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THE EFFECTS OF ANXIETY AND DOGMATISM ON
NON-VERBAL PAIRED-ASSOCIATE LEARNING
IN A NEGATIVE TRANSFER PARADIGM

by

B. A. RIDGLEY

B.A., University of Toronto, 1963

A Thesis
Submitted to the Faculty of Graduate Studies through
the Department of Psychology in Partial Fulfillment
of the Requirements for the Degree of
Master of Arts at University of
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ABSTRACT

This study was an attempt to assess the effect of Anxiety, Dogmatism and negative transfer on non-verbal paired-associate learning. The theories of Spence and Rokeach suggested the following hypotheses:

- I) In a new learning task, performance varies inversely with Dogmatism.
- II) In a negative transfer situation, performance varies inversely with Dogmatism.
- III) High and low dogmatic subjects do not differ in the time taken to reach the analytic stage.
- IV) In a simple learning task, performance varies directly with Anxiety.
- V) In a complex learning task, performance varies inversely with Anxiety.

The experimental sample consisted of 60 Ss who were assigned to High, Medium and Low levels of Anxiety and Dogmatism according their scores on the Taylor Manifest Anxiety Scale and Dogmatism Scale, respectively. Ss were selected in a manner which would discriminate the independent effects of Dogmatism and Anxiety on performance. All Ss were given a non-verbal paired-associate learning task. Halfway through the experiment the reinforced

associations were changed without notifying the Ss. The point at which Ss performed as if they realized that the programme changed was defined as the analytic stage, and a measure was taken of learning after this stage.

The results indicated that performance in a negative transfer paradigm varies inversely with Dogmatism (Hypothesis II); but that performance varies directly with Dogmatism in a new learning situation and directly with Anxiety in a complex task (Hypotheses I and V). Hypothesis III and IV were not confirmed by the data. These findings were discussed in terms of the theories of Spence and Rokeach and a criticism was made of the experimental method and the theoretical formulations employed in this study.

PREFACE

Within the confines of modern psychology, this study can be perceived as somewhat alien from traditional thinking. It is certain, however, that the two assumptions upon which this investigation is based are not alien from sound reason. One of these assumptions purposes that meaningful knowledge can be gained if psychology would focus on, rather than attempting to eliminate, the individual differences which so frequently occur in laboratory experiments. It is only recently with Spence, Taylor, Eysenck, and Brengelmann that the orientation for psychological study has shifted way from the frequent denial of individual difference so characteristic of the 19th century school of Wundt. The second assumption claims that relatively few dimensions of personality can explain a wide range of behaviour. Individual differences are fairly pervasive in their behavioral concomitants. This approach rests on the foundations set by Allport, Klein, Gardner and Holzman and is moving towards the molar conceptualization of personality already suggested by Rogers, Maslow and Schachtel.

It is impossible to construct a thesis of this nature without acknowledging the influence of those immediate persons who responded to the "idea" with such appropriateness.

The most serious expression of gratitude must be delivered to Dr. B. Rourke whose non-directive guidance, personal interest and objective assessment of the topic made this investigation a worthwhile reality. In the same token appreciation is felt for the comments of Dr. A. Smith and Fr. Malley. To those people close to my heart and who received the absurd wrath of each frustration, I extend a well taught apology.

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CHAPTER I
INTRODUCTION

The present period in psychology is marked by an increased interest in the experimental assessment of the behavioral concomitants of "personality" variables. This increased interest has brought the study of personality into the empirical orientation of the laboratory. The reason for, and, the result of this experimental direction in "personality" research has been the productive application of classical learning theory to the interpretation of human behavior. In the main, learning theorists have attempted to study the effects of motivation by controlling increments of motivation (e.g. drive levels) in the experiment proper and/or correlating an intrinsic measure of motivation (e.g. scores on paper and pencil questionnaires) with measures of performance. In the latter method, measures of manifest Anxiety have played an important role.

Chronic manifest Anxiety has been frequently described as a state of heightened emotionality, organismic unrest and psychological discomfort. This description of Anxiety satisfies the definition of drive as it is formulated by Young (1961). It is an organic, a persistent

and an activating or energizing process. Taylor (1953) constructed a manifest Anxiety scale designed, in the main, to discriminate individual differences in the level of Anxiety. Scores on this scale (Taylor Manifest Anxiety Scale) have been correlated with individual performance in numerous classical and operant conditioning tasks (Taylor 1956). In general, the finding has been that performance in a simple task varies directly with levels of Anxiety.

In recent years several investigators have criticized the learning approach for assuming that motivational variables or drive levels are the sole personal determinant of individual differences in behavior. Restricting explanations to levels and types of drive is said to be a naive application of the principles evident in simple animal behavior. Gardner, Holzman, Klein, Linton and Spence (1959) suggest that the concept of motivation is limited in its application to all individual differences. To put the point simply, people with the same levels and types of drives often behave differently. Consequently, some investigators have suggested that there is a second variable, which, in conjunction with drive, determines behavior. This second variable is described as a cognitive style.

Gardner et al. (1959) have described a cognitive style or cognitive controls as invariant and pervasive structures which "provide instrumental means through which drive discharge takes place" and "modulate drive-discharge

processes to accord with established modes of confronting reality contexts in which consummation is sought (p. 12)."

If an individual does have a cognitive style which has a relatively pervasive effect upon his behavior, it follows that these controls could determine individual performance in a learning task. Unfortunately, there have been relatively few studies dealing with the effect of cognitive control on experimental learning. It is also evident that little effort has been made to verify the claim that cognitive controls work in conjunction with drives.

One cognitive style which may affect performance in a learning task has been suggested by Rokeach (1960) in his description of the dogmatic or closed cognitive system. Rokeach (1954) defines Dogmatism as "(a) a relatively closed cognitive organization of beliefs and disbeliefs about reality, (b) organized around a central set of beliefs and disbeliefs about authority which, in turn, (c) provide a framework for patterns of intolerance and qualified tolerance for others (p. 195)." No attempt will be made to review the extensive presentation of Rokeach's cognitive theory or integrate it with that of Gardner et al. (1959). However, it should be pointed that Rokeach has applied the principle of cognitive control to the formation and structure of a belief system.

One characteristic of the dogmatic or closed cognitive system or style is its relatively high resistance

to both change and the formation of new belief systems. If Dogmatism is a relatively pervasive cognitive variable then dogmatic resistance to change should ramify in a large number of situations including experiments in learning. Briefly then, the purpose of this investigation is to show that dogmatic resistance to change, affects learning independently, in affiliation with the State Anxiety. The plan of this chapter is to describe the background of the concept of Dogmatism, to show its pervasiveness in a large number of situations, and to discuss the immediately relevant research concerning the effects of Dogmatism on learning.

Background

The formulation of Dogmatism evolved primarily from the early investigations into the "Authoritarian Personality" (Adorno, Frenkel-Brunswick, Else, Levinson & Sanford 1950). This research, arising out of nineteenth century thought (Vinacke 1963), and the international concern focused on anti-semitism, yielded a conception of the authoritarian personality, viz., an individual classically anti-democratic, ethnocentric, anti-semitic and politically conservative. The chief measuring instrument based on this descriptive foundation is the California F or Fascism Scale. This scale and its theoretical implications found a great deal of use in differentiating behavior in such

diverse areas as political attitudes, socioeconomic status, child rearing, conformity, psychopathology, etc. (Christie and Cook 1958).

As this research expanded, the number and intensity of the criticisms levelled against the F Scale as an adequate measure of authoritarianism increased (Christie and Cook 1958). Shils (1954) and Rokeach (1956) claim that the F Scale, because it is rooted primarily in fascist ideology, measures only Right or Conservative (politically) authoritarianism and is not a measure of general authoritarianism independent of ideological content. According to Rokeach (1956), it is possible for an authoritarian personality to express ideas consistent with any one point along the left-right political continuum. In this way, a communist may be as rigid and antidemocratic and voice as much ethnocentric prejudice as his conservative opposition.

What factors then distinguish the authoritarian personality? Rokeach (1954) states that the criterion of distinction lies in the consideration of an individual's cognitive system. According to Rokeach, all cognitive systems are organized along a continuum defined by the two extremes, the belief system and the disbelief system. Belief-disbelief systems are said to be dogmatic or closed depending on their further organization along three dimensions, the belief-disbelief continuum, the central-peripheral dimension and the time-perspective dimension.

For example, an authoritarian accepts the absolute correctness of authority (central-peripheral dimension), and expresses a relatively narrow, future-oriented time perspective (time-perspective dimension).

In 1956 Rokeach published the first Dogmatism or D Scale which purported to test the cognitive structure associated with general authoritarianism independent of ideological content. Its items were designed expressly to tap the implications contained within each dimension of the belief-disbelief continuum. The D Scale, after several revisions (Rokeach 1960) is finding support in the literature as a measure of general authoritarianism (Fruchter, Rokeach and Novak 1958; Rokeach 1956, 1960; Rokeach & Fruchter 1956; Plant 1960). Investigations by Adams and Vidulich 1962, and others (Korn and Giddan 1964; Lefcourt 1963; La Sciuto & Hartley 1963; Middleton 1964; Restle, Andrews & Rokeach 1964; Vidulich, 1959; and Zagona, & Zurcher 1964) indicate that subjects high and low in dogmatism behave in a manner consistent with Rokeach's theoretical foundations concerning all three dimensions of the belief-disbelief continuum.

Related Research

Rokeach, McGoveney and Denny (1955) designed a task, the "Joe Doodlebug" problem, to test the validity of the dimension of direct concern in the present investiga-

tion - dogmatic resistance to change. Joe Doodlebug is not an ordinary bug and to solve the Doodlebug problem, subjects must attribute to Joe three characteristics which are not typical of ordinary bugs as they are found in nature. In other words, to solve the problem, subjects must abandon three beliefs and replace them with three new beliefs. The point at which subjects overcome the three old beliefs is said to be the analytic stage. The synthetic stage is said to occur when the individual integrates his three newly acquired beliefs to solve the problem. Subjects are encouraged to think out loud and the experimenter records the time taken for a subject to indicate verbally that he has overcome his old belief. This is the measure of analytic ability. Closed-minded subjects (as measured by the D Scale) were significantly slower than open-minded subjects in the mean time required to solve the Doodlebug problem. High and low dogmatics differed primarily in synthetic ability but not in analytic ability. On the basis of this experiment, Rokeach (1960) states that the more closed a person's belief system, as measured by Dogmatism Scale, the more he will resist (consciously or unconsciously) the formation of new belief systems.

According to Rokeach (1960), differences in the performance of high and low Dogmatism groups on the Doodlebug problem is attributable to differences in cognitive structure. Rokeach has stressed that Dogmatic behavior

depends on the structure and not the content of a cognitive system. However, Rokeach describes a hypothetical cognitive structure which is still anchored in a belief-disbelief system and which strongly reflects the early concepts of authoritarianism and the measurement of attitudes. The use of such a vague and undefined term as "belief" raises many questions related to the terms inclusiveness and relationship to non "Cognitive" knowing (e.g. neo-behaviorist concepts such as mediating responses). A review of the literature suggests that the D Scale taps a more pervasive variable than defined by the term "general authoritarianism". Recent studies also indicate that high and low Dogmatics differ in analytic as well as synthetic ability.

