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**THE EFFECT OF INCREASED STIMULUS AMBIGUITY ON PROJECTION
IN A CONTINUOUSLY VARYING STIMULUS**

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CURRICULUM STUDIORUM

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INTRODUCTION

The clinical instruments which are known as projective techniques are a group of psychological tests usually employed for the purpose of eliciting responses from an individual which, it is hoped, will reveal information concerning the individual's personality, dispositions, tendencies and complexes. One characteristic of the stimulus materials employed in projective techniques is the degree of structure or ambiguity of the stimulus. This characteristic of stimulus ambiguity is one of the few aspects of the very complex test situation over which the clinician has some control. He is able to select his stimulus materials on the basis of their degree of ambiguity. By degree of ambiguity is meant the extent to which stimulus material is vague, ambiguous or indefinite. (For purposes of this study, stimulus ambiguity will be defined with respect to picture thematic stimulus materials, the materials used in this study, in terms of a gradient of glare which, when reflected into the subject's eyes, makes the stimulus material more difficult to perceive. This will be more fully described in Chapter III under the section on apparatus and method of experimentation.)

The basic assumption generally made concerning the relationship between degree of ambiguity and response may be stated as follows. All other things being equal, the more indefinite, ambiguous or unstructured the stimulus material

which is presented for response, the more likely is the individual to respond in terms indicative of his own dispositions, motives and attitudes. Stated somewhat differently: the more the individual is required to complete or fill into an unstructured situation from his own resources the more likely he is to "project" his own personality dispositions and tendencies in making his response.

The problem under investigation in this study is whether variations in verbal response are associated with variations in the ambiguity of picture thematic stimulus materials. The scope of this study does not propose to include the investigation of the projective mechanism as such. Neither is there any attempt to investigate the mechanisms of perception which, undoubtedly, are involved in all projective as well as non-projective techniques. Furthermore, this study does not concern itself directly with interpretive aspects of the responses. That is to say that the study is interested in productivity of projective material in terms of quantity rather than in terms of the content and quality of the responses.

People respond as individuals to any stimulus. The subject's response to a picture thematic stimulus may be merely a matter of fact description of the characters and setting with little or no indication of feeling of relationship or of interaction between the characters. This would be

considered by the clinician as a not too productive kind of response. On the other hand, the astute clinician might still make inferences concerning the emotional flatness, or indifference, or social withdrawal on the part of the subject who responds thus; however, the predominantly descriptive response usually does offer little on which to base inferences concerning the subject's feelings, attitudes and relationships. The subject may, on the other hand, go beyond mere objective description of the picture thematic stimulus. He may attribute fear, anger, love, happiness, etc., to the characters and may suggest the bases for these feelings. He may proceed to describe what the characters are thinking and how the characters relate one to the other. The clinician, of course, finds this type of response much more clinically useful. It is the latter verbal response where, assuming projection by the subject, the clinician can infer something regarding the nature of the subject's feelings, attitudes, conflicts, ideas, etc., on the basis of what the subject has attributed to his story characters. In this study, therefore, it will be the latter type of response which will be considered as projected material and this will be differentiated from material of pure description.

Theoretical discussions of projective techniques almost universally assume a relationship between the ambiguity of stimulus materials and the productivity of responses

elicited. This assumption is too frequently made with very little attempt to define stimulus ambiguity or the possible dimensions in which it may vary. It is hoped that this study may contribute to a more explicit understanding of picture thematic stimulus ambiguity and the effect of its variation on response variation.

If a major goal of projective techniques is to enhance the occurrence of response material which is revealing of the personality dispositions of the subject, then the demonstration of relationship between some aspects of the response and some specific characteristics of the stimuli should be of practical significance as well. Since the clinician does, to a large extent, control the stimuli which he presents to the subject, a further elucidation of the relationships between stimulus ambiguity and response elicited should aid in the construction and selection of stimuli which would be maximally provocative and productive.

The first portion of this thesis presents the theoretical and experimental background of the problem of stimulus ambiguity and projection. This "Review of the Literature" reveals that there are three distinct viewpoints on the question of stimulus ambiguity and its relation to response. Following the literature review, several hypotheses are set forth and elaborated. This is followed by a description of the experimental design and the experimental apparatus.

In this section the various procedures, the sample, the judges, the apparatus, and the statistical operations are discussed.

The results obtained in the analyses of verbal productivity and projection are presented and discussed in the subsequent chapters, with particular emphasis being placed on the variations in productivity of projective material.

The study is summarized in the final chapter and some conclusions are then presented with implications for future research in the area of stimulus ambiguity. The appendix contains a more detailed description and drawing of the apparatus used and an abstract of this thesis.

CHAPTER I

THEORETICAL PERSPECTIVE

It is commonly stated in discussions of projective techniques that the materials used in the many different projective procedures vary in a dimension referred to as degree of structure or degree of ambiguity. A quotation from Symonds will illustrate.

There are variations in materials used from unstructured to inchoate material like clay, sand, water, through semi-structured ink blots, to the unequivocal forms of the family dolls or conventional toys.¹

Thus, Symonds establishes a type of continuum from unstructured to highly structured along which various projective techniques may be classified. Similarly, Horowitz and Murphy discussed the "quality of plasticity or degree of formal structure" which stimulus material has and which "determines the range within which projective responses are free to be exposed."²

1 Percival M. Symonds and Elizabeth A. Samuel, "Projective Methods in the Study of Personality", in Review of Educational Research, Vol. 11, No. 1, issue of February 1941, p. 80.

2 Ruth Horowitz and Lois B. Murphy, "Projective Methods for the Study of Personality", in Journal of Experimental Education, Vol. 7, No. 2, issue of December 1938, p. 133.

1. Projective Theories and Postulates.

According to Frank, projective techniques function to elicit revelation of the private world of meanings, feelings and attitudes of the subject by requiring him to "organize the field, to interpret the material and react affectively to it."³ He distinguishes four different kinds of response to projective material which he calls the constitutive, the interpretive, the cathartic and the constructive responses. Constitutive responses are those in which the subject imposes a structure upon a plastic unstructured substance such as clay or upon a partially structured field like the Rorschach ink blots. Interpretive responses are those in which the subject tells what the stimulus means to him. Cathartic responses are those in which the subject discharges some feeling upon the situation such as in play projection and, finally, constructive responses are those in which a subject builds or constructs with given materials such as blocks, and in the process of construction reveals his own organizing conceptions.⁴ According to Rosenzweig, projective techniques "depend upon the subject's objectification of

³ Lawrence A. Frank, "Projective Methods for the Study of Personality", in The Journal of Psychology, Vol. 6, No. 2, issue of October 1939, p. 395.

⁴ Ibid., p. 403.

his subjective processes."⁵ Each technique encourages the individual in the presence of an unorganized, meaningless medium, to let himself go and render it meaningful. Projective techniques, therefore, would seem to be quite reliant on stimulus pull, otherwise responses could not be expected.

According to Rapaport,⁶ a projective procedure is one in which the subject

[...] actively and spontaneously structures unstructured material, and in so doing reveals his structuring principles which are the principles of his psychological structures.

Rapaport⁷ goes on to distinguish between two methods of projection. The method of organization and the method of choice. The process of organization begins with those features of the stimulus situation which have meaning for the subject who then turns back to the stimulus situation in order to organize more of its features to fit the meaning, this process eventually ending in a verbal response. The process of choice, says Rapaport, involves the choice of clothing, furniture or any objects which may be expressive of self. Rapaport then goes on to elaborate that if the stimulus

⁵ Saul Rosenzweig, "Fantasy in Personality and Its Study by Test Procedures", in Journal of Abnormal and Social Psychology, Vol. 37, No. 1, Issue of January 1942, p. 45.

⁶ David Rapaport, Diagnostic Psychological Testing, Vol. II, Chicago, Year Book, 1946, p. 7.

⁷ -----, "Principles Underlying Projective Techniques", in Character and Personality, Vol. 10, No. 3, Issue of March 1942, p. 215.

material elicits

[...] socially or phylogenetically patterned behaviour, the function of choice predominates; if the material is unorganized, or unfamiliar, the function of organization becomes preponderant.⁸

Human beings tend to interpret ambiguous situations and stimuli in conformity with their past experiences and present needs. This was recognized by Murray who, in presenting his rationale for the Thematic Apperception Test, states:

The procedure is merely that of presenting a series of pictures to a subject and encouraging him to tell stories about them invented on the spur of the moment. The fact that stories collected in this way often reveal significant components of personality is dependent upon the prevalence of two psychological tendencies: the tendency of people to interpret an ambiguous human situation in conformity with their past experiences and present wants, and a tendency of those who write stories to do likewise [...]⁹

Thus Murray has recognized the importance of the ambiguity of a stimulus in determining a projection.

Bellak,¹⁰ in order to explain the projective experiences, postulates three types of behavioural responses to stimulus materials: adaptive behaviour, expressive behaviour, and projective behaviour. By adaptive behaviour he refers to

⁸ Rapaport, Diagnostic Psychological Testing. Vol. II, p. 7.

⁹ Henry A. Murray, Thematic Apperception Test Manual, Cambridge, Harvard University Press, 1943, p. 1.

¹⁰ Leopold Bellak, "The Concept of Projection: An Experimental Investigation and Study of the Concept", in Psychiatry, Vol. 7, No. 4, issue of November 1944, p. 363.

these aspects of a response which are determined by the nature of the stimulus, that is, the response must be adapted to certain external conditions. By expressive behaviour he means the style or organization of the individual's response, in terms of such characteristics as the length of the sentences used. In reference to projective behaviour he refers to those aspects of a response which are determined by the subject's own feelings, attitudes, sets, etc. He offers two hypotheses:

1. The amount of adaptive behaviour will vary conversely with the degree of exactness of definition of a stimulus, and will also depend on the task or Aufgabe.
2. Projection will vary in amount inversely with the clearness of the stimulus and also inversely with the exactness of the instructions concerning the task.¹¹

Therefore, according to Bellak's theoretical position and the hypotheses he derived therefrom, one would expect to obtain varying degrees of projective behaviour as the clarity of the stimulus materials is varied. Variations should be in the direction of increasing projection with decreasing clarity and decreasing projection with increasing clarity.

Applying Bellak's hypotheses, one can readily see the important role that stimulus ambiguity plays in determining the amount of projection elicited. Assuming that the projective tests attempt to evoke as many projections as possible, it becomes essential that one study the exact

¹¹ Ibid., p. 363.

effects of stimulus ambiguity if one wishes to get maximal productivity in a projective test situation.

Hypotheses such as Bellak's (and the converse) have been so widely accepted that for many years psychologists never even considered that other possibilities might exist. That these hypotheses became almost axiomatic may be seen in Murstein's recollections of his own earlier thinking on this matter. He writes:

In graduate school [...] I learned [...] that 'the greater the ambiguity in a TAT card the more the subject revealed his inner private world'. This made sense to me, since when a person makes up a story, if the picture is not clear, he cannot simply describe the stimulus, but must project his own characteristics into the story. It all seemed rather straightforward and I never gave a second thought to the fact that nobody had empirically demonstrated this fact. It was, after all, simply a question of common sense.¹²

Indeed, this position was so widely accepted that it remained relatively unchallenged until the recent studies of Weisskopf, Bijou and Kenny, and Murstein began to attack its very foundations. These studies will be discussed later in the chapter on experimental background.

¹² Bernard I. Murstein, "New Thoughts about Ambiguity and the TAT", in Journal of Projective Techniques and Personality Assessment, Vol. 29, No. 2, issue of June 1965, p. 219.

2. Divergent Viewpoints on Projection and Ambiguity.

The literature reveals three rather distinct positions regarding the effects of varied ambiguity on T.A.T. and I.A.A.- like stimuli. The three positions might be stated as follows: 1) Increased ambiguity increases the amount of material projected. 2) Increased ambiguity decreases the amount of material projected. 3) Medium ambiguity increases the amount of material projected.

Numbered among the adherents to the first position, namely, that increased ambiguity increases projection are Bellak¹³ Hutt,¹⁴ Bruner,¹⁵ McGregor,¹⁶ and Vernon.¹⁷ The second position, that of decreased projection with increased

¹³ Bellak, Op. Cit., p. 63.

¹⁴ Max L. Hutt, "Towards an Understanding of Projective Testing", in Journal of Projective Techniques, Vol. 18, No. 2, issue of June 1954, p. 200.

¹⁵ Jerome S. Bruner, "Perceptual Theory and the Rorschach Test", in Journal of Personality, Vol. 17, No. 2, issue of December 1948, p. 161.

¹⁶ Douglas McGregor, "The Major Determinants of the Prediction of Social Events", in Journal of Abnormal and Social Psychology, Vol. 33, No. 2, issue of April 1938, p. 203.

¹⁷ M.D. Vernon, "The Relation of Cognition and Phantasy in Children", in British Journal of Psychology, Vol. 30, No. 4, issue of April 1940, p. 263.

ambiguity is upheld by Weisskopf,¹⁸ and her associates.¹⁹ Finally, the third position, that of Kenny and Bijou,²⁰ Kenny,^{21,22} and Murstein,²³ claim that the largest amount of valuable projective material is elicited by stimuli of intermediate or medium ambiguity.

3. Summary of Theoretical Perspective.

Summarizing the above discussion gives the following points concerning projective techniques: 1) Stimulus materials of a wide range and variety are said to vary in terms of a characteristic or dimension here called degree of

¹⁸ Edith A. Weisskopf, "Experimental Study of the Effects of Brightness and Ambiguity on Projection in the T.A.T.", in Journal of Psychology, Vol. 29, No. 2, issue of April 1950, p. 413.

¹⁹ Edith A. Weisskopf-Joelson and David B. Lynn, "The Effect of Variations in Ambiguity on Projection in the Children's Apperception Test", in Journal of Consulting Psychology, Vol. 17, No. 1, issue of February 1953, p. 69.

²⁰ Douglas T. Kenny and Sidney W. Bijou, "Ambiguity of Pictures and extent of Personality Factors in Fantasy Responses", in Journal of Consulting Psychology, Vol. 17, No. 4, issue of August 1953, p. 256.

²¹ Douglas T. Kenny, "Transcendence Indices, extent of Personality Factors in Fantasy Responses, and the Ambiguity of T.A.T. Cards", in Journal of Consulting Psychology,

²² -----, "A Theoretical and Research Reappraisal of Stimulus Factors in the T.A.T.", in J. Kagan and G. Lesser (eds.), Contemporary Issues in Thematic Apperceptive Methods, Springfield, Charles C. Thomas, 1961, p. 236-300.

²³ Bernard I. Murstein, Theory and Research in Projective Techniques. (Emphasizing the T.A.T.), New York, Wiley, 1963, p. 167-235.

ambiguity. This is to say they vary in terms of the clarity of definition or exactness or specificity. 2) In responding to a stimulus situation, the subject does so in terms of the verbal directions given, the structure characteristics of the stimulus material, and in terms of such subjective personality variables as his feelings, needs, wishes, emotions, attitudes, etc. 3) When presented with an ambiguous stimulus, there is a tendency on the part of the individual to interpret this stimulus and give it meaning. 4) The past literature reveals the development of three conflicting positions: that of increased ambiguity increasing projection; that of increased ambiguity decreasing projection; and that of intermediate ambiguity producing the most projection. These positions are based on experimental findings which will be discussed in the next chapter.

CHAPTER II

EXPERIMENTAL BACKGROUND

In reviewing the research on stimulus ambiguity on the T.A.T. one finds implicit in each author's writings, the view that a direct relationship exists between the ambiguity of the stimulus and the material projected on to it. This has led to the three varying and conflicting positions which have been mentioned in the preceding chapter, namely,

1. increased ambiguity increases projection;
2. increased ambiguity decreases projection;
3. projection is maximal under conditions of intermediate ambiguity.

The research literature which has either suggested or supported these conflicting viewpoints will be examined under each of the above positions and will then be summarized.

1. Increased Projection as a Result of Increased Ambiguity.

The majority of authors who have held the view that projection is increased by increased ambiguity base their feelings on subjective rather than objective evidence. Research support for this view is relatively scant. Only Vernon¹

¹ M.D. Vernon, "The Relation of Cognition and Phantasy in Children", in British Journal of Psychology, Vol. 30, No. 4, issue of April 1940, p. 283.

in her study on the relation of cognition and fantasy in children demonstrated a definite tendency to "invent" (project) things on the less meaningful cards. Her subjects were children between the ages of seven and thirteen years. In this study she used a series of six groups of cards with four cards in each group. In each group there was 1) a card with a meaningful representation of a scene of real objects; 2) a semi-diagrammatic representation of the same scene in approximately the same colours; 3) a card which, although it bore some resemblance to the original scene, was much more distorted and meaningless and usually differently coloured; and, 4) a card which consisted of irregularly shaped patches of colour. Her assumption was that the four cards in each group range from "a most meaningful colour representation of a scene of real objects and figures" to one showing "irregularly shaped patches of colour". Each child was required to describe the picture as presented, then to give a description of a picture from immediate memory, and finally to reproduce a picture from immediate memory by arranging loose figures on a background and then describing the results. Although she was primarily concerned with the normal and aberrant development of response in terms of accuracy of description and reproduction and in terms of the appearance of such characteristics in response as "interpretation" and movement, certain of her findings seem relevant to the question of

projection in response as a function of the degree of ambiguity of the stimulus. For example, she found that as the pictures became "less representative of real objects and people", a good deal of "invention" occurred. In their descriptions the subjects tended to include men, animals and objects not represented in the picture. Vernon stated that this was particularly true for the "semi-diagrammatic" pictures, and concluded that it was "clearly the normal type of response to the picture".

