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Speed and Accuracy of Decision Among Normals and Neurotics

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**SPEED AND ACCURACY OF DECISION AMONG
NORMALS AND NEUROTICS**

Warren Freiband

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

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CHAPTER I

THE PROBLEM

A. Introduction

An increased interest has been shown in recent years in the problem of decision and its related aspects as an area for investigation.¹ Part of this interest has probably had its impetus from the increased use of psychological research by industrial and military organizations. In those fields the making of decisions is often of urgent and practical importance. On occasion this has created a demand for predictive techniques to evaluate an individual's performance in particular situations where decisions may be crucial.²

The importance of the area of decision to psychology goes far beyond the factors noted above. This is evident when we consider that people are confronted daily with many situations which necessitate a decision. The importance, difficulty, and consequences of these situations varies widely and is relative to the person involved. Most of us have, on occasion, pondered over the choice of food from a menu. Even the daily situation of deciding which tie to wear poses a problem which requires a solution. At high executive levels the need

¹Ward Edwards, "The Theory of Decision Making," Psychological Bulletin, LI, 1954, 380.

²Henry A. Murray, "Assessment of Men," New York, 1948; Leon Festinger and Seymour Wapner, "A Test of Decision Time: Reliability and 'Generality'," Civil Aeronautics Administration, Division of Research, Report No. 48, 1945, Washington, D.C. 1-45.

to decide which golf-club to use in a given situation or whether or not to sign a particular international treaty may confront the same individual on the same day. Folklore, humor, and drama, all of which reflect the interests and problems of mankind, are full of examples of human beings faced with decision situations. One of the better known examples of this is illustrated in Hamlet's soliloquy:

To be, or not to be - that is the question . . .

As it was written the consequences of his decision were tragic.

In actual life situations some consequences always follow a decision that is acted upon. These consequences may be subjective, objective, or both. Subjective consequences might follow an event where a person is concerned about choosing the correct attire for a social occasion, for example. In this situation the person's own definition of whether or not he is correctly attired can lessen or enhance his feelings of self-esteem. An example of objective consequences would be where the person's choice of clothes could significantly influence his obtaining a particular position he is seeking. Probably in most situations the consequences of daily decisions are mild and unobservable. However, this does not alter the fact that consequences do follow decisions and that they may prove helpful or harmful to the person. The correctness of the decision is vital to the kind of consequences which follow. Since some degree of benefit or harm accrues to a person as a result of his accuracy in making decisions, the ability to make appropriate decisions can be considered as a form of adaptive behavior.

The factors which make for differences between people in their attitude towards decision situations are many. However, for the moment they may be

summed up as constituting the meaning of the situation to the individual. This difference in meaning may lead to quite varied responses although the external circumstances are the same. As an example of this we offer the illustration of three people riding in a car who are going to the same destination, for the same general purpose, who come to an unfamiliar crossroad. One of the people might regard the situation with impatience and urge that either road be taken without delay. Another person might insist that they wait for a car to come which can accurately direct them. The third occupant might propose that they use the knowledge they have to make what they consider the best choice and then proceed. Several investigators have noted the existence of individual differences in attitude and its importance in situations involving decisions.³ Their findings will be discussed in the next chapter.

In summary, decisions are of practical importance to individuals and groups. They are one manifestation of adaptive behavior, and like other forms of behavior are believed to reflect individual differences. These factors combine to make investigations of people in decision situations a meaningful problem to psychology.

B. Discrimination Situation as a Decision Situation

The common denominator in all decision situations is that a choice between alternatives is involved for a person. The choice may involve such widely

³Carl I. Hovland, and Robert R. Sears, "Experiments on Motor Conflicts; Types of Conflicts and Their Modes of Resolution," Journal of Experimental Psychology, XXIII, 1938, 477-493; Richard S. Lazarus, et al., "The Effects of Psychological Stress Upon Performance," Psychological Bulletin, XLIX, 1952 293-317; Frank, "Individual Differences in Certain Aspects of the Level of Aspiration," American Journal of Psychology, XLVII, 1935, 119-126.

different kinds of alternatives as whether to be polite or rude to a particular person, which of two people to marry, what career to follow, and so on.

A situation in which a subject is asked to make discriminations between lines or weights may also involve decisions. The following discussion will consider the alternatives in such a situation, why they are present, and how they influence the subject.

The first question to be raised is why a subject would be willing to take such tasks as the discriminations between lines or weights seriously. In other words, what factors are present so that the subject does not merely respond blindly to the line discriminations, for example, but keeps his eyes open and looks at the lines. We may assume that the prospective subject has been asked to volunteer and that he has been told that some worthy research goal is involved. Let us also assume that he has been told that a psychologist is the experimenter and that he will be tested in a psychiatric clinic or hospital. The first factor which would lead the subject to regard the tasks seriously would be that he has agreed to participate as a subject. In general people have a desire to cooperate where they have agreed to do so. This is reinforced by the general cultural pressure to live up to responsibilities which one accepts. Cooperativeness and the carrying out of even minor responsibilities is highly regarded in our society and generally continues to win social approval throughout life. Other factors which may lead the subject to have a "serious" attitude in the situation described above are the setting and the prestige of the examiner. A hospital and a psychiatric clinic may be assumed to be regarded by most people as having important purposes of which they generally approve. Research done in these types of settings would probably be viewed by subjects

in a similar way. The experimenter, as a professional person, would tend to have a certain prestige which would lead the subject to seek his approval through doing his best in the situation.

We have dealt in some detail with the above factors because the motivation of the subject to take the discrimination tasks seriously is basic to the meaningfulness of the experiments employed. This will become more evident as we develop the problem further.

Let us now consider other aspects of the situation which will be involved for the subject when he has accepted tasks involving discriminations. If the discriminations are between the lengths of lines, in terms of which is longer, the subject must compare the lines. In making this comparison the subject evaluates whatever cues may be present to aid him in his judgement. Thus, for example, he may attempt to figure out whether the difference between the top of the line and the upper edge of the card make the judgement easier for him than comparing the lines directly. This process of evaluating the pros and cons in the situation is what we mean by judgement. It is a conscious intellectual process which, in itself, implies no tendency to action. When a judgement between alternatives is followed by an inclination towards one of the alternatives a choice then exists.⁴ The expression, "I went against my better judgement," illustrates the fact that judgement and choice are separate but related processes. The implication of that expression is that one is able to act in a manner different from one's judgement.

⁴Magda B. Arnold, and John A. Gasson, "The Human Person," New York, 1954, 39.

Since judgement is an intellectual process intelligence can influence the correctness of a person's judgement. A person with defective intelligence, for example, may correctly perceive the visual cues in discriminating between lines but be unable to correctly evaluate their meaning. Another factor which might create problems in judgement is a physical disability. For example a person may have an injury which has resulted in a loss of sensation in one hand. Such a person could not be expected to accurately discriminate between weights if both hands had to be used. Factors such as these have to be taken into account where discrimination situations are involved as experimental procedures.

Not only will judgement affect the accuracy of a subject's discriminations, but so will his wish to be accurate. When a person has accepted a task, such as making discriminations between the length of lines, and the task involves accuracy as indicated by the instructions, the subject will have a desire to accomplish the tasks correctly. We have already discussed such factors as the subject's agreement to cooperate, the setting, and the prestige of the examiner, as enhancing task involvement. When a person in a discrimination situation is required to be, and wants to be accurate, but cannot be certain of his accuracy, it is reasonable to assume that he will feel some discomfort. When the task involves an "easy" discrimination little delay is necessary for the subject to make an accurate judgement, and therefore only very minimal discomfort may occur. An "easy" discrimination where judgement of lines is involved where the alternative lines are very different with respect to the criteria being judged. A "hard" discrimination in the judgement of lines is involved where the alternative lines are very similar with respect to the

criteria being judged. However, where the discrimination is "hard" the difficulty in being accurate will intensify the discomfort and some delay will be necessary in order for the subject to be accurate.

Although the specific tasks still require only judgements, when the factors of accuracy and difficulty are also involved the total situation presents a type of conflict. By that statement we simply mean that every conflict involves a difficulty in choice. In the situation where accuracy is required, and difficulty is present in the discrimination of lines, the subject will have opposing tendencies that make for the conflict. He will have one tendency to make the decision in order to finish the task and end the discomfort caused by his uncertainty, and another tendency to make an accurate decision. Thus, there will be a conflict between the desire to make the right choice and the desire to make a quick choice. The most effective response to a conflict situation is to order the elements involved in such a way that the conflict can be resolved quickly and accurately. To sacrifice accuracy in the interest of resolving the conflict quickly is not dealing with the problem most effectively. Similarly, to delay excessively prolongs the conflict and may result in inaccuracy. In either instance an inefficient handling of the situation would result.

In our analysis of a situation involving difficult discriminations we have pointed out why it is a type of conflict situation. There are, of course, other types of conflict situations. However, conflict always involves a difficulty in making a decision of some type, as Gasson's discussion indicates.

To sum up: conscious conflict can be considered basically as an inconsistency of choice, unconscious conflict as a choice of goals which are incompatible with the order of things. When the

conflict is conscious it will be found to be the result either of an inability to choose because the person is not willing to sacrifice the alternative goal, or it is the consequence of making a choice unwillingly and wanting the alternative, or finally, of regretting an irrevocable or necessary decision. When conflict is unconscious (though its symptoms of unhappiness, malaise, guilt feelings are clearly evident) its antecedent is either a choice of an end without choosing the necessary consequence or means (e.g., striving for power and wanting the love of one's puppets), or choosing a goal in accord with the tendencies toward possession and stabilization but without regard to inherent limitations (trying to make a fortune and keeping it untouched by catastrophe), or choosing a self-ideal which diverges from the self-ideal as it ought to be.⁵

The conflict which we have described in situations involving difficult discriminations would seem to fit in the category of conscious conflict described by Gasson.

Cartwright offers a general theory of decision which is stated in concepts and terms proposed by Lewin.⁶ According to his theory in a situation where a person is to make a decision, and there are two alternatives available, the person may be said to be within the region of the activity of deciding.

This region is in turn surrounded by the regions of A and B (the two alternatives). If the person is to leave the region of decision, he must enter the region corresponding to the performance of one of the alternatives. Which region he selects, i.e., which region P (the person) enters, depends on the distribution of forces resulting from the valences in each of the regions, since locomotion (the change in position) is coordinated to the resultant of the forces If we assume that the valence of region A is equal to the valence of region B, the resultant of forces will equal zero and no motion can occur. In other words, as the conflicting forces become more equal, locomotion is increasingly retarded until the forces become balanced and it stops completely. In this

⁵Arnold, and Gasson, "The Human Person," New York, 1954, 204.

⁶Kurt Lewin, A Dynamic Theory of Personality, New York, 1935.

extreme case a decision cannot be reached until some change in the situation brings about an imbalance of the forces.⁷

Some of the factors which he suggests may bring about an imbalance of forces are:

1. When equal and opposing forces operate upon a person he may begin a process of comparison and consideration. Viewing the alternatives in a different light may change the valences so that the balance is destroyed.
2. In many instances, such as in "vicarious trial and error," tentative choices are made. When the person sees himself as having selected one alternative, the other appears more appealing and he tentatively selects it. This alternation may continue from one tentative choice to the other until a decision is forced by the situation.
3. The presence of opposing forces probably places the person under tension which, in turn, creates a new force away from the region of decision.⁸

Cartwright points out that this type of theoretical scheme can be applied wherever opposing forces operate upon a person. He suggests that such phenomena as judgement, or decision situations may be viewed as involving conflicting forces. In subsequent investigation evidence is offered supporting his theory.⁹

Although Cartwright's theory lends itself to quantifiable prediction

⁷Dorwin Cartwright, "Decision Time in Relation to the Differentiation of the Phenomenal Field," Psychological Review, XLVIII, 1941, 430-431.

⁸Dorwin Cartwright, op. cit., 441.

⁹Dorwin Cartwright and Leon Festinger, "A Qualitative Theory of Decision," Psychological Review, L, 1943, 595-621; Cartwright, "The Relation of Decision-Time to the Categories of Response," American Journal of Psychology, LIV, 1941, 174-196.

of behavior in decision situations it would seem to place the emphasis of any interpretation, on factors external to the person. That is, differences in conflicts or decision situations would almost have to be defined in terms of the external stimuli rather than the meaning they may have to the subject.

Our discussion of conflict as it relates to decision situations has concerned itself thus far with so-called normal people. We have attempted to show how and why decision situations involve conflict. In what follows we will deal with the relationship between conflict and neurosis as it may pertain to decision situations which involve a type of conflict.

C. Conflict and Neurosis

There are, of course, differences in theoretical approaches to the understanding of personality and neurosis. However, despite these differences the notion of conflict in relation to neurosis is generally accorded an important place in the different approaches.¹⁰

Arnold speaks of the prevention of conflicts as resulting in the prevention of neurosis.¹¹ According to her point of view a disturbance in self-organization results from an emotional conflict which, in turn, has resulted from a person's inconsistency in choosing a goal or his unwillingness to choose the right one. However, as she carefully points out, it is not the presence of conflict in itself which leads to a neurosis but the inability to handle the conflict.

¹⁰Norman Cameron, The Psychology of Behavior Disorders, New York, 1947, 131.

¹¹Arnold and Gasson, "The Human Person," New York, 1954, 204.

Psychoanalytic theory suggests that in psychoneurosis there is a defense set up by the ego against an instinct. This is followed by a conflict between the instinct seeking discharge and the ego blocking it. It is maintained that this conflict is on an unconscious level. This paradigm has been likened to the artificial neurosis created in animal experiments.¹² Maslow and Mittelman point out that in every neurotic illness a psychological conflict is involved. This conflict may be between the person's incompatible needs, goals, or defenses.¹³ Although White assigns anxiety and defense the most prominent position in his theorizing about neurosis, he acknowledges the importance of conflict as a related concept in neurosis.¹⁴

The view taken here in no way intends to imply that a neurotic conflict is the same as the conflict in a decision situation. The former is a seriously disabling state of chronic emotional disturbance which as Arnold points out, is:

. . . really a psychosomatic effect, the result of attitudes towards things to be sought and things to be avoided, which produce emotional disturbances (a psychological state) and their organic expressions (somatic symptoms).¹⁵

The conflict in the type of situation we have previously described is much

¹²Otto Fenichel, The Psychoanalytic Theory of Neurosis, New York, 1945, 19.

¹³A. H. Maslow and Bela Mittelman, Principles of Abnormal Psychology: The Dynamics of Psychic Illness, New York, 1941, 190-191.

¹⁴Robert W. White, The Abnormal Personality, New York, 1948, 218.

¹⁵Arnold, and Gasson, The Human Person, New York, 1954, 497.

more limited in scope, in intensity, and involves less basic needs of the person. However, particular neurotic attitudes towards decision situations may well be a part of the neurosis. If we assume that a neurosis constitutes an inability to handle a conflict which involves some type of choice, the person with a neurosis may have an apprehension of making choices per se. In other words the difficulty in handling situations where choice is involved may generalize beyond the neurotic conflict. Such apprehension over making choices would probably be especially active in a situation where the choice is difficult or where there is some pressure exerted on the person. Murphy, in describing an experimentally induced neurosis which he likens to the typical neurotic situation, gives a vivid picture of this.

As a result of training, the tension level gradually goes up through the series of decision situations, until the process of deciding is itself brought into the conditioning picture. The very fact of confronting a decision becomes a conditioned stimulus, a symbol, that trouble is coming; whenever one finds himself in such a situation, the one thing that is certain is that the outcome bids fair to come out in the worst possible way. It would be a mistake to conclude that since this is absolutely sure, the need to decide adds nothing to the distress.¹⁶

From ours, as well as Murphy's standpoint, decision situations may pose a threat to people with a neurosis which might lead to different types of maladaptive responses. Also, when viewed in this manner the situation may take on greater importance than it has objectively and perhaps lead to greater self-involvement.

¹⁶Gardner Murphy, *Personality, A Biosocial Approach to Origins and Structure*, New York, 1947, 310-311.

We have discussed earlier that the conflict in difficult decision situations involves a state of discomfort. The desire to reduce this discomfort is opposed by the need for accuracy. Several investigators have likened the need for accuracy to the need to adhere to the reality of the situation.¹⁷ This need to make an accurate decision exists when the subject has accepted a task involving accuracy. This conflict is very minimal where easy discriminations are involved. The conflict is more intense where difficult discriminations are involved, since the need for accuracy may prolong the conflict.¹⁸ As some studies have shown, accuracy is increased when the response is delayed.¹⁹ Some people with a neurosis might be expected to sacrifice accuracy more readily than people without a neurosis. This could occur in people whose capacity to sustain discomfort is very slight and who are more concerned with relieving themselves quickly of even minor discomfort than with attaining accuracy. On the other hand, in certain neuroses the fear of inaccuracy itself may predominate, resulting frequently in prolonged indecisiveness as a means of avoiding possible confrontation by that which is feared, namely inaccuracy. This could lead to a cycle of excessive delay, mounting anxiety, and still further delay. The end product of the progressive emotional tension induced by such a conflict may be the inaccuracy which is dreaded.

¹⁷Bernard Meer, "The Relative Difficulty of the Rorschach Cards," Journal of Projective Techniques, XIX, 1955, 43-53; Hans J. Eysenck, Dimensions of Personality, London, 1947, 140-143.

¹⁸Meer, Ibid., 51.

¹⁹Ibid., 52.

One of the characteristics generally associated with normality is the ability to adapt to changing circumstances in order to respond appropriately. This quality is probably not present to the same extent in people with a neurosis. Adaptability implies that there is an optimal range of decision time within which people will make decisions depending on the requirements of the particular situation, as well as flexibility in behavior as required by alterations in the situation. Moreover, normality also implies the presence of consistency in behavior in similar situations.

The considerations which have been discussed pose issues of potentially fruitful concern to the central problem of decision behavior and conflict. These include questions of the handling of conflict in relation to functioning with objectivity and efficiency; individual consistency; and within task and between task variability in performance.

D. Purpose

The theoretical and empirical consideration discussed above raise questions which are believed to be suitable for experimental investigation. These questions deal with possible differences between normals and neurotics in decision time, decision accuracy, and decision variability. The purpose of this study will be to investigate these questions by using three groups of people. One group will be composed of normal subjects. A second group will be composed of people with a neurosis who have been classified as being more impulsive than cautious. A third group will be composed of people with a neurosis who have been classified as being more cautious than impulsive.