For example, La Scuito and Hartley (1963) found that high and low Dogmatics differ in the binocular resolution of perceptual stimuli associated with the subject's religious beliefs. Binocular resolution is primarily an analytic task. Mikol (1959) described predicted differences for closed-minded subjects in their acceptance or rejection of contemporary music. White and Alter (1965) demonstrated that open-minded subjects are more flexible in changing their judgments of weights. Perhaps the most demonstrative evidence that Dogmatism is a relatively pervasive variable comes from the research by Kaplan and Singer (1963). In their experiment they found the follow-

ing: (1) high and low dogmatics differ in analytic tasks related to sensory acuity; (2) a negative correlation exists between Dogmatism and sensory acuity; and, (3) differences between high and low dogmatics are more prominent in autocentric sensation as opposed to allocentric sensation (Schachtel 1959). Kaplan and Singer (1963) concluded that "closed-mindedness and open-mindedness are not phenomena which appear in some areas of an individual's living and not others (p. 490)". Christensen (1964) found that synthetic and analytic measures of classroom learning (essay and objective tests) failed to differentiate open- and closed-minded students. Further doubt was cast on Rokeach's interpretation of synthetic and analytic stages by Lyda and Fillenbaum (1964) who concluded from their work with the Doodlebug problem that "what had been attributed to individual differences in the time taken to synthesize a set of new beliefs into a working system is more likely a consequence of individual differences in the ability to utilize information given in a single unit (p. 102)". From the above research it is evident that (1) dogmatic behavior is manifested in more than just "situations involving person to person communication (Rokeach 1954 p. 196)", and that (2) the results of recent investigations do not confirm Rokeach's prediction that open- and closed-minded individuals do not differ in analytic ability.

Not only is the concept of Dogmatism too limited,

but Rokeach's chief validating instrument, the Doodlebug problem can be criticized for being too specific. The problem does not support the general conclusion that dogmatic individuals resist all change. The Doodlebug problem involves a special case of cognitive change. The new beliefs to be integrated into its solution are antagonistic to beliefs about bugs which have been a positively reinforced part of an individual's cognitive system for a long time. If, as Rokeach claims, there is a strong motivation for an individual to know and to understand, it does not follow that dogmatic individuals will invariably resist the formation of new beliefs, unless the new beliefs can be seen as threatening to the individual. It is also difficult to conceive that a new belief would be threatening unless it is antagonistic in some way to pre-existing beliefs which may have strong affectual loadings. At this point, the following question can be raised: are closed-minded persons relatively more resistant than open-minded persons to the formation of all new belief systems, or does this difference in resistance occur only when the new beliefs are antagonistic to pre-existing beliefs?

If, as it was stated earlier, Dogmatism is a more pervasive variable than was suggested by Rokeach (1960) it may be a variable which influences learning. If so, the above mentioned question can be recast in learning terms: are closed-minded individuals relatively more resistant

than open-minded individuals to all new learning, or does this difference in resistance occur only in a negative transfer situation in which responses required of a new learning situation are interfered with by the responses of prior learning? The possible effects of Dogmatism on learning have not been adequately assessed either in a new learning situation or in a negative transfer paradigm.

Ehrlich (1961) and Christensen (1963) used the degree of classroom learning to measure the effects of Dogmatism on learning. Both investigators discovered that aptitude as measured by entrance exams is independent of Dogmatism but found contradictory results concerning the hypothesis that Dogmatism is inversely related to learning. Ehrlich (1961) concludes that "further study into the generality of the Dogmatism-learning relationship seems warranted (p. 149)". These studies draw criticisms for their quasi-experimental approach and subsequent failure to control the momentous number of classroom variables that affect both learning and Dogmatism (Vidulich & Kaimen 1961; Zagona & Zurcher 1964).

Restle, Andrews and Rokeach (1964) confirmed the hypothesis that "the closed-minded person evaluates incoming information as correct and important if it comes from a positive authority, and unimportant if it comes from a negative authority (p. 648)". These examiners found that high dogmatics (1) show superior performance when depend-

ence on authority can facilitate learning and (2) are inferior when reliance on stimulus cues encourages learning. There was no significant relation between transfer effects and high or low Dogmatism. Moore (1963), by verbally reinforcing the use of particular pronouns, discovered that low dogmatics were more easily conditioned and that there was no significant relation between performance and anxiety.

One study measured the differences between high and low dogmatic subjects in the learning of congruent and incongruent paired associates. Adams and Vidulich (1962) found the following: (1) all subjects made more errors in learning incongruent associations (e.g. ball-square) than congruent associations (e.g. ball-round); (2) no relationship was found between number of intrusions and Dogmatism; (3) more errors were made by high dogmatics versus low dogmatics on incongruent associations; but, (4) high dogmatics also made more errors on congruent associations.

These investigations, because they were not concerned primarily with assessing the effects of Dogmatism on learning, failed to control the influence of authority and the meaningfulness of the learned materials. These studies compared only the high and low extremes of Dogmatism as measured by the D Scale. A simple method of assessing the influence of Dogmatism on learning would be to present High, Medium and Low Dogmatism groups with a non-verbal paired-associate learning task. If, after several

trials, the correct responses to the same stimuli are changed, it constitutes a situation for assessing the effect of Dogmatism on learning in a negative transfer situation. This design is, in essence, a simple A-B, A-C, negative transfer paradigm. The second phase (Part II, A-C) requires the subjects to respond to familiar stimuli (A) by replacing the old response of Part I (B) with new responses (C). Because the stimuli are familiar, but the reinforced responses are different, Part II encourages intrusions and other forms of interference from Part I (that is, negative transfer). In this study it will be assumed that the interference occurring in Part II is the result of negative transfer. This assumption is supported by the studies of Bruce (1933) and Osgood (1949).

If Dogmatic individuals are resistant to all change, but more resistant when change is in direct opposition to established behavior, the following hypotheses are forthcoming: In a new learning situation (Part I), performance varies inversely with Dogmatism (Hypothesis I); In a negative transfer situation (Part II), performance varies inversely with Dogmatism (Hypothesis II).

In the Doodlebug problem Rokeach records, as a measure of analytic ability, the time taken for the subject to say that he has overcome a belief. Applying the concept of analytic ability to Part II (A-C) of the transfer paradigm, a more objective measure can be made if the analytic

stage is defined as that point (that is, trial) at which the subject performs as if he realizes that the programme has been changed. It is hypothesized (Hypothesis III) that high and low dogmatic subjects do not differ in the time taken to reach the analytic stage.

The A-B, A-C, paradigm has been used to assess the influence of two other personality variables on learning, Rigidity and Anxiety. Their influence must be controlled or accounted for in order to claim effects for the distinct variable Dogmatism.

The difficulty in assessing the influence of Rigidity in Dogmatism compares with the difficulty in defining the term "Rigidity" (Goins 1962). One definition (Cervin, 1957) of direct concern in the present study suggests that Rigidity occurs when stimuli evoke "mutually interfering generalized and specific responses (p. 628)". The second phase of a negative transfer paradigm is a situation in which stimuli evoke mutually competitive responses. It is in the second phase of a negative transfer paradigm that rigid subjects should be differentiated from non-rigid subjects. Polan (1955) found that there was no significant differences in paired-associate learning between rigid and non-rigid subjects in any phase of a negative or positive transfer paradigm. Polan used the Wesley Rigidity Scale as a measure of rigidity. This investigator also found no relationship between performance and Anxiety as measured

by the Taylor Manifest Anxiety Scale (Taylor, 1953).

Rokeach (1960) claims that dogmatic and rigid behavior are discriminable processes. Dogmatism refers to a resistance to change a complete network of beliefs; rigidity, to a resistance to change single habits, not total belief systems. Using the Doodlebug problem, Rokeach (1960) supports a hypothesis that the differences between rigid and dogmatic subjects is apparent in analytic thinking. According to Rokeach (Rokeach, McGovernery & Denny 1955), high and low dogmatics do not differ in analytic ability, whereas, rigid subjects do differ. As was reported earlier, however, the concept of analysis and synthesis has not found conclusive support in the literature.

The Dogmatism Scale does not measure the narrow concept rigidity only. This statement is supported by two factorial studies (Rokeach & Fruchter, 1956; Fruchter, Rokeach & Novak, 1958) which have shown that items in the D Scale cluster separately from Rigidity items. The items on the Dogmatism Scale are said to test the individual's ability to change a network of beliefs. Items on Rigidity Scales are concerned with individual tendencies to repeat simple habits.

Although Rigidity and Dogmatism are discriminable they are not totally independent. Correlations of .37 and .55 (Rokeach, 1960) have been found between Rigidity and Dogmatism Scales. It must be remembered, however, that the

Dogmatism Scale is based on a well developed theoretical framework and purports to measure general authoritarianism along three dimensions within which rigidity is said to play a small part. The present study, rather than attempting to differentiate Dogmatism from rigidity, accepts that they are distinct processes in order to demonstrate that Dogmatism is discriminable from Anxiety and that Dogmatism influences learning.

There is some evidence that the D Scale may have a relationship to learning, not because individuals scoring high on the scale are "dogmatic", but because they are high in a drive factor closely affiliated with Dogmatism. Rokeach (1960) suggests that a belief system is closed because it defends against Anxiety, and that individuals who have relatively closed systems should manifest relatively more Anxiety than those with more open systems. Significant positive correlations (Rokeach 1960) in the range .36 to .64 were found between the Welch Anxiety Scale (Welch, 1952) (similar to the TMS) and the Dogmatism Scale. It appears as if individuals high and low in Dogmatism are respectively high and low in Anxiety.

If Anxiety is a drive, then subjects high in Anxiety will learn in a manner which is consistent with the Yerkes-Dodson Law (Yerkes & Dodson, 1908). According to Jones (1961), the Yerkes-Dodson Law can be stated as follows:

1. Efficiency of learning is a curvilinear

function of drive strength, some intermediate level of drive being optimal.

2. Optimal drive strength is an inverse function of the difficulty of a learning task (p. 493).

Applying this law to the A-B, A-C, transfer paradigm, performance in Part I, because it is a relatively easy task, will be facilitated by the presence of Anxiety. Spence (1958) has made similar predictions. In experiments with serial and paired-associate learning, Spence (1958) found that if the subjects were not required to choose a correct response from a large number of competing responses, Anxiety (measured by the Taylor Manifest Anxiety Scale) facilitating effect of Anxiety was a positive function of the number of learning trials. In light of this, Hypothesis IV was proposed as follows: In a simple learning task, performance varies directly with Anxiety.

Part II of this paradigm (A-C), because it encourages interference from past learning, is, in Spence's (1958) criterion, a complex or difficult task. Spence (1953) found that in complex verbal paired-associate learning, when an effort was made to maximize the number of competing responses, high anxious subjects, as measured by the TMAS (Taylor 1953), were poorer in performance relative to low anxious subjects. These results are consistent with the Yerkes-Dodson effect and suggest the following hypothesis, (Hypothesis V): performance varies inversely with Anxiety in a complex learning task (Part II).

The above stated hypothesis (Hypotheses IV and V) suggest that Anxiety, as well as Dogmatism, will influence learning in an A-B, A-C, transfer paradigm. In the present study an attempt was made to "partial out" the effects of Anxiety on learning in order to clarify the effects of Dogmatism. (This procedure is fully outlined in the Method section of this investigation.)

It will be recalled that Hypotheses I and II are based upon Rokeach's interpretation of the closed cognitive system. Related hypotheses concerning individual differences in learning have been suggested by Eysenck (1952). No attempt will be made at this point to present a full and adequate view of his theory. Basically, Eysenck maintains that there are behavioral concomitants of the degree of cerebral excitation. Low levels of excitation ramify in behavior described as extroverted. The extrovert is said to form conditioned responses poorly and these responses once formed, extinguish readily. At the opposite end of the excitation-inhibition dimension of cortical activity is the introverted personality who conditions readily but whose responses take longer to extinguish. Eysenck and his affiliates have constructed the Maudsley Personality Inventory (Jensen 1958) which is designed, in part, to measure the extroversion-introversion dimension of personality. As an auxiliary investigation, this study will employ the MPI in order to assess its possible relationship

with Anxiety and Dogmatism.