Symonds,² in a study designed to determine criteria for the selection of pictures for the investigation of adolescent fantasy, presented eighty-one pictures drawn from a variety of sources to a group of high school adolescents. The subjects were each required to write a story about one of the eighty-one pictures. Eleven hundred and sixty-eight stories were obtained, which averaged out to approximately fourteen stories per picture. Then, each of the eighty-one pictures was rated by twelve judges on characteristics such as whether the characters in the pictures show emotion, whether the pictures represented intimate or family relationships, whether the pictures contained characters of approximately the same age as the subjects, etc. Symonds hypothesized

² Percival M. Symonds, "Criteria for the Selection of Pictures for the Investigation of Adolescent Phantasies", in Journal of Abnormal and Social Psychology, Vol. 34, No. 2, Issue of April 1939, p. 271.

that pictures with such characteristics would evoke stories "revealing deeper needs and more fundamental themes" than those pictures which lacked these characteristics. After comparing the ratings for each picture with the stories elicited, he concluded that "[...] those pictures are most serviceable which have a minimum of detail, are vague in theme, incomplete in content and suggest characters with which those telling the stories can identify".

Bellak³ administered ten Thematic Apperception Test cards to seven subjects who were divided into two groups. The ten cards were presented in two series of five cards in each series, presented in an AB BA order. Hypothesizing that the subjects would project aggression into the stories if the experimenter would be over-critical of their productions, he proceeded to be highly critical of the stories given by the experimental group during the second presentation. He found differences significant at beyond the 2 per cent level of confidence in the amount of aggressive material elicited from the experimental group, and thus he concluded that subjects tend to ascribe excessive aggression to characters in pictures, particularly if the configuration of the picture is somewhat suggestive of aggression, or at least could

3 Bellak, "The Concept of Projection: an Experimental Investigation and Study of the Concept", Op. Cit., p. 350.

relatively easily be so interpreted. It is, of course, the latter point of Bellak's conclusions that have relevance to the problem under investigation in this study. In a follow-up study conducted this time on ten different subjects, he further concludes that "other conditions being equal, one is apt to project a given sentiment or a stimulus as by its very nature easily lends itself to such an interpretation. Response, is in fact, the function of the stimulus".⁴

Thus, the above discussed studies would seem to lend support to the hypothesis that increases in projection are directly related to increased ambiguity.

2. Decreased Projection as a Result of Increased Ambiguity.

Like the view that increased ambiguity increases projection, the opposite view, that projection is decreased by increasing ambiguity, also has many adherents. On this pole of argument, however, we have much better experimental evidence and less pure speculation. This is more likely the result of the need for concrete experimental evidence in order to combat the almost universal assumption that increased ambiguity increases projection. That this assumption was almost accepted as axiomatic might be noted in Murray's attitude. He states:

⁴ Ibid., p. 362.

The advantage of keeping the stimulus conditions of a test uniform - of presenting say, an unchanging set of pictures in an unchanging sequence - are generally known and appreciated. No argument for this principle seems necessary today despite the fact that the majority of T.A.T. workers, as far as I can determine, have not seen fit to abide by it.⁵

Although Murray makes this statement with regard to the different versions of the T.A.T. that have evolved, one cannot but note the confidence with which he views the T.A.T. and his feelings regarding the stimulus conditions of the test.

Among the studies which find an inverse relationship between ambiguity and perception are the studies of Weisskopf,^{6,7} and Weisskopf-Joelson and Lynn.⁸

⁵ Henry A. Murray, "Uses of the Thematic Apperception Test", in American Journal of Psychiatry, Vol. 107, (No. 8), issue of February 1951, p. 578.

⁶ Edith A. Weisskopf, "A Transcendence Index as a Proposed Measure in the Thematic Apperception Test", in Journal of Psychology, Vol. 29, No. 2, issue of April 1950, p. 390.

⁷ -----, "Experimental Study of the Effects of Brightness and Ambiguity on Projection in the T.A.T.", in Journal of Psychology, Vol. 29, No. 2, issue of April 1950, p. 407-416.

⁸ Edith A. Weisskopf-Joelson and David B. Lynn, "The Effect of Variations in Ambiguity on Projection in the Children's Apperception Test", in Journal of Consulting Psychology, Vol. 17, No. 1, issue of February 1953, p. 69.

In their classic study on the effects of needs on perception, Levine, Chein and Murphy¹¹ presented their subjects with forty cards which had drawings on them. Fifteen of the cards were rather meaningless, ten represented ordinary household articles, and fifteen represented articles of food. The authors attempted to increase the ambiguity of the cards by presenting them behind a ground glass screen. They found that subjects who had been food deprived tended to see more and more food responses as time went by. Their conclusions were that the amount of perceptual distortion was related to the intensity of the need.

Although these authors were primarily concerned with the perceptual distortion encountered when needs increased in intensity, their method of card presentation, that is the presentation of the stimuli under conditions of increased ambiguity apparently decreased the amount of material projected on to the stimulus, thus, the authors conclude that the stronger the need the less variation there will be in the way one perceives his environment.

Weisskopf¹² was interested in the general problem of isolating the characteristics of pictures which make for

11 Robert Levine, Isidor Chein, and Gardner Murphy, "The Relation of the Intensity of a Need to the Amount of Perceptual Distortion: A Preliminary Report", in Journal of Psychology, Vol. 13, No. 2, issue of April 1942, p. 283-293.

12 Weisskopf, "A Transcendence Index as a Proposed Measure in the Thematic Apperception Test", Op. Cit., p. 379-390.

maximum production of fantasy material which goes beyond mere description of the pictures. She devised a method of measuring the degree of fantasy which she refers to as the "transcendence index". The "transcendence index" is the mean number of comments about a picture which go beyond pure description. Thus, for Weisskopf a picture with a low transcendence index is one where it is easy for the subject to be impersonal, while pictures with a high transcendence index are difficult for the individual to deal with impersonally, and usually force him to project.

Interested in the degree of fantasy elicited by pictures under varying stimulus conditions, Weisskopf¹³ measured the transcendence indices of the T.A.T. cards and found that the indices for the first ten cards (which Murray has described as the "everyday" series) have higher transcendence indices than pictures 11 to 20 ("fairytale" series). Thus, she was able to demonstrate that the cards in the T.A.T. series were not equally ambiguous.

Since experimental results from previously mentioned sources had suggested that increased ambiguity of a stimulus increased the subjective contribution of an individual, Weisskopf proceeded to check this phenomenon with her transcendence index. The problem she now posed herself was "what is the effect of increase in ambiguity of T.A.T. cards on

13 Ibid., p. 390.

the degree of projection (transcendence index)?'. To study these effects she presented a series of T.A.T. pictures to a group of thirty-seven college students under three different conditions. The first condition involved presentation of the T.A.T. cards exposed for only one-fifth of a second and the subjects were asked to describe them from memory. The second method was the presentation of a group of T.A.T. cards which had been reproduced by a method of tracing their contours while omitting some portions of the contours in order to increase the ambiguity of the cards. Finally, a third group of T.A.T. cards were photographed under reduced exposure time. In this manner she felt that brightness would be reduced but ambiguity would remain constant. Her findings indicated that the transcendence index was lower for the incomplete tracings than for the complete tracings ($p = .001$). On the basis of her findings, Weisskopf concluded that less fantasy material was produced under ambiguous stimulus conditions than under more definite stimulus pictures. She states that "results indicate that the degree of projection (of fantasy material) is unaffected by the intensity of the stimulus and decreased by increasing ambiguity". Another conclusion made in the above study is that when subjects are in doubt as to what is shown in a picture, they do not supplement their vague impressions by increased fantasy, and finally, she concludes that "by increasing ambiguity the production of

fantasy material going beyond perception such as ascribing of emotions to human figures, or the imaginative creation of past and future events, is decreased".¹⁴

A later study by Weisskopf-Joelson and Lynn¹⁵ in which the effects of varying ambiguity in children's projections, using the Children's Apperception Test, again resulted in the pictures with higher transcendence indices producing less projection than less ambiguous pictures ($p = .01$).

In her general discussion of her results, Weisskopf concludes that increasing ambiguity leads to a decrease in the type of fantasy material which is usually considered as valuable for diagnostic purposes. She implies that the decrease in the production of fantasy material which goes beyond perception, as a result of increased ambiguity, while on the one hand being a loss for clinical diagnostic purposes, on the other hand may be a gain for the clinician in another direction. Even though highly ambiguous pictures do not elicit as much material beyond perception, they may enable making diagnostic use of perception itself, that is, of what and how the subject perceives. She states that the protocols obtained in her studies suggest that high picture ambiguity increases the relative influence of individual differences.

¹⁴ Weisskopf, "An Experimental Study of the Effects of Brightness and Ambiguity on Projection in the T.A.T.", Op. Cit., p. 413-415.

¹⁵ Weisskopf-Joelson and Lynn, Op. Cit., p. 69.

In summarizing the studies cited above, those of Weisskopf, and Weisskopf-Joelson and Lynn, present evidence which is contrary to the hypothesis of a direct relationship between ambiguity and projection.

3. Increased Projection as a Result of Intermediate Ambiguity.

Contrary to the extremist views that increased ambiguity tends to increase projection or that increased ambiguity tends to decrease projection, a considerable amount of valuable evidence is being amassed by Bijou and Kenny, and Hurstein which suggests quite strongly that maximum projection is elicited by stimuli of medium ambiguity.

Bijou and Kenny¹⁶ attempted to put the assumptions of a direct relationship between ambiguity qualities of picture stimuli and the extent of personality factors revealed in the elicited fantasy to the test of rigorous experimentation. They used a scaling technique in which twenty-one T.A.T. cards were scaled on the basis of an ambiguity dimension. This was accomplished by having a group of fifty-one introductory psychology students rank the twenty-one cards for their inherent ambiguity. On the basis of this scaling, the authors were able to divide the T.A.T. cards into three

16 Sidney W. Bijou and Douglas T. Kenny, "The Ambiguity Values of T.A.T. Cards", in Journal of Consulting Psychology, Vol. 15, No. 3, issue of June 1951, p. 204-205.

groups: least ambiguous, intermediately ambiguous, and most ambiguous. Cards 1, 2, 9BH, 12BG, and 17B were classified as least ambiguous while cards 5, 15, 18B4, 11, and 19 were classified as being most ambiguous. Cards 4, 7BM, 12BH, and 13MF were placed in a category of intermediate ambiguity. Defining ambiguity as "that which is open to a number of possible interpretations" they then proceeded to compare the cards of high and low inherent ambiguity for richness and usefulness of response ("personality revealingness"). These authors in analyzing the interactions between ambiguity, transcendence, and exposure time indicated that medium ambiguity picture stimuli had higher transcendence indices than stimuli of inherently high ambiguity. This finding was significant under conditions of long exposure time (2 minutes) but did not hold under conditions of short (5 seconds) exposure time. They further found that pictures of medium ambiguity did show higher transcendence indices than the least ambiguous pictures under both long and short exposure time conditions.

In a series of studies, Ullmann¹⁷ and Gurel and Ullmann¹⁸ demonstrated that the twenty-card male T.A.T.

17 Leonard P. Ullmann, "Productivity and the Clinical Use of TAT Cards", in Journal of Projective Techniques, Vol. 21, No. 4, issue of December 1957, p. 399-403.

18 Lee Gurel and Leonard P. Ullmann, "Quantitative Differences in Response to TAT Cards: The Relationship Between Transcendence Score and Number of Emotional Words", in Journal of Projective Techniques, Vol. 22, No. 4, issue of December 1958, p. 399-401.

series was sufficiently structured as to differ significantly in the number of emotional words elicited as well as in the transcendence index of the card. These authors found a correlation of .85 between the transcendence index of the cards and the median number of emotional words elicited. Since Bijou and Kenny had earlier shown that cards of medium ambiguity elicited the greatest amount of transcendence¹⁹ and now Gurel and Ullmann had shown that transcendence and median number of emotional words were highly correlated, it would seem that the findings of these authors point towards medium ambiguity eliciting the greatest number of emotional words in a projective test situation.

Using a modification of Bijou and Kenny's rankings, Murstein²⁰ found significant curvilinear correlations with the number of themes elicited from an all-male population of college students and from a group of psychiatric patients. His findings indicated that the moderately ambiguous cards produced the most themes while the high and low ambiguous cards were significantly less productive.

The findings therefore of Bijou and Kenny, Ullmann, Gurel and Ullmann, and Murstein do not lend support to the hypothesis of a direct relationship between ambiguity and

19 Bijou and Kenny, Op.Cit., p. 206-208.

20 Bernard I. Murstein, "The Relationship of Stimulus Ambiguity on the TAT to Productivity of Themes", in Journal of Consulting Psychology, Vol. 22, No. 5, issue of October 1958, p. 340.

projection, nor do they support the extremely opposite position. Their "middle-of-the-road" view is backed by considerable experimental evidence.

4. Past Methods of Ambiguity Variation.

The approach in the past has been largely one in which the stimulus material was altered, in one way or another, to render it more ambiguous. Ambiguity of the stimulus was usually defined in terms of the altered stimuli. The tendency has been to manipulate the stimulus itself and either subjectively, on the basis of the author's own biases, or occasionally objectively on the basis of rater agreement, to describe the stimulus material as more or less ambiguous. The various techniques used included variations in time exposure,^{21,22} variations in structure,^{23,24,25,26} variations

21 Weisskopf, "An Experimental Study of the Effects of Brightness and Ambiguity on Projection in the T.A.T.", Op. Cit., p. 413.

22 Douglas T. Kenny, "Transcendence Indices, Extent of Personality Factors in Fantasy Responses, and the Ambiguity of T.A.T. Cards", in Journal of Consulting Psychology, Vol. 10, No. 5, issue of October 1954, p. 345-348.

23 Weisskopf, Op. Cit., p. 411.

24 Weisskopf-Joelson and Lynn, Op. Cit., p. 69.

25 David Laskowitz, The Effect of Varied Degrees of Pictorial Ambiguity on Fantasy Evocation, unpublished doctoral thesis presented to the Department of Psychology of New York University, New York, 1959, xii-116 p.

26 J.E. Bradley and R.L. Lysaker, Ambiguity as a Variable in the Use of a Projective Technique, Minneapolis, Pillsbury Mills Inc., 1957, (mimeographed), (no pagination), as reported in Bernard I. Furstein, Theory and Research in Projective Techniques. Emphasizing the TAT, New York, Wiley, 1963, p. 199.

in lighting,^{27,28} variations in colour,^{29,30,31,32,33} and finally the presentation of the stimulus without pictures but simply by the reading of Murray's descriptions of T.A.T. cards.^{34,35}

27 Weisskopf, Op. Cit., p. 400.

28 Bradley and Lysaker, Op. Cit., p. 169 and p. 197.

29 Glen A. Brackbill, "Some effects of Color on Thematic Fantasy", in Journal of Consulting Psychology, Vol. 15, No. 5, issue of October 1951, p. 412-413.

30 Charles E. Thompson and Arthur J. Bachrach, "The Use of Color in the Thematic Apperception Test", in Journal of Projective Techniques, Vol. 15, No. 2, issue of June 1951, p. 173-184.

31 Nathan M. Lubin, "The Effect of Color in the TAT on Productions of Mentally Retarded Subjects", in American Journal of Mental Deficiency, Vol. 60, No. 2, issue of October 1955, p. 366-370.

32 Nathan M. Lubin and P.O. Wilson, 'Picture Test Identification as a Function of 'Reality' (Color) and Similarity of Picture to Subject', in Journal of General Psychology, Vol. 54, No. 1, issue of January 1956, p. 31-38.

33 Edith A. Weisskopf-Joelson and Helen C. Foster, "An Experimental Study of Stimulus Variation upon Projection", in Journal of Projective Techniques, Vol. 26, No. 3, issue of September 1962, p. 366-370.

34 Dell Lebo and Margaret Harrigan, 'Visual and Verbal Presentation of TAT Stimuli', in Journal of Consulting Psychology, Vol. 21, No. 4, issue of August 1957, p. 339-342.

35 Dell Lebo and P. James Cherry, 'Visual and Vocal Presentation of TAT Descriptions', in Journal of Projective Techniques, Vol. 23, No. 1, issue of March 1959, p. 59-63.

Except for the Lebo studies, it will be noted that all the studies tended to alter the stimulus material by some physical means, be it drawing, photographic manipulation, dimming of lights, or split second tachistoscopic presentation. It was assumed by these authors that they were presenting the same stimulus under different ambiguity levels; however, since the stimuli themselves were being altered, the subjects were actually being presented with a series of different stimuli which were erroneously being assumed to be the same.

It is the contention, in this manuscript, that only when a single stimulus can be varied continually in its ambiguity without altering any of the formal or content elements of the stimulus, can the assumptions of increasing or decreasing productivity of projected material be examined. What must be done, therefore, is to increase or decrease the ambiguity levels of a stimulus without actually altering the stimulus itself.

Two methods have appeared in the literature on visual perception which are adaptable to this task. Pickford³⁶ and Jenkin³⁷ have used techniques for continuous variation of a

³⁶ R.W. Pickford, "Some Effects of Veiling Glare in Binocular Vision", in British Journal of Psychology, Vol. 33, No. 3, issue of January 1943, p. 150-151.

