involved in Problem III, all its subjects were male students. The reason for this was that the instructional set used in this group might be unfavorable in female subjects because of their suspected limited familiarity in utilizing such verbal sets. Female subjects were also excluded from Problem IV because it was believed that the psychological effect of the instructional set given to this

Table I.-

Distribution of Subjects with Respect to Number, Age,
and Sex in Each Experimental Group.

Experimental Group	N: 135	Age		Sex	
		Mean	SD	Males	Females
Problem I	30	18.13	1.14	6	24
Problem II	30	18.80	1.79	8	22
Problem III	30	19.80	2.82	30	
Problem IV	15	21.40	3.44	15	
Control	30	18.20	1.24	4	26

group might be more detrimental and last longer in female than in male subjects.

Another reason was to avoid the presence of the experimenter in a dark room with a single female subject, and more so when the instructional sets were designed to deflate the subject's ego and increase the level of anxiety.

Although the distribution of the male subjects in the remaining experimental problems is not even, sex was not considered to account significantly for differences in perceptual behavior, or to be significantly effected by the verbal sets used in these particular groups.

7. The Instructional Expectancies for Each Group.

Except for the first thesis problem, all the other experimental problems utilized different instructional sets depending upon whether the effect of a congruous or incongruous "hypothesis" was to be considered. Also, the slides were not presented in the same order in all the experimental problems.

In the first experimental group, the order of presentation of the slides was from the structured to the ambiguous, while the slide identical to Rorschach's plate was in-between. This procedure was reversed in the second and third experimental groups and in the control group, i.e., from ambiguous to structured. After the showing of the degrees of ambiguity of the slides corresponding to the first plate with respect to

Rorschach's series, the degrees of the second plate would follow in the same order, etc. In the fourth subexperiment, however, all the slides of the ambiguous series were shown first; next were the slides identical to Rorschach's plates. The slides comprising the structured series were not used in this group.

The purpose of problem I was to determine the influence of the immediate past experience upon an ambiguous situation by showing first the structured counterpart of each ambiguous slide. The instructions were as follows:

This is an experiment in perception. Different picture slides will be shown on the screen for a very short time, and you are to write down what you think is the picture. There are no right or wrong answers. Answer each slide even if you have to use your imagination or guess. Write down your first impression as quickly as possible in each of the numbered spaces beginning from No. 1. Different people see different things in these pictures, and I want to find out what each of you see. The slides will be shown as soon as the lights go out. When I say "Ready" please keep your eyes in the middle of the screen and take into account the whole picture in the slide when you decide on your answer. You will have enough time to write down the answer. Please do not talk to each other while the experiment has began.

These instructions were often repeated to the group when some subjects indicated by their questioning that they did not understand adequately the procedure. The same instructions were given to the control group.

The instructional "hypotheses" or sets given to the remaining three experimental groups differed substantially.

Since the whole area of Rorschach's plates could be associated to all types of human forms or to parts thereof, it was felt that such an expectancy in the subjects can serve as a congruous "hypothesis". The "hypothesis" created experimentally in this group through verbal instructions, then, was to make the subjects expect and look for human forms. For this group, the above instructions had been slightly modified with the insertion of the following sentence: "Various picture slides with different human forms will be shown on the screen for a very short time, and you are to write down what kind of human forms you see in these slides by telling from their shapes". This sentence was repeated at the end of the instructions cited above.

The next experimental group dealt with the effect of an incongruous "hypothesis". Implements and mechanical tools and instruments have a very low probability of being seen in Rorschach's plates, and it was felt that an expectancy in the subjects of this group to expect and look for such percepts would be a typical instance of an incongruous "hypothesis". The following qualification was added to the general instructions that had been given to the first group: "Each picture slide has something to do with implements and mechanical tools and instruments. Try to figure out what kind of tools or instruments each slide will show; they could also be parts of larger instruments and tools".

Finally, instructions to induce the subjects to expect failure were attempted. To accomplish this, failure instructions were devised with the intention to make the subject ego-involved, to heighten his level of frustration and anxiety, and to generate feelings of inadequacy and intellectual inefficiency. The only instructions given to this group were as follows:

This is an experiment in perception and it measures your personality and intelligence. I am going to show you slides one at a time and you are to tell me what they are. The answers are either right or wrong; as soon as you give me your answer I will tell you whether you were right or wrong.

Following these instructions, the ambiguous series were shown and the subject was told that he was constantly in error. Derisive comments were also made to deflate the subject's ego and to create an anxiety provoking situation. Some of the comments were as follows: "You have done terribly bad". "You're not even average". "You have done much worse than the others who took this test before". "You're below normal". "You have the lowest score we've had so far". "Why is it that you cannot give the right answers? Is there anything wrong with your eyesight?" "Is it because you are having emotional or personality problems?" "Have you had bad dreams lately?" "Are you taking this test seriously or you're trying to waste my time?"

The experimenter recorded the responses of the ambiguous series while making these remarks to the subject. Then, the slides identical to Rorschach's plates were shown, and the subject was told that the answers will be either right or wrong, but he will not be informed as to how well he did in these series. After all, the subjects had been through with this experimental problem, they were all seen again and the purpose of the procedure was explained to them as they had been promised prior to taking the test. This took place immediately after the experiment was over. This was done in order to alleviate any anxiety that might have precipitated after such an ordeal. There were no complaints and everyone was satisfied with the explanations.