Purpose of Study

This investigation was an attempt to demonstrate that Dogmatism and Anxiety independently affected performance in a learning task. The learning task in this study was of the non-verbal paired-associate variety, using a modified negative transfer paradigm. From the theoretical framework of Taylor and Rokeach concerning manifest Anxiety and Dogmatism respectively, several specific hypothesis will be tested:

I) In a new learning situation (Part I), performance varies inversely with Dogmatism.

II) In a negative transfer situation (Part II), performance varies inversely with Dogmatism.

III) High and low dogmatic subjects do not differ in time taken to reach the analytic stage.

IV) In a simple learning task (Part I), performance varies directly with Anxiety.

V) In a complex learning task (Part II) performance varies inversely with Anxiety.

CHAPTER II

METHODOLOGY AND PROCEDURE

The methodology and procedure chapter of this investigation can be divided into two main sections. Section I is concerned with the description and administration of the paper and pencil questionnaires, and, their importance in the selection of subjects. Section II describes the apparatus and procedure of the learning task.

Section I

Subjects

Sixty-five male and female students attending introductory psychology classes at the University of Windsor were employed in this study. These sixty-five Ss were selected from an initial pool of one hundred and forty-five students who were attending a scheduled psychology class. The only control imposed upon the selection of subjects was that they be naive as to the nature and purpose of the testing materials.

Testing Materials

The Taylor Manifest Anxiety Scale (TMAS) (Taylor, 1953), the Dogmatism Scale, Form E (Rokeach 1960) and the

Maudsley Personality Inventory (Jensen, 1958) were employed to measure the level of Anxiety, Dogmatism and Neuroticism and Extroversion, respectively.

The TMAS is composed of fifty items from the Minnesota Multiphasic Personality Inventory (MMPI) purported by experts to measure a state of chronic Anxiety. Ss admit to Anxiety symptoms by agreeing (answering true) or disagreeing (answering false) to each item. Items on the scale are mixed so that, according to the specificity of the test item, agreement or disagreement may indicate the presence of Anxiety. The range of possible scores is 0 to 50, with a high score on the TMAS indicative of high Anxiety.

The Dogmatism or D Scale is said to measure the degree of close-mindedness characteristic of an individual's belief system. One dimension of a close-minded or dogmatic individual is his resistance to change. Ss express the direction and degree of close-mindedness by agreeing or disagreeing with an item at any one point along the six point continuum of a Likert scale (I agree very much, I agree pretty much, I agree a little, I disagree a little, I disagree pretty much, I disagree very much). For each item, the degree of agreement represents the degree of Dogmatism. Although the D Scale is a forty item Likert scale, only the frequency of "agree" responses was used as the individual measure of Dogmatism. This method of scor-

ing, according to Korn and Giddon (1964), controls for a possible extreme response set. Scoring the D Scale in this manner limits the range of scores to 0 to 40. The higher the score, the higher is said to be the level of Dogmatism. Several questions were included after the D Scale to test the naiveté of the subjects (see Appendix A).

As part of an auxiliary investigation, the Maudsley Personality Inventory (MPI) (Jensen 1958) was also employed. The MPI consists of forty-eight one-sentence items, twenty-four of which make up a Neuroticism scale, while the other twenty-four items comprise an Extroversion scale. Neuroticism and Extroversion items are interspersed within the body of the questionnaire. The MPI is fully described by Eysenck (1958) and Jensen (1958). The Ss admit to neurotic or extroverted characteristics by answering "yes", "?", or "no" to each item. Like the TMAS, agreement or disagreement (yes or no) with an item may indicate Neuroticism or Extroversion according to the specific direction of that item. Agreement and disagreement indicating Extroversion or Neuroticism are given a score of 2 points; question marks a score of 1 point. This makes the range of possible scores 0 to 48 for both scales. A high level of Neuroticism and Extroversion are indicated by high measures on the Neuroticism and Extroversion Scales respectively.

Selection of Subjects

The TMAS and D Scales were administered to 145 first-year students during a normally scheduled psychology class. Prior to the administration of these tests, the Ss received the instructions found in Appendix B. Two Ss were discarded because of spoiled questionnaires.

In view of the high correlation frequently found between the TMAS and D Scales, it was necessary to control for the effects of Anxiety in the selection of Ss used in the learning procedure. Initially, the Ss in the original pool (N=143) were divided into High, Medium and Low Dogmatism groups according to scores on the D Scale; the range of Dogmatism scores for each one of these levels was 21 to 40, 17 to 20 and 1 to 16, respectively. Within each of these groups of Dogmatism, Ss were selected from the High, Medium and Low ranges of Anxiety scores; the range of TMAS scores for each one of these levels was 27 to 39, 12 to 26 and 1 to 11, respectively. Referring to Table 1, this last division of Ss represented three levels of Anxiety within each of the three Dogmatism groups (I, II, III). These Ss were selected so that 1) High, Medium, and Low Dogmatism groups were not significantly different in Anxiety as measured by the TMAS (VI=V=IV), whereas 2) High, Medium, and Low levels of Anxiety were significantly different in TMAS measures within Dogmatism groups (III>II>I).

Approximately one month after the administration

of the questionnaires, the Ss were contacted by telephone and a time was arranged in which they could come to the laboratory for the "learning" procedure in this investigation. Because of the relatively small pool of students available for drawing Ss to fit the above stated criterion, some levels of Anxiety and Dogmatism contained relatively few Ss. This fact, coupled with a frequent failure to cooperate on the part of the Ss, further limited the number of Ss actually employed in the experimental procedure. The number of Ss for each level of Anxiety and Dogmatism, who participated in the learning part of this study are shown in Table 1. The total number of Ss was sixty-five (N=65).

Table 1
Proposed Levels of Anxiety Within and
Between Dogmatism Groups

		Anxiety			
		L	M	H	
Dogmatism	L	TMAS Meas. N=10	N=9	N=4	IV
	M	N=7	N=5	N=4	V
	H	N=4	N=10	N=7	VI
		I	II	III	

Immediately preceding the learning task each Ss was given the MPI. The test and its instructions are presented in Appendix A. Instructions found in Appendix B were read to the Ss prior to administration.

Section II

Learning Apparatus

The learning apparatus used in this study was the General Learning Apparatus or GLA which is fully described in the literature (Cervin, Smith and Kabisch 1965). Briefly, the GLA consists of six isolated panels arranged in a hexagon, and a master console located in a separate room from which all panels are automatically controlled. All six panels were used in this study. On each individual panel there is a horizontal row of six white stimulus lights, a horizontal row of six response buttons and a green reinforcement light. These are the only parts of the panel used for this study. A diagrammatic representation of the panel is presented in Figure 1.

The GLA was programmed for 100% positive (green light) reinforcement in an operant conditioning mode. In this programme Ss respond to the illumination of one of six white lights (CS) by depressing one of six response buttons (CR). When a green light illuminates at the left of the panel (positive reinforcement) it indicates that the correct

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response button has been depressed. The illumination of one white light constitutes a trial. More specific programming is discussed in the "Procedure for Learning Task" section of this dissertation.

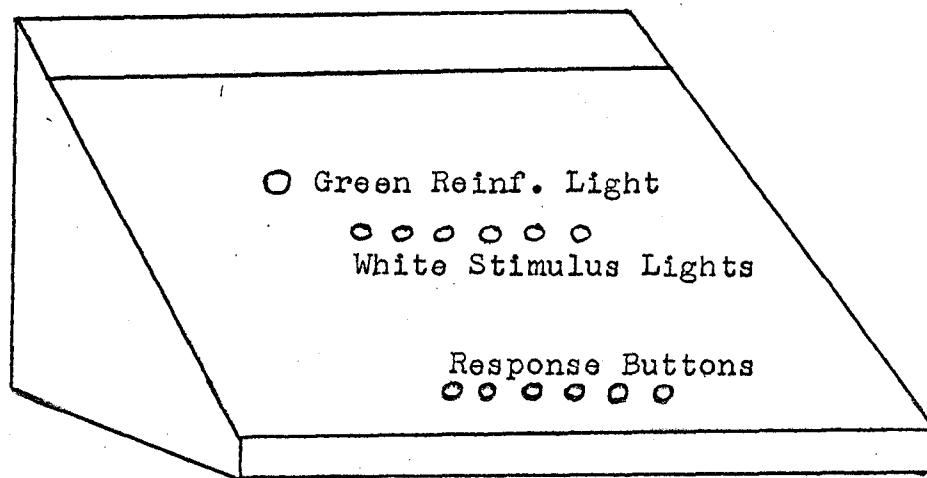


Figure 1. The Elements of an Individual Subject Panel Employed in this Study.

An internal transistor type model AW (style 90M) Esterline-Argus Event Recorder automatically registered correct responses. A common door buzzer was also employed to notify Ss of test and training phases in the learning task (see procedure section). The operation of a standard General Electric window-type air conditioner was used to control temperature in the experimental room and mask any extraneous noise emitted by the learning apparatus and/or environment.

Procedure for Learning Task

All Ss went through the following experimental procedure. In the instructions (fully presented in Appendix C) the Ss were given the following information. They were told that each white light was electrically connected to a specific response button. Their task, they were informed, was to learn which response button was electrically connected to each white light and to indicate (on the illumination of a white light), their choice by firmly depressing one of the six response buttons. The Ss were told that there were alternating test and training phases. In a training phase the Ss received a green light every time a subject depressed a correct response button (pushed that response button which is electrically connected to the illuminated white light). In the test phase Ss received no green light. The change from test phase to trial phase was signalled by two sounds of the buzzer; the transition from training phase to test phase was signalled by one sound of the buzzer. To acquaint the Ss with the learning apparatus all Ss were given a series of 12 white lights and told that the correct response buttons to depress were in a one to one relationship with the white lights (white light one connected to response button one, four to four etc.). During this tryout the Ss were given 100% green light reinforcement and the experimenter checked to see that all Ss were responding appropriately. The instruc-

tions stressed that the programme of light-button connections would be different than a simple one to one relationship once the experiment proper began. Observations made during pilot studies indicate that there is no overt interference of this simple programme with the learning tasks which ensued.

The learning task proper was divided into two parts.

Part I (A-B)

Ss were required to learn a programme of white stimulus light (A), response button connections (B).

Part II (A-C)

In Part II the programme was changed without Ss knowledge or, any break in the procedure. The sequence of white lights (A) remained as it was in Part I but the white light-response button connections were changed. This means that each Ss was forced to learn new responses (C) to familiar stimuli (A).

Part I and Part II consisted of nine test phases alternated with 8 training phases. Each part began and ended with a test phase. Both test and training phases consisted of 12 trials each making the confined total of trials 126 [12 (8+9)] for each of Part I and II respectively. The number of correct responses per block of 12 test trials was recorded as the measure of learning. The number of Ss in any one session varied from one to six.

The sequence of white lights was determined by repeating a series of six blocks of randomly varied six white lights (36 trials is total). This means that for each of the six blocks of six white light presentations, a specific white light appeared once. Consequently for each block of 12 test or training trials a specific white light appeared twice. This randomization of stimulus sequence served to control for the possibility that Ss might memorize the white light and/or response button sequence. One sequence of white lights was used for all experimental sessions. Programmes were varied by changing the response connections. All programmes were of equal difficulty.

Each white light, for every experimental session, remained illuminated for 3.5 seconds whether or not Ss pushed the correct button. If a Ss in a training phase pushed a correct button with 3.5 seconds from the onset of the white light, the green reinforcement light illuminated immediately. Both white light and green lights extinguished 3.5 seconds after the onset of the white light.

The white light-response button associations were randomly determined for Part I of each session. However, the white light-response button connections in Part II were chosen so that five out of six connections in Part I were changed for Part II, with one connection of Phase I being repeated in Part II. The white light-response button connections were not randomized for Part II, because, if this

were done, the number of connections in Part I repeated in Part II would have varied randomly between experimental sessions. This would have meant that some subjects would have received an easier programme in Part II than others. This would have confounded within-subject differences between Parts I and II, especially when the Ss were not assigned to experimental sessions at random. Each set of programmes was changed when it was possible for Ss, after experimentation, to inform other potential Ss of the connections.