³⁷ Noel Jenkin, "Some Relationships Between Projective Test Behaviour and Perception", in Journal of Clinical Psychology, Vol. 11, No. 3, issue of July 1955, p. 270-279.

constant stimulus involving the use of veiling glare. Pickford's method consisted in the use of a box-like apparatus through which the subject observes a stimulus which becomes increasingly more difficult to perceive as the veiling glare on a plate glass panel is increased. Jenkin's method involved the projection of a stimulus on a screen by means of a slide projector, while at the same time a veiling glare is thrown on the screen by means of a second slide projector. In both these methods the stimulus material becomes more ambiguous as the glare intensity increases, and thus, theoretically, an infinite variation of ambiguity should be obtainable by varying the glare intensity while the stimulus material itself would remain unaltered. Pickford, reporting an earlier study, described the process as follows:

The subject looking through the telescope could see nothing but the white veiling glare when the lamp was most brilliant, but as the lamp was gradually dimmed, he became able to see more and more of the picture on which the telescope was focused, until eventually it was clearly visible.

The subject was asked to report what he saw through the telescope at each successive reduction in brilliance of the glare. At first nothing was seen, but step by step the picture came into prominence, and it was found that many interpretations were offered, often highly fantastic, usually very characteristic of the individual subject rather than of the picture seen. For example, one subject tended to see a certain picture as a group of elves and goblins, another interpreted it as children playing, and a third as Indians attacking white men in a boat. The interpretations changed through successive phases until the real picture was clearly seen.³⁰

³⁰ R.W. Pickford, "Personality and the Interpretation of Pictures: A New Projection Technique", In Journal of Personality, Vol. 17, No. 2, issue of December 1948, p. 210-211.

As will be noted, the above experiment was performed using an apparatus involving a monocular telescope. In a later study, Pickford³⁹ used a modification of the original apparatus in attempting to further study "projection in relation to perception and personality". Presenting fifteen coloured reproductions of pictures by famous artists at seven levels of brilliance corresponding to 250, 210, 170, 130, 90, 60, and 0 volts, (presented in that order), the subjects were asked to report what was seen at each step. Pickford was mainly interested in whether the type of response elicited from the subjects would be characteristic of their personalities. Reporting his findings on the six male and four female subjects,⁴⁰ he claimed that the modes of response mainly adopted by each subject were fully characteristic of his or her normal personality.

Unfortunately, the small sample used, the classification of the subjects by the author on the basis of his own experience and the concurrence with the author by "a distinguished (name not mentioned) psychologist" make the findings very questionable. The use of the technique, however, did show promise for the study of projection, and it is

³⁹ Ibid., p. 210-220.

⁴⁰ These subjects were not considered as abnormal at the time of the experiment; however, they were each described in terms of "libido-fixations", such as anxious-obsessional, hysterical, obsessional, etc.

mainly this aspect of Pickford's study which has relevance for this study.

5. Summary and General Hypotheses.

The present investigation is concerned with the questions of whether productivity in projective tests would be increased or decreased by increasing the ambiguity of the stimulus material. Translated into research questions, the investigation will attempt to answer the following questions:

1. Is there an increase or decrease in the number of words used in responding to thematic stimulus materials under conditions of continuously increasing ambiguity?
2. Is there an increase or decrease in the number of thought units used in responding to thematic stimulus materials under conditions of continuously increasing ambiguity?
3. If there are variations in the number of words elicited, are these due to projection, description, or merely comment?
4. If there are variations in the number of thought units, are these due to description or projection?

The review of the literature on this problem presented three schools of thought. The most prominent school, and the oldest, proclaimed that projection increases as ambiguity increases. The second most prominent viewpoint presented strong arguments demonstrating a decrease in projective productivity with increased ambiguity. The third school of thought, which is apparently gaining more prominence today,

takes a middle-of-the-road view and suggests that the greatest amount of valuable projective material is elicited by stimuli of medium ambiguity. The evidence presented by each group has been based largely on speculation and the subjective judgment of the experimenters and to a lesser extent on experimentation. In all the studies reported, attempts to vary stimulus ambiguity involved the presentation of different stimuli under each stimulus presentation condition. The degree of ambiguity of the stimulus was often based on the subjective judgments of the experimenters, and there was no method of presenting the stimuli in a manner in which one could be certain that the stimuli were the same during each presentation.

Of the various methods used to increasing the ambiguity value of thematic stimuli, the only method which was felt to show promise was that of Pickford in which stimulus ambiguity is increased by altering not the stimulus itself, but the conditions under which it is perceived.

In consideration of the aforementioned research findings, the following alternative hypotheses may be set forth:

- Hypothesis 1. Increase in thematic stimulus ambiguity is associated with an increase in projection.
- Hypothesis 2. Increase in thematic stimulus ambiguity is associated with a decrease in projection.

These hypotheses will be elaborated in more specific and operational terms and stated as statistical hypotheses in the following chapter.

CHAPTER III

EXPERIMENTAL DESIGN

This chapter presents the apparatus and procedures involved in the conducting of the experiment to test the hypotheses proposed in the preceding chapter.

The first section of the chapter contains a statement of the experimental hypotheses. A description of the sample used in the experiment is presented in the second section. Section three describes the apparatus and experimental procedure. Finally, the organization of the data and the statistical treatment thereof is described in section four.

1. Experimental Hypotheses.

The main experimental hypotheses are concerned with changes in productivity of projections as ambiguity increases. This is concerned with comparing the amount of material, in terms of number of words and number of ideas, of a projective nature with the number of words and ideas of a non-projective nature under varying degrees of ambiguity. The procedures for distinguishing between projective and non-projective words and ideas will be described in the sections on Procedures and on Statistical Analysis.

More specifically stated, in null form, the experimental hypotheses to be investigated are:

1. There is no significant difference between any two combinations of the four levels of ambiguity and the four stimulus cards with regard to the number of words elicited.
2. There is no significant difference between any two combinations of the four levels of ambiguity and the four stimulus cards with regard to the total number of ideas elicited.
3. There is no significant difference between any two combinations of the four levels of ambiguity and the four stimulus cards with regard to the number of purely descriptive words elicited.
4. There is no significant difference between any two combinations of the four levels of ambiguity and the four stimulus cards with regard to the number of projective words elicited.
5. There is no significant difference between any two combinations of the four levels of ambiguity and the four stimulus cards with regard to the number of purely descriptive ideas elicited.
6. There is no significant difference between any two combinations of the four levels of ambiguity and the four stimulus cards with regard to the number of projective ideas elicited.
7. There is no significant difference between any two combinations of the four levels of ambiguity and the four stimulus cards with regard to the number of words of mere comment elicited.

2. The Sample.

The subjects used in this experiment were second-year female student nurses at the Ottawa Civic Hospital who were undergoing a four month rotation in the Department of

Psychiatry. These subjects ranged in age from eighteen to twenty-one years, had all completed Grade VIII, and were of average intelligence.¹

Insofar as each subject in this experiment, as will be noted later, was to be compared with herself and not with other subjects, it was not deemed necessary to control for other factors such as visual acuity, emotional stability, motivation, etc. It was assumed that such factors, if operating in an individual, would be operating constantly for this individual and thus would not affect the results for that individual. In other words, test taking behaviour would be the same for any stimulus - ambiguity level combination for any one particular subject.

3. Apparatus and Experimental Procedures.

The apparatus employed in this experiment was an adaptation of the apparatus used by Pickford.² This apparatus, shown in Figure 1, consisted of a 2 x 1 x 1 ft. deep box constructed of half-inch plywood which was blackened

1 The Shipley-Hartford Scale had previously been administered to all the subjects as part of another study and the mean I.Q. of this group of students was found to be 109 with a standard deviation of 10.39.

2 R.W. Pickford, "Some Effects of Veiling Glare in Binocular Vision", in British Journal of Psychology, Vol. 33, No. 3, issue of January 1943, p. 150-151.

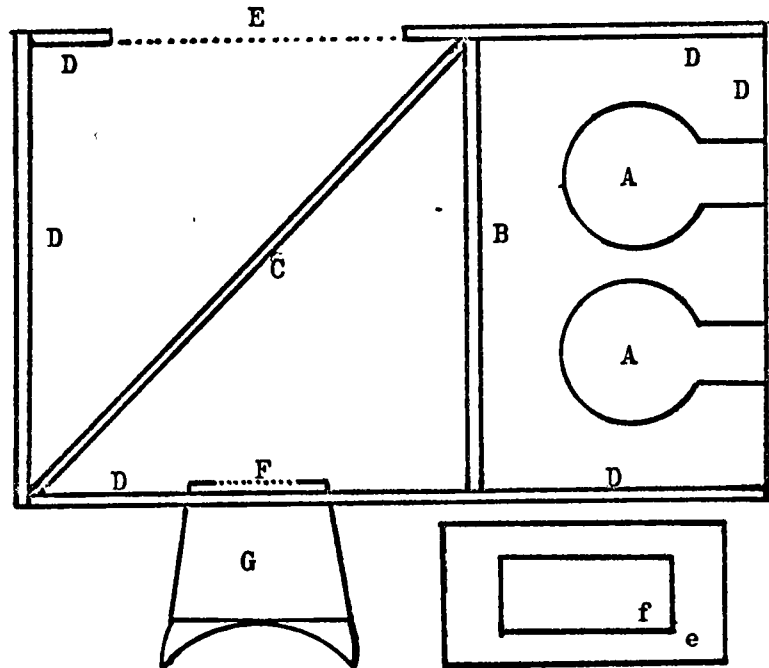


Figure 1.- Veiling Glare Apparatus Viewed from Above with the Top Removed.

- A Two 60 watt lamps in sockets
- B Milk glass panel
- C Plate glass
- D Frame of box
- E Front aperture
- F Rear aperture
- G Viewing hood with headrest
- e Front aperture in elevation
- f Rear aperture in elevation

both inside and out and which was divided into a left and a right-hand section by a milk glass panel. An opening 4" long x 3" high was cut in one wall of the left-hand section and a viewing hood was attached to this opening in such a manner that distractions were eliminated when the subject was looking through the viewing hood. An opening in the opposite wall of the box gave the subject an unbroken field of vision about 2 yards x 3 yards at a distance of 4 feet. In the right-hand section of the box, two 60 watt lamps were fitted, being placed in such a manner so that the entire milk glass panel was evenly lit when both lights were switched on. Finally, a sheet of plate glass was set across the left-hand section of the box at a 45 degree angle to the central line of vision. Glare from the two 60 watt lamps passing through the milk glass panel would be reflected back into the subject's eyes from the piece of plate glass at the 45 degree angle. The intensity of the glare was controlled by means of variable transformers and panel meters.³ A metal stand was constructed which held a T.A.T. card at a 4 ft. distance from the opening of the box which was opposite to the viewing hood opening. The only illumination outside of the two 60 watt lamps in the apparatus was produced by a

³ Technical data regarding the apparatus appears in Appendix 1.

15 watt frosted lamp which was fitted on the far side of the apparatus and which served to illuminate the stimulus material with a constant illumination.

Bijou and Kenny⁴ point out that Murray's intention in the construction of the T.A.T. was to create ten less structured and ten more structured cards. It was therefore deemed necessary to control for the inherent ambiguity of the stimulus cards. These authors have scaled the T.A.T. pictures on the basis of an ambiguity dimension, and on the basis of their conclusions they have categorized the T.A.T. cards into three groups.⁵ They placed cards 1, 2, 9BM, 12BG and 17BM in the group of least ambiguous, while cards 5, 15, 18BM, 11 and 19 were categorized as most ambiguous. A third grouping, which they called intermediate ambiguity, included cards 4, 7BM, 12BM and 13MF. In order to control the influences of the inherent ambiguity of the stimuli, the first two cards were chosen from Bijou and Kenny's low ambiguity group, and the last two cards were chosen from their group of highly ambiguous cards. These cards, Nos. 1, 2, 11 and 19 were presented in the same randomized order to all sixty subjects.

⁴ Sidney W. Bijou and Douglas T. Kenny, "The Ambiguity Values of T.A.T. Cards", in Journal of Consulting Psychology, Vol. 15, No. 3, issue of June 1951, p. 206.

⁵ Ibid., p. 207-208.

Each of the sixty subjects in this study was therefore presented with a series of sixteen stimulus card-ambiguity level combinations. In this experiment the stimulus cards were four selected T.A.T. cards and the ambiguity levels were four different voltages produced by the setting of the apparatus. The stimulus card-ambiguity level combinations were presented in a random order⁶ on the basis of the table of random numbers.⁷ The actual order of presentation thus obtained was as follows:

1. Card No. 2 at 30 volts.
2. Card No. 11 at 120 volts.
3. Card No. 1 at 90 volts.
4. Card No. 1 at 30 volts.
5. Card No. 11 at 60 volts.
6. Card No. 2 at 60 volts.
7. Card No. 11 at 30 volts.
8. Card No. 1 at 120 volts.
9. Card No. 2 at 90 volts.
10. Card No. 19 at 60 volts.

6 In a pilot study, the subjects tended to take a set from the first card and give similar stories to the subsequent ones, when the cards were presented in a direct order of increasing or decreasing ambiguity. Hence randomization of presentation was felt to be indicated.

7 Ronald A. Fisher and Frank Yates, Statistical Tables for Biological, Agricultural, and Medical Research, London, Oliver and Boyd, 1957, p. 134.

11. Card No. 19 at 90 volts.
12. Card No. 1 at 60 volts.
13. Card No. 19 at 30 volts.
14. Card No. 11 at 90 volts.
15. Card No. 2 at 120 volts.
16. Card No. 19 at 120 volts.

The presentation of the series of stimuli was preceded by the following instructions.

This is a research experiment and not a psychological or visual test. It will in no way tell us anything about your intelligence or your personality. We are not interested in your responses as an individual, but only in the way people in general respond.

You are to be shown a series of cards and are to make up a story about what you can see on each card. The story you make up is entirely up to you. Feel free to let your imagination carry you away. There are no time limits in this experiment, so your stories may be as long or as short as you wish. Please notify me when you are finished each story. If you wear eye glasses, please wear them throughout the experiment. You may blink your eyes or close your eyes if you so desire; however, please do not turn your head away from the viewing hood without first notifying me.⁸ Now please look through the apparatus. Here is the first card. Remember, you are to make up a story about what you can see on this card.

Subsequently, each stimulus card was presented with the following instructions: "Now please make up a story about this card." At no time were the subjects told that there were only four cards in the series.

⁸ The possibility of a subject accidentally seeing a stimulus card under other than the experimental conditions was thus eliminated.

Upon completion of the sixteen presentations, the subjects were asked to refrain from discussing the experiment with their fellow students in order to avoid the possibility of contaminating future subjects.⁹

The experiment was carried out over a period of three months, each of the sixty subjects being tested on a different day. The stimulus presentations were carried out in the afternoon (2 p.m. daily) in a totally darkened room, the only sources of light being the 15 watt bulb which illuminated the stimulus cards. The responses of the subjects were recorded verbatim with a Phillips "200" tape recorder, and were subsequently transcribed verbatim for analysis. The amount of time required by the various subjects to complete the test series varied from 48 minutes to 106 minutes, with the average being 68 minutes.

4. Statistical Analysis.

Although the study was designed to determine whether increased ambiguity affected the amount of projection elicited by a stimulus, the question arose as to whether the inherent ambiguity of the stimulus itself might also exercise some

⁹ In the pilot study, tendency for subjects to discuss the experiment was noted. This appeared to bias the responses of those subjects who had not yet been tested. Hence the precaution of asking the subjects to refrain from discussing the experiment was deemed necessary.

influence on the amount of projection which would be elicited. It was decided, therefore, to conduct a three-way analysis of variance which would take into consideration the possible effects and/or interactions of inherent ambiguity as well as of experimentally produced ambiguity. Productivity will be measured in terms of word count and a count of the number of themes or thought units.

For purposes of this study, ambiguity, the independent variable, is being defined in terms of the apparatus, as intensity of illumination. Since, with increases in illumination the clarity of the stimulus decreases, this operational definition is felt to be justifiable. Projection is defined operationally in terms of the responses to the stimuli. Thus, ambiguity is quantifiable in terms of voltages, while projection is quantifiable in terms of word and theme counts.

Although the main object of investigation in this study was the variations in the number of projective words and projective thought units elicited, it was felt necessary to analyze other aspects of the verbal responses which were elicited. Responses were therefore broken down into seven categories as follows:

1. Total number of words elicited.
2. Total number of thought units (themes) elicited.
3. Number of projective words elicited.
4. Number of projective thought units elicited.

5. Number of descriptive words elicited.
6. Number of descriptive thought units elicited.
7. Number of words which were neither descriptive nor projective, i.e. comments.

Division into the aforementioned classifications was done by three independent, non-psychologically trained individuals. These "raters" were required to break the stories up into thought units, and then to compare the thought units with Murray's descriptions.¹⁰ The thought units which agreed with Murray's descriptions were classified as descriptive, while those which went beyond pure description, were classified as projective. Each thought unit was then divided further into the number of words it contained, and this comprised the word counts for description and projection. Words which were not included in the thought units, for example, exclamations, questions and remarks, were all grouped into a category of "comments". This latter grouping was included in the study since, in the pilot study, it was evident that much comment would be elicited, especially under conditions of increased ambiguity where comments such as "I don't see it too clearly", etc. were frequent. By separating out the comment, it was felt that responses which were more truly descriptive or projective would be obtained.

¹⁰ Henry A. Murray, Thematic Apperception Test Manual, Cambridge, Harvard University Press, 1943, p. 18-20.