Some investigators have shown that individuals tend to respond character-

istically in situations involving conflict and decision.²⁰ A further purpose of this investigation will be to explore whether the differences which may be found between these groups reflect general characteristics of the groups, in the sense that they appear in a variety of situations, or whether they are more specific to particular situations. This issue reduces to an inquiry into the generality of modes of response in the several groups.

E. Significance of the Problem

The function of making decisions in a realistic way is of central importance in adaptive behavior. This is evident in personality maladjustment where deficiencies in dealing with reality, and difficulty in choice behavior are prominent. Theories of decision derived from experimental work have utilized only normal subjects. It would seem important to investigate the decision behavior of neurotics as compared to normals in the same decision situations. This might further extend our general understanding of decision behavior in relation to conflict.

In clinical work the differentiation of various types of personality problems is of great importance for intelligent diagnosis and treatment. Any contributions towards this effort would be of value. If we consider diagnosis in the broader sense of meaning an understanding of the way in which individuals

²⁰Carl Hovland, and Robert Sears, "Experiments on Motor Conflicts; Types of Conflicts and Their Modes of Resolution," Journal of Experimental Psychology, XXIII, 1938, 477-493; Festinger and Wapner, "A Test of Decision Time; Reliability and 'Generality'," Civil Aeronautics Administration, Division of Research, No. 48, 1945, Washington, D.C.

are functioning, then to the extent that differences in the functioning of normals and neurotics are found, a contribution would be made to the understanding of the differences between them.

CHAPTER II

A REVIEW OF RELATED LITERATURE

A. Historical Background

A review of the literature reveals a relative scarcity of investigations concerned with personality and conflict as related to decision situations. There is an apparently even greater scarcity of studies comparing psychologically normal and abnormal people in decision situations. The lack of research dealing with decision making and personality has been noted by recent investigators in this area.¹ This review of the literature will indicate the background of the problem of decision but will direct its attention primarily to those studies more immediately relevant here.

Current research in the area of decision and conflict shows historical roots in studies of reaction-time, psychophysical problems, and theories of voluntarism and choice. With the exception of the latter type of experimental investigation the main relationship between these earlier investigations and the present one is that of method. In addition, some of the findings from these studies have led the method to be extended to such studies as the present one.

The simple-reaction-time studies, as they have come to be known,

¹Jack Block and Paul Peterson, "Some Personality Correlates of Confidence, Caution, and Speed in a Decision Situation," Journal of Abnormal and Social Psychology, LI, 1955, 34-41.

preceded reaction-time studies where a choice situation was involved. Such studies were often concerned with stimulus, receptor, and motor conditions.² In a typical study of this type a stimulus would be applied to a receptor, for example, and the time taken to respond would be measured. Through experiments in simple reaction time, differences in the threshold of various sense receptors have been found.³

Attempts to deal with more complex phenomena has contributed to the use of reaction time in situations where a discrimination and a choice were involved.⁴ Comparisons between the simple reaction time and the reaction time where discrimination and choice were involved revealed the latter to take longer. This has been attributed to the additional process of discrimination and choice.⁵ Through studies of the disjunctive reaction, as this more complex type of reaction has been called, findings pertinent to decision difficulty have occurred. One such early finding was that the disjunctive reaction time increases with an increase in the number of alternatives.⁶ In terms of decision behavior this has the implication that the number of alternatives from which one has to choose influences the difficulty in making a decision.

²Warren H. Teicher, "Recent Studies of Simple Reaction Time," Psychological Bulletin, LI, 1954, 128-149.

³Ibid., 129.

⁴Robert S. Woodworth, Experimental Psychology, New York, 1938, 302.

⁵Ibid., 331.

⁶Ibid.

The greater the number of alternatives the more difficult the decision. This general trend has been borne out in current investigation.⁷

Psychophysical methods have often utilized judgement situations. The kinds of judgements involved sometimes lend themselves to an exactness in control and observation. This has led them to be used, where applicable, to investigating some problems in decision. However, the utilization of psychophysical methods for these purposes often requires a consideration of the findings from studies where the problem involved psychophysics. For example, if a problem involves easy and hard decisions and the stimuli to be used are weights it would be necessary for the experimenter to know that the weights used for the hard decisions are actually harder than those used for the easy decisions. One way of dealing with this problem is through reference to Weber's Law. This states that the difference limen (the perceivable difference between stimuli) is a constant fraction of the stimulus. It is constant for all magnitudes of the same type of stimulus. In other words if the difference limen in lifted weights is $1/30$, the next size weight which would be perceptively heavier than the standard would be $1/30$ times the standard.⁸

Other problems which have been encountered where psychophysical judgements have been used are those of constant errors in space and time. Constant errors in space refers to the fact that subjects tend to have a bias to the right or

⁷Dorwin Cartwright, "The Relation of Decision-Time to the Categories of Response," American Journal of Psychology, LIV, 174-196.

⁸Woodworth, Experimental Psychology, New York, 1938, 450.

left depending on the sense modality involved. Where equal weights have been used subjects tend to judge the right one as heavier.⁹ One way of dealing with this kind of problem is to rotate the stimuli so that each appears an equal number of times on both the right and left sides. The time error consists of the second of two stimuli presented in a series tending to be judged as heavier. This has occurred when the stimuli have been weights.¹⁰ This problem can sometimes be controlled by presenting the weights simultaneously.

The theories of voluntarism and choice are, of course, related to the general problem of decision. Methods currently employed in studies of decision bear a strong resemblance to those used in the investigation of those theories. One such method involved presenting subjects with two numbers. When the numbers were of four digits the subjects were to choose between addition and subtraction for a serious motive. If the numbers were smaller the subjects had to decide on reasonable grounds whether they wanted to multiply or divide. They were instructed to choose as quickly as possible. After reaching a decision the subjects pressed a key which recorded the time taken to make a decision. The subjects then introspected as to the processes occurring during the time the decision was being made, and in particular about the processes which occurred at the moment of decision. On the basis of the evidence gathered through this type of experimental method, the conclusion was reached that when the alternatives were judged to be equally meaningful or equally indifferent to the

⁹Ibid., 438.

¹⁰Ibid.

subjects, they experienced difficulty in making a decision. The data obtained, with reference to the process of decision, pointed to the conclusion that frequently the issue between the conflicting motives was settled by the active interposition of the ego. This was most clearly in evidence when the two alternatives were judged to be equal.¹¹

Wells also investigated the processes occurring during an act of voluntary choice. Her subjects were instructed to choose between previously evaluated alternatives consisting of pairs of liquids. In addition the subjects had to drink the liquid they chose. The liquids were placed in three categories: pleasant, unpleasant, and indifferent. All the liquids were colorless and odorless. The taste of each liquid was identified with a nonsense syllable. After this identification had been made for all the liquids the subjects were presented with pairs of nonsense syllables with the corresponding glasses of liquids they represented. The subjects were instructed to choose between the two tastes on the basis of a serious motive and to drink the one they chose. They were also instructed to react as quickly as possible. According to Wells the subjects interpreted a serious motive as one which meant choosing the liquid with the best taste. She found that where the alternatives were judged to be equally pleasant, equally unpleasant, or equally indifferent, the subjects had difficulty in deciding. The reaction times of the subjects were the principle measure used in the study. The introspections of the subjects led to the conclusion that being asked to make a choice after a careful consideration of the alternatives leads to the judgement that they are equal, is

¹¹Hubert Gruender, Experimental Psychology, Milwaukee, 1932, 420.

possible only by action of the ego. That is, it remains for the ego to strengthen one of the alternatives before a choice can be made.¹²

Undoubtedly all of the above experiments, and many others, offer many insights into important areas of inquiry. However, they are primarily concerned with different variables of decision situations and behavior than are under consideration in the present investigation. The findings from some investigations of psychophysical problems offer more than peripheral interest. These will be considered along with findings from studies more directly related to the problem under consideration.

B. Internal and External Factors in Decision Behavior

The literature reviewed in this section will consider experimental evidence that has a bearing on the influence of: 1) objective and 2) subjective, factors in decision behavior. Objective factors are intended to mean those aspects of the decision situation which are external to the person. This will include: a) the number of alternative choices present; b) the instructions to the subject; and c) the relative extent of the differences between the alternatives. The subjective factors in decision making are considered to be those elements of behavior which originate from within the person. These will include: a) attitudes; b) confidence; and c) personality characteristics.

Reviewing this section of the literature in the manner described above

¹²Honore M. Wells, "The Phenomenology of Acts of Choice, and Analysis of Volitional Consciousness," British Journal of Psychology, Monograph Supplement IV, 1927, 1-150.

tends to set up a dichotomy between the internal and external factors in decision behavior. It is recognized however, that these factors rarely, if ever, actually operate in such a fashion. Ordinarily what the subject sees as being involved in making a decision, and how he reacts to this perception, is the result of an interaction between what is external and what is internal to himself.

1. Objective Factors

a) Number of alternatives present

In many instances the greater the number of alternative choices available to a person the greater the difficulty in making a decision.¹³ However, this relationship is partly dependent on the equivalence of the alternatives involved.

Cartwright¹⁴ pointed up the importance of the equivalence between alternatives in the relationship between an increase in the number of alternatives and an increase in the difficulty of making decisions. He had subjects differentiate visual stimuli consisting of geometric forms into several ranges of equivalence. A category name was established for each of these ranges. He found that the decision time was increased as the relative frequency of response between different categories was increased. Where three categories of response were chosen with the same frequency the decision time was longer than where two categories of response were chosen with the same frequency.

¹³Woodworth, Experimental Psychology, New York, 1938, 333.

¹⁴Cartwright, "The Relation of Decision-Time to the Categories of Response," American Journal of Psychology, LIV, 174-196.

b) Instructions to the subject

Several investigators have concluded that the instructions in a situation involving judgements influences the attitude of subjects towards the alternatives present. The influence of instructions on the attitude of subjects towards alternative choices has been observed in connection with decision time.

George¹⁵ used an apparatus which created different intensities of sound to investigate the effect of the "doubtful" category of judgement. The subjects were asked to judge the difference in these intensities. They were instructed that they could use "doubtful" as their response when they were not certain which of the two sounds were more intense. The average reaction time for the judgement "doubtful" was found to be longer than for any other category. He attributed this finding to a special attitude of the subject towards giving the response "doubtful."

Kellogg¹⁶ had subjects make judgements between pairs of visual intensities in terms of which stimuli of each pair was more intense. In this experiment the "equal" judgement was permitted. The method of constant stimuli was employed.

Carlson, Driver, and Preston¹⁷ repeated the experiment of Fernberger

¹⁵S. S. George, "Attitude in Relation to the Psychophysical Judgement," American Journal of Psychology, XXVIII, 1917, 1-37.

¹⁶W. M. Kellogg, "The Time of Judgement in Psychometric Measures," American Journal of Psychology, XXXII, 1921, 65-86.

¹⁷W. R. Carlson, R. C. Driver, and M. C. Preston, "Judgement Times for the Method of Constant Stimuli," Journal of Experimental Psychology, XVII, 1934, 113-118.

and Irwin¹⁸ using comparisons of taste with the method of constant stimuli. They were seeking to determine whether the longer judgement times obtained for the "equal" category by other investigators was due to the psychophysical techniques employed. They found no significance in the judgement time differences between the category of "equal" and the other categories used. They concluded that the difference between their results and those of Kellogg,¹⁹ and George²⁰ was due to the influence of the instructions on the attitudes of the subjects towards the categories of response.

Johnson²¹ had three subjects each make several hundred comparative judgements on linear magnitude under three conditions of instructions. Under one set of instructions neither speed nor accuracy were mentioned, another set of instructions emphasized speed as an important factor, the third set of instructions emphasized accuracy. The measure used to assess the effects of differing instructions was the judgement time. The results showed that under the conditions where accuracy was emphasized the judgement time was, on the average longest; under conditions where neither speed nor accuracy were emphasized the judgement times were next longest; and the judgement times were

¹⁸Samuel Fernberger, and Francis Irwin, "Time Relations for the Different Categories of Judgement in the 'Absolute Method' in Psychophysics," American Journal of Psychology, XXXIV, 1932, 505-525.

¹⁹Kellogg, Ibid.

²⁰George, Ibid.

²¹Donald M. Johnson, "Confidence and Speed in the Two-Category Judgement," Archives of Psychology, CCIXL, 1939, 1-52.

shortest where speed was emphasized. All of the differences were statistically significant.

In an experiment reported by Festinger²² each of five subjects made several hundred judgements under different sets of instructions. He used the method of constant stimuli in a two category experiment. The judgements consisted of stating whether one line was longer or shorter than another line. Four conditions of instruction were used: a) neither speed nor accuracy were mentioned, b) accuracy was emphasized, c) speed was emphasized, and d) the subject was told that he was making a constant error in either the "longer" or "shorter" direction. The findings were in agreement with those of Johnson²³ reported above. In terms of field forces²⁴ the conclusion was advanced that instructions emphasizing accuracy increases the restraining force on the individual, while the instructions emphasizing speed lowers it. Under the conditions where the subject was instructed that he was making a "constant error" the subject would make a shift in the other direction.

The findings from the studies reported above suggest that the externally defined context of the situation in which decisions are made influences the choice and the way in which it is made with respect to decision time.

²²Leon Festinger, "Studies in Decision: 1. Decision-time, Relative Frequency of Judgement, and Subjective Confidence as Related to Physical Stimulus Difference," Journal of Experimental Psychology, XXII, 1943, 291-306.

²³Johnson, "Confidence and Speed in the Two-Category Judgement," Archives of Psychology, CCIXL, 1939, 1-52.

²⁴Kurt Lewin, Field Theory in Social Science, New York, 1951, 270-271.

c) Similarity between alternatives

The experimental evidence concerning the relationship between the differences in the alternatives and the difficulty of the decision confirms the common sense expectation that the greater the similarity between the alternatives the greater the difficulty in making decisions. The evidence for this comes from investigations in which the extent of the similarity between the alternatives has been, in some cases, in terms of the physical properties of the stimulus. In other cases the extent of the similarity between alternatives has been in terms of the degrees of a subject's preference that have been objectively established.

Kellogg,²⁵ in the experiment reported previously, plotted the curves of judgement time against the magnitude of stimulus difference using different visual intensities as the stimuli. He found that the choice time increased as the stimuli became more similar.

Hemmon²⁶ obtained one thousand judgements and judgement times from three subjects. He used the method of constant stimuli and two categories of response for judgements concerning the relative length of lines. He, like Kellogg,²⁷ found that the smaller the difference between the stimuli the longer the judgement time.

²⁵Kellogg, "The Time of Judgement in Psychometric Measures," American Journal of Psychology, XXXII, 1931, 65-86.

²⁶V.A.C. Hemmon, "Time and Accuracy of Judgement," Psychological Review, XVIII, 1911, 186-201.

²⁷Kellogg, Ibid.

Dashiell²⁸ used esthetic judgements with the method of paired comparisons to investigate whether the time taken to make a choice varies consistently with the amount of difference in preference. He had subjects sort pieces of colored paper and rank them in order of preference. A comparison of the average choice times of different ranks of color preference showed a progressive increase in the average length of choice time from the most to the least preferred. He also found that as the size of the intervals between ranks decreased there was an increase in choice time.

In the experiment by Wells which has been reported earlier she had subjects make a ranking of taste preferences and found that the decision times between alternatives increased as the difference in preference decreased.²⁹

The results of the above experiments, and others,³⁰ support the conclusion that the greater the similarity between alternatives the greater the difficulty in deciding between them.

2. Subjective Factors

a) Confidence

The relationship between the confidence of a person in making decisions and the influence of this on his decisions is of considerable importance.

²⁸Dashiell, "Affective Value Distance as a Determinant of Aesthetic Judgement-Times," American Journal of Psychology, L, 1937, 57-67.

²⁹Wells, "The Phenomenology of Acts of Choice; an Analysis of Volitional Consciousness," British Journal of Psychology, Monograph Supplement IV, 1927, 1-150.

³⁰Festinger, "Studies in Decision: 1. Decision-Time, Relative Frequency of Judgement and Subjective Confidence as Related to Physical Stimulus Difference," Journal of Experimental Psychology, XXXII, 1943, 291-306.

Essentially this question deals with the ways in which a person's relative certainty or uncertainty about his decision affects his decision behavior.

Early experimental work in this area did not investigate the individual differences that were noted with respect to decision behavior and confidence. Several investigators found that decision time was longer where the subjects felt less confidence in their decisions.

Hermon³¹ had his three subjects express their degree of confidence, based on a four point scale, following each judgement. He found that an increase in decision time was generally accompanied by a decrease in confidence. Seward³² found that there were marked individual differences in confidence ratings where the stimuli consisted of a response to recall material. She used several types of recognition experiments in which the subjects were instructed to say whether or not the stimuli presented in the second part of the experiment were the same as those which had been presented earlier. Some of the stimuli had been shown previously and some had not. The stimuli presented differing degrees of difficulty for recognition. One hundred and eight subjects participated in the experiment. Among the individual differences were that some of the subjects preferred the upper extremes of the confidence rating scale, some preferred both extremes of ratings, and others showed a fairly even distribution in their confidence ratings. Accurate decisions

³¹Hermon, "Time and Accuracy of Judgement," Psychological Review, XVIII, 1911, 186-201.

³²Georgene H. Seward, "Recognition-Times as a Measure of Confidence," Archives of Psychology, IC, 1928, 1-62.

tended to be accompanied by greater degrees of confidence and to be given more quickly than inaccurate decisions. Volkman³³ gave each of three observers a series of one hundred comparative judgements. These judgements consisted of deciding which of two lines had the greater incline. He used the method of constant stimuli in a two category judgement. Following the complete series of judgements the procedure was repeated. In the repeat procedure the subject responded with the amount of certainty he had about the correctness of his previous judgement. Eleven categories of certainty were used. During the original presentation the time of response was noted. When the response times from the first presentation were correlated with the degrees of certainty they showed that the greater the certainty in the judgement the shorter the time of response.