8. The Scoring of the Responses.

The answer sheets were scored by the experimenter. The Beck⁴ system was used because of its familiarity and relatively restricted subjectivity. Each response was scored by taking into account the whole area of the blot, since the subjects were instructed to perceive it in that manner. Besides the instructions, the speed seems to have prevented the subjects to perceive details and to facilitate the perception of the whole blot. Certain popular areas did not

⁴ Samuel J. Beck, Rorschach's Test, I. Basic Processes, New York, Grune & Stratton, 1944, xiii-223 p.

occupy the whole area of the blot. For example, when subjects responded to Card III with "two people", or to Card VIII with "two animals climbing", they were given a plus rating, although these were certainly not considered as whole responses. Such responses were quite obvious as far as categorization was concerned.

Cards I, IV, V and VIII did not contain any discernible human form, but were retained because it was felt that strong "hypotheses" will be evoked, regardless how inadequate is the stimulus information, due to the nature of the instructions. It is possible to elicit human form responses or responses that follow and resemble such forms, although not necessarily popular.

Responses with good form were given a plus sign; F+ denotes that there is sufficient agreement between the form of the blot and the percept. Responses characteristic of bad form were given a minus sign; F- implies that the percept does not fit the inkblot. The plus responses are precisely the veridical responses cited earlier in this chapter, and the minus responses represent the nonveridical type.

A separate category included those responses which did not fit in either of the above two classes according to Beck's criteria. In this neutral or independent category were assigned those responses normally given a plain F sign according to Beck. Finally, a fourth category included the number of

no responses to the inkblots. The indeterminate and rejection responses were used in order to make the first two sign categories more meaningful in the whole study. Whenever two responses were given to the same blot, the first was considered. Responses that scored both F+ and F- by Beck, such as animals on Card X, were classified in the indeterminate category. Also, responses such as "just", "blobs", "blots", "colors", and "spots", were put in the nonveridical class, because of their lack of definiteness and specific form.

The reliability of the scoring was tested by selecting randomly ten answer sheets - two from each group - which were scored independently by a judge who was not told under what conditions the responses were obtained. Veridical responses were considered first. The data in the two sets contained the veridical responses given by the two independent scorers for each subject (N=10). The first set contained those scored by the experimenter, and the second those given by the judge. A correlation method that is used for ungrouped data when deviations are the original scores, yielded an r of .88. For eight degrees of freedom, an r must be about .765 to be significant at the .01 level.

The same procedure was used for the other categories. A r of .81 was obtained for the nonveridical responses, .93

for the indeterminate responses and .90 for the rejection category. All the correlations are significant at the .01 confidence level.

The next portion of the experiment will present the outcome of these procedures.

CHAPTER IV

RESULTS OF THE EXPERIMENT

This portion of the study will present the method of analysis of the data and will clarify the manner of presentation. The outcome of the responses from the control group will be shown first of all, and then the results of the other experimental groups will follow in the same manner. Finally a discussion and explanation of the results will be presented in terms of their relationship to the Hypothesis Theory, with possible implications for further research.

1. The Statistical Findings.

The frequency of the assigned response categories obtained by each subject for all the series were compiled separately for each experimental group. All the data are presented in Table II. The four response categories are the classes in which the responses were ordered by relatively objective ratings, as has been stated in the preceding chapter. "Series" denotes the three groups of cards which vary characteristically in structuralness; thus, the responses of each series are rated and categorized in either one of four classes.

The first attempt was to establish the validity of the three series of ink blots as they vary in structuralness. The responses of this group were obtained from subjects who

Table II.-

Frequencies of Response Categories in Each Series for Every Group.

Group	Veridical			Nonveridical			Indeterminate			Rejection		
	Amb.	S.	St.	Amb.	S.	Str.	Amb.	S.	Str.	Amb.	S.	St.
Control	82	124	220	54	36	15	160	137	65	4	3	
Reversed	194	155	121	34	32	32	68	107	139	4	6	8
Congruous	93	112	162	22	15	16	167	144	106	18	29	16
Incongruous	47	43	96	16	19	20	198	190	152	39	48	32
Failure	48	57		23	29		55	39		24	25	

were not given any "hypotheses" concerning expectancies as to what was to be seen. By inspection of the figures in the control group, there is a concomitant increase of veridical responses with the structuralness of the ink blots. On the other hand, the nonveridical responses decrease. Likewise, those responses that could not be categorized in either way also decreased as the structurality of the ink blots increased. This apparently suggests that as the stimulus becomes more redundant, it elicits more responses that are veridical, thus, reducing the amount of responses in the remaining three alternative response categories.

The primary purpose of the control group was to establish a criterion measure between the response categories and the three series of structuralness in the ink blots. The findings of this group were obtained without any experimental manipulation of other variables, except for the fact that each series differed in structuralness from an indefinite stimulus to redundancy. These series may be considered as two opposite poles between which were the series identical to Rorschach's ink blots. The control group was considered first in order to make available a distribution of frequencies for comparison with those of the other experimental groups, and to demonstrate if the experimental conditions are really statistically effective.

The next step was to determine whether the frequency differences in the control group, between the series in each of the four class responses, are statistically different. This procedure of analysis of the data is in accord with the experimental design of the problems as stated in the previous chapter. The t test was used in order to determine whether the mean scores in each response category in the control group vary as a function of the structuralness in the ink blots. The response categories in each experimental group consist of correlated data, since they were given by the same subjects. The selected procedure for the computation of the standard deviation was by means of the formula

$$\sigma = \frac{1}{N} \sqrt{N \sum D^2 - (\sum D)^2}$$

usually used when the original correlated measurements are relatively small numbers. The standard error of the difference between any two given means was obtained by the formula

$$\sigma_{dm} = \frac{\sigma}{\sqrt{N-1}}$$

It should be noted that the data in this study are treated as measurements of a variable, depending on the design and procedure of each experimental group, since each subject had given many responses characteristic of a specific class category. All the differences of response categories between each series in the control group were significant beyond the

.01 level of confidence. Thus, the assumption underlying the rationale of the control group, namely, that the structuralness of the ink blots are a source of variance is substantially supported from these results. The rejection category was not taken into account in this group because of the very small numbers. The summary of the results is shown in Table III.