The inter-rater reliability was tested by means of a simple analysis of variance. This analysis was carried out on the ratings given by the three raters to the responses obtained on four randomly selected stimulus card-ambiguity level combinations. The obtained "F" values in each case were not significant at even the .20 level of confidence.¹¹ Table I presents the "F" values obtained for the four combinations, and confirms that there are no differences between the ratings of the three raters in this study for any stimulus card-ambiguity level combination.

Since measures were obtained for each of the seven categories listed on page 40, a series of seven three-way analyses of variance patterned after McNemar's¹² ADG Fixed Model (Case XIV) was employed. In these analyses the subjects are a random variable while the stimuli and variations in stimuli are fixed variables. Each cell contains the total number of words or thoughtunits of one individual, elicited by one stimulus card under one ambiguity level condition. The proper error term in this case for testing the three two-way interactions is the three-way interaction (s^2_{rbc}). The error terms for the two testable main effects, mainly ambiguity

11 Fisher and Yates, Op. Cit., p. 47.

12 Quinn McNemar, Psychological Statistics, Second Edition, New York, Wiley, 1949, p. 330-331.

Table 1.-
Inter-Rater Reliability based on Four Randomly Selected
Stimulus-Ambiguity Level Combinations.

	Source of Variation	SS	df	Est. of Variance	F	F.20 ^a
Card 2 at 60 volts	Between	1	2	0.5		
	Within	14132	15	942	.0005	1.79
	Total	14133	17	831		
Card 19 at 60 volts	Between	10	2	5		
	Within	85909	15	5727	.0009	1.79
	Total	85919	17	5044		
Card 19 at 120 volts	Between	0	2	0		
	Within	36	15	2	0	1.79
	Total	36	17	2		
Card 2 at 90 volts	Between	0	2	0		
	Within	910	15	60	0	1.79
	Total	910	17	53		

^a Ronald A. Fisher and Frank Yates, Statistical Tables for Biological, Agricultural and Medical Research, London, Oliver and Boyd, 1957, p. 47.

level and stimulus cards are the two-way interactions of subjects by stimulus cards (for testing the stimulus card effects), and subjects by ambiguity level (for testing the effects of levels of ambiguity). As pointed out by McNemar, testing the variance of the subjects is not possible in this model. He points out, however, that "this is not serious since it will only be a test of the significance of individual differences."¹³

For purposes of this research study, the level of significance of $p = .001$ was the criterion chosen for evaluating the significance of the attained F values. In the event that significant F values were obtained for the stimulus card-ambiguity level interaction, further F tests for each stimulus card at each of the levels of ambiguity and for each ambiguity level under conditions of each stimulus card would be carried out. Finally, a series of "t" tests would be carried out to determine the significance of differences between the means for each specific main effect, or where indicated for each two-way interaction. The mean difference formula used was:

$$d = t(p=.001) \sqrt{\frac{2 MS}{60}}$$

In all cases, the values for p were read from the table at 177 degrees of freedom.¹⁴

¹³ McNemar, Op. Cit., p. 331.

¹⁴ Ibid., p. 300.

All analyses of variance were programmed for, and carried out on the Bendix G-20 Computer at Computing Devices of Canada, Ltd., in Bells Corners, Ontario.

CHAPTER IV

PRESENTATION OF RESULTS

This chapter presents the results of the experiment described in the previous chapter. The first section presents the results of the preliminary analysis of the scoring categories and their distributions. This is followed by the results of data evaluation pertinent to the experimental hypotheses dealing with changes in the number of elicited words. Finally, the results of data evaluation pertinent to the experimental hypotheses concerned with differences in thought content are presented.

Preliminary analysis revealed that there were a total of 51,446 words and 5,000 thought units obtained from the sixty subjects during the 960 presentations. The actual amounts and percentages of words and thought units falling into each of the different scoring categories are presented in Table II.

1. Main and Interaction Effects.

The data for each of the seven categories were analyzed by means of a $4 \times 4 \times 60$ analysis of variance patterned after McNemar's Case No. XIV.¹ This is a mixed model of

¹ Quinn McNemar, Psychological Statistics, second Edition, New York, Wiley, 1955, p. 330-331.

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Table II.-

Number of Words and Thought Units Falling Into Each of Seven Scoring Categories.

	<u>Description</u>		<u>Projection</u>		<u>Comment</u>		<u>Total</u>	
	Amt.	%	Amt.	%	Amt.	%	Amt.	%
Words	8167	14.8	36866	67.0	10020	18.2	55053	100
Thought Units	1066	21.3	3934	78.7	-	-	5000	100

the (aDG) type. The summaries of these seven analyses are presented in Tables III, IV, V, VI, VII, VIII, and IX. These tables reveal that for all seven categories, the interaction between stimulus cards and ambiguity levels was significant at beyond the .001 level of confidence. Therefore, in each of the seven categories, the null hypothesis was rejected and further analyses were carried out in order to study the simple effects of ambiguity and of the stimulus itself. The final step in the analysis of the data for effects of levels of ambiguity on productivity of words and ideas involved the use of the critical difference procedure in order to determine which particular means differed significantly from other means.

2. Effects of Ambiguity Level Variation on Word Productivity.

a) Effects on Total Number of Words Elicited.- The data were analyzed for the total number of words elicited and this total was further broken down into the number of descriptive words, the number of projective words, and the number of commentary words elicited. This section presents the results of these analyses.

Examination of Table III reveals a significant interaction between ambiguity levels and stimulus cards. This being the case, the significance of the main effects of ambiguity and of stimuli (in this analysis) become meaningless

Table III.-

Summary of Analysis of Variance of the 4 x 4 x 60 Mixed Model
for Total Number of Words Elicited.^a

Sources of Variation	SS	df	Est. of Variance	F	P.001
Subjects (a)	1569866.42	59	26607.90		
Ambiguity Levels (D)	521457.19	3	173819.06	<u>127.72</u> ^b	5.42
Stimulus Cards (G)	37963.27	3	12655.42	<u>26.70</u>	5.42
D x G	24743.84	9	2749.31	<u>6.29</u>	3.27
D x a	240869.19	177	1360.84	<u>3.11</u>	1.00
G x a	83868.10	177	473.83	<u>1.00</u>	1.00
D x a x G	231952.29	531	436.82		
Total	846780.00	959	5701.65		

^a Quinn McNemar, Psychological Statistics, Second Edition, New York, Wiley, 1955, p. 330, (Case XIV).

^b Underlined numbers represent significance at the .001 level of confidence.

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Table IV.-

Summary of Analysis of Variance of the 4 x 4 x 60 Mixed Model
for Number of Words of Comment Elicited,^a

Sources of Variation	SS	df	Est. of Variance	F	F.001
Subjects (a)	42110.12	59	713.73		
Ambiguity Levels (D)	1294.27	3	431.42	3.03	5.42
Stimulus Cards (G)	2503.77	3	861.25	<u>10.03^b</u>	5.42
D x G	2590.00	9	287.87	<u>3.67</u>	3.27
D x a	25177.35	177	142.24	<u>1.81</u>	1.00
G x a	15109.06	177	85.81	<u>1.09</u>	1.00
D x a x G	41612.00	531	78.36		
Total	235502.00	959	245.77		

^a Quinn McNemar, Psychological Statistics, Second Edition, New York, Wiley, 1955, p. 330, (Case XIV).

^b Underlined numbers represent significance at the .001 level of confidence.

Table V.-

Summary of Analysis of Variance of the 4 x 4 x 60 Mixed Model
for Number of Descriptive Words Elicited.^a

Sources of Variation	SS	df	Est. of Variance	F	P.001
Subjects (a)	28660.51	59	485.77		
Ambiguity Levels (D)	14715.33	3	4905.11	<u>44.46^b</u>	5.42
Stimulus Cards (G)	12022.49	3	4007.49	<u>25.19</u>	5.42
D x G	11913.72	9	1323.74	<u>11.19</u>	3.27
D x a	19527.36	177	110.32	.93	1.00
G x a	28154.20	177	159.06	<u>1.34</u>	1.00
D x a x G	62810.34	531	118.26		
Total	247283.00	959	257.85		

^a Quinn McNemar, Psychological Statistics, Second Edition, New York, Wiley, 1955, p. 330, (Case XIV).

^b Underlined numbers represent significance at the .001 level of confidence.

Table VI.-

Summary of Analysis of Variance of the 4 x 4 x 60 Mixed Model
for Number of Projective Words Elicited.^a

Sources of Variation	SS	df	Est. of Variance	F	F.001
Subjects (a)	1057167.05	59	17918.00		
Ambiguity Levels (D)	339710.00	3	113236.66	<u>37.31</u> ^b	5.42
Stimulus Cards (G)	19172.59	3	6390.86	3.40	5.42
D x G	191079.74	9	21231.08	<u>11.55</u>	3.72
D x a	537122.25	177	3034.58	<u>1.65</u>	1.00
G x a	332269.66	177	1877.22	<u>1.02</u>	1.00
D x a x G	975801.51	531	1837.66		
Total	4858054.00	959	5065.74		

^a Quinn McNemar, Psychological Statistics, Second Edition, New York, Wiley, 1955, p. 330, (Case XIV).

^b Underlined numbers represent significance at the .001 level of confidence.

Table VII.-

Summary of Analysis of Variance of the 4 x 4 x 60 Mixed Model
for Total Number of Themes Elicited.^a

Sources of Variation	SS	df	Est. of Variance	F	P.001
Subjects (a)	14142.10	59	239.69		
Ambiguity Levels (D)	6750.83	3	2250.27	<u>156.16^b</u>	5.42
Stimulus Cards (G)	382.52	3	127.50	<u>31.02</u>	5.42
D x G	677.59	9	75.28	<u>13.44</u>	3.27
D x a	2551.11	177	14.41	<u>2.57</u>	1.00
G x a	728.42	177	4.11	.73	1.00
D x a x G	2975.22	531	5.60		
Total	48549.00	959	50.62		

^a Quinn McNemar, Psychological Statistics, Second Edition, New York, Wiley, 1955, p. 330, (Case XIV).

^b Underlined numbers represent significance at the .001 level of confidence.

Table VIII.-

Summary of Analysis of Variance of the 4 x 4 x 60 Mixed Model
for Number of Descriptive Themes Elicited.

Sources of Variation	SS	df	Est. of Variance	F	P.001
Subjects (a)	498.42	59	8.44		
Ambiguity Levels (D)	374.05	3	124.68	<u>67.76^b</u>	5.42
Stimulus Cards (G)	171.32	3	57.10	<u>28.69</u>	5.42
D x G	206.63	9	22.95	<u>14.16</u>	3.27
D x a	326.33	177	1.84	<u>1.13</u>	1.00
G x a	352.55	177	1.99	<u>1.22</u>	1.00
D x a x G	861.00	531	1.62		
Total	3974.00	959	4.14		

a Quinn McNemar, Psychological Statistics, Second Edition, New York, Wiley, 1955, p. 330, (Case XIV).

b Underlined numbers represent significance at the .001 level of confidence.

Table IX.-

Summary of Analysis of Variance of the 4 x 4 x 60 Mixed Model
for Number of Projective Themes Elicited.^b

Sources of Variation	SS	df	Est. of Variance	F	F.001
Subjects (a)	9170.96	59	155.44		
Ambiguity Levels (D)	4030.55	3	1343.51	<u>122.58</u> ^b	5.42
Stimulus Cards (G)	50.36	3	16.79	.37	5.42
D x G	215.50	9	23.95	<u>11.90</u>	3.27
D x a	1940.50	177	10.96	<u>5.48</u>	1.00
G x a	7910.90	177	44.69	<u>22.35</u>	1.00
D x a x G	1059.67	531	2.00		
Total	35999.00	959	37.53		

^a Quinn McNemar, Psychological Statistics, Second Edition, New York, Wiley, 1955, p. 330, (Case XIV).

^b Underlined numbers represent significance at the .001 level of confidence

and one must therefore go to the simple effects of ambiguity levels for each stimulus card and effects of stimulus cards for each level of ambiguity.

Individual analyses were therefore carried out on each card for all ambiguity levels for all cards. Tables X and XI present the summaries of these analyses. Consideration of Table X reveals that there was an effect significant beyond the .001 level of confidence on the total number of words in response to the experimental conditions under the first and second levels of ambiguity. This did not appear to carry over, however, into the third or fourth levels. Table XI reveals that the variations in ambiguity affected all four stimulus cards significantly. In plotting the mean number of words elicited (Figure 2) the effect of increased productivity with decreased ambiguity becomes apparent. Finally, an examination of Table XII points out that the mean number of words elicited differed significantly from presentation to presentation and from card to card, excepting for the 30 to 60 volt levels for cards 1, 2 and 19, and the 90 to 120 volt levels for card 11. These findings suggest that there was an overall increase in the amount of words elicited as the ambiguity of the stimulus decreased. Examination of Figure 2 reveals that even though the means for cards 1, 11 and 19 were not significantly different at the 30 and 60 volt levels, the trend remains in the same upward direction. The question, of course,

Table X.-

Effects of Ambiguity Variations on the Total Number of Words
Elicited for All Stimulus Cards.

	df	Level 1		Level 2		Level 3		Level 4	
		Est.	F	Est.	F	Est.	F	Est.	F
Stimulus Cards	3	14371.00	<u>23.31</u> ^a	4456.71	<u>7.23</u>	1496.63	4.82	578.01	2.39
Subjects	59	10629.58		7789.09		8186.24		4087.50	
Stimulus Cards x Subjects	177	616.50		619.76		310.42		241.60	
Total	239	3261.00		2434.30		2269.55		1195.23	

^a Underlined numbers represent significance at the .001 level of confidence.

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Table XI.-
Effects of Stimulus Cards on the Total Number of Words
Elicited at All Ambiguity Levels.

	df	Card 1		Card 2		Card 11		Card 19	
		Est.	F	Est.	F	Est.	F	Est.	F
Ambiguity Levels	3	27512.01	<u>56.94^a</u>	56771.23	<u>64.92</u>	67714.54	<u>73.56</u>	30069.21	<u>76.45</u>
Subjects	59	5139.55		8204.19		8379.58		6306.03	
Ambiguity Levels x Subjects	177	463.10		874.43		920.46		393.30	
Total	239	1971.08		3385.50		3600.25		2225.43	

a Underlined numbers represent significance at the .001 level of confidence.

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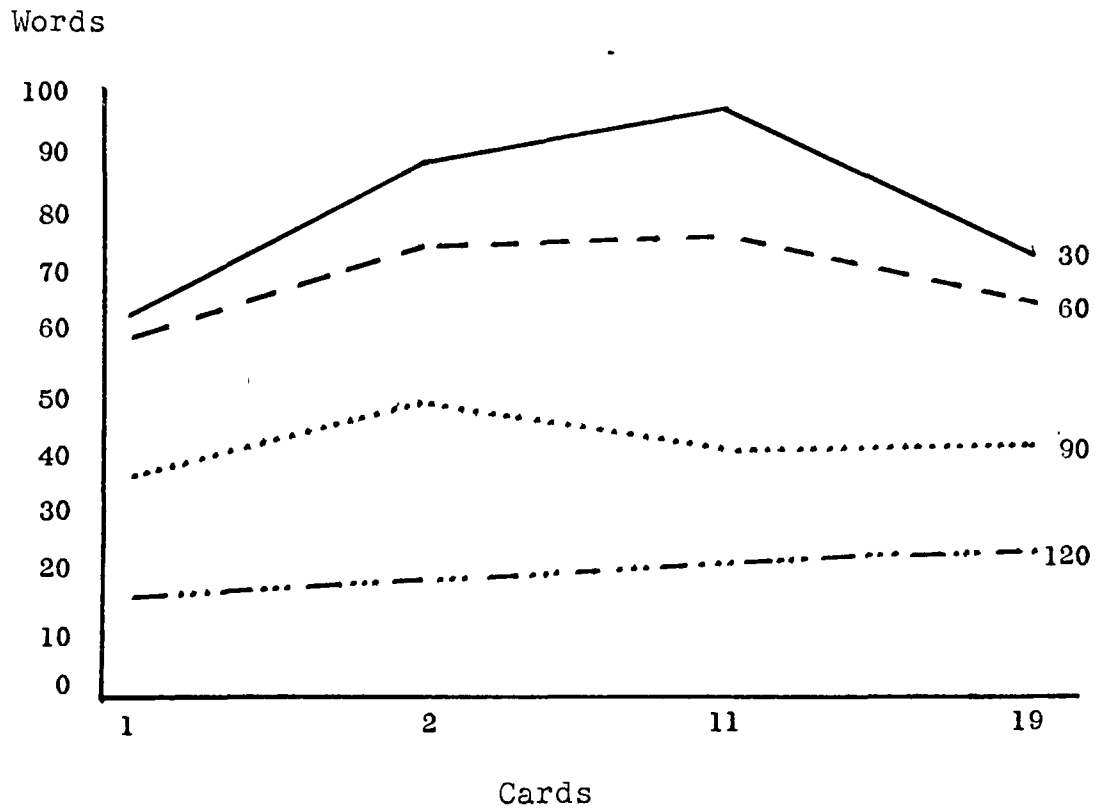


Figure 2.- Total Number of Words Elicited by each Stimulus Card at each Level of Ambiguity.