The experimental findings that suggested that some individuals seemed to function within a given range of confidence was followed up by Johnson.³⁴ He investigated the generality of confidence with respect to the making of judgements. He was primarily concerned with whether a person who is confident of one judgement was likely to have the same relative degree of confidence in another judgement where different stimuli were used. He had forty-one subjects make thirty-five two category judgements on each of four kinds of stimulus material. The stimuli included were: the length of lines; the meaning of

³³John Volkman, "The Relation of the Time of Judgement to the Certainty of Judgement," Psychological Bulletin, XXXI, 1934, 672-673.

³⁴Johnson, "Confidence and Speed in the Two-Category Judgement," Archives of Psychology, CCIXL, 1939, 1-62.

words (thirty-six true false statements defining words); the recognition of geometric figures some of which had been previously shown; and the position of the subjects hands in relation to designated points of reference. The psychology instructor of the subjects rated them in self-confidence on the basis of his impression of them in this respect. After each judgement the subjects expressed a degree of confidence in the judgement. Johnson found that his subjects were very consistent in their expressed confidence in judgements of any one type. He also found a fairly high positive correlation between the subjects confidence in his judgements and the confidence rating given the subjects by their instructor. He interpreted this r of .50 as supporting his hypothesis that a personality characteristic of confidence is reflected in the judgement behavior of individuals. The generality of confidence of subjects from one task to another was found to be dependent to a measurable degree upon the individual's characteristic in this regard.

b) Personality characteristics and decision behavior

Thus far the findings presented have been derived from investigations where subjects have been asked explicitly to make judgements. However, decisions are involved in other types of situations. Responses to Rorschach cards, for example, involve the decisions of which kind of response the subject chooses to give. He can decide to give a response which selects a good likeness or one which barely hints at the configuration that is actually there. In either case the decision comes in the form of the subject implicitly saying, "This is what I choose." This formulation enables the use of observations regarding the reaction times to Rorschach cards for shedding further light on decision behavior in regard to personality.

Phillips and Smith³⁵ offer empirical observations in regard to the above problem. They suggest that,

The time of the first response to each of the cards has prominent personality correlation although it lacks diagnostic significance. Mean response times of 10 seconds or less are characteristic of immature and impulsive persons who lack foresight or planning ability and typically are passive and suggestible. Lengthened reaction times . . . are associated with cautious, unspontaneous, typically rigid and methodical adjustment and with the tendency to avoid new situations or to approach them with reluctance.

These observations are in general agreement with findings from an investigation in which personality data was collected on subjects who performed tasks involving decisions.

Block and Peterson³⁶ studied fifty-three army officers using a battery of personality tests, perceptual-cognitive tasks, interviews, psycho-dramas, and other techniques. Each subject was then described by each of eight staff members by means of a 76 item Q sort rating and an adjective check list. A composite Q and a composite adjective check list was derived for each subject. These subjects were given decisions to make in a two category experiment in which the method of constant stimuli was used. The subjects had to decide whether one line was longer or shorter than the other. Fifteen positions of lines were used in graduated differences of one sixteenth of an inch. Each position was repeated ten times. After each judgement the subject rated his degree of confidence in the judgement. Judgement times and responses were

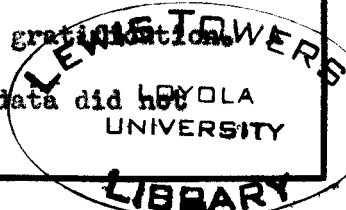
³⁵Phillips and Smith, Rorschach Interpretation, New York, 1953, 196.

³⁶Jack Block and Paul Peterson, "Some Personality Correlates of Confidence, Caution, and Speed in a Decision Situation," The Journal of Abnormal and Social Psychology, LI, 1955, 34-41.

recorded. Subjects were then categorized as either Overly Confident, Overly Cautious, or as having Warranted Confidence. This categorization was based on the appropriateness of his confidence as measured by his accuracy in judgment.

A comparison was made between the Q sort description and the adjective check list with the three types of categories. The group classified as Overly Confident were found to have been judged as overcontrolled, constricted, blustery, dogmatic, and with little tolerance for the complexities of living. The group classified as Overly Cautious were judged to be lacking in self-reliance, overly introspective, and to have difficulty in sustaining effort and delaying gratification. This group was believed to adjust to the world via non-participation. The personality data on the group rated as having Warranted Confidence pictured them as being self-reliant, socially perceptive, flexible without being fluid, and able to sustain effort without being perseverative. In addition they appeared to adapt to different situations as required, in contrast to the other two groups.

On the basis of the decision times the total sample was divided into fast and slow deciders. A comparison was made between these groups in terms of personality correlates. The fast decider in both easy and difficult decision situations was found to be lacking in confidence and self-assertiveness. Some of the personality correlates associated with the fast decider were passivity, conformity, a tendency to overcontrol and inhibit himself, a slow personal tempo, rigidity, and pedanticism. The slow decider was found to be self-assertive, ascendant, acts impulsively, and unable to delay gratification. A comparison of accuracy and inaccuracy with the personality data did not



reveal any significant results.

The investigators point out that the findings in many respects do not meet with the common sense expectation. They suggest that the fast decider in this situation responded in this way because he is unable to withstand the pressure of making decisions and capitulates quickly. On the other hand they believe the slow decider was able to take more time because he could assert himself and be more leisurely in making these decisions. However, they also attribute the somewhat paradoxical nature of the findings to the particular kind of decision situation faced by the subject. In these decision situations a response was readily available to the decider in the form of "longer" or "shorter" and the importance of the outcome of the decision is not great. They suggest that if the decision were more complex and more important the present fast decider would be vacillating and slow, and the present slow decider would decide rapidly. Another explanation for their findings may lie within the way the data was analyzed. They do not report on the question of whether there were two or more types of fast and slow deciders. Some fast deciders may be inaccurate but confident while others may be accurate but lack confidence. The same may be true for slow deciders. It would seem that an analysis of the data which takes into consideration accuracy, confidence, speed, and personality variables might reveal findings congruent with expectations.

The experimental findings presented in this section of the chapter indicate that certain objective and subjective factors operate in the decision behavior of people. A positive relationship exists between the number of alternative choices a person is faced with and the difficulty of the decision.

This relationship is partly dependent on the equivalence of the alternatives. The context of the decision situation, with reference to instructions, influences the choices made and the time taken to make them. The greater the similarity between the alternatives, the more difficult the decision is and the longer it takes to make the decision. The general level of confidence which a person has is reflected in his approach to decision making. A high level of confidence appears to lead to more rapid decisions than when a low level of confidence is characteristic of the person. There are suggestions that other personality attributes may be characteristic of a person's approach to making decisions. However, the evidence is inconclusive with respect to the characteristics which are found with different types of decision behavior.

C. Decision Difficulty and Conflict

Several factors have been noted above which have been found to influence the amount of difficulty a person experiences in making decisions. There is experimental evidence that suggests that difficulty in making decisions has resulted in conflict. The conclusion that some types of decision situations involve conflict for people is derived from two principal sources. One source is theoretical formulations from which hypotheses have been developed and tested against experimental evidence. Another source has been experiments in which behavioral criteria support the conclusion that a decision situation is a type of conflict situation.

Cartwright³⁷ advanced a quantified theory positing a relationship between decision difficulty, decision time, and conflict. His theoretical position is that a decision situation involves the presence of opposing forces and that a person would probably experience some conflict in making a choice each time. He did several experiments in which a series of stimuli were differentiated into several ranges of equivalence and a category name established for each of these ranges. He found that a direct relationship obtained between the relative frequency of the alternative chosen, the similarity between the alternatives, and the length of time it took to make a decision. Those stimuli which, when compared with each other, were chosen with equal frequency had the maximal decision time. Those stimuli which were next in the relative frequency of choice had the next largest decision time, and so on. Assuming that the relative frequency of choice between alternatives does reflect the degree of conflict, then the decision time would also appear to be an indicator of conflict. These conclusions were confirmed by Festinger.³⁸

Miller presents an analysis of conflict which is, in part, applicable to an understanding of the types of conflict in decision situations. Three types of decision difficulty may be discerned in his analysis. One type of decision

³⁷Cartwright, "Decision-Time in Relation to the Differentiation of the Phenomenal Field," Psychological Review, III, 1941, 425-442; Cartwright and Festinger, "A Quantitative Theory of Decision," Psychological Review, I, 1943, 595-621; Cartwright, "The Relation of Decision-Time to the Categories of Response," American Journal of Psychology, LIV, 1941, 174-196.

³⁸Festinger, "Studies in Decision: I. Decision-Time, Relative Frequency of Judgement and Subjective Confidence as Related to Physical Stimulus Difference," Journal of Experimental Psychology, XXXII, 291-306.

difficulty is present when both alternatives are desirable. Under these circumstances he proposes that even where the alternatives are equally desirable the tendency will be to approach the nearest alternative or the goal that happens to be chosen first. In another type of choice a person is faced with making a choice between undesirable alternatives. In a third type of decision situation, which also presents conflict, a person has to decide whether or not to choose a single alternative which has both positive and negative qualities. Evidence from a number of experimental studies is presented in which behavioral and time indices of conflict are used to support his analysis.³⁹ Although this kind of approach to an understanding of decision making and conflict does not argue against Cartwright's formulations⁴⁰ it places greater emphasis on the motivational aspects of decision behavior.

Many experiments with animals have been designed to produce an "experimental neurosis" through the use of difficult discriminations. Generally these experiments have employed some type of conditioning technique to create a reward or punishment situation. Under these conditions when the differences between the stimuli have been ambiguous the behavior noted has been described as evidence of a conflict.⁴¹ Where people have been used as subjects in difficult decision situations the conditions for the experiment, and the

³⁹Neal E. Miller, "Experimental Studies of Conflict," Personality and the Behavior Disorders, ed. Joseph McVicar Hunt, I, New York, 1944, 431-465.

⁴⁰Cartwright and Festinger, "A Quantitative Theory of Decision," Psychological Review, L, 1943, 595-621.

⁴¹Howard S. Liddell, "Conditioned Reflex Method," Personality and the Behavior Disorders, ed. Joseph McVicar Hunt, I, New York, 1944, 389-430.

results, have generally been less dramatic.

In the experiment by Wells,⁴² noted above in another context, subjects had to choose between previously evaluated alternatives consisting of taste preferences in liquids. A psychogalvanometer was attached to the subjects throughout the experiment. She reported that a lowering of resistance followed the presentation of liquids for which the subject had a similar amount of preference. In addition, a drop in resistance regularly accompanied the making of the decision. These findings offer support for the interpretation that tension is present during the process of making difficult decisions which reaches a climax when the subject gives his decision.

Godbeer⁴³ had children make a choice between candy and toy soldiers. An attempt was made to equate the number of toy soldiers which equalled a piece of candy for each child. One group of children was observed under conditions where the alternatives were equal and another group was observed where the alternatives were unequal. Three measures of conflict behavior were employed: a) movements of a lever which indicated the child's choice; b) the eye movements back and forth between alternatives were counted; and c) the decision time was recorded. The subjects who had to choose between equally desirable alternatives showed more eye movements, moved the lever back and forth in the direction of both alternatives more frequently, and took longer to make their

⁴²Wells, "The Phenomenology of Acts of Choice; an Analysis of Volitional Consciousness," The British Journal of Psychology, Monograph Supplement, IV, 1927, 1-150.

⁴³E. Godbeer, "Factors Introducing Conflict in the Choice Behavior of Children," Dissertation, Yale University, 1940, Reported in Miller, Ibid.

choices than the other group.

In an experiment by Barker, conflict in a decision situation was behaviorally elicited as well as a comparison between the relative amount of conflict in a "real" as compared to an "unreal" decision situation. He presented a sample of ten year old boys with a "real" choice between two liquids. The "reality" was introduced by the experimental condition that the subjects had to drink the liquids they chose. In the other situation the subjects merely had to choose which of two liquids they would drink if they had to drink one of them. Decision time and movements back and forth between choices were used to estimate the amount of conflict engendered by the choice. The liquids were first arranged by the subjects in their order of preference by means of paired comparisons. The results showed that as the difference in preference between the alternatives decreased the decision time increased. The length of the decision time was found to have a positive relationship to the frequency of lever movements. The findings were not conclusive with respect to significant statistical differences in the "real" and "unreal" decision situations. However, the trend indicated is that "real" decisions require more time and produce more conflict behavior, in the form of frequency of lever movements, than hypothetical ones.⁴⁴ This evidence suggests if differences in attitude towards these two types of situations exist, they are one of degree rather than kind.

The literature reviewed thus far is generally confirmatory of the position

⁴⁴Roger G. Barker, "An Experimental Study of the Resolution of Conflict by Children; Time Elapsing and Amount of Vicarious Trial-and-Error Occurring," Studies in Personality, ed. Q. McNemar and M. A. Merrill, New York, 1942.

that a decision situation is a type of conflict situation. Additional support for this position is gained when difficult decisions are involved. Viewing a decision situation as a type of conflict situation appears to apply to decisions involving stimuli of little real consequence to people, such as judgements of lines, as well as where the alternatives involve subjective preferences. Where decisions involve "real" consequences rather than hypothetical ones the differences in conflict behavior between these two kinds of situations tend to be quantitative rather than qualitative.

D. Group Comparisons in Decision Behavior

The prediction has previously been advanced by another investigator that differences in decision-time and accuracy would be found in comparing normals and neurotics in decision situations. Meer called attention to this problem through postulating an analagous relationship between reaction-time and form level on the Rorschach, and decision-time and accuracy in a psychophysical experiment. According to his formulation, in the former situation the subject must decide whether to inhibit impulsive associations in order to achieve reality oriented associations or reduce the tension in the situation by giving impulsive responses. In an investigation of the relationship between reaction time and form level on the Rorschach he found a high positive relationship between these factors for normals. He explains this finding in terms of the subject's capacity to endure frustration which enables him to inhibit inadequate responses. This explanation provides the basis for his prediction that neurotics would have a significantly lower positive correlation between decision

time and accuracy in a decision situation than normals.⁴⁵

The findings from investigations comparing psychologically normal and abnormal groups tends to offer confirmatory evidence that differences in their reactions to decision situations exist. These findings generally center around decision time differences between such groups. It will be recalled that experimental evidence supports the conclusion that decision time is a measure of conflict. Used thusly, some studies involving the decision time taken to choose a level of aspiration have application in the present context. The conflict involved is probably between one's desire for self-esteem and status as opposed to one's fear of failure in achieving the goal chosen. If one wanted to gain maximum assurance of being correct in fulfilling his aspiration level one could choose a very low level very rapidly. Presumably, additional time is taken by some subjects because of their attempts to "squeeze out" the highest choice within their self-estimates of their capabilities without being incorrect. Previous investigators have observed that one aspect of the level of aspiration is a decision situation when the person is attempting to decide the level of difficulty he will attempt.⁴⁶

Escalona did a study of different diagnostic groups with regard to the time taken to choose a level of aspiration. She compared a group of sixteen manic patients, 24 depressed patients, and 36 normal subjects. Two types of tasks were used. In the first task the subjects had to choose from a

⁴⁵Bernard Meer, "The Relative Difficulty of the Rorschach Cards," Journal of Projective Techniques, XIX, 1955, 43-53.

⁴⁶Lewin, Field Theory in Social Science, New York, 1951, 270-271.

series of paper and pencil mazes which were arranged in order of difficulty. In the other type of task twelve peg boards graded in size were used. In order to avoid an overlap in reactions which might cancel out meaningful differences, the depressed group was classified into five groups. This division was based on differences in the types of retardation manifested. The quantitative measures obtained supported the behavioral distinctions on which the depressed group had been divided. The total depressive group averaged significantly longer to make their decisions than either of the other groups. The differences between the normals and the manics were negligible on the mazes and somewhat shorter for the normals than the manics on the peg board. A measure of conflict assumed to be independent of decision time was taken. This consisted of the number of fluctuations in glance between the different choices. Fluctuation in glance was considered to be a reflection of indecision and therefore conflict. The decision time measure was concluded to be a reliable indicator of conflict since it showed corresponding increases with the measure of fluctuation in glance. The findings from this study suggests that the depressed group experienced more conflict in making decisions than either of the other groups.⁴⁷

In a subsequent study Escalona investigated the use of the level of aspiration as a diagnostic tool.⁴⁸ The times taken to decide on the levels

⁴⁷Sibylle K. Escalona, "The Effects of Success and Failure Upon the Level of Aspiration and Behavior of Manic-Depressive Psychosis," Welfare, XVI, No. 3, University of Iowa Studies, 1940, 197-302.

⁴⁸Escalona, An Application of the Level of Aspiration Experiment to the Study of Personality, Teachers College Columbia University Contribution to Education, No. 937, New York, 1948.

of aspiration were recorded and comparisons made between adjusted and maladjusted groups. One group was composed of nineteen people between the ages of 14 and 18 years of age who were classified by the investigator as overtly well adjusted. This classification was made on the basis of school data which included descriptive comments by school authorities. The other group was classified as overtly maladjusted people and was also composed of nineteen subjects in the same age range. Both groups were considered similar in all respects other than their personality adjustment. Data from the California Test of Personality was obtained from these groups and later analyzed. Significant differences in the adjustment scores were found between these groups. In the experiment the groups were asked to choose between a series of puzzles of graded difficulty in terms of the level of difficulty they wanted to attempt. In addition to recording the time taken to make a choice, the number of fluctuations in glance between alternative choices was approximated.

Among the findings from this study the average decision time of the maladjusted group was revealed to be significantly longer than that of the adjusted group. The maladjusted group also took significantly longer to make a decision after a failure than after a success, than was the case with the adjusted group. A qualitative analysis based on interview material showed the adjusted group to have attempted to form a systematic plan for making future choices. This was significantly less in evidence for the maladjusted group. These findings were interpreted as indicating that the maladjusted group showed a greater sensitivity to failure, and in anticipation of failure delayed longer in making decisions, than the adjusted group. Despite their concern about failure they were not led to plan ahead systematically regarding

their decisions to the same extent as the adjusted group. The decision variables of time and behavior appeared, therefore, to reveal significant differences between the groups. These differences suggest that the adjusted group was more efficient in several respects than the maladjusted group in making decisions.

It may be assumed that if maladjusted groups differ from adjusted groups in decision behavior that neurotic groups will also differ from non-neurotic groups, in this regard. Some evidence from the decision aspects of level of aspiration studies appears applicable to this question.