In the remaining four experimental groups, other independent variables were introduced to measure their effect, while the stimuli still remained identical. The data of the first experimental problem are shown in Table IV. In this group the series are reversed, i.e., the structured cards were presented first and followed by those identical to Rorschach's plates; the last series consisted of the ambiguous ink blots.

This procedure was to test whether "hypotheses" formed from previously shown structured stimuli will continue to operate even if the stimuli gradually become more ambiguous. Consequently, in this group there should be no statistical difference between the mean frequencies of each series in any of the response categories, if such an assumption were true. The results reveal that the t fails decidedly short of the .05 level of confidence between the mean frequencies of the three series only in the nonveridical response category. In all other categories, the t was significant at beyond the .01

Table III.-

Comparison of the Categorization of Responses Between the Control Group Series. (N=30)

Response Category	Series	M	σ	Diff.	σ_{dm}	t	Sign.
Veridical							
	Ambiguous	2.7	1.7	1.4	.32	4.3	$p < .01$
	Same	4.1					
	Same	4.1	1.9	3.2	.35	9.1	$p < .01$
	Structured	7.3					
Nonveridical							
	Ambiguous	1.8	1.1	.6	.20	3	$p < .01$
	Same	1.2					
	Same	1.2	1.1	.7	.21	3.3	$p < .01$
	Structured	.5					
Indeterminate							
	Ambiguous	5.3	1.5	.8	.27	2.9	$p < .01$
	Same	4.5					
	Same	4.5	1.8	2.3	.34	6.8	$p < .01$
	Structured	2.1					

Table IV.-

Comparison of the Categorization of Responses Between the Control Group Series When Their Order of Presentation was Reversed. (N=30)

Response Category	Series	M	σ	Diff.	σ_{dm}	t	Sign.
Veridical							
	Ambiguous	6.4					
	Same	5.1	1.6	1.3	.31	4.1	$p < .01$
	Same	5.1					
	Structured	4.0	1.6	1.1	.30	3.6	$p < .01$
Nonveridical							
	Ambiguous	1.1					
	Same	1.0	1.2	.1	.22	.4	N.S.
	Ambiguous	1.1					
	Structured	1.0	1.6	.1	.29	.3	N.S.
Indeterminate							
	Ambiguous	2.2					
	Same	3.5	1.4	1.3	.26	5	$p < .01$
	Same	3.5					
	Structured	4.6	2.2	1.1	.40	2.7	$p < .01$

confidence level. The rejections in this group were very few and hence were not taken into account. In instances where the mean frequencies between the series were either identical or very close, the t was not computed. This applies to the other groups as well.

In the second experimental problem, as well as in the remaining ones, the series were shown in the same order as in the control group. Table V contains the results of the second group. The mean frequencies between the series in the veridical category are statistically significant at beyond the .01 confidence level. The same result was found between the ambiguous and structured series in the indeterminate category. The remaining data were not statistically significant.

It may be recalled that this group was introduced with congruous "hypotheses", in order to test the assumption that ambiguous stimuli will elicit veridical responses if the subject's dominant "hypotheses" at the moment of perceiving suggest such responses. This procedure implies further that these responses will be just as veridical as if the stimuli were redundant. The results suggest that this assumption is only partially confirmed, since there was a concomitant increase in the frequencies along with the structurality, as in the veridical category, for example.

Table V.-

Comparison of the Categorization of Responses Between the Series in the Group with Congruous Hypotheses. (N=30)

Response Category	Series	M	σ	Diff.	σ_{dm}	t	Sign.
Veridical							
	Ambiguous	2.1	1.2	1.6	.22	7.2	$p < .01$
	Same	3.7					
	Same	3.7	1.8	1.7	.33	5.1	$p < .01$
	Structured	5.4					
Nonveridical							
	Ambiguous	.7	.9	.2	.18	1.2	N.S.
	Same	.5					
	Same	.5	.7	.03	.14	.2	N.S.
	Structured	.5					
Indeterminate							
	Ambiguous	5.5	1.7	.7	.32	2.1	N.S.
	Same	4.8					
	Same	4.8	2.2	.7	.40	1.7	N.S.
	Structured	3.5					
	Ambiguous	5.5	2.3	2	.42	4.6	$p < .01$
	Structured	3.5					
Rejection							
	Ambiguous	.6	1.2	.3	.23	1.5	N.S.
	Same	.9					
	Ambiguous	.6	.6	.07	.12	.5	N.S.
	Structured	.5					

The results of the third experimental group are presented in Table VI. The mean frequencies between the same and structured series in the veridical and indeterminate categories are significant at the .01 confidence level. The same significance is found in the ambiguous and structured series in the veridical category. As stated in the previous chapter, this group was given incongruous "hypotheses", assuming that regardless of the redundancy of the ink blot stimulus, the responses will be nonveridical as if the stimuli were ambiguous. Since in most instances the mean frequencies between the series do not fluctuate significantly, such an assumption can be only partially true for this group as well.

Finally, the results of the last experimental group are presented in Table VII. The frequencies between the series in all the response categories are not statistically significant. This group was designed to test the assumption that a series of ambiguous stimuli associated with failure "hypotheses" will continue to operate even if the subsequent stimuli have become more redundant. Statistically, then, there should be no fluctuation in the mean frequencies of the series in any category of this group, and the results substantially support this assumption.

The next attempt will be to consider further these findings and examine them as to how they confirm the experimental problems derived from the Hypothesis Theory, and to formulate inferences from the negative results.