Table XII.-

Mean Differences of Number of Words Elicited from Presentation
to Presentation and from Card to Card.^a

	Ambiguity Levels						Diff. required at .001
	1 & 2	1 & 3	1 & 4	2 & 3	2 & 4	3 & 4	
Card 1	3.92	<u>26.13</u> ^b	<u>46.13</u>	<u>22.21</u>	<u>42.21</u>	<u>20.00</u>	13.19
Card 2	13.25	<u>40.05</u>	<u>69.48</u>	<u>26.00</u>	<u>56.23</u>	<u>29.43</u>	17.73
Card 11	<u>20.32</u>	<u>56.03</u>	<u>74.11</u>	<u>35.71</u>	<u>53.79</u>	<u>10.08</u>	18.19
Card 19	7.00	<u>31.20</u>	<u>49.12</u>	<u>23.26</u>	<u>41.32</u>	<u>10.04</u>	11.00

^a The means are presented in Appendix 2.

^b Underlined numbers represent significance at or beyond the .001 level of confidence.

arises here as to whether these significant increases are indeed increases in projection, or might they simply be increases in the amount of description or pure comment. The next step in the analysis, therefore, was to break down the number of words into projective, descriptive, and comment words.

b) Effects on Number of Words of Comment Elicited.-

The interaction between ambiguity levels and stimulus cards being significant as seen in Table IV, further analyses were carried out on each stimulus card at all ambiguity levels and for each ambiguity level for all stimulus cards. Summaries of these analyses appear in Tables XIII and XIV. Examination of Table XIII reveals that there was an effect, significant beyond the .001 level of confidence, on the number of words of comment elicited in response to an increase in ambiguity only under the first and third levels of stimulus ambiguity. This was not true, however, of either the second or fourth levels of ambiguity. Table XIV further reveals that the variations in intensity had no effect on cards 1, 2 and 19, but did affect the amount of comment elicited on card 11. In plotting the mean number of comment words elicited (Figure 3), it will be noted that there are no consistent trends other than the tendency for an increase under the first and third intensities for cards 2 and 19. Finally, examination of Table XV points out that the mean number of commentary

Table AIII.-

Effects of Ambiguity Variation on the Amount of Comment
Elicited for All Stimulus Cards.

	df	Level 1		Level 2		Level 3		Level 4	
		Est.	F	Est.	F	Est.	F	Est.	F
Stimulus Cards	3	736.66	<u>6.94</u> ^a	254.81	3.30	650.51	<u>9.62</u>	202.89	2.89
Subjects	59	264.58		275.53		279.64		320.70	
Stimulus Cards x Subjects	177	106.08		77.10		67.60		70.11	
Total	239	153.12		120.31		127.26		133.64	

^a Underlined numbers represent significance at the .001 level of confidence.

Table XIV.-

Effects of Stimulus Cards on the Amount of Comment Elicited
for All Ambiguity Levels.

	df	Card 1		Card 2		Card 11		Card 19	
		Est.	F	Est.	F	Est.	F	Est.	F
Ambiguity Levels	3	233.31	2.73	326.02	3.04	440.27	<u>5.02^a</u>	415.53	3.20
Subjects	59	160.40		400.97		169.22		232.50	
Ambiguity Levels x Subjects	177	85.42		107.36		54.87		129.67	
Total	239	105.70		184.55		87.94		158.66	

a Underlined number represents significance at the .001 level of confidence.

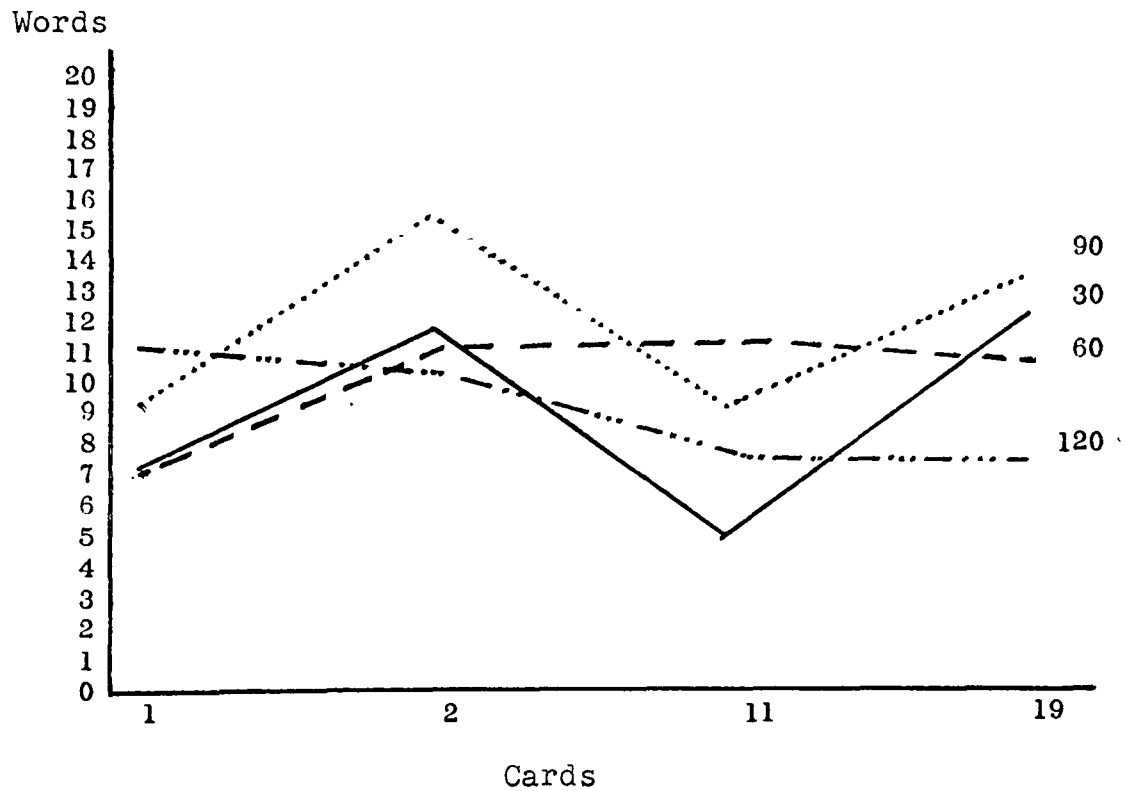


Figure 3.- Number of Words of Comment Elicited by each Stimulus Card at each Level of Ambiguity.

Table IV.-

Mean Differences of Number of Commentary Words Elicited from
Presentation to Presentation and from Card to Card.^a

	Ambiguity Levels						Diff. required at .001
	1 & 2	1 & 3	1 & 4	2 & 3	2 & 4	3 & 4	
Card 1	.02	2.01	4.11	2.03	4.13	2.10	5.53
Card 2	.71	3.75	1.51	4.46	.80	5.26	6.19
Card 11	<u>6.45^b</u>	4.16	2.65	2.27	3.80	1.53	4.41
Card 19	1.20	1.80	4.45	3.00	3.25	6.25	6.81

^a The means obtained are presented in Appendix 2.

^b Underlined number represents significance at or beyond the .001 level of confidence.

words elicited differed significantly only between the first and second intensity levels for card 11, all other combinations of intensity and stimulus cards being non-significant.

It appears that when an inherently moderately ambiguous card is made more ambiguous, the amount of comment one gets tends to increase. This, however, holds true for only moderately ambiguous cards. When a stimulus is very ambiguous to start with, and ambiguity is further increased, there is no difference obtained in the amount of comment elicited.

c) Effects on Number of words of Description Elicited.-

The interaction between ambiguity levels and stimulus cards for descriptive word productivity was significant beyond the .001 level (Table V) and therefore it was again necessary to study the simple effects of ambiguity levels and stimuli. Individual analyses carried out on each level of ambiguity for all cards and on each card for all ambiguity levels, are summarized in Tables XVI and XVII. Consideration of Table XVI reveals that there was an effect, significant beyond the .001 level of confidence, on the number of descriptive words elicited in response to the experimental conditions, under the first and second levels of ambiguity. This did not carry over, however, into the third or fourth ambiguity levels. Table XVII reveals that the variations in ambiguity affected cards 1, 2 and 11 significantly, but had no effect on card 19. In plotting the mean number of descriptive words elicited (Figure 4) it

Table XVI.-

Effects of Ambiguity Variation on the Number of Descriptive Words Elicited for All Stimulus Cards.

	df	Level 1		Level 2		Level 3		Level 4	
		Est.	F	Est.	F	Est.	F	Est.	F
Stimulus Cards	3	4684.19	<u>27.51</u> ^a	2728.93	<u>13.13</u>	375.87	4.30	109.73	3.91
Subjects	59	219.06		250.09		224.71		122.87	
Stimulus Cards x Subjects	177	170.24		207.75		87.40		48.52	
Total	239	238.95		249.85		124.92		68.64	

^a Underlined numbers represent significance at the .001 level of confidence.

Table XVII.-

Effects of Stimulus Cards on the Number of Descriptive Words
Elicited at All Ambiguity Levels.

df	Card 1		Card 2		Card 11		Card 19		
	Est.	F	Est.	F	Est.	F	Est.	F	
Ambiguity Levels	3	1161.32	<u>15.78^a</u>	1921.06	<u>14.49</u>	5714.11	<u>26.92</u>	59.83	1.29
Subjects	59	91.14		271.65		444.66		155.49	
Ambiguity Levels x Subjects	177	74.83		132.52		211.65		46.17	
Total	239	92.75		189.32		338.24		73.33	

^a Underlined numbers represent significance at the .001 level of confidence.

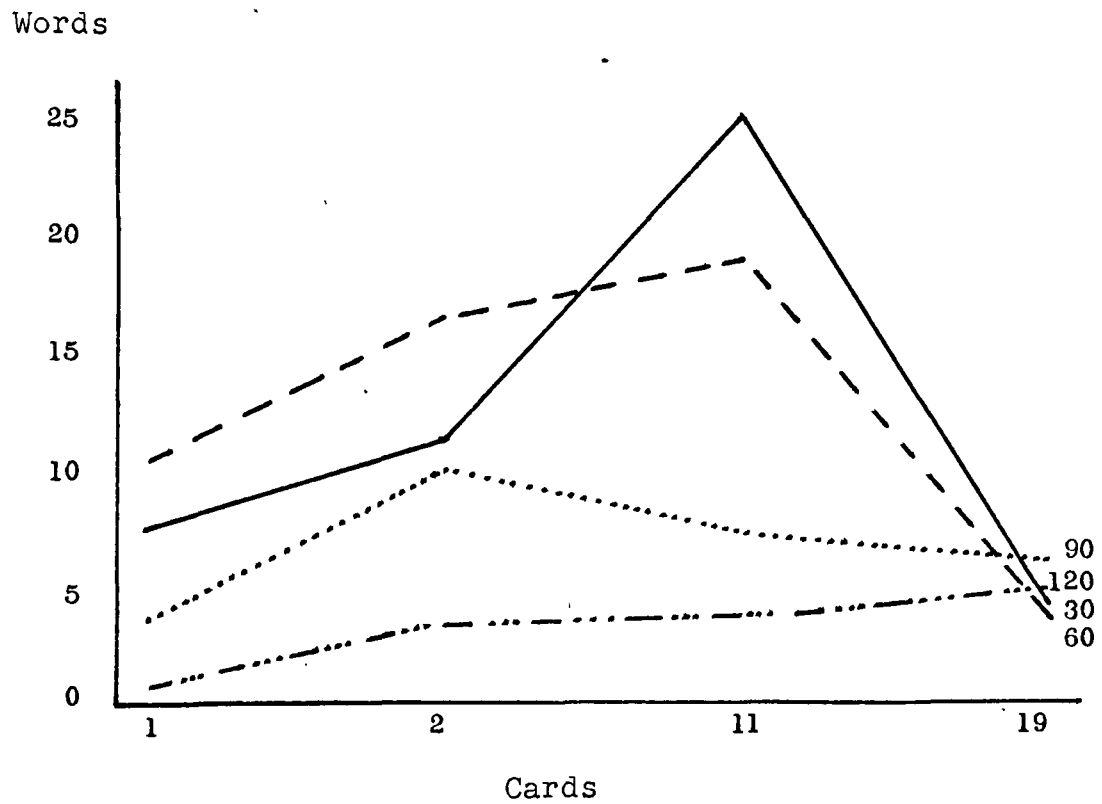


Figure 4.- Number of Descriptive Words Elicited by each Stimulus Card at each Level of Ambiguity.

becomes apparent that as ambiguity is increased, the number of descriptive words decreases until we get to 90 volts and then the stimulus cards themselves cease to have any effect on the number of descriptive words; thus, for the two higher levels of ambiguity the stimulus cards did not produce differences, but for the two lower intensities, differences are produced, although not in a consistent or comprehensible pattern. As will be further noted on Table XVIII, the 60 volt level (intermediate ambiguity) produces significantly more descriptive words than either the 90 or 120 volt levels on cards 1, 2 and 11; however, there is no significant difference between the 30 and 60 volt levels for these cards. The 30 volt level did not differ significantly in the mean number of descriptive words elicited from the 90 volt level, in the case of the two inherently less ambiguous cards. This may be interpreted as indicating that a moderate intensity (60 volts) will produce more descriptive words than either a very slight (30 volts), or a very intense (90 or 120 volts) intensity, for stimuli of inherently low ambiguity.

For card 11, the two lower levels of ambiguity did not differ from each other but did differ from both of the higher levels which in turn did not differ from each other. For the fourth card (card 19), there were no differences due to ambiguity variation.

Table XVIII.-

Mean Differences of Number of Descriptive Words Elicited from
Presentation to Presentation and from Card to Card.^a

	Ambiguity Levels						Diff. required at .001
	1 & 2	1 & 3	1 & 4	2 & 3	2 & 4	3 & 4	
Card 1	3.03	3.55	<u>6.41</u> ^b	<u>7.03</u>	<u>10.24</u>	2.36	5.17
Card 2	5.30	1.93	<u>8.39</u>	<u>7.23</u>	<u>13.69</u>	6.46	6.91
Card 11	5.57	<u>17.23</u>	<u>20.82</u>	<u>11.66</u>	<u>15.25</u>	3.59	0.72
Card 19	.71	1.67	.35	2.38	1.06	1.32	4.05

^a The means are presented in Appendix 2.

^b Underlined numbers represent significance at or beyond the .001 level of confidence.

d) Effects on Number of Words of Projection Elicited.-

The overall analysis as indicated on Table VI showed an interaction between the ambiguity levels and the stimulus cards which was significant beyond the .001 level of confidence and therefore the simple effects of stimuli and levels of ambiguity were again analyzed separately. Tables XIX and XX present the summaries of these analyses. Examination of Table XIX shows that only the lowest ambiguity level affected the stimuli to produce a significant difference in the number of projected words. There were no other ambiguity effects on the stimuli. The effects of the stimuli, however, on the number of projective words elicited under the varying ambiguity conditions was quite marked as will be noted on Table XXI, which shows that the ambiguity effects varied from card to card with the exception of the two lowest levels not affecting cards 1 and 19 and the two highest levels not affecting cards 11 and 19. The pattern evolved on plotting the projected words is quite similar to that obtained for total number of words and bears some similarity to that of the number of descriptive words, although in the latter case, the similarity exists only for the two higher levels of ambiguity. The plotting of the number of projected words on Figure 5 shows that decreasing of the ambiguity gradient produces more words until one reaches the second lowest ambiguity level, at which time differences for cards 1 and 19 cease to exist. It will be noted further on

Table XIX.-

Effects of Ambiguity Variation on the Number of Projective
Words Elicited for All Stimulus Cards.

	df	Level 1		Level 2		Level 3		Level 4	
		Est.	F	Est.	F	Est.	F	Est.	F
Stimulus Cards	3	4160.57	<u>5.66^a</u>	732.94	1.59	368.73	1.47	666.35	4.35
Subjects	59	7412.60		5325.46		4914.60		1830.60	
Stimulus Cards x Subjects	177	734.27		460.34		250.01		157.60	
Total	239	2425.88		1664.77		1401.76		577.23	

a Underlined numbers represent significance at the .001 level of confidence.

Table XX.-

Effects of Stimulus Cards on the Number of Projective Words
Elicited at All Ambiguity Levels.

	df	Card 1		Card 2		Card 11		Card 19	
		Est.	F	Est.	F	Est.	F	Est.	F
Ambiguity Levels	3	22650.91	<u>56.50^a</u>	35999.94	<u>46.20</u>	39601.77	<u>63.42</u>	69721.07	10.35
Subjects	59	4080.33		5274.72		4787.94		9233.27	
Ambiguity Levels x Subjects	177	412.50		779.11		624.35		6731.61	
Total	239	1710.50		2331.01		2141.44		5139.64	

^a Underlined numbers represent significance at the .001 level of confidence.

Table III.-

Mean Differences of Number of Projective Words Elicited from
Presentation to Presentation and from Card to Card.

	Ambiguity Levels						Diff. required at .001
	1 & 2	1 & 3	1 & 4	2 & 3	2 & 4	3 & 4	
Card 1	7.53	<u>24.52</u> ^b	<u>43.69</u>	<u>16.99</u>	<u>36.36</u>	<u>19.37</u>	12.67
Card 2	<u>17.71</u>	<u>40.85</u>	<u>18.95</u>	<u>23.16</u>	<u>40.76</u>	<u>17.70</u>	15.00
Card 11	<u>21.00</u>	<u>42.85</u>	<u>15.36</u>	<u>20.97</u>	<u>33.96</u>	13.01	16.71
Card 19	8.42	<u>38.70</u>	<u>43.37</u>	<u>30.28</u>	<u>38.95</u>	8.67	12.17

a The means are presented in Appendix 2.

b Underlined numbers represent significance at or beyond the .001 level of confidence.