Eysenck and Himmelweit⁴⁹ provide a tentative answer to the question of whether different types of neurotic groups differ in the degree to which their need for self-esteem influences decision behavior. The method of factor analysis was used to divide a hospital population composed mainly of neurotics into two groups. One group, which was called "hysterical," contained those patients whose symptoms mainly involved psychogenic conversions, and hypochondriasis. The second group, which was called "dysthymic," was characterized by a syndrome whose main features included anxiety, reactive depression, and obsessional tendencies. Fifty male hysterics and fifty male dysthymics were given the triple tester in a level of aspiration situation. This task consisted of keeping a small metal ball on a revolving miniature highway which required the subject to anticipate his moves. The task was repeated ten times

⁴⁹Hans J. Eysenck, and H. T. Himmelweit, "An Experimental Study of the Reactions of Neurotics to Experiences of Success and Failure," Journal of General Psychology, XXXV, 1946, 132-134.

following a series of practice trials and instructions. The groups were equated for age, intelligence, and ability in the test. The dysthymic group was found to choose goals which were further from their actual attainment than the hysteric group. The hysterics tended to decide on a lower goal after failure and a higher goal after success to a significantly greater degree than the dysthymics who tended to be more inflexible in their decision making. In order to determine whether the above results were largely a function of the particular test used, the experiment was repeated with different subjects who fitted the descriptions of the previous groups using a different test. The results reported were in agreement with those obtained in the first experiment.⁵⁰ These results indicate that the hysteric group tended to modify their decision behavior in the light of their experience to a greater degree than did the dysthymics. These differences suggest the possibility that neurotic groups may differ from each other in meaningful ways in other kinds of decision situations.

In another experiment Himmelweit⁵¹ compared dysthymic and hysteric groups with respect to speed and accuracy on a variety of tests. Fifty subjects were in each group. Each of the tests were scored in terms of the time taken to complete them and the accuracy of the performance. Each test was done twice. Of interest here, are the results when the test conditions included

⁵⁰H. T. Himmelweit, "A Study of Temperament of Neurotic Persons by Means of Level of Aspiration Test," Thesis, University of London, 1945, reported in Eysenck, Dimensions of Personality, London, 1947, 137.

⁵¹Ibid., 150-154.

instructions to work as quickly and accurately as possible. From the standpoint of decision making subjects were then faced with making a choice between these two factors. The differences between the groups in terms of the time taken to complete the tasks were not statistically significant but did indicate a tendency of the dysthymic group to be slower than the hysteric group. However, the dysthymic group was significantly more accurate than the hysteric group on every test. These findings are suggestive of possible differences between more conventionally diagnosed neurotic groups with respect to decision time and accuracy.

Himmelweit⁵² also compared two groups of normals with two types of neurotic groups (hysteric and dysthymic) using the triple tester described earlier. One group of normals was composed of 20 male soldiers, and the other group consisted of 33 female nurses. Twenty-two male dysthymics composed one neurotic group, and twenty male hysterics composed the other group. Pertinent to the study here, is the finding that when the neurotic groups under-rated their performance in the level of aspiration situation they tended to decide to lower their goals still further. When they over-rated their performance they tended to decide to raise their goals still further. The normals, on the other hand, showed a reversal of this pattern. One of the conclusions that might be drawn from this finding is that the neurotics tended to make more unrealistic decisions in the light of their past experience than did the normals.

E. The Generality of Decision Behavior

An important problem in investigating decision behavior is the extent of

⁵²Ibid., 139-140.

its generality. Is the measure of the behavior in question characteristic of the individual, or is it specific to each decision situation? If a person behaves in the same way, or similar way, in different tasks involving decisions, such behavior suggests generality.

The problem of generality has been previously referred to in regard to the relationship between confidence and decision behavior. The conclusion of the study cited in this regard was that individuals have a characteristic level of confidence which is manifested in different types of decision situations.⁵³

Decision time has been suggested as a measure which depends on the degree of caution and restraint with which individuals approach choice situations. In addition, decision time may be a measure of the difficulty individuals have in resolving some types of conflict.⁵⁴

Festinger and Wapner⁵⁵ investigated the generality of decision time in the process of constructing a test of decision time. They used 75 female university students who were given a series of four tests which involved a total of 130 judgements for each subject. The tests were arbitrarily considered to represent some divergence in the types of decisions involved.

⁵³Johnson, "Confidence and Speed in the Two-Category Judgement," Archives of Psychology, CCIXL, 1939, 1-52.

⁵⁴Festinger, "Studies in Decision: I. Decision-Time, Relative Frequency of Judgement and Subjective Confidence as Related to Physical Stimulus Difference," Journal of Experimental Psychology, XXXII, 1943, 291-306.

⁵⁵Festinger and Wapner, "A Test of Decision Time: Reliability and 'Generality'." Civil Aeronautics Administration, Division of Research, Report NO. 48, 1945.

Three of the tests involved psychophysical discriminations each of which involved a different sense modality. They included: visual judgements between the length of lines; tactual judgements between the size of angles; and tactual judgements between the length of lines. The fourth task consisted of judgements between which of two words best fitted a particular phrase. The words which were used were mostly synonyms although the subjects were instructed otherwise.

The principal measure derived from the data was called decision-time. This measure represented the difference between the average time taken to decide on the easy discriminations and the average time taken to decide on the difficult discriminations. The problem of generality was dealt with by determining the intercorrelations among decision-times obtained in the four decision situations. They found that the decision-time intercorrelations for the four tests ranged from .52 to .59 and that all of the correlations were significant at the .01 level. The size and significance of the correlations is interpreted by the investigators as indicating that the measure of decision-time is an indicator of the characteristic way in which people react to a type of conflict situation. The narrow range of intercorrelations between the tests was construed as indicating that the degree of generality does not decrease as the pairs of situations become more divergent. The similarity of the tasks is a recognized weakness of this study with respect to the problem of generality as defined by the investigators. However, the findings are suggestive that decision-time does have a significant extent of generality.

Individual consistency in the manner in which conflicts over choices are

solved was demonstrated by Hovland and Sears.⁵⁶ In the situation used for the experiments, subjects were instructed to select between two alternatives. The subjects had practiced in a random order two incompatible manual responses and then were presented simultaneously with the two lights which had served as a signal for the two individual responses. Four types of manual conflicts were set up by using different instructions for four different groups. One of the findings, applicable to the present context, was that in a given type of situation individuals were consistent in the way in which they resolved the conflict.

The combined evidence regarding the generality of confidence and decision time, and individual consistency in solving conflicts involving a choice, indicates that some aspects of decision behavior may reflect stable personality characteristics.

F. Summary

A decision situation involves a choice between alternatives. As the evidence cited has indicated, this choice can be made by acting on both objective and subjective considerations in the situation. By subjective considerations we have reference to such things as the degree of confidence of the person. The principal concern here is with personality considerations which might lead to differences in the extent to which one or the other type of factor predominates. This concern is related to the importance of such considerations to decision theory and problems of adaptive behavior in general.

⁵⁶Carl Hovland, and Robert Sears, "Experiments on Motor Conflicts; Types of Conflicts and their Modes of Resolution," Journal of Experimental Psychology, 1938, 23, 477-493.

Evidence has been presented of a theoretical and empirical nature indicating that difficult decisions involve a type of conflict. The extent of the conflict has been found to be, in some measure, dependent on the extent of the difficulty of the choice. Evidence favors decision time as being a measure of conflict. In terms of this measure findings have been presented indicating that people react characteristically to the conflict in decision situations.

The findings from some level of aspiration studies have applicability to differences in decision behavior between normal and abnormal groups. These findings support the suggestion that normal people function with greater objectivity and efficiency in making certain types of decisions than abnormals.

Previous investigations reveal certain differences in the decision behavior of psychologically normal as compared to abnormal groups. However, no systematic investigation of differences in decision-time, accuracy, generality, and intra-individual variability between normal and neurotic groups in decision situations has been done. Remedying this deficiency will be the goal of this study.

CHAPTER III

METHODOLOGY

A. Description of Subjects

A total of 60 women between the ages of 19 and 45 with a minimum of two years of high school education were subjects for the experiments. They were tested during the period from December 1954 through September 1955. This experimental population was composed of 60 individuals, 20 people in each of three groups. One group was classified as normals (hereafter referred to as the No group), another group was classified as impulsive neurotics (hereafter referred to as the I group), and the third group was classified as cautious neurotics (hereafter referred to as the C group). With 4.0 representing high school education including graduation, the mean of the No group was 4.3, the mean of the I group was 4.5, and the mean of the C group was 4.7. The amount above 4.0 represents a portion of a year of college. The range of the education of the subjects included two years of high school up to one year of graduate training. The mean age of the No group was 28.9 of the I group 31.6, and of the C group 35.3 years. The age range of the subjects was from 19 through 45 years of age.

The criteria determining the eligibility of subjects for the No group rested primarily on two factors. One factor was the exclusion of subjects with any known psychiatric disability past or present. The other factor was the exclusion of subjects who were judged to manifest adjustment difficulties

in their current employment. These subjects in the No group were all residents of Lake County, Indiana, and were employed in clerical capacities in the Lake County Department of Public Welfare.

Criteria of adjustment in employment were used. They included a rating by the Director of the Welfare Department of the subject's freedom from any neurotic disability as manifested on the job, and a fitness report* on the subject made out by her immediate supervisor. The Director is a professionally trained psychiatric social work supervisor. His office is centrally located in the department from which subjects were drawn and is glass enclosed. These physical features afford him an excellent opportunity for observing the entire clerical staff during the performance of their duties and in their interaction while in the office.

He was asked to make two judgements concerning each clerical employee:

- (a) From your personal observation of this employee during her hours of employment is she free of any neurotic disability?
- (b) Based on your knowledge of this person's supervisor and the relationship she has to this employee, do you believe she would:
 - 1. Be reasonably objective in evaluating her in all areas of her fitness report.
 - 2. Be reasonably objective in some, but not all areas of her fitness report.
- (c) If the answer to the above question is (2.), list the areas of the fitness report where this lack of objectivity might be revealed.

On an a priori basis it was decided that all potential subjects would be excluded whom the Director believed to have a neurotic disability. Out of a total of 45 potential subjects two were excluded on this basis. The fitness

*See Appendix XI.

report includes, among other things, the areas of: interpersonal relationships on the job; cooperation with other staff members; ability to accept instruction where indicated; personal stability; and personal characteristics. These areas were assumed to be sensitive indicators of possible maladjustment. If the Director gave the opinion that the supervisor would not be objective in evaluating a potential subject in any of these areas the subject was excluded. One person was excluded on this basis.

A fitness report is made out annually for each employee. To qualify for the No group a person's overall rating had to be at least satisfactory. In addition, she had to receive a satisfactory rating, or better, in each of the areas assumed to be sensitive to possible maladjustment. On the basis of the supervisor's ratings one employee was excluded from the No group. A list of the names of all employees who remained eligible was compiled. This list consisted of 41 names.

It was recognized by the experimenter that the use of a psychological test in the form of an adjustment inventory might have increased the confidence in the screening process. The director of the agency from which the No group was to be obtained declined giving administrative approval for this procedure on the basis that excessive anxiety might be generated for the staff which might result in decreased work efficiency. Since reasonable precautions were taken to eliminate people with a neurosis, and since the population offered certain advantages from the standpoint of homogeneity and availability it was decided to proceed within the limitations of this sample.

The known practitioners of psychiatry in Lake County were contacted and they agreed to aid in the further screening of people with a neurosis from the

No group. They were each sent a copy of the list of eligible subjects and instructed to indicate by a check-mark the names of any person on the list whom they had treated in the past, any person whom they were presently treating, or any person whom they knew to have received, or to be receiving, treatment for psychiatric and/or psychological problems. The only clinic in this county which provides psychiatric and psychological services, similarly agreed to review the names of the people on the eligible list. The results of this entire procedure eliminated two people from the eligible list of the No group. As a further precaution each subject from the No group was routinely asked whether she had received, or was receiving, any kind of psychological or psychiatric care. No subject responded positively to this.

Initially two types of neurotics were sought for the experiment. These were people with a neurosis of the obsessive-compulsive type, and people with a neurosis diagnosed as hysteria. These types were presumed to have distinctive characteristics pertaining to decision behavior. The obsessive-compulsive neurosis is often accompanied by indecisiveness and excessive cautiousness. People with hysteria are frequently found to be impulsive in their actions. Those clinics and hospitals which were contacted as possible sources for the above types of subjects reported that these subjects were not available. The basis for their unavailability was either that formal diagnostic nomenclature was not used in the settings, or that the particular diagnostic types being sought were extremely rare in those settings. Other criteria for establishing the neurotic groups were then considered.

A functional basis involving components of personality considered most pertinent to the behavior under study was employed in the selection of neurotic

groups. Impulsivity and caution appeared to be characteristics which bear a close relationship to decision behavior. An accurate selection of a group of neurotics along this dimension was expected to reveal any decision time differences between neurotics and normals.

One of the criteria for being a subject in the neurotic groups was that the person was actively being treated for an illness which had been diagnosed as a neurosis. The distinction between the two neurotic groups was that those in the I group were judged by their treatment psychiatrists to be more impulsive than cautious, and those in the C group were judged by their treatment psychiatrists to be more cautious than impulsive.

In each of the settings where the experiments were run the psychiatrists who were potential sources for subjects were seen either individually or collectively. They were given an explanation of the definition of impulsivity and caution as it pertained to this study. The idea was emphasized in this explanation that we were not concerned with the dynamic meaning of those terms as they might apply to our subjects, but were limiting this description of impulsivity and caution to the behavior of the patients in question. When a patient met the criteria for the neurotic group the treatment psychiatrist was given a forced-choice question to answer regarding the patient. The question was posed in the following way: "Based on your knowledge of this patient, if you had to classify her behavior in terms of impulsiveness or cautiousness would you classify her as, (a) impulsive, lacking sufficient restraint, or (b) too cautious, overly indecisive." The classification of each patient was not made known to the experimenter until after the completion of the testing session.

The establishment of the diagnoses for the patients who made up the samples of neurotics proceeded differently at the different clinics. However, in each of the clinics these diagnoses were formally made by the senior psychiatrists who were either eligible for, or had passed their specialty boards in psychiatry. In two of the clinics the diagnoses resulted from diagnostic conferences presided over by senior psychiatrists. Material at these conferences included the social and psychiatric histories, and psychological tests where they had been part of the study made of the patient. In the other clinic the diagnoses were made by senior psychiatrists on the basis of psychiatric interviews with the patients. All of the forty patients making up the neurotic samples were actively engaged in psychotherapy at the clinics from which they were obtained.

B. Method of Obtaining Subjects

After the list of 39 eligible subjects for the No group was composed each potential subject was sent a memorandum signed by the Director of the Department of Public Welfare. This memorandum told them that they might be contacted by the experimenter and asked to take part in a research project concerned with gaining a better understanding of people. The notice went on to state that this project had the approval of the Director but was voluntary insofar as their participation was concerned. Since the order of the names on the list was purely random, data was obtained on the first 20 subjects for the purpose of analysis.

In order to get patients for the C and I groups all psychiatric clinics treating adults, which were within commuting distance of Chicago, Illinois and Gary, Indiana were contacted by phone and mail. A brief explanation of the

research problem was given along with a request for their cooperation in providing patients. Six of the nine clinics contacted were unable to provide patients meeting the requirements of the investigation.

The three remaining clinics which agreed to provide patients meeting the criteria for the experiment included the Mandel Clinic of Michael Reese Hospital, Chicago; The Montgomery Ward Clinic, Northwestern University Clinics, Chicago; and The Lake County Mental Health Clinic, Gary, Indiana. It was necessary to use all three of these clinics since no single one of them could provide the required number of subjects within a reasonable time period.

In each of the above settings the folders on every case in treatment were reviewed by the experimenter. A list was made up of the names and diagnoses of those cases which met the predetermined criteria. The aims and methods of the experiment were explained to the psychiatrists responsible for the treatment of the cases selected. This was done by the person in charge of research at the institutions together with the experimenter. In addition, the psychiatrists were given a mimeographed statement (see appendix 1.) to give to designated patients in order to facilitate getting patient cooperation in arranging appointments.

As a result of this method of obtaining patients, Mandel Clinic supplied 12 I and 15 C patients, Montgomery Ward Clinic 4 I and 3 C patients, and Lake County Clinic 4 I and 2 C patients.

C. The Experimental Stimuli and Administration of the Tasks

The three types of tasks used in these decision situations have received

fairly wide use for similar purposes elsewhere.¹ These tasks included discriminations between weights; discriminations between lines; and judgements between words. In each of the situations employed here both hard and easy decisions were involved, relative to each other, within the range of comparisons which we will discuss. This relative difference in difficulty between hard and easy decisions was based on the generally accepted assumption that large differences are more readily perceived than small differences.² Some preliminary work with several subjects bore out the expectation that the decisions which had been classified as hard yielded lower levels of accuracy than those which had been classified as easy. This question will be discussed further when the results of this study are analyzed.

The experiments were done in three different settings. All of the subjects from the No group, four patients from the I group, and two patients from the C group were tested in the same room in the Lake County Mental Health Clinic. The 27 neurotic patients obtained through Michael Reese Hospital were tested in rooms set aside for this purpose at Mandel Clinic and the Psychosomatic Institute for Research and Training. The 7 neurotic patients obtained through the Montgomery Ward Clinic were tested in a room in the Medical School of Northwestern University. The conditions in all three settings allowed for

¹Festinger, "Studies in Decision: I. Decision-Time, Relative Frequency of Judgement, and Subjective Confidence as Related to Physical Stimulus Difference." Journal of Experimental Psychology, XXXII, 1943, 291-306; Festinger and Wapner, "A Test of Decision Time: Reliability and Generality." Civil Aeronautics Administration, Division of Research, Report No. 48, 1945.

²Woodworth, Experimental Psychology, New York, 1938, 428.

complete privacy and no interruptions occurred. Provisions were made in each of the rooms where the experiments were conducted to maintain as close a similarity in lighting conditions as possible. However, there were undoubtedly variations in this regard. All practical attempts were made to take account of this. One method which was used was to exclude natural light and to place the stimuli in a position where it would be well lit and not subject to shadows. During the administration of all three tests a stop-watch was used which was concealed from the subjects. They were all given the tests in the following order: 1. Weight Test; 2. Line Test; and 3. Word Test.