Table VI.-

Comparison of the Categorization of Responses Between the Series in the Group with Incongruous Hypotheses. (N=30)

Response Category	Series	M	σ	Diff.	σ_{dm}	t	Sign.
Veridical							
	Ambiguous	1.5					
	Same	1.4	1.4	.1	.27	.3	N.S.
	Same	1.4					
	Structured	3.2	1.7	1.8	.32	5.6	$p < .01$
	Ambiguous	1.5					
	Structured	3.2	1.6	1.7	.30	5.6	$p < .01$
Nonveridical							
	Ambiguous	.53					
	Same	.63	.7	.1	.13	.7	N.S.
	Same	.63					
	Structured	.66	.7	.03	.13	.2	N.S.
	Ambiguous	.53					
	Structured	.66	.8	.13	.14	.9	N.S.
Indeterminate							
	Same	6.3					
	Structured	5.0	2.0	1.2	.38	3.3	$p < .01$
Rejection							
	Ambiguous	1.3					
	Same	1.6	1.4	.3	.26	1.1	N.S.
	Same	1.6					
	Structured	1.0	1.5	.5	.28	1.8	N.S.
	Ambiguous	1.3					
	Structured	1.0	1.0	.2	.19	1.2	N.S.

Table VII.-
Comparison of the Categorization of Responses Between the
Series in the Group Experiencing Failure Hypotheses. (N=15)

Response Category	Series	M	σ	Diff.	σ_{dm}	t	Sign.
Veridical	Ambiguous	3.2	1.5	.34	.42	.80	N.S.
	Same	2.8					
Nonveridical	Ambiguous	1.5	1.7	.40	.45	.88	N.S.
	Same	1.9					
Indeterminate	Ambiguous	3.6	2.0	1.06	.55	1.9	N.S.
	Same	2.6					
Rejection	Ambiguous	1.6	1.7	.06	.45	.13	N.S.
	Same	1.6					

2. Discussion of the Results.

The four experimental problems in this study were constructed to investigate the effect of "hypotheses" on Rorschach's ink blots, which are more or less considered as a test of perception. The reproduced Rorschach ink blots and the additional series of their over- and under-elaboration was not intended as a test of Rorschach's technique. Instead, they were utilized to investigate perceptual responses as they occur in situations where Rorschach's ink blots are stimuli. Another reason is that they provide criteria for the classification of responses obtained under conditions of experimentally induced "hypotheses" in order to test a general theory of perception.

The results of this study have indicated that the predictions within all four experimental problems have not been unanimous as it was originally assumed. In the first problem, for example, the number of nonveridical responses recognized in the structured series continues to be the same in less redundant ink blots; the gradually increasing ambiguity does not have any effect on the increase of the nonveridical "hypotheses". In the other two major response categories, however, such a relationship does not occur. The results are similar when the order of presentation is from the ambiguous to the structured series. The same can be said for all the problems.

This relationship becomes more meaningful if the content of the indeterminate category was explained. It is possible that the responses in this class are nothing more than a function of the rater rather than of the subjects. By inspection of the individual answer sheets, these responses appear to be closer to those in the veridical category. However, should they be reclassified into the other two categories, there might be an element of error which makes these responses unreliable due to the subjective nature of this kind of categorization. Except for the last problem, all the indeterminate responses are inversely related to those in the veridical category in the statistical sense, while the nonveridical ones remain statistically the same. This might be a clue to the indeterminate category. Although it does not seem to have much validity insofar as the problems are concerned, it does make the veridical category more meaningful. It could be said that this category contains a considerable number of responses not ordinarily seen with normal scoring. If they were categorized, a large amount would probably fall in the veridical category, except perhaps, for those in the problem with incongruous "hypotheses". Indeterminate responses are elicited, regardless of the kind of experimentally induced "hypotheses" because these conditions are not similar to those where normal responses are elicited, and consequently, most of them are not found in Beck's system of classification. The

nonveridical frequencies of the ambiguous series, for example, in both the congruous and incongruous problems are considerably less than those in the control group. Incongruous expectancies do not fit the stimulus, and therefore, result in responses outside the content most frequently seen which tends to increase the frequency in the indeterminate category. On the other hand, congruous expectancies do not seem to decrease this category considerably which is contrary to the anticipation of the study, although the veridical frequencies have almost doubled when compared to those in the incongruous group. It is also noticed that the nonveridical responses in the congruous group are about one half less when compared to the first two groups, yet, these responses in the incongruous group do not increase as anticipated.

The results here appear somewhat inconsistent, but if each response category is examined separately, there is notable evidence in favor of the Hypothesis Theory. It seems plausible to state that if the assumptions in the present study - based on the Hypothesis Theory - have any nomothetic validity, they should apply to the veridical and nonveridical categories regardless whether the indeterminate class is considered. This later class has screened and "purified" the overall responses, so to speak, so that the data in the whole study will be more objective for evaluation; it increases the confidence in the conclusions of the study.

Finally, another plausible explanation for the indeterminate category is its possibility of indicating a degree of uncertainty, whether conscious or not - provided that the uncertainty of the rater is ruled out. It is quite possible that ambiguous situations created by induced expectancies on the one hand, and inappropriate cues in the ink blots on the other, may result in ambiguous and equivocal responses so as to avoid the conflictual situation. It is already shown statistically that such a dissonance decreases significantly as the cues in the ink blots increase. In many cases, indeterminate responses could not be classified because of lack of criteria, as for example, many of the responses of a mechanical nature found in the problem whose subjects were given incongruous expectancies. Since this problem has a greater overall number of indeterminate responses when compared, by inspection of Table II, with the frequencies of the other problems and classes, there seems to be some truth in this reasoning.