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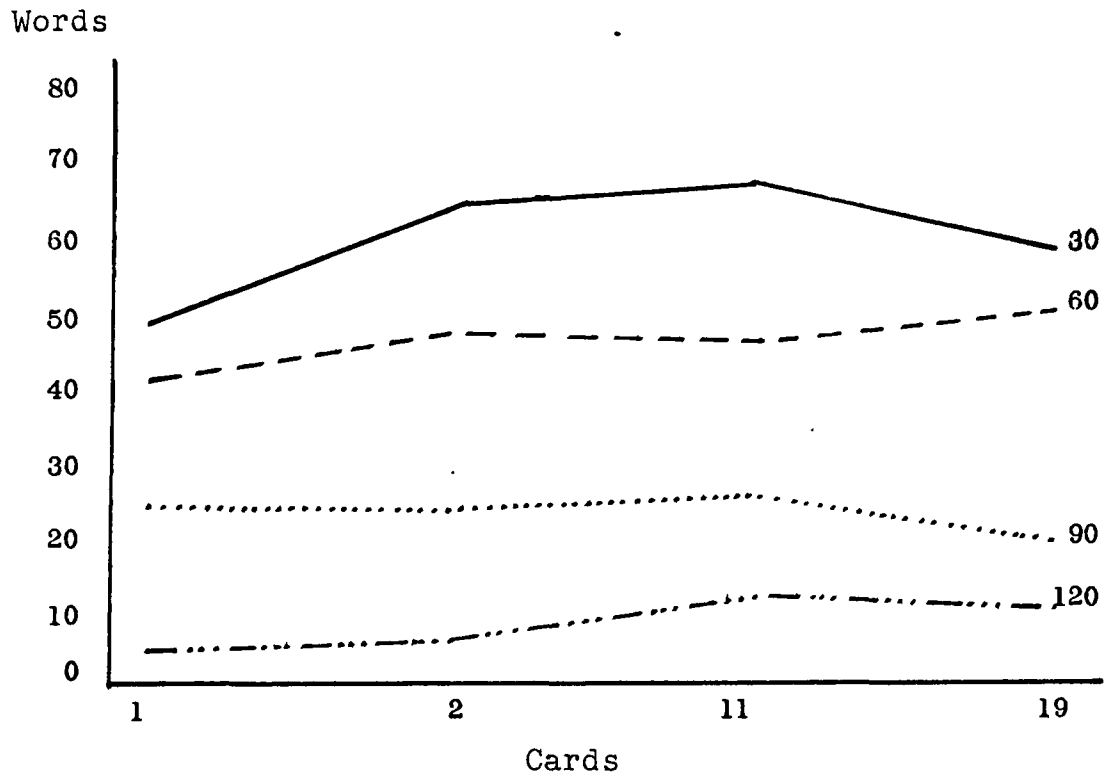


Figure.5.- Number of Projective Words Elicited by each Stimulus Card at each Level of Ambiguity.

Table XXII that as ambiguity decreases there are no stimulus effects on the amount of projected words elicited until one reaches the level of least ambiguity. At this point, card 1 becomes affected by the ambiguity decrease in the direction of becoming less productive of projective words than either cards 2, 11 or 19. There was also a significant difference obtained between the third and fourth cards in which the third card tends to produce more words than the fourth card. It will be noted on Figure 5 that as the ambiguity is decreased, the number of projective words tend to rise. This is true of cards 1 and 2, card 1 up until the second level of ambiguity, and card 2 throughout. For cards 11 and 19 there are no differences between the two highest levels of ambiguity nor are there any differences for card 19 between the two lowest levels of ambiguity; however, there are differences between the medium-high and medium-low levels on both, as well as a difference for card 11 on all except, as was mentioned, the two highest levels. There is a clear demarcation between the two highest and two lowest levels.

Summarizing the analysis of projective words, one might note that at the lower levels of induced ambiguity, the number of projective words elicited is dependent on the particular stimulus cards when the stimulus cards are of inherently intermediate ambiguity, but not when the stimuli are inherently high or low on the ambiguity gradient. At

Table XXII.-

Mean Differences of Number of Projective Words Elicited from
Card to Card and from Presentation to Presentation.^a

	Cards						Diff. required at .001
	1 & 2	1 & 11	1 & 19	2 & 11	2 & 19	11 & 19	
Level 1	<u>15.00</u> ^b	<u>18.61</u>	<u>9.30</u>	3.01	6.50	<u>9.51</u>	7.53
Level 2	5.54	4.46	8.41	1.08	2.07	3.95	9.50
Level 3	.53	.48	4.88	1.01	4.35	5.36	12.06
Level 4	1.14	6.84	5.02	5.70	4.68	1.02	16.22

^a The means are presented in Appendix 2.

^b Underlined numbers represent significance at or beyond the .001 level of confidence.

the higher levels of induced ambiguity, there tends to be a decrease in the number of projective words elicited on the two lower ambiguity levels for all stimulus cards; however, this effect occurs only on cards of lower inherent ambiguity but not on cards of a more ambiguous nature.

3. Effects of Ambiguity Level Variation on Theme Productivity.

a) Effects on Total Number of Themes Elicited.- The total number of themes elicited were analyzed as a unit and then analyzed in terms of the two components which make up the total number of themes, namely, projective themes and descriptive themes. The analysis of the total number of themes showed a significant interaction between stimulus cards and ambiguity levels (see Table VII) and therefore the simple effects of each stimulus card at all ambiguity levels and each ambiguity level for all cards, were analyzed. Results of these analyses are presented in Tables XXIII and XXIV. These analyses proved to be very similar to the previously presented findings for the total number of words elicited. In general, the tendency is that for each stimulus card, the total number of themes increases as we decrease ambiguity, with the exceptions indicated in Table XXV. Table XXV and Figure 6 reveal that the increases in total number of themes elicited are most pronounced on card number 11, where all ambiguity levels differ from one another in terms of theme

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Table XXIII.-

Effects of Ambiguity Variation on the Number of Themes Elicited
for All Stimulus Cards.

	df	Level 1		Level 2		Level 3		Level 4	
		Est.	F	Est.	F	Est.	F	Est.	F
Stimulus Cards	3	275.11	<u>31.12^a</u>	49.67	<u>9.72</u>	21.87	4.32	6.70	3.52
Subjects	59	102.89		68.70		86.24		23.01	
Stimulus Cards x Subjects	177	8.84		5.11		5.06		1.90	
Total	239	35.40		21.39		29.00		7.17	

^a Underlined numbers represent significance at the .001 level of confidence.

Table XXIV.-

Effects of Stimulus Cards on the Number of Themes Elicited
at All Ambiguity Levels.

	df	Card 1		Card 2		Card 11		Card 19	
		Est.	F	Est.	F	Est.	F	Est.	F
Ambiguity Levels	3	510.37	<u>58.06^a</u>	661.87	<u>62.20</u>	1042.71	<u>128.25</u>	261.18	<u>21.95</u>
Subjects	59	72.00		63.90		67.01		49.11	
Ambiguity Levels x Subjects	177	6.79		10.64		8.13		3.63	
Total	239	30.69		31.97		35.66		18.09	

^a Underlined numbers represent significance at the .001 level of confidence.

TABLE XV.-

Mean Differences of Number of Themes Elicited from Presentation to Presentation and from Card to Card.^a

	Ambiguity Levels						Diff. required at .001
	1 & 2	1 & 3	1 & 4	2 & 3	2 & 4	3 & 4	
Card 1	0.00	<u>3.17</u> ^b	<u>6.07</u>	<u>3.17</u>	<u>6.07</u>	<u>2.91</u>	1.74
Card 2	1.50	<u>4.63</u>	<u>7.45</u>	<u>3.11</u>	<u>5.92</u>	<u>2.82</u>	1.94
Card 11	<u>4.46</u>	<u>7.77</u>	<u>9.47</u>	<u>3.29</u>	<u>4.99</u>	<u>1.76</u>	1.68
Card 19	1.00	<u>3.46</u>	<u>4.47</u>	<u>2.48</u>	<u>3.47</u>	.90	1.12

^a The Means are presented in Appendix 2.

^b Underlined numbers represent significance at or beyond the .001 level of confidence.

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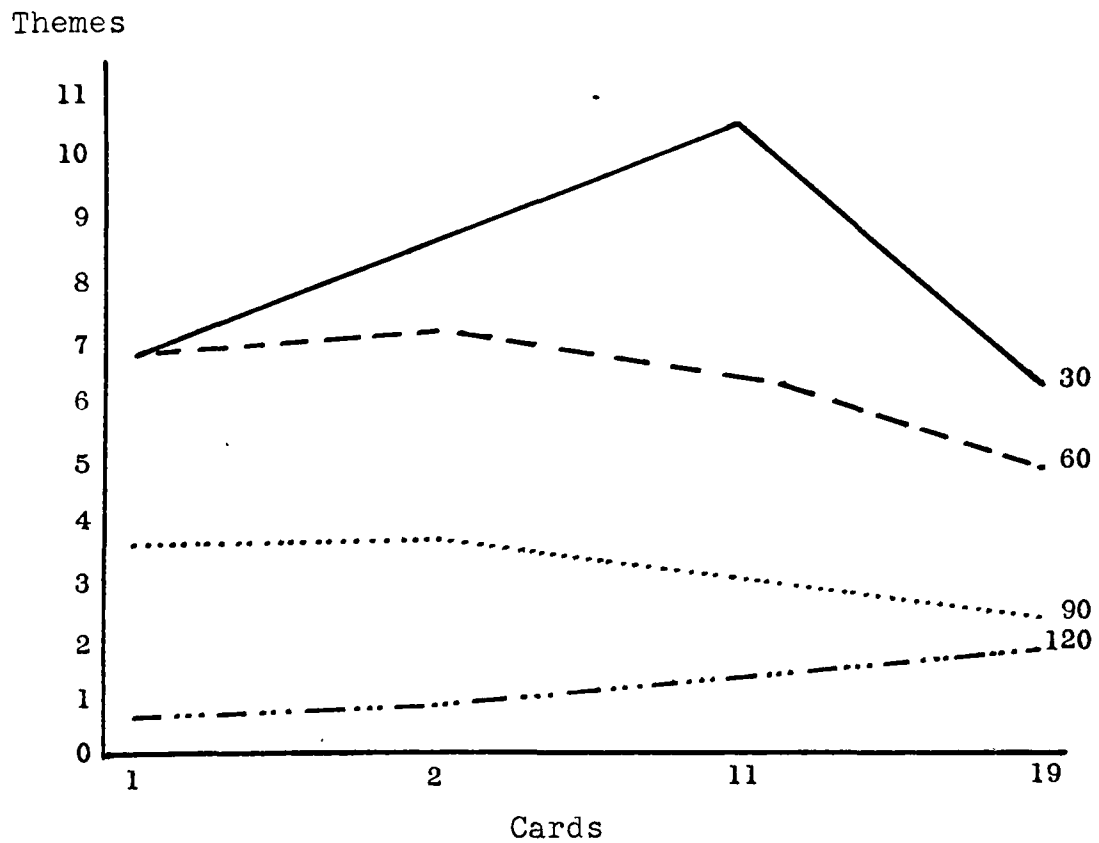


Figure 6.- Number of Themes Elicited by each Stimulus Card at each Level of Ambiguity.

productivity. Cards 1 and 2, however, show increases in productivity with diminishing ambiguity until the second lowest ambiguity level is reached. The effect of the two higher levels of ambiguity was the same from stimulus card to stimulus card.

There were significant differences in the number of themes elicited at both the lowest and second lowest levels of ambiguity, the greatest variability appearing at the very lowest level. The differences obtained on the second lowest level were in fact noted only on card 19.

In summarizing the above findings, it will be noted that at the lower levels of induced ambiguity, the total number of themes varies from stimulus to stimulus, while at the higher levels of ambiguity there are no differences in the total number of themes from one stimulus to another.

b) Effects on Number of "Descriptive" Themes Elicited.- The analyses carried out on the amount of descriptive themes elicited, (Tables VII, XXVI, XXVII, XXVIII) produced results which were almost identical to those obtained on the previously presented analyses of descriptive words elicited (Tables V, XVI, XVII, XVIII). That is, for the two higher levels of ambiguity, the stimulus cards did not produce any differences, while with the two lower ambiguity levels, differences were produced. These differences, however, were not in any consistent or comprehensible pattern. For three

Table XXVI.-

Effects of Ambiguity Variation on the Number of Descriptive Themes Elicited for All Stimulus Cards.

	df	Level 1		Level 2		Level 3		Level 4	
		Est.	F	Est.	F	Est.	F	Est.	F
Stimulus Cards	3	80.51	<u>27.01</u> ^a	39.18	<u>15.67</u>	5.45	5.24	1.27	3.96
Subjects	59	4.96		3.88		3.76		1.38	
Stimulus Cards x Subjects	177	2.98		2.50		1.04		.32	
Total	239	4.44		3.30		1.77		.60	

a Underlined numbers represent significance at the .001 level of confidence.

Table XXVII.-

Effects of Stimulus Cards on the Number of Descriptive Themes
Elicited at All Ambiguity Levels.

	df	Card 1		Card 2		Card 11		Card 19	
		Est.	F	Est.	F	Est.	F	Est.	F
Ambiguity Levels	3	35.63	<u>22.55^a</u>	38.05	<u>17.53</u>	119.49	<u>46.97</u>	.38	.76
Subjects	59	3.09		3.69		5.23		2.39	
Ambiguity Levels x Subjects	177	1.56		2.17		2.44		.50	
Total	239	2.38		3.00		4.60		.96	

^a Underlined numbers represent significance at the .001 level of confidence.

Table XXVIII.-

Mean Differences of Number of Descriptive Themes Elicited from
Presentation to Presentation and from Card to Card.^a

	Ambiguity Levels						Diff. required at .001
	1 & 2	1 & 3	1 & 4	2 & 3	2 & 4	3 & 4	
Card 1	.40	<u>.91</u> ^b	<u>1.26</u>	<u>1.31</u>	<u>1.66</u>	.35	.72
Card 2	.46	.57	<u>1.39</u>	<u>1.13</u>	<u>1.85</u>	.82	.86
Card 11	<u>1.11</u>	<u>2.66</u>	<u>3.03</u>	<u>1.57</u>	<u>1.92</u>	.35	.92
Card 19	.13	.07	.18	.06	.05	.11	.33

a The means are presented in Appendix 2.

b Underlined numbers represent significance at or beyond the .001 level of confidence.

of the stimulus cards (1, 2 and 11), the second lowest level of ambiguity elicited significantly more descriptive themes than either of the two highest ambiguity levels. For the two inherently less ambiguous stimulus cards (1 and 2) the level of least induced ambiguity did not differ from the second highest level, as will be noted on Figure 7. This may be interpreted as indicating that a moderate level of ambiguity will produce more descriptive themes than either a very low level or a very high level. This interpretation is only valid for stimuli of inherently low ambiguity and does not hold true for stimuli of inherently high ambiguity. On stimulus card 11, for example, the two lower levels of ambiguity did not differ significantly from each other in their ability to elicit descriptive themes, but they did differ significantly from the two higher levels which in turn did not differ from each other. On card 19, there were no differences at all which might have arisen out of ambiguity variations.

To summarize the above findings regarding descriptive themes, one might say that basically the analysis of descriptive themes is identical to that of the analysis of descriptive words. The maximum productivity of descriptive themes was elicited by stimulus cards of inherently high ambiguity under an intermediate level of induced ambiguity or by cards of low inherent ambiguity at the lower levels of induced ambiguity.

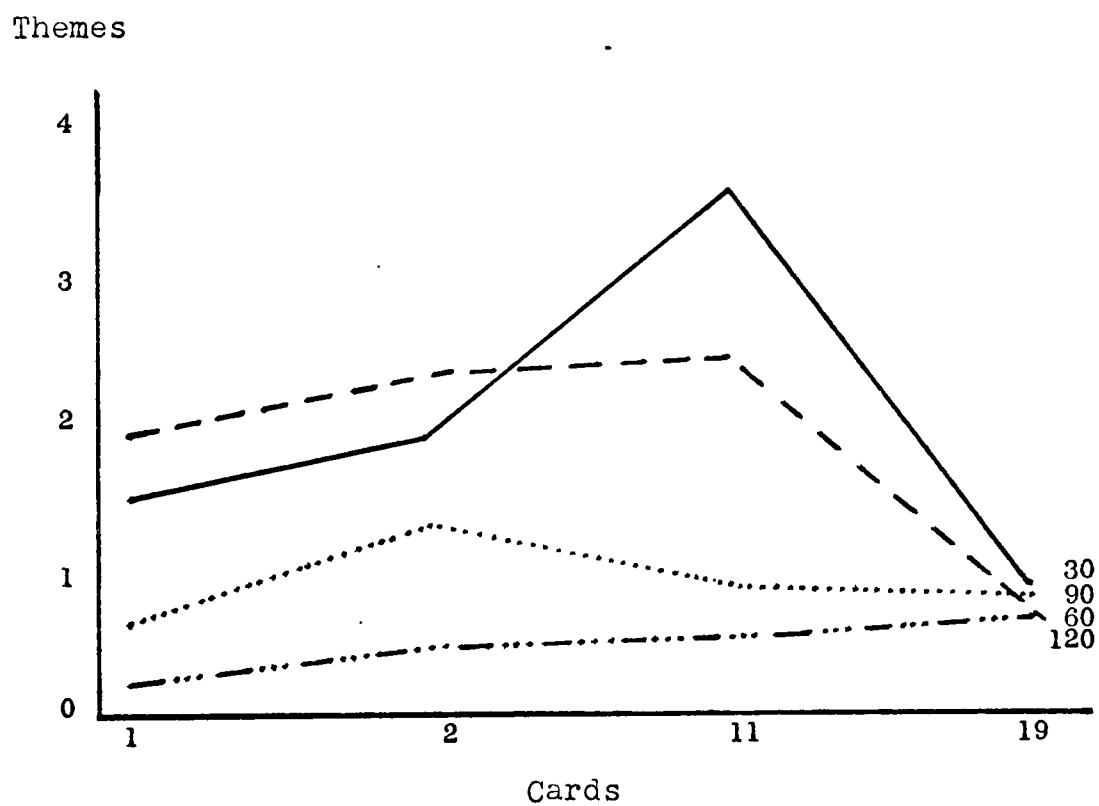


Figure 7.- Number of Descriptive Themes Elicited by each Stimulus Card at each Level of Ambiguity.

c) Effects on Number of "Projective" Themes Elicited.-

The analyses carried out on the number of projective themes elicited (Tables IX, XXIX, XXX, XXXI) produced results which were essentially identical to those obtained on the previously presented analyses of effects on projective words (Tables VI, XIX, XX, XXI).