C. Experimental Tasks and Procedures

After the subjects entered the testing room identifying data, including age and education, was obtained from them. The subjects for the No. group were also asked whether they had received, or were receiving, any kind of psychological or psychiatric care. None of the subjects responded positively to this question.

C. Experimental Tasks and Procedure

1. The stimuli for the Weight Test consisted of equal appearing weights and the subjects had to decide which of each pair of weights was the heavier. An 86, 82, 78, 54, and 50 gram weight made up the set used. The 86 gram weight was the standard and each of the other weights was compared with it ten times making a total of forty decisions. The comparisons of the 50 and 54 gram weights with the 86 gram weight composed the twenty easy decisions. The comparisons of the 78 and 82 gram weights with the 86 gram weight composed the twenty hard decisions. The order of presentation was randomized through the use of a table of random numbers. The standard weight was presented on

the right and left of each comparison weight five times. Through the use of a blindfold the weights were never visible to the subjects. This simplified the procedure from the standpoint of administration and timing of the test.

The subjects were seated at the side of a table, facing, and to the left of the experimenter. Following the introduction of the subject to the general situation the instructions for the Weight Test were read to them.

The first situation will be a test of weight judgement. You are to decide which weight of each pair you will be given is heavier, the one in your left hand or the one in your right hand. At times they may seem equal but they never are. You are to respond only once and only with the words Left or Right, depending on which hand the heavier weight is in, your left hand or your right hand. It's important that you do not see the weights and therefore you will wear a blindfold. You will rest just your hands on the table so that they are like fists. (Examiner demonstrates.) One weight will be placed against each fist. When you feel the weight against your fists pick them up between the thumb and forefinger simultaneously. (Examiner demonstrates.) Do not change the weights from the hand which has picked them up and remember to pick them up simultaneously. You will be given three practice trials after which I cannot answer any questions.

During the practice trials the experimenter tried to avoid giving any indications as to the relative importance of either speed or accuracy of the subjects' decisions. In the instances when questions were asked by the subjects the experimenter replied, "It's all up to you." The weights were presented in the manner indicated in the instructions. The timing was started from the point when the subject lifted the weights from the table. The timing was stopped when the subject gave a decision. The weights were both removed and the decision time and response noted. The experimenter attempted to maintain a constant time interval of approximately 15 seconds between the presentations of the weights. The blindfold was removed following the last trial and the subject was told that while her eyes were again becoming accustomed to the

light the next set of instructions would be read to her.

2. The stimuli for the Line Test consisted of pairs of lines drawn on white poster board 8 by $10\frac{1}{2}$ inches. The subjects were required to decide which of each pair of lines was the longer. Each pair of lines was on a separate board of this size. The two lines were drawn five inches apart from each other, and were in a vertical position. The lengths of the lines which were used were 5 inches, $4\frac{7}{8}$ inches, $5\frac{1}{8}$ inches, $4\frac{1}{2}$ inches, and $5\frac{1}{2}$ inches. The standard line was the 5 inch line and each of the other lines (including another 5 inch line), was presented with the standard line eight times making a total of forty decisions. The comparisons of the $4\frac{1}{2}$ inch and $5\frac{1}{2}$ inch lines with the 5 inch line composed the sixteen easy decisions. The comparisons of the $5\frac{1}{8}$ inch, 5 inch and $4\frac{7}{8}$ inch lines with the standard 5 inch line composed the twenty four hard decisions. Each of the comparison lines was on the right and left of the standard line four times. The order of presentation of the cards was randomized.

The lines were drawn on the cards in juxtaposition to each other. When the line on the right was one inch from the top and two inches from the bottom, the line on the left was more than one inch from the top and less than two inches from the bottom. Thus the lines were always in juxtaposition. Each of the comparison lines appeared an equal number of times in the "high" and "low" positions on both the right and the left sides of the standard lines.

The stimuli were placed at a distance six feet from the eyepiece of an exposure apparatus. This apparatus provided concealment for the experimenter, reduced to a minimum the view of any extraneous stimuli, and provided a method for uniform timing. The eyepiece was mounted on a rectangular box 10 inches

long and 4 inches square. At the end opposite the eyepiece a hinged door was attached which opened from the top down. A board 12 inches wide and 7 inches long was directly between the eyepiece and the rectangular box. Two holes were cut out in this board permitting direct vision to whatever stimuli were exposed when the hinged door was opened. The hinged door could be opened by releasing a catch and allowing the spring action to operate to drop the door. The apparatus could be raised or lowered to the most comfortable eye level for the subject. Timing was begun at the moment the hinged door was dropped exposing the stimuli.

The instructions for the Line Test were as follows:

This is a test of line judgement. You are to decide which line of each pair you will be shown is the longer, the one on the left or the one on the right. At times they may seem equal but they never are. You are to respond only with the words left or right depending on which line you decide is the longer the one on your left or the one on your right. When the apparatus is in front of you place your head against the eyepiece so that you are looking directly into the box. Keep your eyes open all during the test, find a comfortable position for your head and do not change this position. You will be given three practice trials after which I cannot answer any questions.

The apparatus was placed in front of the subject with the hinged door closed. A brief period of time was allowed the subject to become adapted to the darkness of the exposure box. Following the practice trials the subjects were presented with the series of line judgements. Timing was begun at the moment the catch on the hinged door was released. Timing was stopped when the subject gave her decision, and the hinged door was closed. The decision time and response were then recorded. A period of approximately twenty seconds elapsed between presentations.

3. The stimuli for the Word Test consisted of 30 phrases each of which was typed on a 3 by 5 inch card. A corresponding pair of words for each phrase was also typed on a 3 by 5 inch card. Twenty-five pairs of words were synonyms while five pairs of words contained words with different meanings. The subjects were to decide which word of each pair fitted the corresponding phrase better. They were told explicitly that the words in each pair never meant the same thing. The phrases and words used in this experiment were adapted from an earlier investigation of decision time. In that study the Word Test had shown a high correlation with other tests of decision time.³ In the present investigation the twenty-five pairs of synonyms constituted the hard decisions while the five pairs of words with different meanings constituted the easy decisions. The order of presentation was randomized. The words which were used are included in the appendix. (See Appendix I).

A cardboard 14 inches high and 10 inches long was used to shield from the subject's view all stimuli not immediately being presented to him. A stop watch was used for the purpose of timing. The instructions to the subjects were as follows:

This is a test of word judgement. In this test I will show you a sentence or a phrase. After you have read it you will say 'Ready' and you will be shown two words. You are to decide which of these two words best fits the sentence or phrase and say that word aloud when you have decided. The words may often appear to mean the same thing but they never do. The only response you are to make is to say the word aloud which you decide best fits the sentence or phrase. In every instance one of the two words fits the sentence better than the other word. You are to choose this

³Festinger and Wapner, "A Test of Decision-Time: Reliability and Generality." Civil Aeronautics Administration, Division of Research, Report No. 48, 1945.

word. You will be given three practice trials during which time I will answer any questions you may have about what you are to do. After the practice trials I cannot answer any questions. Only one response is permitted.

The two piles of cards, one of which contained the phrases and the other the words, were concealed from the subjects by the cardboard described previously. The experimenter placed the card containing a phrase face up on the table in front of the subject. When the subject responded with the word, 'Ready', the experimenter placed the card on which were the two words the subject had to decide between, face up on the table alongside of the first card. Timing was started when the second card was placed on the table. Timing was stopped when the subject responded with one of the two words and both cards were removed. The decision time and response were recorded for the regular trials. After the completion of the practice trials the subjects were told, "We will begin now." The procedure with the practice trials was repeated for the regular trials.

An inquiry into each subject's reactions to the tests was done after the entire procedure was completed. However, this was done informally and without a systematic procedure. Some of the following questions were asked of the subjects:

- (1) Generally speaking what do you think of what you have been doing?
- (2) What were your reactions to each of the tests?
- (3) Which test did you find most difficult? Why?
- (4) Which test did you find easiest? Why?
- (5) What basis did you use for making decisions on each of the tests?

Since subjects in the No. group worked in close proximity to each other they were asked not to discuss what they had done with anyone they worked with. Subjects for the No. group were routinely asked at the beginning of the session whether they had heard from anyone what the nature of the tasks was to be like. None of the subjects said that they had any information about the tasks other than that given them by the examiner.

CHAPTER IV

ANALYSIS OF THE DATA

The measures of concern in this study consist of the time taken by subjects to give decisions and the accuracy of these decisions. As explained earlier, accuracy is not involved in the decisions to the Word test. In the construction of both the Line and Weight tasks it was proposed that certain decisions could be characterized as easy, and others as hard. This assumption was based on the extent of actual physical differences between the stimuli that were to be compared. It seems pertinent before considering the differences between groups on the primary measures used to determine whether this assumption concerning the relative difficulty of the stimuli was justified in the light of the empirical findings.

A. Analysis of Stimulus Differences

The initial premise determining the classification of some decisions as easy and others as hard was derived from the extent of physical differences between the standard and the comparison stimulus in the case of the Weight and Line tests. On the Word test the logical assumption was made that comparisons between words which had different meanings were easier than comparisons between words which had the same or similar meanings. Obviously, the question of whether the decisions were, in fact, easy or hard rests in this instance on the actual responses themselves. That is, whether the comparisons termed easy were judged accurately significantly more often than those termed hard.

Inspection of the data on both Weights and Lines reveals that each subject, in all three groups, had a greater number of errors on hard than on easy decisions. (See appendices II through VII). Clearly then the presumed differences between easy and hard decisions on the Weight and Line test are verified. The method used for assessing the validity of the rationale concerning stimulus differences on the Word test assumed that hard decisions required more time than easy decisions. Inspection of the data on the Word test revealed that each subject, in all three groups, averaged more time on the hard than on the easy decisions. (See appendices VIII through X). The presumed difference between the easy and hard decisions on the Word test are also verified.

A related problem is that of determining whether hard decisions yielded better than chance accuracy. It is conceivable that under some conditions hard decisions could be so difficult that subject could only guess at the answers. For our purposes, if the normal group data shows a significantly better than chance degree of accuracy for hard decisions this would satisfy the requirements that subjects were not "forced" to guess at the answers. If the neurotic groups did not function in the same way as the normals in this respect it will be evident in later analysis of the comparisons in accuracy between the groups.

If the hard decisions were so hard that subjects could only be accurate on a chance basis, then theoretically if twenty decisions were involved each subject would be correct ten times and incorrect ten times. A technique

recommended by McNemar¹ was applied to determine the t value of the obtained accuracy from the accuracy to be expected by chance. As Table I shows, both tests have a p value which is beyond the .01 level of chance. It seems safe to assume that the No group was able to be accurate in making hard decisions on other than a "guesswork" basis.

B. Group Differences in Accuracy

The mean number of errors for each group is shown in Table II. It is clear that on both tasks the ordering of groups from most to least accurate is No, C, and I. This order is found consistently and appears when hard and easy decisions are considered separately or when they are combined.

TABLE I

DIFFERENCES BETWEEN OBTAINED AND CHANCE ERRORS FOR HARD DECISIONS ON WEIGHTS AND LINES IN THE NORMAL GROUP

Test	Mean Error	Hypothetical Mean Error	Standard Error	t	p
Weights	5.35	10.0	.557	8.34	.01
Lines	4.65	12.0	.308	20.83	.01

Table III presents an analysis of the reliability of these group differences in error on the Weight test. On all decisions combined the No group is significantly more accurate than either the C or I groups at less than the .01 level of confidence. However, the two neurotic groups do not differ signifi-

¹Quinn McNemar, Psychological Statistics, New York, 1949, 85, 221.

cantly from one another. The same picture emerges on the hard decisions. Yet, on easy decisions none of the differences between the groups attain statistical significance. It appears, therefore, that the differences between groups on total accuracy are largely derived from the hard decisions.

The statistical comparisons of the groups errors on Lines are described in Table IV. None of the t tests attain the conventional levels of significance. The statistically significant differences in accuracy favoring the No group in comparison to the neurotic groups on the Weight test are not obtained on the Line test; although in this task also the No group has the greatest amount of accuracy of all the groups.

C. Group Differences in Decision Time

The decision time is the amount of time in seconds intervening between when the subject is presented with the alternatives and when he gives his decision.

The mean decision times for the three groups on all tests are given in Table V. With one minor exception the results reveal a consistent pattern. For hard and easy decision times considered separately, or combined, the I group requires the least time to make decisions, the No group takes longer, and the C group takes longest of all. The only exception to this pattern occurs on the easy decision for the Weight test where the No group responds slightly faster than the I group. Table VI shows that for Weights the differences between the No and C groups on all decisions, and for hard decisions considered

TABLE II

MEAN ERRORS OF GROUPS ON THE WEIGHT AND LINE TESTS

Test	Type of Decision	Groups		
		Normal	Cautious	Impulsive
Weights	Hard	5.35	7.00	7.45
	Easy	.10	.20	.30
	Total	5.45	7.20	7.75
Lines	Hard	4.65	4.75	5.30
	Easy	.60	.85	1.15
	Total	5.25	5.60	6.45

TABLE III

RELIABILITY OF DIFFERENCES BETWEEN GROUPS IN MEAN ERROR FOR WEIGHTS

Comparison	Variable	Mean Error	Difference	t	p*
Normal vs Cautious	All Decisions	5.45 7.20	1.75	2.85	.01
Normal vs Impulsive	All Decisions	5.45 7.75	2.30	3.72	.01
Cautious vs Impulsive	All Decisions	7.20 7.75	.55	1.04	ns
Normal vs Cautious	Hard Decisions	5.35 7.00	1.65	3.07	.01
Normal vs Impulsive	Hard Decisions	5.35 7.45	2.10	3.45	.01
Cautious vs Impulsive	Hard Decisions	7.00 7.45	.45	.85	ns
Normal vs Cautious	Easy Decisions	.10 .20	.10	.73	ns
Normal vs Impulsive	Easy Decisions	.10 .30	.20	1.36	ns
Cautious vs Impulsive	Easy Decisions	.20 .30	.10	.57	ns

*When p is larger than .05 it will be omitted from the tables and ns (not significant) inserted in its place.

TABLE IV

RELIABILITY OF DIFFERENCES BETWEEN GROUPS IN MEAN ERROR FOR LINES

Comparison	Variable	Mean Error	Difference	t	p
Normal vs Cautious	All Decisions	5.25 5.40	.15	.22	ns
Normal vs Impulsive	All Decisions	5.26 6.45	1.20	1.64	ns
Cautious vs Impulsive	All Decisions	5.40 6.45	1.05	1.25	ns
Normal vs Cautious	Hard Decisions	4.65 4.75	.10	.19	ns
Normal vs Impulsive	Hard Decisions	4.65 5.30	.35	1.39	ns
Cautious vs Impulsive	Hard Decisions	4.75 5.30	.55	1.07	ns
Normal vs Cautious	Easy Decisions	.60 .85	.25	.62	ns
Normal vs Impulsive	Easy Decisions	.60 1.15	.55	1.08	ns
Cautious vs Impulsive	Easy Decisions	.85 1.15	.30	.53	ns

separately, are significant at less than the .005 level of confidence by U test.² The differences between the C and I groups duplicate this finding. However, no statistically significant differences between groups appear for easy decisions. Thus, as was the case for accuracy, the overall differences between groups on decision time for Weights are contributed largely by the hard decisions.

Table VII considers the reliability of the decision time differences on the Line test. A similar picture to the Weight test occurs here with reference to all decisions, and for hard and easy decisions. The differences between the No and C, and the C and I groups consistently achieves statistical significance. The differences between the No and I groups fall short of significance.

The reliability of the differences in decision time on the Word test are shown in Table VIII. Here, the only reliable differences occur between the C and I groups. These appear on all decisions and on hard decisions. These significances fall below the .05 level of confidence.

Thus far the analysis has focused on the relationships between groups in decision time for easy decisions, hard decisions, and all decisions. Still another meaningful question can be posed. What are the relationships of easy to hard decisions within each of the three experimental procedures? Do the groups differ in any systematic manner in this respect? It would appear that such an inquiry would bear on the general problem of the degree to which each

²Donavon Auble, "Extended Tables for the Mann-Whitney Statistic," Bulletin of the Institute of Educational Research, I, No. 2, 1953, Indiana University. In this, as in all later analysis, where normality of the distribution was in question, the Mann-Whitney U test was used. This statistic makes no assumptions concerning the normality of the distributions in question.

TABLE V
 MEAN DECISION TIMES OF GROUPS ON ALL THREE TESTS OF DECISION
 (in seconds)

Test	Type of Decision	Groups		
		Impulsive	Normal	Cautious
Weights	All	2.19	2.33	4.60
	Hard	2.87	3.17	6.86
	Easy	1.54	1.50	2.34
Lines	All	4.01	4.49	6.96
	Hard	4.74	5.08	8.40
	Easy	3.08	3.27	4.54
Words	All	2.97	3.84	4.73
	Hard	3.21	4.21	4.99
	Easy	1.87	2.00	2.27

TABLE VI
 RELIABILITY OF DIFFERENCES BETWEEN GROUPS IN MEAN DECISION
 TIME FOR WEIGHTS

Comparison	Variable	Mean	Differences	<u>U</u>	<u>p</u>
Normal vs Cautious	All Decisions	2.33 4.60	2.27	315	.005
Normal vs Impulsive	All Decisions	2.33 2.19	.14	193	ns
Cautious vs Impulsive	All Decisions	4.60 2.19	2.41	324	.005
Normal vs Cautious	Hard Decisions	3.17 6.86	3.69	328	.005
Normal vs Impulsive	Hard Decisions	3.17 2.87	.30	189	ns
Cautious vs Impulsive	Hard Decisions	6.86 2.87	3.99	399	.005
Normal vs Cautious	Easy Decisions	1.50 2.34	.84	256	ns
Normal vs Impulsive	Easy Decisions	1.50 1.54	.04	208	ns
Cautious vs Impulsive	Easy Decisions	2.34 1.54	.80	249	ns

TABLE VII

RELIABILITY OF DIFFERENCES BETWEEN GROUPS IN MEAN DECISION
TIME FOR LINES

Comparison	Variable	Mean	Difference	Statistic	Result	p
Normal vs Cautious	All Decisions	4.49 6.96	2.47	U	112	.02
Normal vs Impulsive	All Decisions	4.49 4.01	.48	U	176	ns
Cautious vs Impulsive	All Decisions	6.96 4.01	2.95	U	84	.005
Normal vs Cautious	Hard Decisions	5.08 8.40	3.32	U	105	.01
Normal vs Impulsive	Hard Decisions	5.08 4.74	.34	U	210	ns
Cautious vs Impulsive	Hard Decisions	8.40 4.74	3.66	U	84	.005
Normal vs Cautious	Easy Decisions	3.27 4.54	1.27	t	2.56	.05
Normal vs Impulsive	Easy Decisions	3.27 3.08	.19	t	.42	ns
Cautious vs Impulsive	Easy Decisions	4.54 3.08	1.46	t	2.90	.01

of the groups respond differentially to task requirements that vary in difficulty. We have already demonstrated for Weights and Lines the accuracy of all subjects on easy decisions exceeds that achieved on hard decisions. One would expect that the more difficult the task the longer the time required to solve the problem adequately.