The data in the nonveridical category suggest that strong nonveridical "hypotheses" do not change even if the stimulus information becomes more adequate to these "hypotheses". Veridical "hypotheses", on the other hand, will change as a function of the stimulus. This later finding applies to most of the experimental groups. By extrapolation from this data, it might be that in ordinary Rorschach responses

which to a great extent reveal the subject's strongest and most significant "hypotheses", those that are invalid or incongruous will require a greater amount of adequate information to be rejected.

These results support the Hypothesis Theory and substantiate further that degrees of ink blot stimuli elicit the same relationship as do the other ambiguous stimuli. Furthermore, it makes more meaningful the process involved in the perception of ink blots for the study of personality. On the basis of these findings, further research might reveal a relationship between certain personality attributes with specific response categories. For example, rigid individuals might maintain nonveridical "hypotheses" from ambiguous to redundant situations more readily than less rigid persons.

Contrary to the above findings, congruous "hypotheses" become easily reconfirmed as the structuralness increases. Said in another way, veridical responses are stimulus bound. These results may imply that veridical responses - usually characteristic of the normally functioning personality - are more flexible to changing stimuli; with these there seems to be greater reality testing than with nonveridical responses which lack such flexibility and are not associated with normal tendencies. Although there is empirical evidence in favor of the above interpretation, it would be interesting to investigate further the various types of subjects utilizing such expectancies with varying degrees of stimulus cues.

If "hypotheses" are seen as expectancies imbedded in the personality structure of the individual and formed by past experience, verbal instruction of the moment, etc., the strength of the invalid ones are elicited with ink blot stimuli just as readily as with other forms of ambiguity.

Seeing that perceptual responses to ink blots vary significantly, either as a function of the stimulus or of the given and acquired expectancies of the perceiver, it appears unlikely that interference of recognition of the ambiguous or conflicting stimulus input from the ink blots is by and large, an expression of need gratification and impulsive drives. Perhaps, a similar experimental design as the present study, when need is used as an independent variable, might spell out this relationship more clearly. It is conceivable that Rorschach responses can be understood in terms of the Hypothesis Theory, in the sense that "projective" material manifest the quality and strength of "hypotheses" that the subject has at his disposal which are of a highly personal relevance and significance, and his readiness to express them whenever a sufficiently ambiguous opportunity is given. The evocation of perceptual responses to ink blots, according to the data, seems likely to involve the "hypothesis" - information - confirmation cycle for the explanation of the perceptual processes, since some of the same functional relationships were confirmed in the present study.

The data of the study have shown how nonveridical expectancies persist and continue to dominate a changing perceptual field, which makes more observable the operation of invalid attitudes - a very frequent phenomenon in the area of social perception. More research is needed to find ways for eradicating the strength and formation of these enduring and persistent "hypotheses". Furthermore, perceptual responses to ink blots of the nonveridical type can be adequately understood and explained from the Hypothesis Theory point of view, and this theory of perception might furnish the basis for a theory of personality from the perception of ink blot stimuli.

Continuing with the discussion of the results, there is a noticeable increase in the rejection responses, in the last two problems given failure and incongruous "hypotheses". It is conceivable that in the first of the above problems, the phenomenon of response suppression occurred - a process, whereby, a stimulus is seen but not reported when a situation is ego-threatening or embarrassing. This seems to be confirmed from the fact that the control group did not elicit such responses. Since the mean frequencies between the two series of the failure expectancy group are not statistically significant, it implies that the trial series, i.e., the ambiguous cards, had the same effect as the subsequent series. When these subsequent and more structured series were followed,

the number of rejections did not decrease in spite of the increase in structure. Such an outcome indicates that failure and ego-threatening "hypotheses" continue to operate even when cues in the environment increase and thus affording a greater chance for perceptual confirmation. This confirms the rationale of this group, and supports previous findings reported in the second chapter.

It was interesting to notice that several subjects in this group complained that either the time interval was too quick or, if they did see something, they were unable to identify it. Indeed, some subjects reported at the end of the experiment that they felt "worried" and "mad", and most felt apprehensive and uncomfortable during the task. A few wanted to change their distance from the screen; others said they would have been able to give the "right" answer if the slide was shown again. These illustrations indicate that the failure "hypotheses" were very effective in the subjects.

Regarding the rejections in the problem given incongruous "hypotheses", the same explanation could be given. When strong "hypotheses" do not match or fit an ink blot stimulus, a disagreement between the input of stimulus cues and the given expectancy precipitates an avoidance reaction as the solution to the conflict. As for the rejections in the congruous group, they are considerably more than those in the control group, yet, they should not have occurred.

It appears that congruous expectancies, i.e., to anticipate and perceive human forms, were to many subjects a difficult match to make, perhaps because the blots were not human-like enough as they originally had anticipated from the instructions. The blots might have appeared more ambiguous from what the subjects were awaiting to see.

The general conclusions of the study indicate that nonveridical "hypotheses" continue to operate and are not subject to change regardless of the significant increase of the stimulus cues. Veridical responses, on the other hand, change concomitantly as the stimuli become redundant. These results were obtained on the basis of a statistical comparison between the total number of responses of every separate category in each series.

It must be remembered that for the theoretical assumptions to be true, the null hypothesis is to be retained, in order to bear favorable evidence for the assumptions implied in the Hypothesis Theory. The first two problems deal with veridical and the last two with nonveridical responses. In problem I there is a significant change of veridical responses between the series, and consequently, the null hypothesis is rejected. In this case, the results are not significant in the predicted direction. Similar results were obtained for problem II. Finally, in the last two problems the nonveridical responses do not change significantly between

the series, and therefore, the null hypothesis is upheld, i.e., the results support the theoretical assumptions of the Hypothesis Theory.