After the completion of each experimental session, the Ss were told that the study was designed to assess exactly what happens to the majority of people when a learning programme is changed. It was explained that future Ss must not know that the programme is to be changed. For this reason, the experimenter asked the Ss to refrain from discussing the study once they left the laboratory.

CHAPTER III

PRESENTATION AND ANALYSIS OF RESULTS

The most important aspect of the selection of Ss for the learning task was the attempt to control for Anxiety, which has been frequently found to be significantly correlated with Dogmatism. The Pearson Product-Moment correlation computed for the TMAS and D Scale measures in this study was .35. This was for the initial classroom sample of 143. The standard deviations of TMAS and D Scale measures were 8.23 and 5.17, respectively. The correlation is somewhat lower than the mean correlation reported by Rokeach (1960 p. 348) between the D Scale scored as a Likert Scale and the Welch (1952) Anxiety Scale. The mean D Scale score for 143 Ss was 19.53 out of a possible 40. Korn and Giddan (1964), using a Stanford University sample of 195 and the same scoring procedure as was employed in this investigation, found D Scale means of 17 and for males and females, respectively.

Table 2 presents the Pearson product-moment correlations for Dogmatism, Anxiety, Extroversion and Neuroticism Scales. These correlations, it must be recalled, refer to the restricted population of those Ss who

participated in the learning task (N=60) and who were selected according to TMAS and D Scale measures. The data contained in Table 2 indicate that, although the Dogmatism measure correlates significantly with the Anxiety measure ($P < .05$), it does not correlate significantly with Extroversion and Neuroticism measures.

Table 2
Correlations Between Questionnaire Measures
for Ss selected according to Dogmatism and
Anxiety Measures
(N=60)

	Questionnaire		
	Anx.	Ext.	Neur.
Dog.	.36**	.09	.12
Anx.		-.41**	.53**
Ext.			-.41**

** $P < .05$

The results of selecting Ss for the experimental learning task according to the criterion set to control for Anxiety are presented in Tables 3 and 4. Comparison of the two tables demonstrates that the mean TMAS scores for the High (18.07), Medium (18.42) and Low (19.19) Dogmatism levels are not significantly different, although, for each level of Dogmatism, D Scale scores are signifi-

cantly different, although, for each level of Dogmatism, D Scale scores are significantly different (Low 12.67, Medium 18.65, High 24.74). Comparison of Tables 3 and 4 also indicates that the three levels of Anxiety are significantly different in mean TMAS measures (Low 7.67, Medium 18.97, High 30.04) whereas the mean D Scale score is not significantly different for Anxiety levels (Low 17.12, Medium 19.25, High 19.48).

Table 3

TMAS Score (Possible Range 1-50) for Anxiety and Dogmatism Levels (N=60)

Dogmatism Levels	Anxiety Levels			Mean Total
	Low	Medium	High	
Low	8.00	17.22	29.00	18.07
Medium	9.00	20.00	29.25	19.42
High	6.00	19.70	31.86	19.19
Mean Total	7.67	18.97	30.04	

Table 4

D Scale Measures (Possible Range 1-40) for Anxiety and Dogmatism Levels (N=60)

Dogmatism Levels	Anxiety Levels			Mean Total
	Low	Medium	High	
Low	17.70	13.56	13.75	12.67
Medium	19.29	18.40	18.25	18.65
High	22.00	25.80	26.43	24.74
Mean Total	19.12	19.25	19.48	

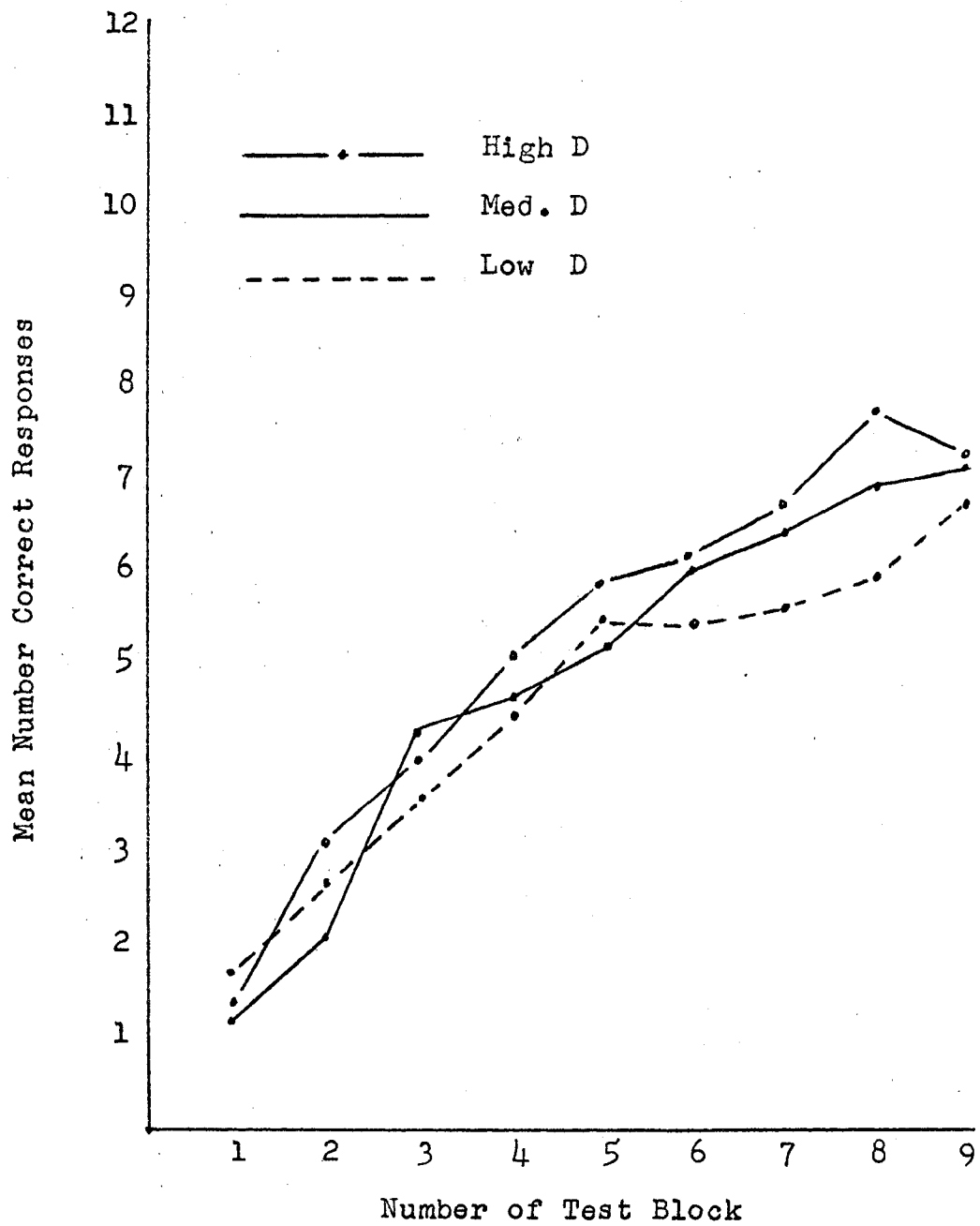


Figure 2. Learning Curves for Low, Medium and High Dogmatism Groups Part I (N=60).

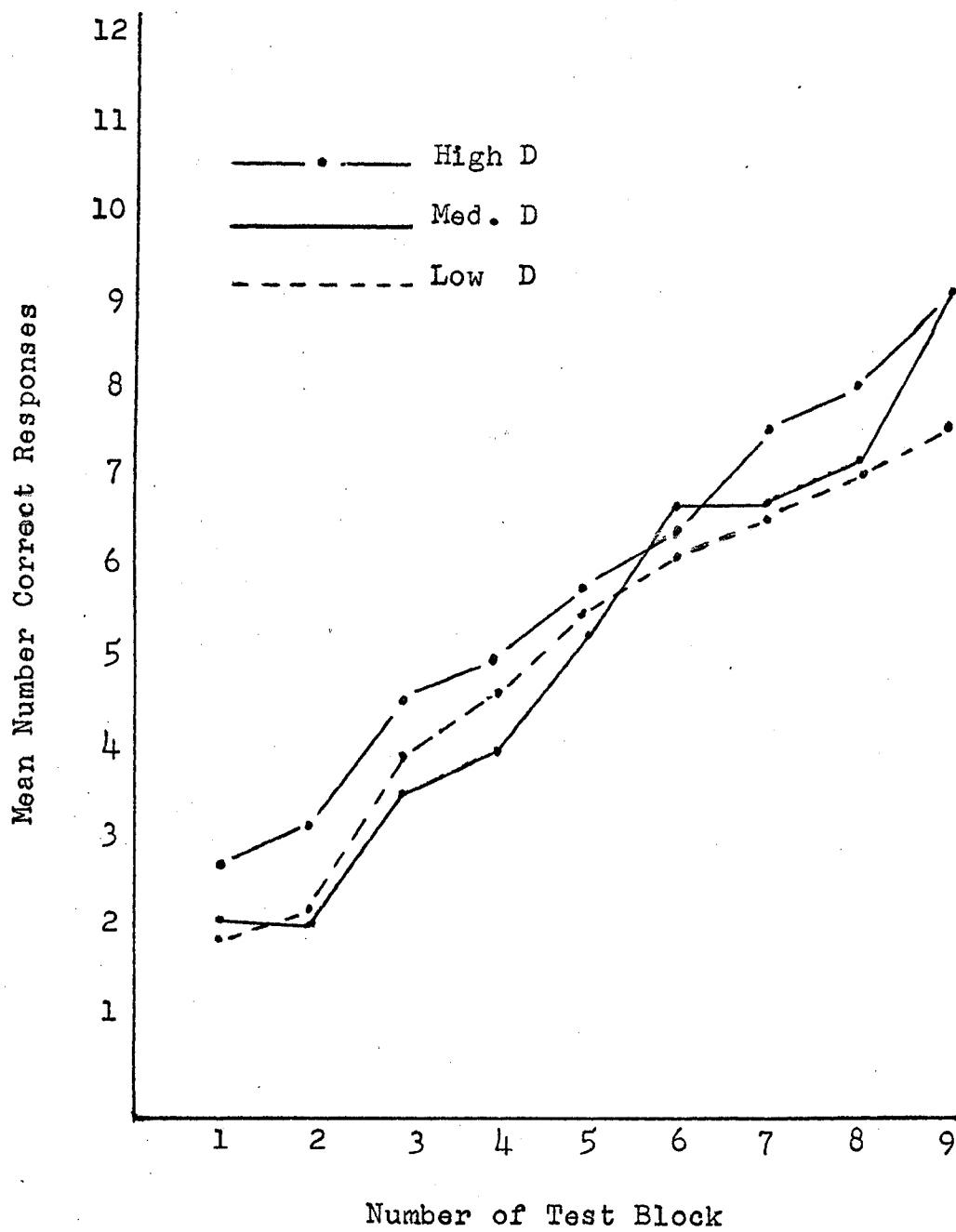


Figure 3. Learning Curves for Low, Medium and High Dogmatism Part II (N=60).