The measure employed to pursue this question was the ratio of hard to easy decision time. In this index the extent to which the ratio exceeds 1.0 indicates the amount of proportionate increase for hard relative to easy decision time. The groups are compared on all tasks in relation to this measure in Table IX.

The results yield a remarkably consistent pattern. On all tests the I group has the smallest ratio, the No group a larger one, while the C group has the largest ratio of all.

Table X shows the reliabilities of these differences in group ratios on all tests. The differences between the No and C groups on the Weight test are significant at less than the .005 level of confidence although the differences between these groups on the Line and Word test do not reach statistical significance. On all three tests the differences between the C and I groups are statistically significant. On the Weight test the significance is at less than the .02 level, on the Line test it is at less than the .05 level, and on the Word test it is at less than the .01 level. None of the differences between the No and I groups reaches statistical significance.

In summary, the findings pertaining to decision time illustrates the same highly consistent pattern on all three tests, for hard decisions, easy

TABLE VIII

RELIABILITY OF DIFFERENCES BETWEEN GROUPS IN MEAN DECISION
TIME FOR WORDS

Comparison	Variable	Mean	Difference	U	p
Normal vs Cautious	All Decisions	3.84 4.78	.94	242	ns
Normal vs Impulsive	All Decisions	3.84 2.97	.87	153	ns
Cautious vs Impulsive	All Decisions	4.78 2.97	1.81	278	.05
Normal vs Cautious	Hard Decisions	4.21 4.99	.78	169	ns
Normal vs Impulsive	Hard Decisions	4.21 3.21	1.00	151	ns
Cautious vs Impulsive	Hard Decisions	4.99 3.21	1.78	278	.05
Normal vs Cautious	Easy Decisions	2.00 2.27	.27	137	ns
Normal vs Impulsive	Easy Decisions	2.00 1.87	.13	216	ns
Cautious vs Impulsive	Easy Decisions	2.27 1.87	.40	143	ns

TABLE IX
MEAN RATIOS OF HARD TO EASY DECISION TIME FOR ALL TESTS

Test	Groups		
	Impulsive	Normal	Cautious
Weights	1.87	2.24	3.35
Lines	2.18	2.38	2.95
Words	1.83	2.09	2.17

decisions, and for hard and easy decisions combined. The I group has the shortest decision time, the C group has the longest decision time, and the No group is intermediate with reference to the length of decision time. The same degree of consistency in this pattern is obtained in relation to systematic differences between the groups with reference to their responding differentially to task requirements of varying difficulty. In relation to the criteria of hard to easy decision time, which was used to attack this problem, the I group shows the smallest ratio on all tests, the C group the largest ratio, and the No group has a ratio of intermediate size.

D. Individual Consistency and Intra-individual Variability

The previous sections presented data concerning the levels of decision time and accuracy within each of the groups. Ordinarily the problems of consistency and variability may be considered separately from the level of decision time. For example, although the mean levels of decision time between groups on three tasks may be identical it is still an open question whether the individuals within the groups are ordered in a similar manner on the three

TABLE X

RELIABILITY OF GROUP DIFFERENCES IN RATIO OF HARD TO
EASY DECISION TIME ON ALL TESTS

Comparison	Test	Mean Ratio	Difference	U	p
Normal vs Cautious	Weights	2.24 3.35	1.11	75	.005
Normal vs Impulsive	Weights	2.24 1.87	.37	164	ns
Cautious vs Impulsive	Weights	3.35 1.87	1.48	111	.02
Normal vs Cautious	Lines	2.38 2.95	.57	153	ns
Normal vs Impulsive	Lines	2.38 2.18	.20	175	ns
Cautious vs Impulsive	Lines	2.95 2.18	.77	127	.05
Normal vs Cautious	Words	2.09 2.17	.08	225	ns
Normal vs Impulsive	Words	2.09 1.83	.26	130	ns
Cautious vs Impulsive	Words	2.17 1.83	.34	102	ns

tasks. In a similar vein, a measure such as the group mean, which provides the best estimate of group level, does not provide desirable information concerning the variability within subjects. The question of generality was posed earlier. This question involves the essential issue of the extent to which decision behavior is characteristic of individuals through a variety of situations. In this investigation an advantage exists in exploring this issue in that we can examine individual consistency in different groups.

We have also referred previously to the potential significance that an exploration of individual variability might have for shedding light on the problems of adaptability.

In this section the following questions will be explored:

1. How consistent were the individuals within groups in their hard decision times on all of the tests?
2. Are there any meaningful differences between groups in terms of the variability of hard decision times within subjects for each of the tests?

The first question deals with the problem of generality and therefore requires a measure which reflects the extent of similarity in the behavior of an individual from one decision situation to another. An approach to this question can be made through comparing the relative standings of members of a group to each other over the course of several situations. This can be obtained through ranking the members of a group along some variable for each task, and examining the extent to which the members change their standing in relation to each other. Hard decision time was used as the variable because it was considered to reflect behavior in situations of greater meaning than involved in the easy decision time. The W statistic is a correlation coefficient of

concordance in ranking from one situation to another.³ This measure was used to reflect the reliability of individual performance over the course of several situations.

The results of this analysis are presented in Table XI. These results show that the members of each group achieve a level of consistency in hard decision time that is statistically significant below the .01 level of confidence. Moreover, the groups do not appear to differ from one another in this regard, in that a similar range of consistency is exhibited by each group.

TABLE XI
COEFFICIENTS OF CONCORDANCE (W) FOR EACH GROUP ON
ALL TESTS
(HARD DECISION TIME)

Group	N	Tests	<u>W</u>	F	<u>p</u> ⁴
Normal	20	Weights	.70	4.67	.01
		Lines			
		Words			
Cautious	20	Weights	.68	4.25	.01
		Lines			
		Words			
Impulsive	20	Weights	.58	2.76	.01
		Lines			
		Words			

³H. Morris Kendall, Rank Correlation Methods, London, 1948, 80.

⁴Helen Walker, and Joseph Lev, Statistical Inference, New York, 1953, 285.

The second question is concerned with the variability within subjects in making decisions of similar objective difficulty within each of the tests. In order to effect a comparison between groups with respect to intra-individual variability, a group mean of intra-individual variability was obtained. These findings are presented in Table XII. Although the differences between groups are sometimes found to be statistically significant, no consistent pattern in the differences between groups is found.

The major question within this section concerns the problem of the generality of decision time behavior. The findings reveal that, within the limitations of this study, a significantly high degree of generality in hard decision time for subjects of all groups, across all tasks, obtains.

A preliminary exploration into the question of group differences in intra-individual variability in hard decision time failed to reveal any consistent and meaningful differences.

E. Qualitative Observations

The reactions of the subjects to the experimental situation elicited some striking differences between normal and neurotic subjects. No systematic inquiry into these differences was attempted. However, the observations that were noted indicates that considerably more tension was generated by the situation for the neurotics than for the normals. Certain aspects of the neurotics' behavior have rather specific implications for the problem solving activity involved in decision making.

Many more neurotic subjects than normals cancelled or were late for appointments. Sixteen neurotic subjects made comments about their physical disabilities which they suggested might handicap them on the tests. Only one

TABLE XII

COMPARISONS BETWEEN GROUPS OF MEAN INTRA-INDIVIDUAL VARIANCES

Comparison	Test	Mean Variance	U	P
Normal vs Cautious	Weights	92.08 819.72	60	.005
Normal vs Impulsive	Weights	92.08 121.06	184	ns
Cautious vs Impulsive	Weights	819.72 121.06	51	.005
Normal vs Cautious	Lines	155.42 846.43	93	.005
Normal vs Impulsive	Lines	155.42 130.78	217	ns
Cautious vs Impulsive	Lines	846.43 130.78	71	.005
Normal vs Cautious	Words	199.47 204.04	150	ns
Normal vs Impulsive	Words	199.47 62.51	156	ns
Cautious vs Impulsive	Words	204.04 62.51	107	ns

normal subject introduced this problem. In response to test instructions approximately eight times as many neurotics asked fifteen times as many questions than did the normals. Whereas the questions of the normal subjects almost invariably occurred at an appropriate time, the questions of the neurotics were almost always introduced during the testing proper. The type of question asked by the normal subjects appeared designed to elicit a clarification of the instructions. The neurotics' questions, on the other hand, mainly consisted of appeals for help in the form of asking for hints. Fifteen out of the forty neurotics attempted to give the decision, "the same," despite repeated instructions that this response was not permitted, while this occurred only twice with normal subjects. About a third of the neurotic subjects tried to change decisions despite instructions to the contrary, while only three normal subjects attempted this. Many of the neurotic subjects criticized the test material and suggested its defects had been a limiting factor in their performance. This occurred with only one normal subject.

Other differences between normals and neurotics were revealed in relation to feelings of discomfort in the situation, the basis used for making decisions, and concern over speed as a factor in the situation.

Almost all of the neurotic subjects spontaneously mentioned during the question period that they had been in a state of emotional discomfort at various times during the tests. This was almost never the case with the normal subjects. The neurotics expressed these feelings by fairly direct statements such as: "I don't know why, but I just felt uncomfortable about the whole thing;" "I felt uneasy while I was doing this;" "I tried to concentrate but my mind kept wandering and I was upset;" "I kept wondering if my intelligence

was being measured and I don't think I knew what I was doing;" "They (the Lines) almost drove me crazy."

Many of the neurotic subjects developed distorted notions about the physical nature of the Weight stimuli which they then used as a basis for making their decisions. It will be recalled that the Weights were all exactly alike with the exception of the number of grams of each weight and that the subjects were blindfolded during this experiment. Some of the neurotic subjects said that they "knew" the heights of the weights were different and they tried to decide which was the taller weight. Other neurotic subjects said that they thought one of the weights was always plastic and the other metal, and they tried to decide which was the metal one. There were other unusual means by which some of the neurotic subjects developed cues by which to make their decisions. These included attempting to gauge the weight which was placed against their knuckles with the most pressure; the differences in the intensity of the lines being compared; and the use of "intuition" as the guiding principle for making their decisions.

The normal subjects generally omitted any spontaneous expressions of concern with regard to the speed of their decision making. However, such remarks were very prevalent among the neurotics. Among the Impulsive subjects such comments were made as: "I just said the first thing that came into my mind;" "I decided on the basis of impulse;" "I just felt like I didn't have enough time;" "I thought you were in a hurry, so I rushed;" "I tried to react as quickly as possible;" "I gave my first impression;" and so forth. Many Cautious subjects, interestingly enough, expressed the feeling that they had responded "too quickly." The reason sometimes given for this "quick"

response was that after changing their minds many times they finally just, "gave up trying."

In general it appears that the neurotic subjects regarded the experimental situation as more crucial, and responded with more tension, greater fear of failure, and greater uncertainty about their ability to solve the problems presented by the situation, than did the normal subjects. Several techniques in dealing with the situation were prominent among the neurotics which may represent attempts to cope with these feelings. As a group the neurotics try to avoid involvement with the decision situations and responsibility for their decisions. Once committed to making decisions they try to find "loopholes" which reduce the difficulty involved. It is suspected that from time to time in the process of making decisions their energies are diverted to an attack on the problem as being unfair, unsolvable, and so forth, instead of consistently seeking the realistic solution. Also, in terms of problem solving behavior, they appear to seek delays, means of evasion, and escape from the situation. Finally, a tendency for neurotics to seek unrealistic means of working out a solution to the problem seems apparent, as well as a tendency to see the alternatives in the problem unrealistically. The latter aspect of their behavior may reflect their need and attempt to reduce the ambiguity in the situation.

CHAPTER V

DISCUSSION OF RESULTS

A. Review of Conceptual Framework

It seems profitable to review the conceptual framework within which this investigation was conducted before proceeding to a discussion of the results.

A decision situation, for our purposes, is viewed as a type of conflict situation. In experimental decision situations some tension is created by instructions which indicate that accuracy is a factor in making the decisions, and where the difficulty of the decisions causes uncertainty about which choices are correct. This tension results in a conflict between the alternatives of responding quickly to reduce the tension, or striving to respond accurately and enduring the tension caused by the necessary delay. In order to respond appropriately, in terms of decision time and accuracy, one has to be able to sustain the tension that is present and be able to prevent it from interfering with fulfilling the objective requirements of the situation. In order to prevent this occurrence, a person has to be reasonably well integrated so that the tension does not interfere with the performance of the intellectual processes.

A neurosis indicates the presence of several factors which could operate in a detrimental manner in decision situations. One potentially detrimental factor, is that a neurosis indicates that a higher level of tension, resulting from unresolved conflicts, is present than one might expect to be the case for

normal persons. These tensions would be added to the tension resulting from the conflict in decision situations. Secondly, if we assume that a neurosis constitutes an inability to handle a conflict which involves some type of choice, the person with a neurosis may have an apprehension over making choices per se. Lastly, the threat to self-esteem, which is considered as posing an important problem to people with a neurosis, may, therefore, also be aroused by difficult choice situations.

If a subject with a neurosis has a relatively low level of tolerance for tension he might be expected to make quick and inaccurate decisions. The inaccuracy would probably result not only from the interference of tension with the process of evaluating the decision alternatives, but also from the lack of sufficient time required to make an accurate decision.

If a subject with a neurosis has a relatively high level of tolerance for tension, and an excessive need for certainty, he might be expected to delay excessively in making decisions. Under these circumstances tension would probably continue to mount and interfere with the process of evaluating the decision alternatives.

Within the context of this conceptual framework several major questions were raised. These questions involved comparisons between the normal and neurotic groups used in the study with regard to the variables of decision accuracy, decision time, differential responses to varying degrees of decision difficulty, and the generality of decision time behavior. In addition to these questions, a question concerning intra-individual variability in making decisions of the same level of difficulty was raised for preliminary exploration.

The findings presented earlier, with reference to the major questions

raised, reveal a highly consistent and meaningful pattern. The differences between the groups, in regard to these questions, are therefore concluded to be substantial evidence of the existence of important trends. The meaning of the findings will now be considered with reference to the questions inquired into, and against the conceptual background from which they were derived.

B. Decision Accuracy

The first question to be considered concerns the relative accuracy of the groups. The findings in this regard consistently reveals the No group as more accurate than either neurotic group on both tests, and on both hard and easy decisions.

The objective difficulty of the tasks were the same for all subjects. Aside from the presence of a personality disorder in the subjects who composed the two neurotic groups, all known variables which might have affected the accuracy of the subjects were controlled.¹ Therefore, the differences in the level of accuracy between the normal and neurotic groups are considered to have arisen from differences due to the level of personality adjustment. The differences in the level of accuracy of the groups are in agreement with theoretical expectations.

From the standpoint of personality functioning primarily two factors are believed to account for the comparatively lower level of accuracy of the neurotics. The inadequately resolved conflicts in a neurosis would add tension to that which is derived from the decision conflict. The implied issue of correctness as a part of the decision situation, together with the lack of a

¹Although there is a range of six years in the mean age differences between the groups comparisons in group accuracy showed that the group that had the smaller mean age was not always the more accurate.

basis for real certainty concerning the accuracy of the decisions, probably added to the already present threats to the self-esteem of the neurotics. In addition to the threat to self-esteem, a potential threat was probably present in the form of a loss of the esteem of others. In this case that of the experimenter. These factors probably served to heighten the importance of the decision situation to the neurotics to a greater degree than occurred with the normals.

In effect, the lower level of accuracy of the neurotics constitutes a manifestation of less adherence to the reality demands of the situation as defined by the instructions. From this point of view, their decisions represent a greater departure from objective standards of performance than manifested by the normal subjects.

While the differences between the groups in their level of accuracy on easy decisions are very small, they offer a tentative source of corroboration for the interpretation concerning differences between the groups on hard decisions. The alternative choices on the easy decisions offer, in themselves, very little basis for conflict. Therefore, differences between the groups in level of accuracy are more clearly evident as the result of conflict from sources other than the decision alternatives themselves. According to the point of view developed earlier, these sources of conflict stem from within the personality. These findings suggest that the neurotics, as a result of personality conflicts, have a higher level of tension to start with than the normal person. This results in greater inaccuracy for them.

An additional, but not necessarily contradictory, basis for the differences in accuracy on easy decisions may exist. The easy decisions were

randomly ordered within the total series of decisions. It is conceivable that the tensions generated by the hard decisions were generalized to some extent to the easy decisions. Thus, a greater degree of tension would still be present for the neurotics than the normals.

A consistent and meaningful pattern of a higher level of accuracy for the C than the I group was found on both the hard and easy decisions. This finding is interpreted in terms of the relative merits of cautiousness as compared to impulsiveness for making accurate decisions. Caution implies a restraint in behavior which, in part, is assumed to be due to a fear of making mistakes. In decision situations this probably leads to a constant attempt to direct attention to evaluating the differences between the alternatives. Impulsiveness, from the point of view of this study, represents a difficulty in sustaining the tension which results from the fear of uncertainty. Neurotic subjects who have this difficulty probably concern themselves more with relieving their tension than in considering the alternatives in a decision situation.

The issue, then, that is believed to be primarily responsible for the relatively higher level of accuracy of the C, as compared to the I group, is the attention and concern of this group for accuracy, and the relative indifference to accuracy of the I group.