Consideration of Table XXA reveals that ambiguity level has an effect on all four stimulus cards in terms of the number of projective themes elicited. As with projective words, the tendency is for an increase in the number of projective themes to occur as the ambiguity of cards 1 and 2 (the "low ambiguity" cards) is decreased. Again, for card 1, the effects of increased ambiguity disappears when one reaches the 60 volt level. Thus, for stimuli of inherently low ambiguity, projection increases as ambiguity decreases up to a point and then, when the point is reached (where presumably there is no longer any induced ambiguity) there is no longer any difference in the number of projective themes elicited. The stimuli of high inherent ambiguity, on the other hand, showed greater differences between the two middle ambiguity levels than at either extremes except in the case of card 11 where differences in amount of projective themes were found between means at all ambiguity levels except at the fourth (most ambiguous) level.

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Table XXIX.-

Effects of Ambiguity Variations on the Number of Projective Themes Elicited for All Stimulus Cards.

	df	Level 1		Level 2		Level 3		Level 4	
		Est.	F	Est.	F	Est.	F	Est.	F
Stimulus Cards	3	56.54	<u>8.57^a</u>	10.36	3.14	17.46	<u>5.91</u>	50.01	<u>68.50</u>
Subjects	59	72.00		48.52		54.81		13.11	
Stimulus Cards x Subjects	177	6.59		3.29		2.95		.73	
Total	239	23.37		14.54		15.98		4.41	

^a Underlined numbers represent significance at the .001 level of confidence.

Table XXX. -

Effects of Stimulus Cards on the Number of Projective Themes
Elicited at All Ambiguity Levels.

	df	Card 1		Card 2		Card 11		Card 19	
		Est.	F	Est.	F	Est.	F	Est.	F
Ambiguity Levels	3	291.66	<u>55.03^a</u>	394.05	<u>60.81</u>	456.98	<u>74.38</u>	259.18	<u>72.60</u>
Subjects	59	43.75		44.10		46.40		32.76	
Ambiguity Levels x Subjects	177	5.30		6.48		6.17		3.56	
Total	239	18.39		20.63		21.79		13.97	

^a Underlined numbers represent significance at the .001 level of confidence.

Table AXXI.-

Mean Differences of Number of Projective Themes Elicited from
Presentation to Presentation and from Card to Card.^a

	Ambiguity Levels						Diff. required at .001
	1 & 2	1 & 3	1 & 4	2 & 3	2 x 4	3 & 4	
Card 1	.43	<u>2.37</u> ^b	<u>4.83</u>	<u>1.94</u>	<u>4.40</u>	<u>2.46</u>	1.35
Card 2	<u>1.63</u>	<u>3.05</u>	<u>5.86</u>	<u>2.22</u>	<u>4.23</u>	<u>2.01</u>	1.40
Card 11	<u>3.32</u>	<u>5.05</u>	<u>6.40</u>	<u>1.73</u>	<u>3.00</u>	1.35	1.40
Card 19	.92	<u>3.54</u>	<u>4.37</u>	<u>2.62</u>	<u>3.45</u>	.83	1.09

a The means are presented in Appendix 2.

b Underlined numbers represent significance at or beyond the .001 level of confidence.

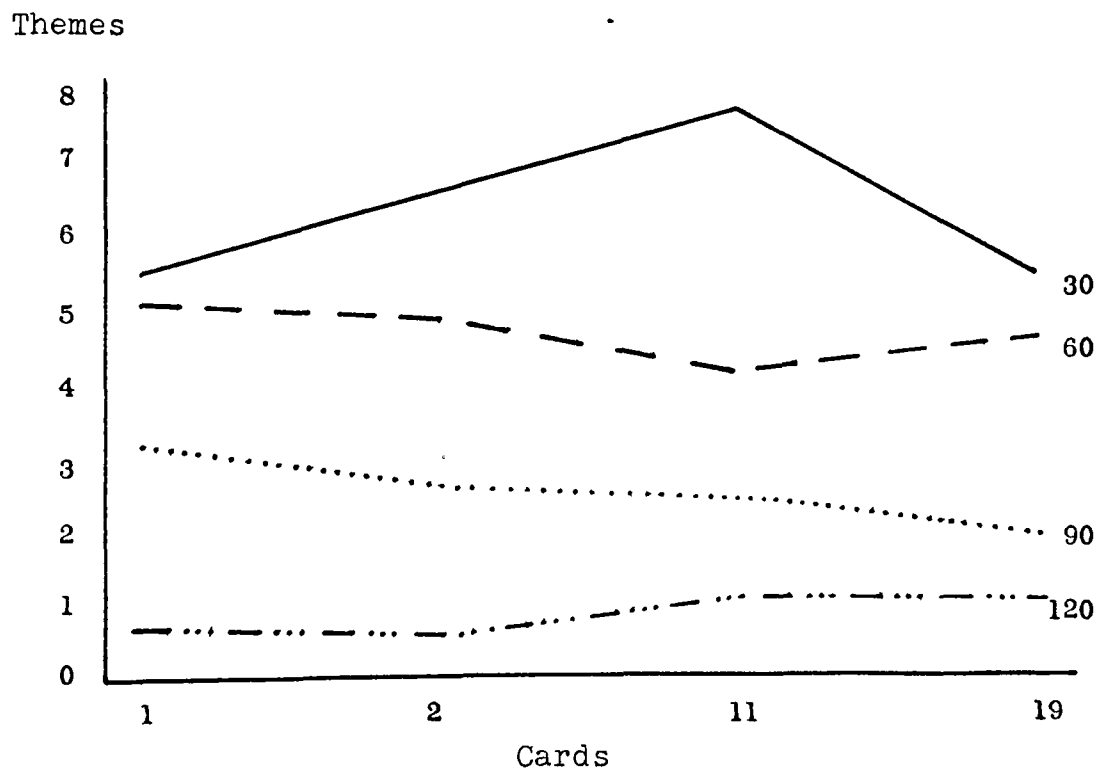


Figure 8.- Number of Projective Themes Elicited by each Stimulus Card at each Level of Ambiguity.

In summary, therefore, it appears that for cards of inherently low ambiguity, there is a tendency for projection to increase as ambiguity decreases; however, this phenomenon reaches a "point of diminished return" as ambiguity is further increased, and differences tend no longer to occur after this point has been reached. This point is more remarkable on the cards of intense inherent ambiguity when presented at either extreme of the ambiguity dimension. It will be further noted on Figure 8 that in all cases there was a significantly greater number of projective themes elicited between the two highest and the two lowest ambiguity levels.

The results of the study having been presented, the following chapter of this manuscript will deal with a discussion of these results.

CHAPTER V

DISCUSSION OF RESULTS

This chapter discusses the results presented in the previous chapter in relation to the experimental hypotheses and the findings in the study. The first section will deal with variation in the amount of projection with variations in ambiguity in the light of past and current theoretical positions and research findings. The second section will discuss the implications of this study for further research in the area of ambiguity and projection.

1. Variations in Projection with Ambiguity Variations.

The overall results of the study show varying effects of ambiguity variation on the amount of verbal material projected on to the stimulus cards. Although the effects did vary slightly from one hypothesis test to the other, the general pattern of results showed that words and themes of descriptive nature tended to vary in an almost identical manner. This was true of words and themes of projection too, and also of total number of words and themes. For this reason, it is felt that the words and themes analyses in each of the above three groupings might more easily be discussed under the headings of description, projection, and total productivity instead of under separate word and theme headings.

It is not surprising, of course, to find that both words and themes in each case did tend to follow identical patterns. This could well have been expected, especially since the word count in each case consisted of the number of words in each theme. It was felt, however, that the possibility existed that one particular type of theme (i.e., projection) might consist of greater verbosity than another type of theme (i.e., description) or vice versa. It is, of course, possible that people would require a larger number of words to express thoughts which are reflecting novel and original concepts, whereas in merely describing familiar material, less verbosity might be required. It was these possibilities which prompted the use of the seven category analysis in this study. The results of the data, however, did not bear out any such relationships and therefore discussion of the results would most economically be presented in terms of the combined groupings of "description", "projection", and "total productivity".

The general tendency noted in the study was for overall increases in productivity to occur as the ambiguity of the stimulus decreased. This held true for descriptive, projective, and total productivity, but not for commentary remarks. It would seem, therefore, that the results of the study do not support Ballak's hypothesis of an inverse relationship between stimulus clarity and projection, but favour, rather, the viewpoint of Weisskopf and her followers. Closer observation of the data, however, revealed that although the general trend was in

the direction of decreases in productivity with increases in ambiguity, the initial inherent ambiguity of the stimulus was of considerable importance in determining the direction of productivity variation. For instance, under conditions of moderately induced ambiguity, stimuli which were inherently low in ambiguity value produced more descriptive material than the same stimuli under conditions of greater or lesser induced ambiguity. On the other hand, the stimuli of inherently high ambiguity tend to be more productive of projective material when the induced ambiguity is at either the high or low extreme, while under intermediate induced ambiguity conditions, projective productivity tends to be lowered.

Bijou and Kenny, and Marstein, in their reported studies, may have been reporting on this very phenomenon. Unless the inherent ambiguity of the stimulus is taken into account in the design of this type of study, the results might well ultimately suggest that moderate ambiguity is the answer to creating tests which would be maximally productive.

The significant increases in the amount of commentary remarks which occurred as the stimuli became more ambiguous, might hold the answer to the early beliefs in a direct relationship between these variables. It may well be that the increase in comments such as, "it's not clear", "is that a?", "am I supposed to see something there?", etc., tends to expand the responses to more ambiguous stimuli in an

increasing manner. Much comment of this nature could easily lead the non-experimenting student of projective techniques to the erroneous conclusion which at one time was so prevalent.

The implications of the findings in this study with regard to the process of projection itself are manifold. Firstly, the evidence pointing in the direction of negating the inverse relationship hypothesis makes allowance for variability under specific conditions. This suggests that the approach to the study of the stimulus-ambiguity problem in the past has been too broad and has produced very limited real breakthroughs into the problem. Probably one should now turn more towards studying the particular characteristics of specific stimuli to discover exactly where the stimulus pull lies. This, at first, may appear to be very cumbersome, but unless one becomes more knowledgeable about the ambiguity value and stimulus pull of such factors as "dark versus light areas", "grey areas", "large versus small central figure", "presence or absence of one, two or more central figures", etc., we may never fully understand how projection really operates.

When a stimulus is made ambiguous, it is usually the aim of the tester to provide a less than optimal presentation, assuming that the subject will be thrown back on his own resources and that he will form hypotheses on the basis of his motivations and past experiences rather than on the basis of the immediately available stimulus itself. If then, the

stimulus is presented under even less optimal conditions, the expectations would be for a greater reliance on motivations and past experiences. That this did not evince itself in this study bears explanation. Might it not be that, profound as human beings are, there are limits to the feelings, strivings, experiences in each person, and when these limits have been exhausted, there just is no more. This is what may be happening in the decreasing amounts of projection as ambiguity increases when one deals with stimuli of varying degrees of ambiguity.

An alternative explanation is that there might be, for any given individual, both a minimal and a maximal threshold below and above which projection decreases. It might be that below the threshold, responses are determined by the stimulus and its content while at above maximum threshold levels the individual's ability to associate to the stimulus presented is inhibited by the increasing anxiety which may accompany the individual's inability to organize and make sense of the extremely ambiguous stimulus.¹ Either way, since the subject tends to produce less material as the stimulus gets more ambiguous, is it not possible that he has already "given his all", to the intermediately ambiguous

¹ Douglas T. Kenny, "Transcendence Indices, Extent of Personality Factors in Fantasy Responses, and the Ambiguity of T.A.T. Cards", in Journal of Consulting Psychology, Vol. 18, No. 5, issue of October 1954, p. 347-348.

stimulus and just has no more material left? The answer is not so simple. Even if the above were true, how can one be sure that a particular stimulus is of high, low, or intermediate ambiguity unless the material had been unequivocally fashioned in a particular way so that it did have a "measured" amount of ambiguity?² And then, what about subject matter or structure of the stimulus? How can one determine whether one stimulus will have the same pull as another when we don't know enough about the effects of the stimulus content, let alone of the stimulus ambiguity level? The answers to these questions will come only with further research.

2. Implications for Further Research.

Although this experiment was designed with a view to increasing ambiguity in T.A.T. cards, the method of study could easily be adapted to the study of ink blots, cloud pictures and other highly unstructured stimulus materials as well as to the study of relatively unambiguous stimuli such as photographs of familiar objects and people. The apparatus proved very adequate as a means of increasing ambiguity, but its limitations as a method of decreasing ambiguity make it

2 The method of ambiguity variation used in this study might be useful in increasing ambiguity, but does not provide for the decreasing of ambiguity. Methods such as "transcendence indices" are useful in checking the ambiguity levels of stimuli, but cannot alter them.

of limited further use as a tool for experimentation in the area of stimulus ambiguity unless one is only concerned with increasing ambiguity rather than in studying the effects of ambiguity variation.

Techniques are necessary which can be used to decrease the ambiguity level of a stimulus as well as increase it. This might be done by having an artist "touch up" photographs or drawings so as to make them even less ambiguous than they might appear in everyday life. Then, by proceeding in steps to increase the ambiguity of the stimulus, a true gradient of ambiguity-non-ambiguity might result.

A further suggestion would be to increase the number of stimuli used in the study, and to include a group of cards which were inherently intermediate on the ambiguity dimension. Bijou and Kenny's³ classification could again be used in such a study except that several cards from the intermediate ambiguity group would be included.

The direction of research in stimulus ambiguity should proceed toward devising methods of producing stimuli which have specific stimulus pulls. Too long have clinical psychologists been using tools which were accidentally conceived and subjectively selected. If clinical psychology is

³ Sidney W. Bijou and Douglas T. Kenny, 'The Ambiguity Values of T.A.T. Cards', in Journal of Consulting Psychology, Vol. 15, No. 3, issue of June 1951, p. 207-208.

to continue to grow and be more and more scientific, its tools will have to be built and employed in the light of current research findings. Only when one has found out "what makes a stimulus more or less ambiguous could one hope to prepare the 'ideal' projective test". Research should aim at the establishment of 'rules' for creating stimuli of maximum provocative ability, and then stimuli should be produced according to these "rules". Such a procedure would almost "guarantee" maximum productivity.

Although any attempts at eliminating commentary and description from responses to ambiguous stimuli so as to obtain a purely projective response would not be feasible (or even advisable since it would likely interfere with the subject's flow of thought), it might be worthwhile to manipulate the ambiguity of stimuli so as to get more or less of one type of material than another. Hence, if a stimulus tends to produce more descriptive material than projective material, it might be altered in its ambiguity to a point where the converse would be true. This certainly seems feasible in the light of the findings in this study regarding inherent ambiguity effects on description and on projection as induced ambiguity was varied.

SUMMARY AND CONCLUSIONS

The purpose of the present research was to investigate the influences of varying degrees of ambiguity on the amount of projective material elicited by a stimulus. Although common sense suggests that there is a direct relationship between ambiguity and projection, the past literature reveals that there are three conflicting schools of thought on this matter. The oldest and most prominent school proclaims that projection increases as ambiguity increases. The second most prominent viewpoint presents strong arguments demonstrating a decrease in productivity with increased ambiguity, while the third group, which is gaining more prevalence, currently takes a middle-of-the-road view and claims that the greatest amount of projection occurs under conditions of medium ambiguity. Each group presents some evidence for their contentions; however, the evidence appears to be largely speculative, and to a much lesser degree, experimental.

In the reported studies ambiguity variation usually involved the presentation of stimuli which had been altered by some mechanical alterations to the stimulus structure. The degree of ambiguity of the stimulus was often based on the subjective judgment of the experimenters, and there could be no certainty that the stimuli were identical during each presentation. It was felt that due to the designs of these studies, they were in effect presenting a series of different

stimuli to the subjects while claiming to be presenting the same stimulus under different ambiguity conditions.

The present investigation was concerned with the questions of whether productivity in projective tests would be increased or decreased by increasing the ambiguity of the stimulus material. These questions could only be answered when the stimulus used in the experiment could be altered in ambiguity but not in structure. The hypotheses set forth were designed to test Bellak's theoretical postulate that projective behaviour would vary inversely with the clarity of a stimulus, and directly with the ambiguity of the stimulus.