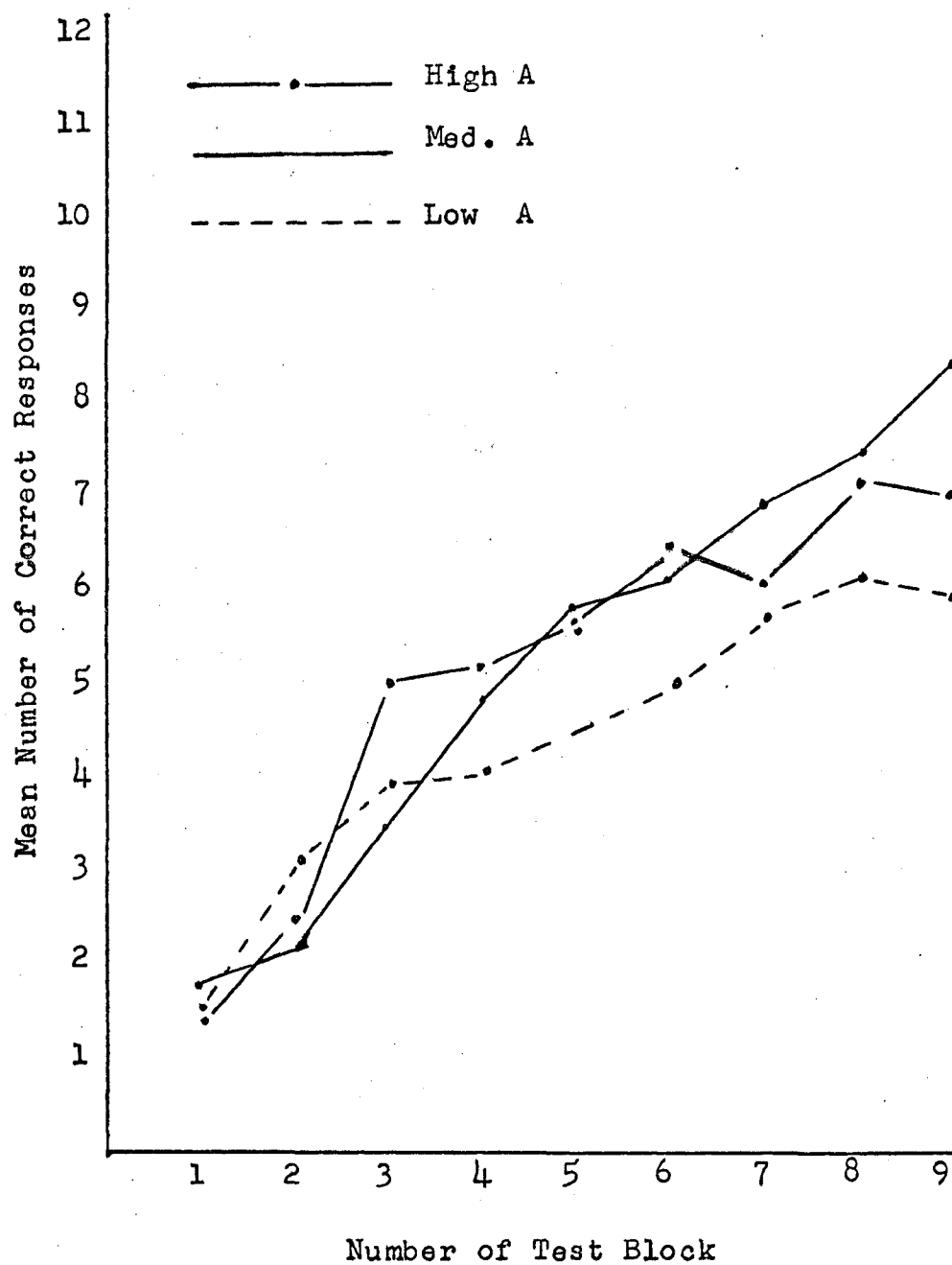


Figure 4. Learning Curves for Low, Medium and High Anxiety Groups in Part I (N=60).

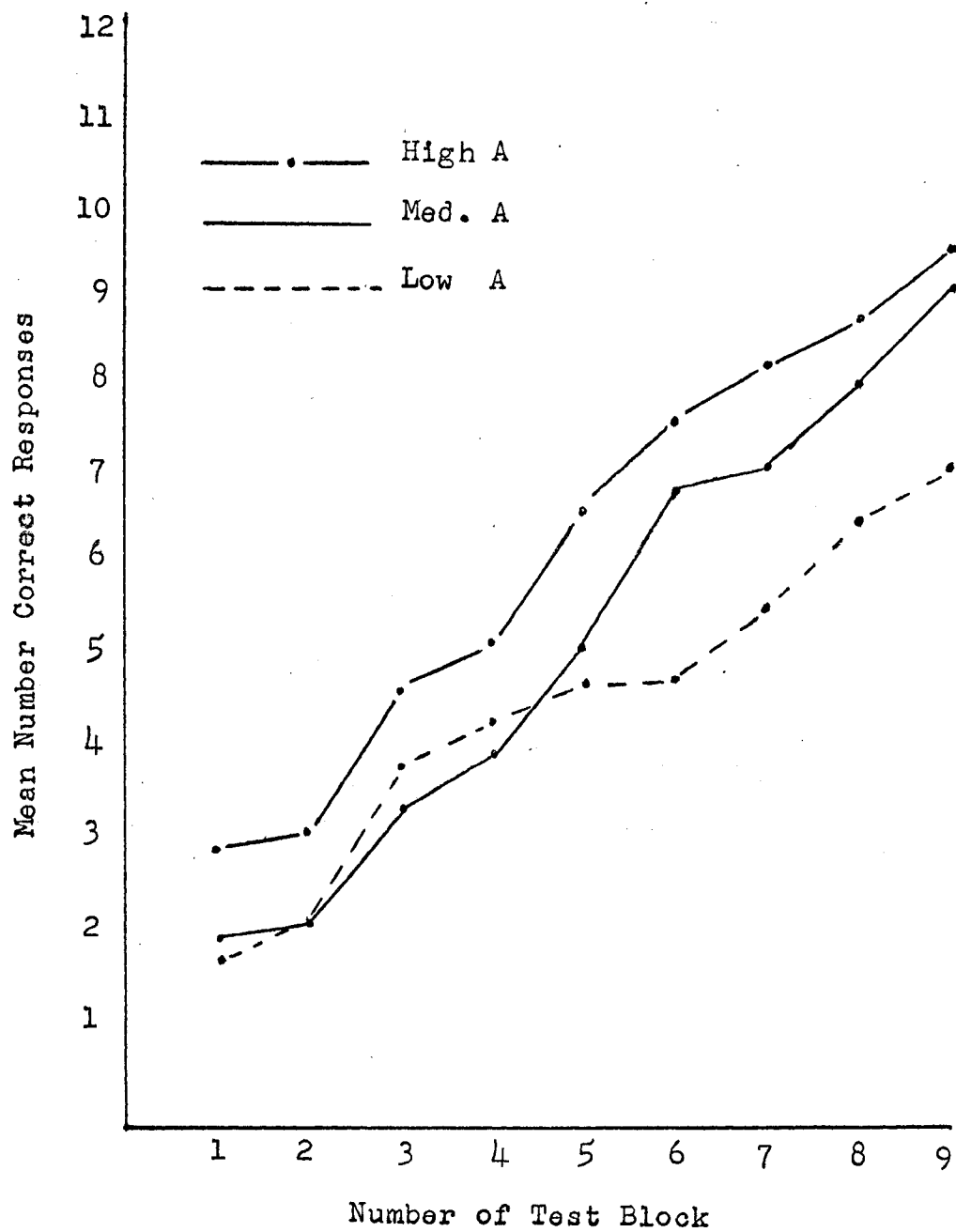


Figure 5. Learning Curves for Low, Medium and High Anxiety Groups in Part II (N=60).

The primary learning measure in this study consisted of the number of correct responses made by each S on each test block. The means for each group of this measure are presented graphically in Figures 2, 3, 4 and 5 in the form of learning curves for all levels of Anxiety and Dogmatism in Part I and Part II. The data on five subjects were discarded which reduced the total number of Ss to 60. These five Ss failed to follow instructions and/or cooperate during the experiment. Inspection of Figures 2, 3, 4 and 5 suggests that High Dogmatic and Anxious Ss tend to perform better than Low Dogmatic and Anxious Ss, respectively. Ss also seem to perform better in Part II in comparison to Part I. The figures also illustrate the progressive increase in learning with each test block.

In order to assess the statistical significance of some of these differences, the mean total number of correct responses over all test blocks was computed for each group in Part I and Part II. These computations are presented in Table 5, and, in summary form, in Figure 6.

A three way analysis of variance for repeated measures and unequal cells was computed on the total number of correct responses over all test blocks. The summary of this analysis is presented in Table 6. Considering first between subject differences combines the performance measures in Part I with Part II, it appears as if the levels of Dogmatism had no significant independent effect on

performance. Levels of Anxiety, however, affected performance at the .01 degree of confidence. In general the High Anxious groups performed significantly better than Low Anxious groups. There was no significant interaction of Anxiety with Dogmatism although the F ratio for this interaction approached significance at the .10 level of confidence [$F_{10}(4,171) = 1.97.$].

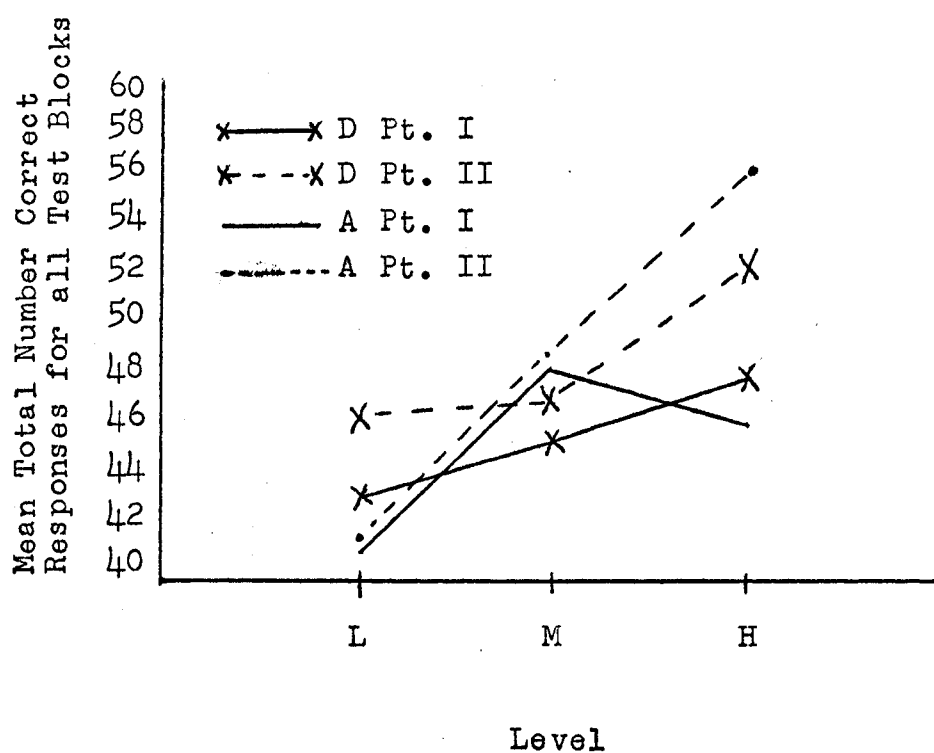


Figure 6. Learning Measures for the Three Levels of Anxiety and Dogmatism for Part I and II (N=60).