C. Decision Time

The second question which has been raised dealt with possible decision time differences between the groups. The findings on hard decision time on all three tests invariably reveal the No group to have averaged more time than the I group, and less time than the C group. This question was raised on the basis that the most effective resolution of a conflict situation involving

difficult decisions was to make accurate decisions as rapidly as possible. This implies that an optimal decision time exists which provides sufficient opportunity to make accurate decisions. As noted earlier, to sacrifice accuracy in the interest of making quick decisions, or to delay making decisions without further gains in decision accuracy, is not efficient behavior. In comparison to the other groups our findings suggest that the normals tolerated the discomfort of making difficult decisions long enough to achieve the maximum degree of accuracy without delaying excessively. From this standpoint they operated with the highest level of efficiency of all the groups and functioned within the "optimal range" of decision time.

The differences between the N and I groups in easy decision times is found to be very slight. However, very little time should be required to make accurate decisions at the level of difficulty of the easy tasks. In comparison to the I group this is what the N group did. The "quick" decision behavior of the N group on the easy decisions is therefore viewed as a reflection of efficiency rather than impulsivity.

The consistency with which the I group was found to average the least time on hard decisions on all tests is in line with expectations and favors the view that this behavior is characteristic of the group. The two alternatives posed by the conflict in the decision situation are the desire to reduce the tension by responding quickly, and the desire to adhere to the reality of the situation by striving for accuracy. The comparatively short decision times of the I group would suggest that they chose the alternative of reducing their tension to a greater extent than that of striving for accuracy. In making this type of choice they reveal a type of irresponsibility and relative lack of

regard for the reality demands of the situation. In effect, their behavior is more subjectively rather than objectively determined.

The finding that the C group consistently averages the longest times on hard decisions also is in line with expectations. The "long" decision times indicates a caution in making decisions that would appear to be related to an excessive concern over the possibility of being inaccurate. Their "long" decision times might be justified if their level of accuracy was comparatively higher than the No group. Since this is not the case, the "extra" time they spend in making decisions is viewed as having been used to cope with their emotional reactions to the situation. The answers of members of this group to the questions following the tests supports this interpretation. A considerable portion of their decision time appeared to be consumed by their high degree of uncertainty over accuracy.

An answer to the hypothetical question of why these subjects' make decisions if their wish is to avoid them has been suggested earlier. In the same manner that their "fear of doing the wrong thing" is believed to underlie their hesitancy in making decisions, it can also serve to motivate them to make decisions when they might prefer not to do so. Although there is no way they can be certain that their decisions in these situations are correct, they are certain that they have agreed to make decisions. If they refused to make some of the decisions after having agreed to do so they would be certain that they were doing the wrong thing.

The differences between the groups on hard decision time are concluded to be a reflection of meaningful trends. These trends indicate that the length of the decision times of the neurotic groups, as compared to the No group, reflects

more unrealistic ways of coping with their tensions in the situation. From this point of view, the No group functioned more efficiently and objectively than either of the neurotic groups.

D. Differential Response to Hard and Easy Decisions

The third question that was raised concerned possible differences between the groups in responding differentially to decisions of varying levels of difficulty. This question deals with the extent to which the groups distinguish between the two types of decisions (hard and easy), and how they compare in this regard. The objective difficulty of the hard as compared to the easy decisions was the same for all groups of subjects. Any meaningful differences between the groups in the magnitude of the ratios of hard to easy decision times are therefore a function of differences between the groups. The differences that were found between the group ratios are consistently in the same direction on all of the tests. The I group had the smallest ratio, the C group had the largest ratio, and the No group had a ratio which was intermediate in size in comparison to the other groups. The consistency of this finding is considered evidence of the presence of a trend, the significance of which will be discussed.

Theoretically, the differences in the difficulty of the hard and easy decisions required that they be responded to differently in terms of decision time. In absolute terms each of the groups did respond appropriately since an increase in hard over easy decision time occurred in each group. Within the limits of the measure used, and the conceptual framework of this investigation, a proportionate increase in hard over easy decision time is considered to result from the reaction of subjects to the added conflict introduced by the

additional difficulty of the hard as compared to the easy decisions.

The relative standings of the groups in terms of the ratio measure are consistent with the previous interpretation of the differences in the behavior of the groups with reference to absolute levels of decision time. In the discussion of these findings it was suggested that, on a comparative basis, the I group tended to make decisions hastily, and the C group tended to be over slow in making decisions.

The comparatively small ratio score of the I group is a further indication of this group's tendency to escape the tension resulting from the conflict in the decision situation by responding quickly. Their ratio score is believed to reflect this tendency since it indicates that this group, in comparison to the others, only minimally extended the time they took for the hard, as compared to the easy decisions.

The ratio score of the C group, who were "slow" in terms of their absolute decision times, supports the earlier interpretation that they tend to be overly fearful of being inaccurate. Their relatively large ratio score suggests that in response to the added difficulty of the hard, as compared to the easy, decisions they tended to delay much longer than the other groups. In taking extended periods of time to deal with the additional difficulty of the hard decisions they also endure the conflict and tension for a longer period of time than either of the other groups. Since the task requirements are for the subjects to make accurate decisions, the excessive time given to this effort by the C group is a reflection of their excessive concern over possible inaccuracies. As discussed earlier, the additional time taken by this group, in comparison to the other groups does not receive justification in terms of the

level of accuracy which they achieved.

The ratio score of the No group, from a comparative standpoint, appears to reflect greater balance in the reactions of this group to the conflict provided by the hard decisions. That is, they do not take the additional difficulty of these decisions as "lightly" as seems to be the case for the I group, nor do they seem to be "thrown for a loss" as to what to decide, as would appear to be the case for the C group.

The ratio measure provides an estimate of the differences in the functioning of these groups while in a type of conflict situation, with regard to the effects of this conflict on their ability to differentiate appropriately between types of decisions. In a more general sense it reflects the extent of the capacity to respond to a situation in its own terms when subjects are in a conflict situation. The ratio score of the I group can be described as reflecting a relative lack of discrimination in response to two types of decisions. This implies that differences between the two types of decisions are being overlooked to some extent and that some loss of objectivity has occurred. On the other hand, it appears that the C group shows a marked difference in their decision time responses to the two types of decisions. In comparison to the ratio score of the No group, such a large time difference in hard versus easy responses may not be justified. In a sense they appear to have magnified the differences between the hard and easy decisions. This interpretation would lead to the conclusion that the behavior of the C group, like that of the I group, constitutes to some extent a departure from an objective perception of the two types of decisions.

E. Individual Consistency

The fourth question to be considered concerns the modes of response of the groups, and the individuals making up these groups, with respect to the problem of generality. Generality of behavior implies that the same or similar behavior consistently occurs under circumstances which may differ in some aspects, though other aspects remain the same. The experimental conditions used in this investigation meet the requirements for an exploration of this question. In each of three different tests the subjects were required to make decisions. To some extent the differences in the experimental stimuli justify considering the decision situations as being different from each other.

According to the results of the statistical analysis each of the groups had a significantly high R correlation on hard decision time across all tasks. These results are considered as evidence that the subjects within all groups behaved in a consistent manner with respect to their hard decision time on the various tests. That is, subjects regardless of whether they were normals or neurotics, showed generality in their decision time behavior.

Other sources for estimating the generality of the decision time of the groups are also present and offer support for the above conclusion. These sources include the relative standing of the groups across all tests, and comparisons of the ratio measure to the easy decision time for all groups. The groups have been found to retain the same standing, relative to each other, in their absolute levels of decision time across all tests. That is, the I group was fastest, the C group was slowest, and the No group was intermediate in decision time on the variety of the tests presented the groups. This appears to indicate that the groups behaved in a consistently different manner from each other, and that the differences in their modes of response reflect

differences in characteristic attitudes towards decision situations.

As mentioned earlier, an estimate of generality involves evaluating behavior in situations that differ to some extent. A comparison of the ratio score to the easy decision time provides two measures of behavior where two different types of decisions are involved. The ratio measure, in effect, gives the time taken to make hard decisions when the easy decision time is removed. Thus, for the purposes intended here, a comparison between the ratio score and the average of the easy decision times for each group, is a comparison of a group's reactions to two different types of decisions. In the case of the I group, the easy decision time was found to be comparatively short. The ratio measure also indicates that comparatively, only a short time is spent by this group in dealing with the additional difficulty of the hard decisions. In effect then, this group responds to two different kinds of decisions in a similar manner. This is considered to be an indication that the I group responded in a characteristically rapid manner to different types of decisions.

Applying the same line of reasoning to the question of generality for the C group, the easy decision time in that case was found to be relatively long, and the ratio score large. This is considered an indication that the C group responded in a characteristically slow manner in making both types of decisions.

F. Intra-Individual Variability

The last question explored concerned the possibility of meaningful differences between groups in terms of the variability of hard decision times within subjects for each of the tests. The findings obtained from this investigation do not support the notion that such meaningful differences do exist.

G. Qualitative Observations

Although the qualitative observations of the subjects' behavior were not systematically conducted they are pertinent and interesting in view of the findings discussed above. Before, as well as during, the actual presentation of the alternative stimuli the neurotics showed greater anxiety about their ability to perform adequately than did the normal subjects. They used a variety of techniques to avoid and delay actually "facing up" to the choices they were called upon to make. A tendency on the part of the neurotics was noted in which they sought unrealistic means for deciding between the alternative choices.

The above observations are consistent with the theoretical position of this study, namely, that the degree of conflict experienced in the decision situation depends on the prior emotional adjustment of the subject. The actual decision that is to be made appears to be only an additional burden on an individual already burdened by unresolved conflicts. Similarly, the type of reactions to the decision situation is only partly dictated by the specific task.

H. Implications for Future Research

The discussion which follows will consider some theoretical questions raised by the results of this study, as well as the implications for future research.

The findings from a previous investigation² of the generality of decision time behavior, in which normal subjects were used, led to the conclusion that such behavior is characteristic of individuals. The findings from the present investigation supports this conclusion and enables it to be extended to neurotic

²Festinger and Wapner, Ibid.

groups, of the type used here, as well.

The theory of decision advanced by Cartwright and Festinger³ emphasizes the importance of factors external to the person, such as the differences between the decision alternatives. They do not elaborate any lawful principles of decision behavior derived from personality factors. In brief, this theory proposes that as the relative frequency of choice between two alternatives approaches 50%, the conflict is increased with a resulting increase in decision time. Individual differences in decision time are accounted for on the basis of differences in the amount of restraint exercised by subjects in making decisions. They imply that restraint in a decision situation is brought about by a person's need to make a correct choice. Relevant experimental evidence concerning the relationship between the relative frequency of choice, conflict, and decision time, tends to verify their major hypotheses derived from this theory. However, no experimental evidence is presented concerning the significance of individual differences to their theory. The present study provides some illumination on this problem. The findings indicate that personality factors, namely the fear of inaccuracy of the C group, and the intolerance of tension of the I group, substantially influence the mode of decision behavior. The use of groups which differed in their level of personality adjustment has provided findings which suggest that people bring prior tensions, as well as ways of handling their tension to decision situations. The influence of the level of tension within the person which existed previous to the decision

³Cartwright and Festinger, "A Quantitative Theory of Decision," Psychological Review, L, 1943, 595-621.

situation, and the characteristic mode of response to tension, seems to become more pronounced as the difficulty in choosing between alternatives increases. This is most clearly indicated in the nearly diametrically opposed results of the I and C groups where the I group "increased" their hard decision time only slightly, as compared to a large increase for the C group.

In the light of the above finding the theoretical position that decision time approaches a maximum where the relative frequency of choice approaches 50% may require modification. The findings from this investigation point to the possibility that a curvilinear relationship may actually exist between decision time and decision difficulty for some, or all, of the types of groups used in this experiment. An approach to this problem could be made through the use of a graded series of decisions of increasing difficulty and corresponding increases in the importance of the decisions. One would need to be able to determine accuracy on some objective basis. Under these circumstances our findings would lead to the expectation that the I group would begin to decrease their decision times when the difficulty of the decisions achieved chance proportions in terms of possible accuracy. From a theoretical point of view this expectation could be argued on the basis that as tension increased, and accuracy became a matter of chance, they would tend to manifest a decreasing desire and ability to cope with the situation by increasing their speed in deciding. The No group might be expected to increase their decision time even though accuracy was within the range of chance because of the corresponding increase in the meaningfulness of the decisions. However, this group might also tend to begin to decrease their decision times, although at a point further along in the series of graded difficulty of the decisions than reached by the I

group, because of their recognition and acceptance of the reality that their efforts could only be "guesswork." The members of the C group are believed to have an excessive fear of inaccuracy, and in view of their comparatively large increase in decision time when the decision difficulty was increased, they would be expected to continue to increase their decision time to a point further along in the series of graded difficulty of the decisions than that reached by either the No or the I groups.

Another theoretical question is raised by the finding that despite the comparatively long decision-times of the C group, their accuracy was somewhat below that of the No group. It appears that there is general agreement in the experimental results from normal subjects that increases in decision time corresponding to increases in decision difficulty leads to decreases in decision error.⁴ A modification of this concept might be desirable in order to take into account that this may apply only within an optimal range of decision time. The straight line relationship implied by this concept, as it now exists, does not appear to be borne out by the finding noted above relative to the C group. Exceeding this optimal range of decision time not only may fail to increase accuracy, but may result in a decline in accuracy.

From the standpoint of personality functioning in decision situations the findings from this study indicate that major disturbances in the personality intrude on the perception and adequacy of the solutions achieved in solving the problems presented in making difficult decisions. The neurotics not only perform less efficiently than normals, they are also less realistic because

⁴ Festinger and Wapner, Ibid., 12.

they spend too much time on easy decisions (E group), or too little time on the hard decisions (H group). In addition, the neurotics seem to pay less attention to differences in the difficulty of the tasks and tended to respond to both easy and hard decisions in their own characteristic way. They either tended to respond to both types of decisions as being easy, (E group), or as being hard (H group). Thus some reduction in the capacity to function in a discriminating manner is suggested in the case of the neurotics.

In summary, the results of this study indicate the existence of meaningful differences between normal and neurotic groups in decision accuracy, and decision time. These differences emphasize the importance of personality as a factor in the theory and prediction of decision behavior. In a general way the maladaptive functioning implied in a neurosis appears to be reflected in decision behavior.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Effective decision behavior is an important manifestation of the general problem of adequate adaptation to one's environment. Decisions are often a source of difficulty and conflict. As such, systematic observation of people in difficult decision situations can offer a fruitful source for further understanding the manner in which conflict is handled and decisions are made.

Theoretical formulations of the relationship between decision difficulty and conflict, as well as experimental investigations in this area, have emphasized the "conflict potential" of the decision alternatives in predicting decision behavior. But there may also be a potential within the individual for experiencing difficulty in handling conflict. Perhaps partly as a consequence of the former point of view the experiments conducted in the area of decision have utilized mainly normal subjects.

The present investigation has used normal subjects, and subjects with a neurosis, on the assumption that they will show differences in the ability to handle conflict. Our results, which show that such differences do exist in decision situations, may serve as a preliminary effort towards bridging a gap in the investigation of decision behavior. These results can be useful in establishing the importance of personality factors in decision theory. Lastly, this investigation has attempted to serve as a means for increasing the general diagnostic understanding of differences in the functioning of normals and

neurotics.

This problem was investigated through the use of three groups consisting of twenty female subjects in each group. The same ranges in age and education were used in the selection of subjects for the groups. One group consisted of normal subjects, one group consisted of impulsive neurotics, and one group consisted of cautious neurotics. The neurotic subjects were patients who had been diagnosed as having a neurosis and were under psychiatric care. The classification of these subjects as either impulsive or cautious was made by their treatment psychiatrist. Attempts were made to omit people with neuroses, and people with other serious emotional disorders from the normal group. This was done by not including subjects who had received, or were receiving, treatment for such difficulties. In addition, subjects were omitted whose current occupational adjustment showed difficulties in some areas which might reflect emotional problems. Each of the subjects underwent the same experimental procedures under approximately the same conditions.

Each subject was given three tests in which they were instructed to make decisions involving comparative judgements; an informal questioning period followed the tests. The decision time, as measured by a stop-watch, and the response were noted for each decision.

In the first test the subjects were presented with comparisons between equal appearing weights and instructed to decide which weight was the heavier. Forty comparisons were involved, twenty of which were easy, and twenty of which were hard. An 86 gram weight was used as the standard and ten comparisons each of a 50 and 54 gram weight with the standard made up the easy decisions. Conflict over the choice of alternatives was provided by using comparisons

between weights which differed by small amounts. These included ten comparisons each of a 78 and 82 gram weight with the standard.

The second task involved comparisons between lines in which the subject was asked to decide which of two lines was longer. A standard line five inches long was presented eight times with each of five comparison lines making a total of forty decisions. For the easy decisions the comparison lines included a $5\frac{1}{2}$ and $4\frac{1}{2}$ inch line. For the hard decisions the comparison lines included a $5\frac{1}{8}$, a $4\frac{7}{8}$, and another 5 inch line. The subjects viewed the lines through an exposure box.

The third task consisted of the subjects being instructed to decide which of each pair of words they were shown fitted better with a corresponding phrase. The hard decisions consisted of twenty-five comparisons between words which were synonyms, and the easy decisions consisted of comparisons between five pairs of words which had very different meanings in terms of the relevant phrase.

The analysis of the data on decision accuracy, decision time, and differential responses to hard and easy decisions, revealed a remarkably consistent pattern in the relationships between the groups. The consistency of this pattern extended through all of the tests and on both hard and easy decisions. In addition to this very high degree of consistency, the standings of the groups are meaningful in terms of theoretical expectations. The No group was found to be the most accurate, and the I group was the least accurate with the C group being the intermediate. With one minor exception the I group was found to be fastest in decision time, the C group was the slowest, and the No group was intermediate. The one exception was a reversal from this pattern between

the I and No groups on the easy decisions of the Line test. In comparison of group responses to hard as compared to easy decisions, the I group had the smallest proportionate increase in decision time, the C group had the largest proportionate increase, and the No was intermediate.

An analysis of the reliability of the mean differences between groups several comparisons achieved statistical significance beyond the .05 or .01 levels of confidence. In accuracy these included the differences between the No and I groups, and the No and C groups for the Weight test on the hard decisions, and when hard and easy decisions were combined. These differences exceeded the one percent level of confidence. In decision times on the Weight test the differences between the No and C, and the C and I groups on hard decisions, and when hard and easy decisions were combined, exceeded the .005 level of confidence. On the Line test the mean hard decision time differences between the No and C groups, and the C and I groups exceeded the one percent level of confidence. On the Word test the difference between the mean decision times of the C and I groups on hard decisions and when hard and easy decisions were combined exceeded the five percent level of confidence. On the ratio of hard to easy decision times the difference in the means between the C and I groups exceeded the one percent level on the Word test, the two percent level of confidence on the Weight test, and the five percent level of confidence on the Line test. The mean differences between the No and C groups exceeded the .005 level of confidence on the Weight test. None of the other comparisons between groups on any of the measures mentioned thus far reached the five percent level of confidence.