SUMMARY AND CONCLUSIONS

The present endeavor has been an attempt to establish whether some of the theorems from the Hypothesis Theory are comprehensive enough to account for the perceptual processes from stimuli other than the ones already utilized. It was assumed that responses from inkblot stimuli can be subsumed and interpreted according to a recently formulated general theory of cognition. Favorable findings will render the theory valid and promising.

Specifically, the purpose of this study was to examine the effects of certain verbally induced expectancies on three series of inkblot stimuli, ranging from ambiguity to redundancy. Four experimental problems were formulated to test this assumption. In the first problem, the structured series were presented first and the ambiguous last. It was assumed that veridical responses would not decrease, because structured inkblots would form strong veridical expectancies which would continue to function with inkblots that lack structure. The results did not uphold this assumption.

In the second problem, the ambiguous series were shown first and the structured last. It was assumed that veridical responses would be the same in the ambiguous as they are in the structured series, when the subjects were given congruous expectancies. The results showed that these responses increased significantly with the structuralness of the inkblots;

consequently, the experimental evidence does not support the assumption.

In the third problem the series were shown in the same way, and the subjects were given incongruous expectancies, assuming that the nonveridical responses will be just as many in the structured as they are in the ambiguous series. The results indicated that this assumption was true. Finally, the ambiguous series in the fourth group were associated with failure and ego threat, assuming that there would be a carry-over of nonveridical responses to the middle series. The results substantiated this assumption.

Additional findings were obtained from this study. It was shown that the nonveridical responses in all the groups did not change concomitantly with the structurality in the inkblots; this lends support to the Hypothesis Theory that strong negative expectancies will continue to operate regardless of the changing meaningfulness of the stimulus. Veridical responses, on the other hand, change concomitantly with the structurality of the inkblot stimuli.

On the basis of analysis of the data obtained from the four experimental conditions, support was obtained for two of the four problems. Taking the study as a whole, it is appropriate to conclude on the basis of the results that there is still some doubt whether the Hypothesis Theory can account for all the perceptual responses elicited with inkblot stimuli.

In the case of nonveridical responses, the results support the theory, whereas, veridical responses cast serious doubts on the universality of the Hypothesis Theory.

It was suggested that further research might concentrate on the additional findings of the study, by utilizing subjects that were categorized according to different personality types; then, to observe whether specific class response dispositions would be concomitant with personality characteristics, and the manner in which perceptual expectancies would be evoked with changing degrees of stimulus information. Such an attempt might lend more insight into the role of cognitive processes - and general perceptual behavior - as being systematically associated with the functioning of personality and with psychological adjustment.

BIBLIOGRAPHY

Allport, Floyd H., Theories of Perception and the Concept of Structure: A Review and Critical Analysis with an Introduction to a Dynamico-Structural Theory of Behavior, New York, Wiley, 1955, xxii-709 p.

An extensive and critical review of the major theories of perception with a lucid explanation of their nature and function. The Hypothesis Theory is given special extensive treatment and critique, as well as the related experimental evidence. Very verbal with review of literature not quite up-to-date. Recommended for the graduate student who is particularly interested in acquiring a broad background and a sound basis of perceptual theory.

Beardslee, David C., and Michael Wertheimer, Readings in Perception, Princeton, Van Nostrand, 1958, xiii-751 p.

A selection of important papers by many authors on perceptual processes. Papers are arranged in sequence and cover such topics as, physiological mechanisms, research methods, the perception of space, figures, areas and events, imagery, and the perceptual recognition of ambiguous and meaningful stimuli. The best text of its kind for a course or supplementary reading on the psychology of perception. Several papers in favor of the Hypothesis Theory are cited.

Bruner, Jerome S., "Personality Dynamics and the Process of Perceiving", in Perception: An Approach to Personality, Robert R. Blake and Glenn V. Ramsey, eds., New York, Ronald, 1951, p. 121-147.

A series of lectures related to the major trends on the determinants of perception. The chapter contains an outline of the Hypothesis Theory, with the intention to bridge the gap between clinical observations and experimental investigations in perception. It explains the nature and formation of "hypotheses", and the factors that determine their change and strength. There are implications for a theory of personality, along with experimental evidence and suggestions for further research. A simple and clear exposition of the Hypothesis Theory, and very comprehensible to the neophyte in the field.

Bruner, Jerome S., and Leo Postman, "An Approach to Social Perception", in Current Trends in Social Psychology, Wayne Dennis, ed., Pittsburgh, University of Pittsburgh Press, 1948, p. 71-118.

The beginning attempts for a general theory of perception is presented by invoking the contributions of psychophysics, Functionalism, and of Act and Gestalt psychology. The role of "hypotheses" is presented as functions of the organism's prevailing state at the moment of perceiving, as reflected by perceptual organization, selectivity, fixation and accentuation. These personality states are seen as products of interaction between society and the organism. An excellent historical account of the antecedent notions that helped in the formation of the Hypothesis Theory.

Gibson, James J., "A Critical Review of the Concept of Set in Contemporary Experimental Psychology" in the Psychological Bulletin, Vol. 38, No. 9, issue of November 1941, p. 781-817.

A thorough historical review on the various meanings and origins of the concept of set, with an extensive survey of the experimental literature. Covers learning, perception, thinking, conditioning, reaction time, association and task completion, in relation to set. One of the best detailed reviews on set; contains a rich and comprehensive bibliographical list. A good source for the student in experimental psychology.

Postman, Leo, "Toward a General Theory of Cognition", in Social Psychology at the Crossroads, John H. Rohrer and Muzaffer Sherif, eds., New York, Harper, 1951, p. 242-272.