Table 5
 Mean Total Number of Correct Responses for all Groups of Dogmatism and
 Anxiety in Part I and II (N=60)

Part	Dogmatism Levels								
	Low		Medium		High				
	Anxiety Levels	Anxiety Levels	Anxiety Levels	Anxiety Levels	Anxiety Levels	Anxiety Levels			
I	Low	Med.	High	Low	Med.	High	Low	Med.	High
	34.70	53.78	41.00	35.00	44.20	57.25	55.75	46.20	42.71
II	Low	Med.	High	Low	Med.	High	Low	Med.	High
	40.50	45.00	53.25	41.57	45.80	56.00	41.00	54.90	61.57

Table 6

Analysis of Variance on the Total Number of Correct Responses in all Test Blocks for each Level of Anxiety and Dogmatism in Part I and II

Source of Variation	Sum of Squares	df	Mean Squares	F Ratio
Between Ss				
D (Dogmatism)	577.93	2	288.97	2.25
A (Anxiety)	2,009.02	2	1,004.51	7.82***
DxA	1,000.42	4	250.11	1.95
Ss within groups	21,944.71	171	128.33	
Within Ss				
Pt. (Part)	272.85	1	272.85	4.47**
DxPt.	17.11	2	8.56	.14
AxPt.	602.75	2	301.38	4.94***
DxAxPt.	1,901.85	4	475.46	7.79***
Pt.xSs within groups	10,438.55	171	61.04	

*** P<.01				
** P<.05				

In considering the effect of Part I and II, it appears as if the overall effect of changing programmes was to increase the total number of correct responses ($P<.05$). This is clearly illustrated in Figure 6 which demonstrates that for each level of Dogmatism and Anxiety performance was superior in Part II compared to Part I.

The data contained in Table 6 indicate that there is no significant interaction of Dogmatism with the change of programmes. This is illustrated in Figure 6 which shows that the difference in performance between Part I and Part II is virtually constant for all levels of Dogmatism. The

levels of Anxiety, however, significantly interacted with programme change ($P < .01$). This is demonstrated in Figure 6. The difference between Part I and Part II in the performance of High Anxious Ss is significantly different from the difference between Part I and II for low Anxious Ss. Contrary to Hypothesis II, this difference is in the direction of improved performance.

The findings presented in Table 6 also indicate a significant interaction ($P < .01$) between Dogmatism, Anxiety and the change of programmes. In order to "break down" this interaction, an analysis of variance for simple effects was computed. Some of these computations are presented in Table 7.

Only at the highest level of Anxiety (Pt at A_3) was there a significant increase in performance as a result of changing programmes ($P < .01$). This is well illustrated in Figure 6. Inspection of the data contained in Table 7 indicates that the tendency of performance to improve with an increase in Anxiety level was only significant ($P < .01$) in Part II (A at Pt_2) and not in Part I (A at Pt_1).

The observation (Table 6) that the overall interaction between Anxiety and Dogmatism approached significance is in some ways explained by an inspection of Table 7. It appears as if Anxiety significantly ($P < .01$) interacts with Dogmatism to improve performance in Part I (DA at Pt_1) but not in Part II (DA at Pt_2).

Table 7

Analysis of Variance for Simple Effects of Anxiety,
Dogmatism and Parts I and II on Performance

Source of Variation	Sum of Squares	df	Mean Squares	F Ratio
A at D ₁ (Anxiety at Low Dogmatism)	914.43	2	457.27	3.56**
A at D ₂	2,011.24	2	1,005.62	7.84***
A at D ₃	83.45	2	41.73	.33
Error	-	171	128.33	
Pt at A ₁ (Parts at Low Anxiety)	5.49	1	5.49	.09
Pt at A ₂	.47	1	.47	<.01
Pt at A ₃	867.82	1	867.82	14.21***
Error	-	171	61.04	
A at Pt ₁ (Anxiety at Part I)	390.46	2	195.23	2.06
A at Pt ₂	2,221.24	2	1,110.62	11.73***
DA at Pt ₁ (Anxiety x Dogmatism at Part I)	2,705.30	4	676.33	7.14***
DA at Pt ₂	196.22	4	49.06	.52
Pooled Error		171	94.69	

***	P < .01			
**	P < .05			
*	P < .10			

In summary, it appears as if neither increasing levels of Anxiety or Dogmatism independently significantly influenced performance in Part I. However, the effect of simultaneously raising the levels of Dogmatism and Anxiety in Part I, was to significantly improve performance. In

Part II, after changing the programme, Dogmatism neither independently nor with Anxiety significantly affected performance despite the fact that performance in Part II increased with the level of Anxiety. Changing the programmes affected the interaction between Anxiety and Dogmatism.

This failure of Anxiety to interact with Dogmatism in Part I but not in Part II suggested an inspection of the raw data to determine if the change of programmes affected dogmatic Ss differently than anxious Ss, and, in a way which was not indicated by the learning measure.

It will be recalled that the programme was changed without the subject's knowledge. This means that Ss, before efficient learning can occur, must first realize that the programme has been changed, and, secondly, Ss must be able to abandon the old responses of Part I to learn the new ones of Part II. Rokeach (1960) termed that point at which the individual realizes that his belief system is inappropriate for the task at hand, the analytic stage. In many ways the analytic stage of thinking is analogous to the Ss realization that the programme has been changed. Consequently, that point at which the Ss realize the programme change will be referred to as the analytic stage. If levels of Anxiety and Dogmatism differ in the time taken to reach the analytic stage, the performance summaries presented in Tables 6 and 7 are confounded by this artifact. It follows that Ss who realize relatively

early that the programme has been changed will have more trials to improve their performance.

In order to investigate possible within-and between-group differences in the time -- that is, number of test blocks -- taken to reach the analytic stage an empirical criterion was set to make this measure possible. Although this criterion does not reveal when it is that the individual's cognitive processes come to the realization of the programme change, it does set a standard which indicates at what test block the Ss perform as if they realized that the programme has changed.

This criterion was set as follows: That test block at which the subject first pushes three or more correct responses was used as a measure of the analytic stage if: A) the subject pushed three or more correct responses in the following test block and B) the subject pushed three or more correct responses in any test block following the first and second test blocks containing three or more correct responses. It will be recalled that one white light-response button connection remained the same in Part II as Part I and that each white light-response button connection appears twice in every block of 12 test trials. It was for this reason that the criterion for the analytic stage was set at three correct responses. Setting three as the criterion rules out the possibility that the Ss are just responding in Part II with the connection learned in

Part I. "A" and "B" conditions of the criterion cited above were designed to rule out the possibility that the Ss pushed three correct responses by chance.

If comparisons are made between Ss in Part II, it is necessary to show that these differences are not confounded by pre-existing differences in Part I. For this reason, the above mentioned criterion was imposed on Part I learning in order to clarify the possible effects of changing programmes on Anxiety and Dogmatism groups. For the convenience of explanation, this measure will also be referred to as the analytic stage in Part I, although it must be remembered that it is not a measure of realization of a programme change. In this sense, reference to the analytic stage in Part I is really a non-theoretical reference to the empirical criterion established above.

Table 8 is a presentation of the mean number of test blocks to reach the analytic stage for levels of Dogmatism and Anxiety in Part I and Part II. A summary of this table is presented graphically in Figure 7. An analysis of variance for repeated measures and unequal cells was computed in order to assess the statistical significance of between and within group differences. The summary of this analysis is presented in Table 9.

Considering first the between group differences which combines the effect of Part I and Part II, the data contained in Table 9 indicate that the levels of Dogmatism had a significant effect ($P < .01$) on the number of test blocks taken to reach the analytic stage.

T A B L E 8

Mean Number of Test Blocks to reach the Analytic stage for levels of Anxiety and Dogmatism in Part I and II (N=60)

Part	Dogmatism Levels								
	Low			Medium			High		
	Anxiety Levels	Anxiety Levels	Anxiety Levels	Anxiety Levels	Anxiety Levels	Anxiety Levels	Anxiety Levels	Anxiety Levels	Anxiety Levels
I	3.50	3.22	3.00	5.14	5.20	2.70	4.00	3.00	3.29
II	4.40	4.00	2.50	3.86	4.80	2.70	3.25	2.70	1.86

A Newman-Keuls procedure was used to assess the significance of differences between group means. This procedure indicated that the only significant ($P < .05$) difference lay between the High Dogmatic Group and the Medium Dogmatic Group. In general, High Dogmatic Ss reached the criterion of three correct responses for one test block (analytic stage) significantly sooner than the Medium Dogmatic Group.

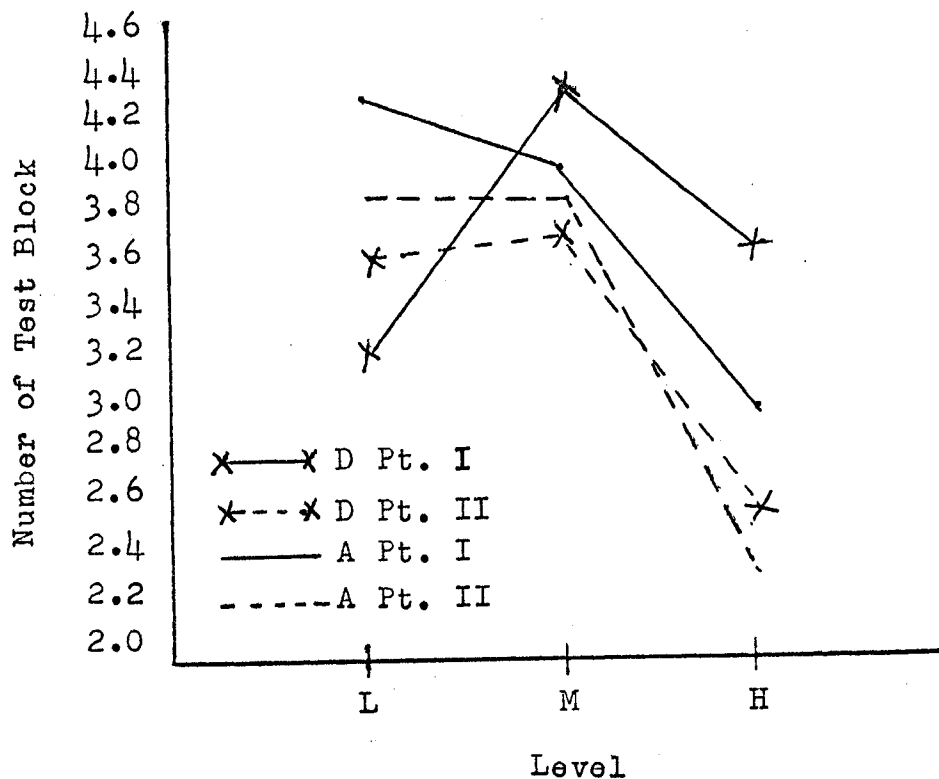


Figure 7. Number of Test Blocks to reach Analytic Stage for all Levels of Dogmatism and Anxiety in Part I and II (N=60).

Table 9

Analysis of Variance of the Mean Number of Test Blocks required for Subjects at the three Levels of Dogmatism and Anxiety to reach the Analytic Stage in Part I and Part II (N=60)

Source of Variation	Sum of Squares	df	Mean Squares	F Ratio
Between Ss				
D	16.35	2	8.18	5.68***
A	39.54	2	19.77	13.73***
DxA	10.04	4	2.51	1.74
Ss within groups	247.08	171	1.44	
Within Ss				
Pt	4.15	1	4.15	3.99***
DxPt	9.23	2	4.62	4.44***
AxPt	.93	2	.47	.45
DxAxPt	5.84	4	1.46	1.40
PtxSs within groups	177.74	171	1.04	

*** P<.01

The overall effect of Anxiety on the number of test trials to reach three or more correct responses in one test block was significant at .01 level of confidence. Increasing the level of Anxiety appears to have decreased the number of test blocks taken to reach the analytic stage. High Anxious Ss tend to reach the analytic stage sooner than Low Anxious Ss. This is well illustrated in Figure 7. There was no significant interaction between levels of Dogmatism and levels of Anxiety.

Referring to the effects of changing the programme, (within subject differences) it appears as if Ss tended to reach a criterion of three or more correct responses in one test block significantly sooner in Part I compared to Part II ($P < .01$). This is apparent on inspection of Figure 7. There was no significant interaction of Anxiety with programme change, nor was there any combined interaction of Anxiety with Dogmatism with programme change.