An analysis was done of the consistency with which individuals behaved in

the different decision tests as measured by hard decision times. This analysis has a bearing on the generality of the decision time in the three groups. The correlation of individual consistency of hard decision time behavior across tasks was .70 for the No group, .68 for the C group, and .58 for the I group. Each of these correlations achieves statistical reliability beyond the .01 level of confidence.

Comparisons between groups with respect to their average intra-individual variability on decisions of similar levels of difficulty were analyzed. These findings show shifts from test to test in the relative standings of the groups in their average intra-individual variability in hard decision time. The No group had a lower mean intra-individual variability on the Weight test than the I group but a larger one on the Line and Word tests. None of these mean differences achieve statistical reliability. The No and I groups both have a lower mean variance on this measure than the C group on all tests. The differences between the means of the No and C, and the I and C groups on the Weight and Line tests were significant beyond the .005 level of confidence. On the Word test only the difference in means between the C and I groups were significant beyond the .05 level of confidence.

Within the limitations of this study, which will be discussed below, certain conclusions have been reached on the basis of the findings obtained. The differences between the normal and neurotic groups in the manner of handling personality conflicts, tends to distinguish between these groups in their response to the conflicts posed by the decision situations. This was manifested in decision accuracy and decision time. The decision times of these groups seem to be characteristic for each group. The normal group indicates the

highest level of objectivity and efficiency in making their decisions. They were the most accurate and neither "too fast" nor "too slow" in decision times, as compared to the neurotic groups. In responding to two types of decisions (easy and hard) their decision times reflect a more balanced appreciation of the differences between these decisions than do the decision times of the neurotic groups.

The Impulsive neurotics tend to choose the alternatives of responding quickly to reduce their tension, which stems from personality conflicts as well as from the decision alternatives. While this type of response reflects a low level of tolerance for tension, it also indicates a greater concern for relieving discomfort than for meeting the situation realistically. As a result of this relative indifference to the reality demands of the situation their decisions are less accurate than those of any other groups. In keeping with their attempt to relieve themselves of tension, they indicate a failure to distinguish appropriately between different levels of difficulty in decisions. Their response tends to be "quick" regardless of the difficulty involved in the decisions.

The Cautious neurotics indicate a marked hesitancy and uncertainty in making decisions which reflects, among other things, great concern over inaccuracy. In functioning in this manner they manifest a willingness to sustain the mounting tensions involved in their "long" delays. Nevertheless, their tensions in the situation interferes with their ability to achieve the accuracy they seek. However, their attention and concern in regard to fulfilling the requirement for accuracy, which is both self and externally imposed, leads to a higher level of accuracy than occurs with the Impulsive neurotics.

Their concern for accuracy, and their cautiousness in approaching a situation in which it is a factor, tends to result in their responding "slowly" regardless of the level of difficulty involved in the decision.

The findings based on qualitative observations of the groups offers support for some of the interpretations and conclusions discussed. The neurotic subjects appeared to regard the experimental situation as more personally threatening, were more anxious, and seemed to have greater uncertainty about their ability to solve the problems presented, than the normal subjects. They used a variety of techniques to avoid and delay having to make the decisions and frequently sought means of temporarily escaping from the immediate problem confronting them.

On the basis of the findings from this study two theoretical questions have been raised as suggested lines for further exploration. The first question concerned the straight-line relationship between decision time and decision difficulty that is implied in current decision theory. The findings from this study suggest the possibility that a curvilinear relationship between these variables might actually be the case. The second question concerns the possible refinement of the notion that increases in decision time corresponding to increases in decision difficulty, leads to decreases in errors. The findings from this study indicate that provision for an optimal range of decision time might lead to greater preciseness in predicting decision behavior.

Within the limits of this experiment, and the measures used, the findings and conclusions are strongly indicative of trends in the directions discussed. These limits are important to mention. The use of only female subjects limits the generality of the findings and conclusions. Experimental data is not avail-

able which considers the differences between men and women in the areas of interest to this investigation. The normal group had homogeneous types of employment, while this variable was left uncontrolled for the neurotic subjects. No practical way was known for evaluating the importance of this difference between the groups. Lastly, the decision situations were "experimental" rather than "actual" in nature. On the basis of the very limited data pertinent to this question, it appears likely that differences in the decision behavior of subjects to these different types of situations are quantitative rather than qualitative.

The results of this investigation indicate the importance of personality as a factor to be reckoned with in decision theory in general. More particularly, the effects of differences in personality adjustment seem to be manifested in relation to decision conflict, decision accuracy, and decision time. The results suggest that neuroses impairs functioning in an important area of adaptive behavior which involves decision making.

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APPENDIX I

WORD TEST *

- | | |
|------------------------------------|-------------------|
| 1. interest in one's self | vanity - conceit |
| 2. to depart in a hurry | escape - flee |
| 3. to spring forward | leap - jump |
| 4. an even surface | flat - level** |
| 5. to proceed leisurely | walk - run |
| 6. to do something quickly | haste - hurry |
| 7. to talk to an audience | speech - lecture |
| 8. to keep out of view | conceal - hide |
| 9. to set free from danger | save - rescue |
| 10. not easily moved | rigid - firm |
| 11. to be energetic | lazy - active** |
| 12. to plead | beg - implore |
| 13. something to be aware of | threat - menace |
| 14. done for amusement | play - work** |
| 15. to want | desire - wish |
| 16. unadorned | simple - plain |
| 17. abounding in money | wealthy - rich |
| 18. a request which must be obeyed | command - order |
| 19. to commence | begin - start |
| 20. free from injury | safe - secure |
| 21. to assist | help - aid |
| 22. ungraceful in movement | awkward - clumsy |
| 23. instrument played with a bow | piano - violin** |
| 24. below | under - beneath |
| 25. temporarily unwell | sick - ill |
| 26. a sudden fear | fright - scare |
| 27. season of warm weather | summer - winter** |
| 28. a speech difficulty | stammer - stutter |
| 29. to give an account of | tell - relate |
| 30. a collection of houses | town - village |

* Each phrase and each corresponding pair of words was presented on separate cards.

** Easy decisions.

APPENDIX II

NORMAL GROUP: FREQUENCY OF ERRORS BY SUBJECT FOR EACH COMPARISON
STIMULUS IN THE WEIGHT TEST*

Subjects	Easy Decisions			Hard Decisions			Total
	50 grms.	54 grms.	Subtotal	78 grms.	82 grms.	Subtotal	
1	-	1	1	3	3	6	7
2	-	-	-	3	4	7	7
3	-	-	-	3	2	5	5
4	-	-	-	1	3	4	4
5	-	-	-	2	2	4	4
6	-	-	-	1	3	4	4
7	-	-	-	5	5	10	10
8	-	-	-	2	6	8	8
9	-	-	-	3	3	6	6
10	-	1	1	3	3	6	7
11	-	-	-	-	3	3	3
12	-	-	-	4	2	6	6
13	-	-	-	1	3	4	4
14	-	-	-	2	5	7	7
15	-	-	-	3	2	5	5
16	-	-	-	1	4	5	5
17	-	-	-	4	3	7	7
18	-	-	-	2	3	5	5
19	-	-	-	-	1	1	1
20	-	-	-	2	2	4	4
Subtotal 2						Subtotal 107	Total 109

* For this task the standard stimulus was 86 grms.

APPENDIX III

CAUTIOUS GROUP: FREQUENCY OF ERRORS BY SUBJECT FOR EACH COMPARISON
STIMULUS IN THE WEIGHT TEST

Subjects	Easy Decisions			Hard Decisions			Total
	50 grms.	54 grms.	Subtotal	78 grms.	82 grms.	Subtotal	
1	-	-	-	3	5	8	8
2	-	-	-	3	5	8	8
3	-	1	1	4	2	6	7
4	-	-	-	2	3	5	5
5	-	-	-	2	5	7	7
6	-	-	-	3	3	6	6
7	-	-	-	4	5	9	9
8	1	-	1	2	7	9	10
9	-	-	-	1	3	4	4
10	-	-	-	4	5	9	9
11	-	-	-	4	4	8	8
12	-	-	-	2	5	7	7
13	-	-	-	3	3	6	6
14	-	-	-	1	5	6	6
15	-	-	-	2	3	5	5
16	-	-	-	3	4	7	7
17	-	-	-	2	4	6	6
18	1	1	2	3	6	9	11
19	-	-	-	4	4	8	8
20	-	-	-	3	3	6	6
			Subtotal 4			Subtotal 139	Total 143

APPENDIX IV

IMPULSIVE GROUP: FREQUENCY OF ERRORS BY SUBJECT FOR EACH
COMPARISON STIMULUS IN THE WEIGHT TEST

Subjects	Easy Decisions			Hard Decisions			Total
	50 grms.	54 grms.	Subtotal	76 grms.	82 grms.	Subtotal	
1	-	-	-	4	6	10	10
2	-	-	-	1	6	7	7
3	-	-	-	-	4	4	4
4	-	-	-	4	5	9	9
5	-	-	-	3	4	7	7
6	-	-	-	1	4	5	5
7	1	-	1	5	4	9	10
8	-	-	-	4	3	7	7
9	-	-	-	1	6	7	7
10	-	-	-	2	5	7	7
11	-	-	-	2	4	6	6
12	-	-	-	5	5	10	10
13	-	-	-	5	5	10	10
14	-	-	-	2	6	8	8
15	-	1	1	5	5	10	11
16	1	-	1	3	6	9	10
17	1	1	2	3	2	5	7
18	-	-	-	4	4	8	8
19	-	-	-	3	2	5	5
20	-	1	1	2	4	6	7
Subtotal 6			Subtotal 149			Total 155	

APPENDIX V

NORMAL GROUPS: FREQUENCY OF ERRORS BY SUBJECT FOR EACH COMPARISON
STIMULUS IN THE LINE TEST*

Subject	Easy Decisions		Hard Decisions		Total
	$\frac{1}{2}$ inch difference from standard	Subtotal	$\frac{1}{8}$ inch difference from standard	Subtotal	
1	-	-	3	3	3
2	-	-	4	4	4
3	-	-	7	7	7
4	1	1	4	4	5
5	-	-	6	6	6
6	1	1	4	4	5
7	3	3	5	5	8
8	1	1	3	4	4
9	3	3	5	5	8
10	-	-	3	3	3
11	-	-	6	6	6
12	-	-	8	8	8
13	-	-	4	4	4
14	-	-	5	5	5
15	-	-	3	3	3
16	2	2	5	5	7
17	-	-	3	3	3
18	-	-	6	6	6
19	-	-	5	5	5
20	1	1	4	4	5
	Subtotal	12	Subtotal	94	Total 106

* For this task the standard stimulus was five inches long

APPENDIX VI

CAUTIOUS GROUP: FREQUENCY OF ERRORS BY SUBJECT FOR EACH COMPARISON
STIMULUS IN THE LINE TEST

Subjects	Easy Decisions	Subtotal	Hard Decisions	Subtotal	Total
	$\frac{1}{8}$ inch difference from standard		$\frac{1}{8}$ inch difference from standard		
1	1	1	5	5	6
2	6	6	5	5	11
3	-	-	5	5	5
4	-	-	4	4	4
5	-	-	8	8	8
6	-	-	5	5	5
7	1	1	4	4	5
8	-	-	6	6	6
9	2	2	7	7	9
10	-	-	5	5	5
11	-	-	2	2	2
12	-	-	5	5	5
13	1	1	2	2	2
14	1	1	3	3	4
15	-	-	3	3	3
16	2	2	1	1	3
17	-	-	5	5	5
18	2	2	10	10	12
19	-	-	4	4	4
20	-	-	6	6	6
	Subtotal	16	Subtotal	95	Total 111

APPENDIX VII

IMPULSIVE GROUP: FREQUENCY OF ERRORS BY SUBJECT FOR EACH COMPARISON
STIMULUS IN THE LINE TEST

Subjects	Easy Decisions		Hard Decisions		Total
	$\frac{1}{8}$ inch difference from standard	Subtotal	$\frac{1}{8}$ inch difference from standard	Subtotal	
1	1	1	4	4	5
2	-	-	8	8	8
3	-	-	5	5	5
4	1	1	6	6	7
5	1	1	5	5	6
6	-	-	5	5	5
7	-	-	5	5	5
8	3	3	3	3	6
9	2	2	6	6	8
10	-	-	4	4	4
11	1	1	7	7	8
12	-	-	6	6	6
13	1	1	8	8	9
14	-	-	5	5	5
15	1	1	5	5	6
16	1	1	4	4	5
17	9	9	7	7	16
18	-	-	6	6	6
19	-	-	2	2	2
20	2	2	5	5	7
	Subtotal	23	Subtotal 106	Total 129	

APPENDIX VIII

NORMAL GROUP: MEAN HARD AND EASY DECISION TIMES
FOR EACH SUBJECT ON THE WORD TEST

Subject	Mean Easy Decision Time	Mean Hard Decision Time
1	2.28	7.15
2	1.34	2.08
3	1.86	2.88
4	1.08	2.09
5	1.20	3.15
6	2.34	5.73
7	1.48	2.23
8	2.32	5.82
9	6.22	8.15
10	1.48	1.53
11	1.20	1.26
12	1.10	1.87
13	1.42	3.34
14	2.00	9.99
15	1.50	2.28
16	1.30	3.27
17	2.96	7.74
18	1.34	2.04
19	3.44	7.84
20	2.26	3.81

APPENDIX IX

CAUTIOUS GROUP: MEAN HARD AND EASY DECISION TIMES
FOR EACH SUBJECT ON THE WORD TEST

Subject	Mean Easy Decision Time	Mean Hard Decision Time
1	1.86	4.84
2	1.56	2.32
3	2.14	3.85
4	2.08	4.21
5	1.22	1.55
6	2.12	7.21
7	3.28	6.08
8	1.70	4.15
9	2.16	6.46
10	1.70	2.57
11	4.14	9.92
12	3.28	5.98
13	1.46	2.84
14	1.72	3.14
15	4.22	14.49
16	2.38	4.53
17	2.56	5.79
18	2.54	4.38
19	1.40	3.66
20	1.36	1.76

APPENDIX X

IMPULSIVE GROUP: MEAN HARD AND EASY DECISION TIMES
FOR EACH SUBJECT ON THE WORD TEST

Subject	Mean Easy Decision Time	Mean Hard Decision Time
1	1.36	1.73
2	1.94	2.74
3	1.26	1.66
4	3.02	7.58
5	1.44	3.26
6	1.42	1.70
7	1.80	6.22
8	1.64	2.42
9	1.68	2.04
10	1.92	1.66
11	3.26	4.61
12	2.92	5.16
13	1.84	5.34
14	2.96	4.87
15	2.40	2.46
16	1.48	2.29
17	1.26	1.43
18	1.72	4.51
19	0.98	1.26
20	1.10	1.37

constructive interest in client.

5. Supervisory only
Availability of services of supervisor; coordinating of staff functions.

C. Work Interest

Attends scheduled meetings; attends conferences on social work; participates in any staff meeting; keeps current with prescribed departmental procedures; understand principles of program; keeps up to date on professional trends.

D. Work Attitudes

1. Initiative
Ability to work on own initiative
2. Loyalty
Loyal to vocation, his agency and his associates.
3. Stability
Maintains composure under pressure; control of one's prejudices as they affect job performance and work relationships; fairness and poise in handling controversial matters.
4. Personal Characteristics
Maintains appropriate appearance for job; health as it affects the job; appreciation of effect of personal conduct on job; acceptance of responsibility for own errors.

TOTAL

Rating	Weight	Weighted Score

Signature of Supervisor

I hereby certify that I have discussed this service rating with my immediate supervisor.

Date _____

Signature of Employee _____

Approved by:

Appointing Authority _____

COMMENTS: _____

APPENDIX XVI
RAW DATA FORM

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SUBJECT:
AGE: SEX:
CLASSIFICATION

(R L) Weights Test I Lines Test II Words Test III

Stim.		Resp.	D. Time	Stim.		Resp.	D. Time	Stim.		Resp.	D. Time
L	R			L	R			L	R		
1	54-86			1				1			
2	86-82			2				2			
3	86-78			3				3			
4	78-86			4				4			
5	86-54			5				5			
6	50-86			6				6			
7	86-54			7				7			
8	54-86			8				8			
9	86-82			9				9			
10	82-86			10				10			
11	50-86			11				11			
12	86-50			12				12			
13	86-82			13				13			
14	86-82			14				14			
15	86-78			15				15			
16	54-86			16				16			
17	86-78			17				17			
18	50-86			18				18			
19	86-50			19				19			
20	82-86			20				20			
21	50-86			21				21			
22	54-86			22				22			
23	50-86			23				23			
24	82-86			24				24			
25	78-86			25				25			
26	78-86			26				26			
27	86-50			27				27			
28	82-86			28				28			
29	86-50			29				29			
30	86-78			30				30			
31	78-86			31							
32	86-78			32							
33	82-86			33							
34	86-50			34							
35	86-54			35							
36	86-82			36							
37	78-86			37							
38	54-86			38							
39	86-54			39							
40	86-54			40							

APPENDIX XIII

REQUEST FOR PATIENT PARTICIPATION

We are constantly attempting to gather information about how people behave. The more we can learn about the behavior of people the more we can ultimately be of help to you and others. Most of the people being seen at Clinic are being requested to participate in a brief study. This will only involve fifty minutes of your time and will consist of a series of judgements of objects. You will not be made to feel the slightest discomfort. Almost without exception those who have been asked to participate have agreed and it is hoped that you will also.

In general it might be most convenient for you if you can arrange to be at the clinic for this purpose, the hour immediately before or after your regularly scheduled treatment hour. However, your psychiatrist will arrange a definite appointment with you.

APPROVAL SHEET

The dissertation submitted by Warren Freiband has been read and approved by five members of the Department of Psychology.

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

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

Jan. 4, 1957

Date

Magda B. Arnold.

Signature of Adviser