Contains overviews of concepts and theories in fields related to social psychology, and the Hypothesis Theory is proposed as a basic theoretical framework for social psychology. Presents previous attempts for a unified cognitive theory, followed by a very clear and succinct account of the formation and processes in the operation of "hypotheses". Very useful for understanding cognitive processes.

APPENDIX 1

THE THREE SERIES OF INKBLOT SLIDES

Figure 1. The Series of Ambiguous Slides.

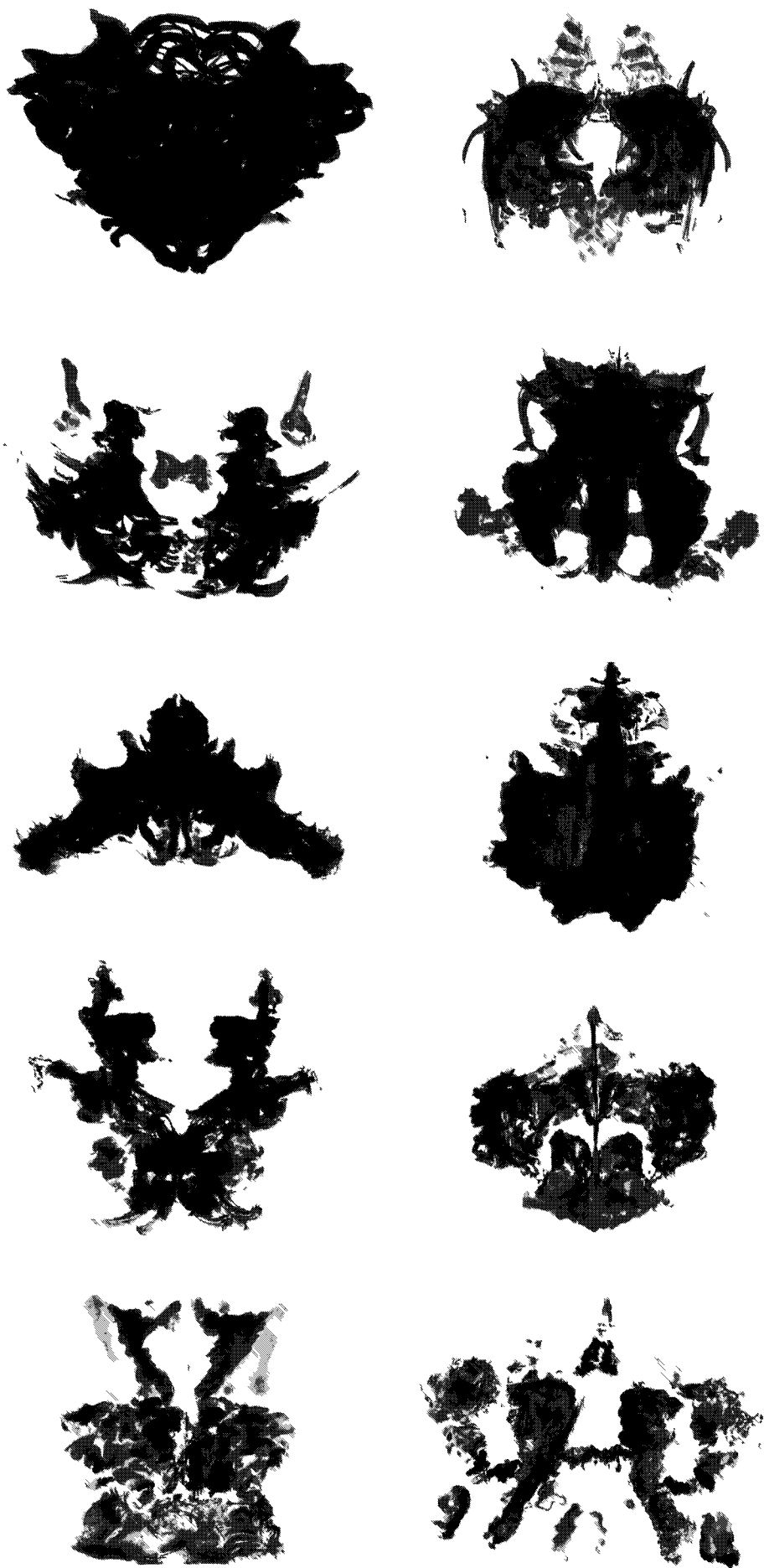
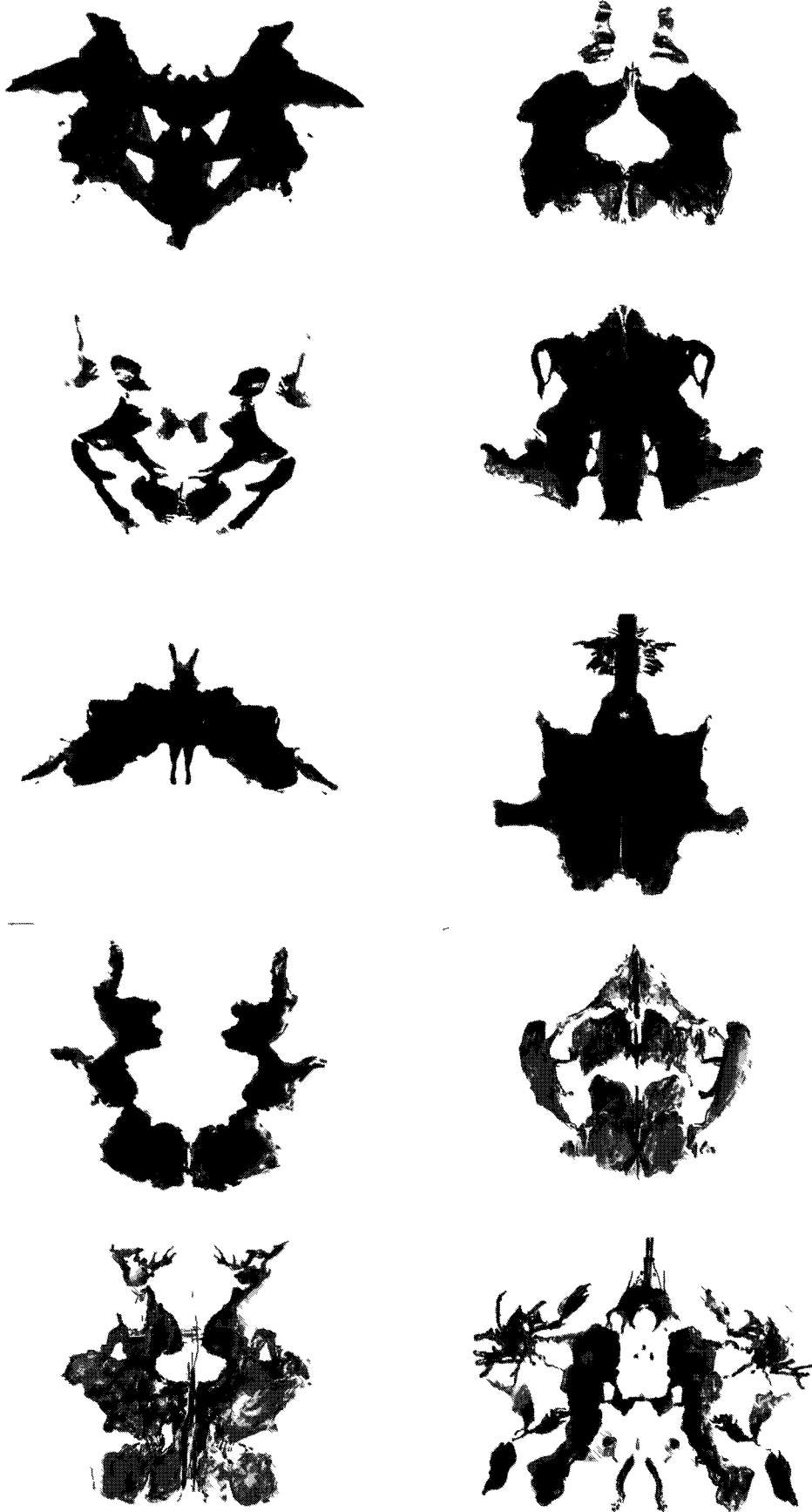