A series of four T.A.T. cards, selected on the basis of their inherently rated ambiguity, were presented to a group of sixty student nurses under four varying degrees of induced ambiguity, making a total of sixteen presentations per subject. Ambiguity was varied by using a "veiling glare" technique, where ambiguity increases with the amount of veiling glare reflected into the subject's eyes. The responses were recorded verbatim and were then divided into "descriptive", "projective", and "comment" categories.

The results of the study do not support the inverse relationship hypothesis of Bellak but point rather in the direction of agreement with the Weisskopf findings. It was further noted that the amount of descriptive material elicited, as well as the total amount of material elicited, also tended

to vary in the same direction. In the case of commentary remarks, however, the situation was in the reverse, with more comments being elicited as ambiguity increased. This finding suggests that the previous studies which had pointed towards increases in projection with increased ambiguity may have been confounded by the presence of many commentary statements which might have been included as part of the projective response.

The results also point out that, while the general tendency is towards a decrease in productivity with an increase in ambiguity, the inherent ambiguity of the stimulus does play an important part in determining the response. For instance, there were certain combinations of inherent and induced ambiguity which varied in their effects on productivity of verbal material from other combinations which included either of the inherent ambiguity-induced ambiguity stimulus conditions of the former combination.

It was felt that future research might well include three levels of inherent ambiguity rather than two extremes as had been done in the present study. The results of the present study, insofar as the specific combination effects, are not too clear and probably further investigation of each possible inherent ambiguity-induced ambiguity condition would be necessary in order to provide a fuller understanding of how ambiguity functions in relation to projection.

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A very brief resume of an experiment carried out on a rather small sample, following which the author presents his theoretical formulations.

-----, 'The Concept of Projection: An Experimental Investigation and Study of the Concept', in Psychiatry, Vol. 7, No. 4, issue of November 1944, p. 353-370.

The author, on the basis of several experiments carried out on extremely small samples, presents a fairly clear picture of his own thinking on the concept of projection. The article strongly points towards a direct relationship between ambiguity and projection.

Bijou, Sidney W., and Douglas T. Kenny, "The Ambiguity Values of T.A.T. Cards", in Journal of Consulting Psychology, Vol. 15, No. 3, issue of June 1951, p. 203-209.

Arguing that ambiguity should be defined in terms of the responses elicited rather than in terms of the physical characteristics of the stimulus, the authors proceeded to rate all the T.A.T. cards for their inherent ambiguity and then attempted to show that there is not any direct relationship between ambiguity and projection. Their findings suggest that intermediate ambiguity leads to maximum productivity of projective responses.

Gurel, Lee and Leonard P. Ullmann, "Quantitative Differences in Response to TAT Cards: The Relationship Between Transcendence Score and Number of Emotional Words", in Journal of Projective Techniques, Vol. 22, No. 4, issue of December 1958, p. 399-401.

Evidence is presented which points out that T.A.T. cards differ in their stimulus pull. A relationship is also demonstrated between transcendence scores and the number of emotional words elicited, thus allowing for greater confidence in the usefulness of both techniques of measurement.

Kenny, Douglas T., "Transcendence Indices, Extent of Personality Factors in Fantasy Responses, and the Ambiguity of T.A.T. Cards", in Journal of Consulting Psychology, Vol. 18, No. 5, issue of October 1954, p. 345-348.

On the basis of a comparison of three groups of T.A.T. cards for their transcendence indices, the author attempts to

explain variations in productivity of projections as being a result of the inhibiting effects of anxiety which is produced by extremes of ambiguity.

Kenny, Douglas T., and Sidney W. Bijou, "Ambiguity of Pictures and Extent of Personality Factors in Fantasy Responses", in Journal of Consulting Psychology, Vol. 17, No. 4, issue of August 1953, p. 263-286.

In this study of T.A.T. ambiguity, the authors present a very strong case for medium ambiguity as the greatest evoker of projective response material.

Murray, Henry A., Thematic Apperception Test Manual, Cambridge, Harvard University Press, 1943, 20 p.

The T.A.T. manual which contains Murray's suggestions for test administration and which is concluded with verbal descriptions of each card in the series. These descriptions were used as the basis for differentiating descriptive from projective material in the responses obtained in the present study.

Murstein, Bernard I. (ed.), Handbook of Projective Techniques, New York, Basic Books, 1965, xxiv-934 p.

Emphasizing research findings, the editor brings together the major contributions in the field of projective techniques, preceding each article with a critical evaluation. This is a very recent up-to-date guide book for student and researcher alike.

-----, "The Measurement of Ambiguity in Thematic Cards", in Journal of Projective Techniques, Vol. 24, No. 4, issue of December 1960, p. 419-423.

In a stirring article, the author calls attention to the need in research to objectively ascertain the ambiguity qualities of stimuli (T.A.T. cards). This, he points out, would enable one to subtract the component due to stimulus properties and leave a more meaningful projective residual. This article is most certainly the fore-runner of the book, Theory and Research in Projective Techniques. Emphasizing the T.A.T.

-----, Theory and Research in Projective Techniques. Emphasizing the T.A.T., New York, Wiley, 1963, xiii-385 p.

The author examines the determinants of responses to projective techniques, especially the T.A.T., and comes up with one of the most complete and comprehensive coverages of this research area. This text is essential reading for anyone who wishes to study the T.A.T. The text is exhaustive in its literature survey and is an excellent book with which one might begin one's "review of the literature".

Murstein, Bernard I., "The Relationship of Stimulus Ambiguity on the TAT to Productivity of Themes", in Journal of Consulting Psychology, Vol. 22, No. 5, issue of October 1958, p. 348.

The results obtained in this study offer further evidence to support the contention that medium ambiguity elicits maximum projection.

Pickford, R.W., "Personality and the Interpretation of Pictures: A New Projection Technique", in Journal of Personality, Vol. 17, No. 2, issue of December 1948, p. 210-220.

The author, on the basis of accidental findings in an earlier study, proposes the use of the veiling glare technique as a new projective technique. The study itself is of limited consequence due to extremely small sampling and questionable controls; however, it does have some merit in its findings which indicate that the method does indeed elicit projections.

-----, "Some Effects of Veiling Glare in Binocular Vision", in British Journal of Psychology, Vol. 33, No. 3, issue of January 1943, p. 150-161.

A description of the original veiling glare apparatus which, with modifications, was used in the present study, is presented in a very clear and concise manner.

Weisskopf, Edith A., "A Transcendence Index as a Proposed Measure in the Thematic Apperception Test", in Journal of Psychology, Vol. 29, No. 2, issue of April 1950, p. 379-390.

In this article, the author formulates her method for obtaining the transcendence indices of T.A.T. cards which she proposes as a means of measuring the ambiguity of thematic stimuli.

-----, "Experimental Study of the Effect of Brightness and Ambiguity on Projection in the T.A.T.", in Journal of Psychology, Vol. 29, No. 2, issue of April 1950, p. 407-416, and also in American Psychologist, Vol. 4, No. 7, issue of July 1949, p. 257.

In this study of the effects of the brightness of pictures and the degree of ambiguity of these pictures on the amount of projection elicited, the author concludes that degree of projection is unaffected by brightness but is decreased by increasing ambiguity.

Weisskopf-Joelson, Edith A., and David B. Lynn,
"The Effect of Variations in Ambiguity on Projection in the
Children's Apperception Test", in Journal of Consulting
Psychology, Vol. 17, No. 1, issue of February 1953, p. 67-70.

Using the children's version of the T.A.T., the
authors repeated a previous study and amassed further evi-
dence to support their contention of an inverse relationship
existing between ambiguity and projection.

APPENDIX 1

TECHNICAL DATA ON APPARATUS

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A. Construction Details of Apparatus.

The apparatus was constructed entirely of $\frac{1}{2}$ inch fir plywood, the outside dimensions being 2 feet long by 1 foot wide by 1 foot deep. A milk-glass partition was inserted 10 inches from one end dividing the "box" into two sections, 10 inches and 14 inches respectively. Openings were cut into the front and rear of the larger section and a sheet of plate glass was fitted diagonally from the front left-hand corner to the rear right-hand corner of this section. The front opening was 4 inches by 6 inches and was located 4 inches from the top of the box and 3 inches from the left-hand side. The rear opening was 11 inches by 11 inches and was located 1 inch from the top of the box and 1 inch from the left-hand side.

The electrical wiring and controls were all installed by an electrician in the smaller right-hand section of the apparatus, and consisted of two power transformers, two light bulbs, two panel meters, one fuse and fuse holder, one pilot light, connective wiring and line cord. The following list gives specifications of the electrical equipment used.

B. Electrical Equipment used in the Apparatus.

Powerstat Variable Transformers manufactured by the Superior Electric Company of Bristol, Connecticut, U.S.A.

Specifications: Type 10

Line Voltage.....	120 Volts.
Output Voltage.....	0-132 Volts.
Maximum Output.....	1.25 Amperes.
Output VA.....	165
Cycles.....	60
Size.....	3-1/8 x 2-1/16
Weight.....	3 lbs.
Net Price.....	\$11.90.

B. Electrical Equipment used in the Apparatus.
(Cont.d.)

Shurite Panel Meters purchased from Electro Sonic Supply Co. Ltd., Toronto, Ontario, Canada.

Specifications: Model 950 AC
Stock No.9406.
Voltage.....0-150 Volts.
Net Price.....\$4.91.

Light Bulbs

Specifications: 60 Watt White General Lighting Lamp.
General Electric 60 A-19 w.
Net Price.....\$.27
15 Watt White General Lighting Lamp.
General Electric 15 A-15
Net Price.....\$.23

Fuse Holder, fuse, and pilot light are not critical as long as the fuse is not rated at higher than 5.00 amps. Unidentifiable used parts were used in the construction of the apparatus for fusing the circuits.

C. Wiring Details.

The two 60 watt bulbs were each connected separately to one of the variable transformers so that each could be varied independently of the other. The transformer control knobs and dials, the voltmeters, the fuse holder and the pilot light were all mounted on the front right-hand side of the 'box' and connected to the two 60 watt bulbs as indicated in the wiring diagram in Figure 9.

D. Other Equipment used in the Experiment.

A viewing hood, purchased from Universal Electric Co. Ltd., of Montreal, Quebec, was placed in front of the smaller (viewing) opening and an altered music stand was used to hold the stimulus cards in place.

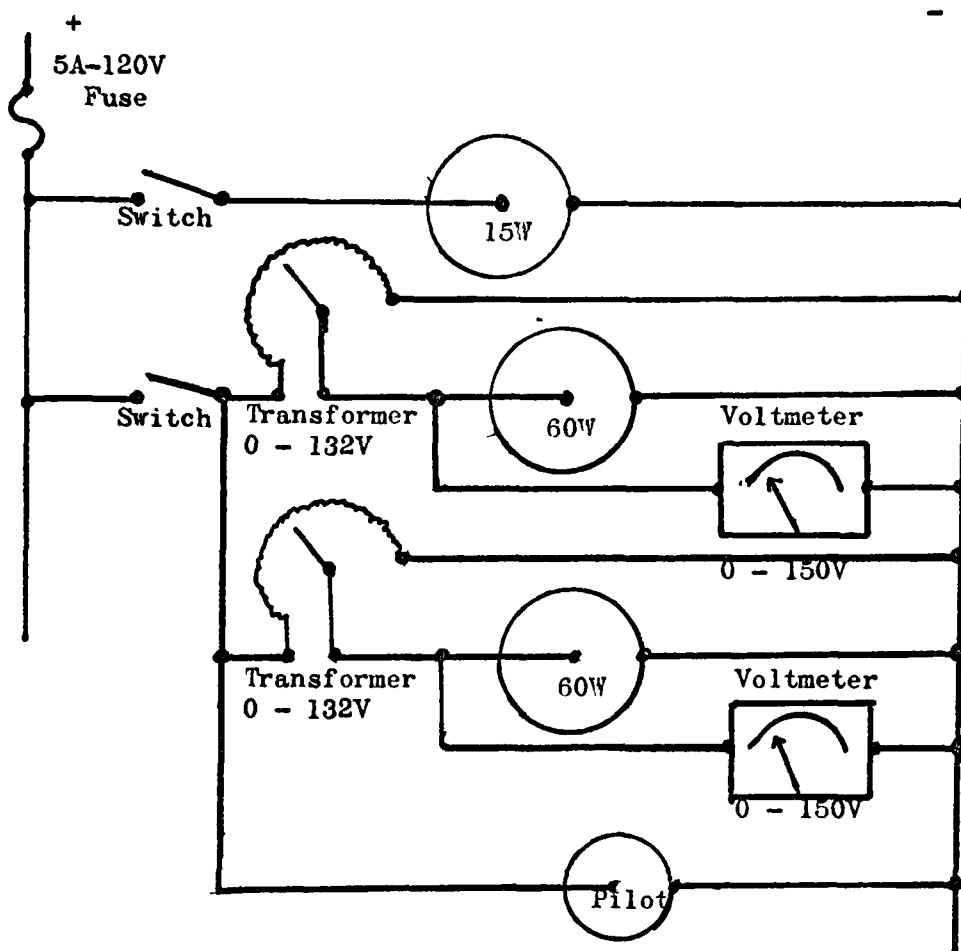


Figure 9.- Wiring Diagram of Veiling Glare Apparatus.

APPENDIX 2

**MEAN NUMBER OF WORDS AND THEMES ELICITED BY EACH OF THE
SIXTEEN STIMULUS CARD - AMBIGUITY LEVEL CONDITIONS**

APPENDIX 2

Table XXXII.-

Mean Number of Words Elicited Under Each of the Sixteen
Stimulus Card - Ambiguity Level Conditions.

Stimulus Card	Ambiguity Levels			
	1	2	3	4
1	63.53	59.61	37.40	17.40
2	89.46	76.21	49.41	19.98
11	97.68	77.36	41.65	23.57
19	73.03	65.23	41.95	23.90

Table XXXIII.-

Mean Number of Commentary Words Elicited Under Each of
the Sixteen Stimulus Card - Ambiguity Level
Conditions.

Stimulus Card	Ambiguity Levels			
	1	2	3	4
1	7.45	7.43	9.46	11.56
2	12.21	11.50	15.96	10.70
11	11.85	11.85	9.58	8.05
19	11.21	11.21	14.21	7.96

Table XXXIV.-

Mean Number of Descriptive Words Elicited Under Each of
the Sixteen Stimulus Card - Ambiguity Level
Conditions.

Stimulus Card	Ambiguity Levels			
	1	2	3	4
1	7.03	10.86	3.48	.62
2	11.46	16.76	9.53	3.07
11	24.36	18.81	7.15	3.56
19	4.51	3.00	6.18	4.06

Table XXV.-

Mean Number of Projective Words Elicited Under Each of
the Sixteen Stimulus Card - Ambiguity Level
Conditions.

Stimulus Card	Ambiguity Levels			
	1	2	3	4
1	48.95	41.42	24.43	5.06
2	64.75	46.96	23.90	6.20
11	67.76	45.88	24.91	11.90
19	58.25	49.03	19.55	10.88

Table XXXVI.-

Mean Number of Themes Elicited Under Each of the Sixteen
Stimulus Card - Ambiguity Level Conditions.

Stimulus Card	Ambiguity Levels			
	1	2	3	4
1	6.80	6.80	3.63	.73
2	6.31	6.01	3.60	.88
11	10.70	6.30	3.01	1.31
19	5.00	4.88	2.40	1.41

Table XXXVII.-

Mean Number of Descriptive Themes Elicited Under Each of
the Sixteen Stimulus Card - Ambiguity Level
Conditions.

Stimulus Card	Ambiguity Levels			
	1	2	3	4
1	1.36	1.76	.45	.10
2	1.70	2.16	1.13	.31
11	3.36	2.25	.68	.33
19	.63	.50	.56	.45

Table XXXVIII.-

Mean Number of Projective Themes Elicited Under Each of
the Sixteen Stimulus Card - Ambiguity Level
Conditions.

Stimulus Card	Ambiguity Levels			
	1	2	3	4
1	5.43	5.00	3.06	.60
2	6.41	4.76	2.56	.55
11	7.38	4.06	2.33	.98
19	5.30	4.38	1.76	.93

APPENDIX 3

ABSTRACT OF

The Effect of Increased Stimulus Ambiguity on
Projection in a Continuously Varying Stimulus

APPENDIX 3

ABSTRACT OF

The effect of Increased Stimulus Ambiguity on Projection in a Continuously Varying Stimulus.¹

Research studies which are concerned with projective techniques are frequently confronted with the question of the effects of stimulus ambiguity on the projective productions elicited. Various conflicting viewpoints have been expressed in the literature, none of which have been too conclusive. Most previous studies had been carried out on extremely small samples and the experimental designs were such as to confound the obtained results.

Bellak's hypothesis, namely, that projection varies directly with ambiguity, is tested by means of presenting a series of I.A.T. cards to sixty subjects under varying degrees of induced ambiguity. Ambiguity was varied by means of the "veiling glare" technique in which ambiguity increases as the amount of glare reflected on a glass screen is increased. In this way, it was felt that an infinite variation of ambiguity could be produced.

The results obtained generally did not support Bellak's position; however, there were many exceptions noted. It was

¹ Gerald M. Bloom, doctoral thesis presented to the Faculty of Psychology and Education of the University of Ottawa, Ontario, 1966, xi-121 p.

concluded that, although the overall tendency was for projection to decrease as ambiguity increased, the inherent ambiguity of the stimulus has a varying effect on this phenomenon. It was further suggested that the role of "inherent ambiguity", in experiments dealing with ambiguity variation, is probably much more important than had been previously considered.

The implications of these findings were discussed in the light of the general problem of projective testing and suggestions for further research in the areas of projection and ambiguity were advanced.