However, it appears from Table 9 that the levels of Dogmatism had a significant ($P < .01$) influence on performance as a function of changing the programme. In order to simplify this interaction, an analysis of variance for simple effects was computed. The summary of this analysis is presented in Table 10.

Inspection of Table 10 indicates that the difference between Part I and Part II in the number of test blocks to reach the analytic stage was significant ($P < .05$) at the High level of Dogmatism. High Dogmatism groups reached the analytic stage significantly sooner in Part II than in Part I.

Table 10 also indicates that in Part I the influence of Dogmatism levels on time taken to reach the analytic stage was significant at the .05 degree of confidence. Individual comparisons reveal that the Medium Dogmatism Group took the longest time to reach the analytic

stage. As illustrated in Figure 7, Low and High Dogmatism groups did not differ significantly in this measure.

Table 10

Analysis for Simple Effects of Dogmatism and Programme Change on the Number of Trials to Reach the Analytic Stage (N=60)

Source of Variation	Sum of Squares	df	Mean Squares	F Ratio
Pt for D ₁ (Part I for Low Dog.)	1.40	1	1.40	.97
Pt for D ₂	2.74	1	2.74	1.90
Pt for D ₃	8.99	1	8.99	6.24**
Error		171	1.44	
D for Pt ₁ (Dog. for Part I)	11.04	2	5.57	4.49**
D for Pt ₂	14.54	2	7.27	5.86***
Pooled Error		171	1.24	

*** P<.01
** P<.05

Perhaps the most important comparison to be made relevant to Hypothesis III is between Dogmatism levels in Part II. It is in Part II that reaching the analytic stage implies a realization that the programme has been changed from Part I. Inspection of Table 10 reveals a significant (P<.01) effect of the levels of Dogmatism on the number of test blocks needed to reach the analytic stage. Individual comparisons revealed that High Dogmatic

Ss tended to realize that the programme had been changed significantly earlier than either Medium or Low Dogmatic Ss. This is well illustrated in Figure 7.

The significance of the results concerning the analytic stage affects the interpretation of the within-and between-group differences in learning cited earlier in this chapter. The most important question to be raised is whether or not the measures presented in Table 5 are a true indication of learning or only a reflection of the number of test blocks taken to reach the analytic stage. The difference in performance between groups in Part II may not have arisen because one group of Ss learned more efficiently than another group, but because some Ss realized relatively earlier than others that the programme had been changed. These Ss would have had a longer time to improve their performance before the end of the experiment.

In order to control for differences in test blocks taken to reach the analytic stage, a measure was taken in learning after the analytic stage. The measure is as follows. The number of correct responses occurring in and after that test block defined as the analytic stage was totalled for each S. In order to make between-subject comparisons, for each S, this total was divided by the number of test blocks contributing to this total. The means for each group of this mean number of correct responses for each test block is presented in Table II. A summary of this measure for each level of Dogmatism and Anxiety is presented graphically in Figure 8. In order to test the statistical significance of the differences indicated in Figure 8, a three-way analysis of variance for repeated measures and unequal cells was computed. The summary of this analysis is presented in Table 12.

TABLE II

Mean of the Mean Number of Correct Response per Test Block
after the Analytic Stage (N=60)

Part	Dogmatism Levels								
	Low		Medium		High				
	Anxiety Levels	Anxiety Levels	Anxiety Levels	Anxiety Levels	Anxiety Levels	Anxiety Levels			
I	4.87	7.08	5.21	5.07	6.43	7.69	7.77	6.56	5.66
II	5.82	6.61	6.66	5.81	7.32	7.51	5.77	6.83	7.33

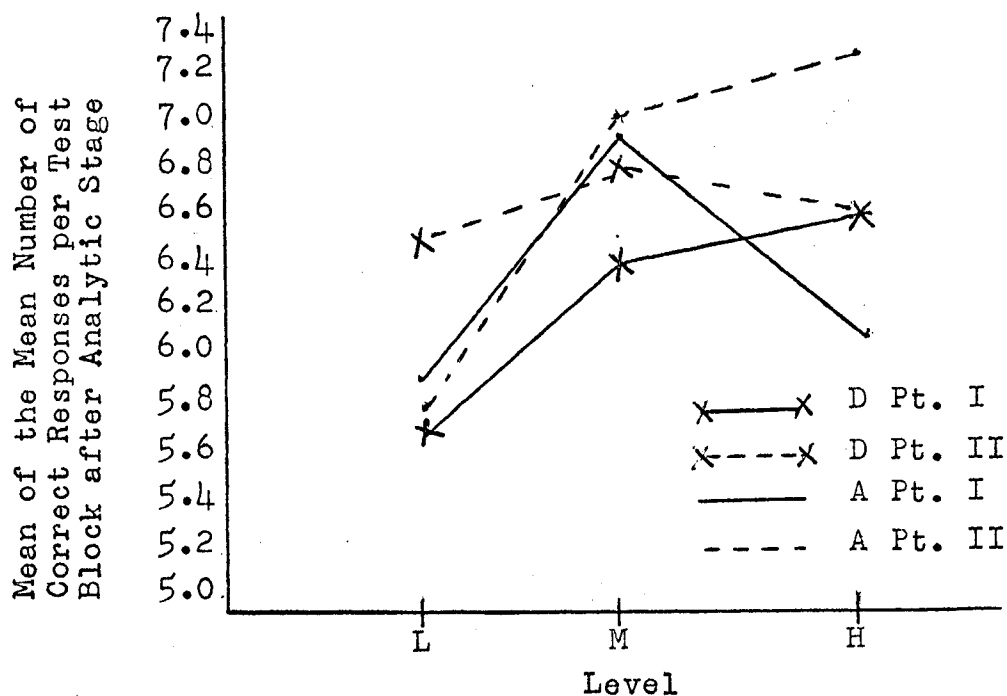


Figure 8. Learning after the Analytic Stage for the Three Levels of Dogmatism and Anxiety in Part I and II (N=60).

Considering first the between-subject differences which combines for Part I and Part II, it appears as if the overall effect of the levels of Dogmatism on performance was not statistically significant. However, the overall effect of the levels of Dogmatism on performance was significant at the .05 degree of significance. Inspection of the data indicated that the performance of the Medium Anxious Group was the highest for all levels of Anxiety. A Newman-Keuls procedure with group means showed that High and Medium Anxious groups are significantly ($P < .05$) better "learners" than the Low Anxious groups.

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Table 12 also describes a significant overall interaction between Anxiety and Dogmatism. Simultaneously increasing Dogmatism and Anxiety levels improves performance.

Table 12

Summary of Analysis of Variance for the Performance Measures after the Analytic Stage (N=60)

Source of Variation	Sum of Squares	df	Mean Squares	F Ratio
Between Subjects				
D	8.53	2	4.27	1.85
A	18.75	2	9.88	4.28**
DxA	23.24	4	5.81	2.52**
Ss within groups	394.90	171	2.31	
Within Ss				
Pt	3.56	1	3.56	5.24**
DxPt	2.10	2	1.05	1.54
AxPt	5.37	2	2.69	3.96**
AxDxPt	22.43	4	5.61	8.25***
Ss within groups	116.81	171	.68	

*** $P < .01$
 ** $P < .05$
 * $P < .10$

In considering the effects of changing the programme (within Ss), it appears as if the Ss generally learned better after the analytic stage in Part II than in Part I ($P < .05$). This is well illustrated in Figure 8.

Inspection of Table 12 does not reveal any

significant interaction between levels of Dogmatism and changing the programme. This is not the case for levels of Anxiety which showed an interaction at the .05 level of significance. Figure 8 illustrates the tendency for the difference in performance between Part I and Part II to increase, in the direction of better performance, with each increasing level of Anxiety. There was a significant ($P < .01$) interaction of Anxiety with Dogmatism with programme change. Changing the programme and simultaneously increasing Anxiety and Dogmatism levels appears to improve performance.

In order to "break down" these significant interactions, an analysis of variance for simple effects was computed. The summary of this analysis is presented in Table 13. This table indicates (D at A, etc.) that, if Part I and Part II measures are combined, there is a significant difference ($P < .05$) between High and Low Dogmatic groups at the High and Low levels of Anxiety but not at the Medium level. The tendency is for performance to increase with Dogmatism, although, as Table 12 indicates, this tendency is not statistically significant.

Inspection of Table 13 also reveals (A at D_1 etc.) that High Anxious groups performed significantly better than Low Anxious groups at Low ($P < .10$) and Medium ($P < .05$) levels of Dogmatism. The overall effect of increasing Anxiety levels is to increase performance.

Table 13

Summary of Analysis of Variance for Simple Effects on
Performance after the Analytic Stage (N=60)

Source of Variation	Sum of Squares	df	Mean Squares	F Ratio
D at A ₁ (Dog. at Low Anx.)	14.83	2	7.42	3.21**
D at A ₂	.23	2	.12	.05
D at A ₃	16.76	2	8.38	3.63**
A at D ₁ (Anx. at Low Dog.)	13.32	2	6.66	2.88*
A at D ₂	28.27	2	14.14	6.12***
A at D ₃	.47	2	.24	.10
Error	-	171	2.31	
Pt at D ₁ (Part. at Low Dog.)	3.62	1	3.62	5.32**
Pt at D ₂	2.10	1	2.10	3.09*
Pt at D ₃	<.01	1	<.01	<.01
Pt at A ₁	.11	1	.11	.16
Pt at A ₂	.47	1	.47	.69
Pt at A ₃	8.41	1	8.41	12.37***
Error	-	171	.68	
D at Pt ₁ (Dog. at Part I)	8.29	2	4.15	2.86*
D at Pt ₂	2.34	2	1.17	.81
A at Pt ₁	5.55	2	2.78	1.92
A at Pt ₂	18.57	2	9.29	6.41***
DA at Pt ₁	44.15	4	11.04	7.61***
DA at Pt ₂	1.58	4	.39	.27
Pooled Error	-	171	1.45	

*** P<.01

** P<.05

* P<.10

The data in Table 13 indicate (Pt at D_1 etc.), Ss in Low ($P < .05$), and Medium ($P < .10$) Dogmatism groups performed significantly better in Part II than in Part I. Figure 8 clearly demonstrates, that the difference in performance between Parts I and II decreases with each increasing level of Dogmatism until there was no significant difference at the High level of Dogmatism.

These findings were exactly the opposite for levels of Anxiety. Only the High Anxiety group (Pt at A_3) showed significant ($P < .01$) improvement when the programme was changed from Part I to Part II. Figure 8 illustrates this very well. There is an increasing improvement between Part I and Part II with each increase in Anxiety level.

Perhaps one of the most important findings relevant to Hypotheses I and II comes with the consideration of the effects of Dogmatism on performance separately for Part I (D for Pt_1) and Part II (D for Pt_2). The levels of Dogmatism had a significant ($P < .10$) effect on performance in Part I with the High Dogmatism Group performing significantly better than the Low Dogmatism Group. This is well illustrated in Figure 8. However, there was no significant effect of levels of Dogmatism on performance in Part II. In Part II, High Dogmatic Ss did not differ significantly from Low Dogmatic Ss. This finding is also well illustrated in Figure 8.

Again, the above-mentioned findings are exactly

the reverse for the effects of Anxiety on performance in Part I (A at Pt₁) and Part II (A at Pt₂). High and Low Anxious Ss did not differ significantly in their performance in Part I. These observations are immediately relevant to Hypotheses IV and V. Apparently, the increase in performance between Low and Medium Anxious Ss which is illustrated in Figure 8 is not statistically significant. However, High Anxious Ss performed significantly ($P < .01$) better than Low Anxious Ss in Part II as is illustrated in Figure 8.

From Table 13 it also appears that the interaction between Anxiety and Dogmatism was significant ($P < .01$) in Part I (DA at Pt₁) but not in Part II (DA at Pt₂). For Part I, simultaneously increasing the levels of Anxiety and Dogmatism significantly increased performance. This was not the case in Part II.