Figure 2. The Series Identical to Rorschach's Inkblots.



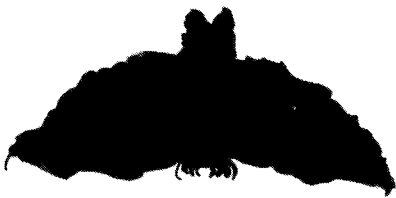
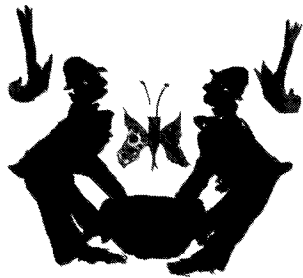
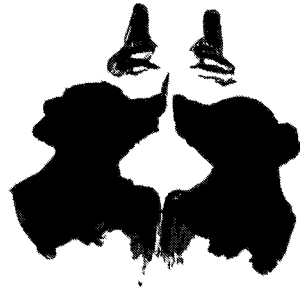


Figure 3. The Series of Structured Slides.

APPENDIX 2

ABSTRACT OF

The Hypothesis Theory and Perceptual
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The Hypothesis Theory and Perceptual Responses to Inkblots¹

Bruner and Postman's Hypothesis Theory maintains that past experience and motivational support are among the factors that strengthen perceptual expectancies which come into play when the stimulus becomes less structured. By varying systematically the perceptual expectancies and the amount of meaningfulness in the stimuli, certain nomothetically lawful relationships can be found and applied to all cognitive phenomena. The universality of this theory has not been controlled methodically; hence the present research tested its applicability to the perception of inkblots.

Beginning with a historical account of the many attempts to formulate a general theory of cognition, this study leads to the formation of the Hypothesis Theory, its description, its operation and the experimental literature about it.

The assumption was made that responses to varying degrees of structure in the inkblots would be related to expectancies that are either verbally induced, previously confirmed, or motivationally significant. Three series of inkblots slides, each varying in structurality, were projected individually

¹ Arthur G. Nikelly, Unpublished Ph.D. thesis presented to the School of Psychology and Education of the University of Ottawa, Ontario, June 1959, x-156 p.

on a screen to four groups of subjects. The middle series contained Rorschach's original inkblots, while one of the other two were more structured and the other unstructured. Responses were scored with Beck's criteria; a plus sign denoted a veridical and a minus a nonveridical response.

In the first group, the series were shown going from the structured to the ambiguous, assuming a carry-over of veridical responses from the former to the later; in the second group, the series were shown going from the ambiguous to the structured, assuming that congruous expectancies given verbally would elicit just as many veridical responses to the ambiguous series as to the structured series. Both assumptions were not statistically confirmed.

The third group was given incongruous expectancies, assuming that just as many nonveridical responses would occur with structured stimuli as they did with ambiguous stimuli. The ambiguous series in the fourth group were associated with verbally given failure expectancies, assuming a carry-over of nonveridical responses to the middle series. Both assumptions were statistically significant.

It was concluded that the results from the perception of inkblot stimuli partially confirm the Hypothesis Theory. Implications of the findings were discussed along with some suggestions for further research.