CHAPTER IV
DISCUSSION OF RESULTS

The results indicate that the selection of Ss to control for Anxiety was successfully accomplished. It appears as if conclusions concerning the effects of Dogmatism and Anxiety can be made which are relatively independent of Anxiety on the one hand and Dogmatism on the other. Unfortunately, the small pool of Ss available for sampling severely restricted the selection so that there may not have been an adequate number of subjects for each group.

Before discussing the results, it is appropriate at this point to consider the empirical criterion imposed on the data and defined as the analytic stage. This criterion set that test block at which the subject first gained three or more correct responses as a measure of the analytic stage. This first test block which contained three correct responses had to be followed by others containing three to satisfy the criterion. Although this criterion was arbitrarily defined, the empirical stringency of its application to the data made it a useful measure.

Consider first its usefulness in Part I. Part I

was a simple learning task with a minimum of potential interference from past learning. The analytic stage in Part I can be interpreted as an indication of a subject's general comprehension of the learning task. A subject who gives three or more correct responses relatively early in Part I must have understood the instructions. In addition, he must have become relatively familiar with the learning apparatus and the characteristics of its function.

However, the meaning of the analytic stage in Part I is somewhat different from its interpretation for Part II. It will be recalled that between Part I and II the programme was changed without notifying the subjects. The criterion set as the analytic stage in Part II was an attempt to measure, in number of test blocks, the time taken for subjects to perform as if they realized that the programme had been changed.

It will also be recalled that measurement of the analytic stage had an important effect on a learning measure employed in this study. Two measures of learning were taken. One was the total number of correct responses appearing in the nine test blocks of each of Part I and Part II. The second measure was the number of correct responses appearing in test blocks after the analytic stage. This second measure is very much determined by the arbitrary criterion set for the analytic stage. In order to clarify the possibility of experimenter bias, it is neces-

sary to show how measures which are based on an arbitrary criterion compare to measures relatively free from this criterion. In the present study this problem can be formulated as follows: Does taking a measure of performance after the analytic stage seriously change the findings based on the first measure of performance? The results indicate that the post-analytic measure of performance does not seriously affect conclusions based on the first measure except in the case of the High Dogmatism Group in Part II. This is readily apparent when Figure 6 is compared to Figure 8. It can be seen that the figures are practically identical except for the High Dogmatism Group. This observation was replicated by comparing the results of analysis of variance for simple effects for both measures. The comparison reveals that only the Dogmatic groups were affected by the change in measurement. In most cases this difference was in the direction of making tendencies which were evident with the first measurement statistically significant with the second. In conclusion, it appears as if employing the number of correct responses after the analytic stage is a relatively valid measure of learning. Future references to learning will be to this measure.

It is appropriate at this point to discuss each one of the hypothesis in view of the results reported in Chapter III. It was hypothesized that, in a simple learning task (Part I), performance varies directly with Anxiety.

This hypothesis was not supported by the results. Performance tended to increase from the Low Anxiety level to the Medium Anxiety level but it dropped at the High Anxiety level. High anxious subjects failed to perform significantly better than Low anxious subjects, despite the fact that they gave three or more correct responses (analytic stage) significantly sooner than did the Low Anxiety subjects. Apparently, High anxious subjects in Part I, because of their high level of drive and need to achieve tended to master the learning apparatus and task at hand significantly sooner than did Low Anxiety subjects. Despite this fact, High anxious subjects were not able to improve their performance relative to Low anxious subjects. The reasons for this failure will be discussed in conjunction with the results in Part II.

It was also hypothesized that, in a complex learning task (Part II), performance varies inversely with Anxiety. The results do not support this hypothesis. In this study the exact reverse occurred. High Anxiety groups performed significantly better than did Low Anxiety groups in Part II. The results also indicated that highly anxious subjects realized that the programme had been changed significantly sooner than low anxious subjects. Perhaps this was because highly anxious people, with a high drive level, are more sensitive to changes in the environment. It can be hypothesized that highly anxious people are quick to

realize changes in their environment and are able to utilize the realization of change to perform relatively more efficiently.

It will be recalled that the hypotheses concerning the effects of Anxiety in Part I and Part II arose out of a consideration of the theories of Spence, Taylor and the Yerkes-Dodson Law. The data of this investigation failed to support these hypotheses. This failure may be the result of an inexact theory and/or a poor experimental method.

Spence's theoretical position concerning the effect of Anxiety on learning states that Anxiety functions as a drive which facilitates learning in a simple task, but inhibits learning in a complex task. The difficulty for any experimenter attempting to assess the effects of Anxiety on learning is deciding operationally what is meant by a "simple" and "complex" task. Spence suggests that a task which offers a number of interfering response choices can be said to be "complex". In order to simulate such a condition this experiment employed a modified negative transfer paradigm, which, in Part II, was designed to present a maximum amount of interference. The results suggest that although pilot studies and personal reports indicated that there was interference from past learning, Part II failed to be "complex" enough to discriminate the predicted effects of Anxiety. Most subjects performed better in

Part II than in Part I. Apparently there is a negative transfer of stimulus response connections, and a positive transfer of knowledge concerning machine operation and methods of learning. Subjects reported that in Part II they frequently pushed Part I response buttons but that in Part I they learned methods of learning (memorized pairs, geometric connections, etc.) which facilitated performance in Part II. It appears as if Part II failed to be a sufficiently "complex" task.

If this was the case the results are, in many ways, consistent with the Spence-Taylor interpretation of Anxiety as a drive. The fact that the performance of High Anxiety subjects only began to differ from that of the performance of Low Anxiety subjects in Part I supports Spence's contention that the difference in performance between high and low anxious individuals is a function of the number of learning trials. Highly anxious people bring to each experimental session a number of response patterns, which, at the onset of a learning task, interfere with learning. After several trials, subjects are able to abandon these patterns and only then does High Anxiety facilitate performance. It is possible that, in Part I, High Anxiety groups did not differ significantly from Low Anxiety groups because there were not enough trials to encourage this difference.

The application of Spence's theory to Part II

would mean that highly anxious subjects bring to Part II relatively more interfering responses from Part I. But the finding that only the High Anxiety Group improved their performance significantly with the change of programmes indicates that the High Anxiety Group also brought to Part II methods of learning (positive transfer) which outweighed the effects of response interference and facilitated performance. This fact, coupled with the increased number of trials, may have caused the High Anxiety groups to perform significantly better than Low Anxiety groups.

In conclusion, this study illustrates the need for better operational definitions of those tasks in which highly anxious people are said to perform significantly different from the low anxious person. One of the most interesting findings is not suggested by the theories of Spence and Taylor. The results indicate that highly anxious people may bring to a learning task response patterns, which, apart from interfering with performance, may facilitate it. The results also indicate that highly anxious persons are relatively more sensitive to changes in their environment. With the above mentioned qualifications, this investigation generally supports Spence's position that, in a simple task, highly anxious persons perform significantly better than do low anxious persons. This difference between high and low anxious persons was shown to be a function of the number of learning trials.

It was hypothesized that in a new learning situation (Part I) performance varies inversely with Dogmatism. This hypothesis was not confirmed by the results. On the contrary, high dogmatic subjects performed significantly better in Part I ($P < .10$) than did low dogmatic subjects.

It was also hypothesized that, in a negative transfer situation (Part II) performance varies inversely with Dogmatism. This hypothesis was not confirmed by the initial statistical analysis of learning measures. Levels of Dogmatism had no significant effect on performance in Part II. However, further inspection of the results indicated that the change of programme had a definitive impact on high dogmatic subjects.

One such indication of this effect is the finding that high dogmatic subjects, although they learned relatively better than did low dogmatic subjects in Part I, did not learn significantly better in Part II. This is well illustrated in Figure 8. It is apparent that changing the programme inhibits the performance of dogmatic subjects.

Figure 8 and the analysis of variance for simple effects (Table 13) indicate that for Low and Medium groups of Dogmatism, performance improved significantly with the change of programmes. This was not the case for the High Dogmatism Group whose performance did not improve with the change of programmes. It was suggested earlier that all

subjects bring to the onset of Part II interfering responses of Part I (negative transfer) along with facilitating knowledge on how the machine functions and the best ways of learning (positive transfer). The results indicate that high dogmatic subjects are unable to utilize this positive transfer, possibly because of overwhelming interference from Part I.

Another observation extremely relevant in assessing the effects of the programme change on the performance of high and low dogmatic subjects involves the criterion defined as the analytic stage. It was hypothesized that High and Low Dogmatism groups do not differ in time taken to reach the analytic stage, which, in this study was the time taken to realize that the programme had been changed. This hypothesis was not confirmed. High Dogmatism groups realized significantly earlier than did the Low Dogmatism Group. These results will be discussed initially as they relate to the learning measure.

This finding implies that the performance of high dogmatic subjects in Part II did not differ from that of low dogmatic subjects, despite the fact that they realized relatively early that the programme had been changed. On the average, high dogmatic subjects had over 24 test and training trials more to improve their performance than did low dogmatics. Although high dogmatic subjects realized earlier that the programme has been changed, it did not

facilitate better performance. The above mentioned results all support the hypothesis that, in a negative transfer situation, performance varies inversely with Dogmatism.

The findings of this investigation have serious implications for the concept of Dogmatism as it is formulated by Rokeach. From the Doodlebug problem, Rokeach concluded that dogmatic individuals, because of their closed cognitive systems, are relatively poor "learners". The results of the present study indicate that this conclusion is an unwarranted generalization. In Part I of this investigation, high dogmatic subjects learned significantly better than did low dogmatics. Consequently, Rokeach's general hypothesis must be modified to incorporate the present data. In a simple learning task which is relatively free from interference from past learning it appears as if performance varies directly with Dogmatism. In a complex learning task in which there is a maximum of potential interference from prior learning, performance varies inversely with Dogmatism.

These hypothesis are not alien from the theoretical conceptualization of the dogmatic person described by Rokeach. Such individuals, because they are basically threatened by the environment, are relatively intolerant of ambiguity. Consequently their cognitive system is oriented towards manipulating and organizing their perceptual field. Perhaps it is for this reason that highly

dogmatic subjects perform relatively well on Part I of this study.

It is appropriate at this point to comment on a frequent criticism of "Authoritarian" questionnaires. Such questionnaires are often said to be a measure of acquiescence in response rather than of authoritarian personality. In this study, it is difficult to conceive of an acquiescent individual performing in a superior manner as did high dogmatic subjects in Part I.

The hypothesis that performance varies inversely with Dogmatism in a negative transfer situation is well explained by Rokeach's description of the dogmatic person. Individuals high in Dogmatism are extremely resistant to change and tend to rigidly employ response patterns which are often a result of past learning. Assuming that there was true negative transfer in Part II, this conceptualization of the dogmatic personality explains the performance of High Dogmatism groups in Part II. Future studies should attempt to investigate if dogmatic subjects actually do use old responses in a new learning task.

It will be recalled that there was a significant interaction between Anxiety and Dogmatism in Part I. Rokeach claims that the closed mind is a defense against Anxiety. It follows, therefore, that holding Dogmatism constant, the effect of increasing Anxiety would be to increase an individual's need to achieve organization of

his environment. Increasing both Anxiety and Dogmatism would heighten the performance characteristic of this need to organize. The fact that there was no significant interaction between Dogmatism and Anxiety in Part II further supports the above-mentioned conclusion that the programme change affected anxious and dogmatic subjects differently.

From experiments with the Doodlebug problem, Rokeach maintains that high and low dogmatic subjects do not differ in the time taken to reach the analytic stage. Using the criterion set in this investigation, high dogmatic subjects reached the analytic stage significantly earlier than did low dogmatic subjects. The discrepancy of Rokeach's position with the results of this study reflect the difference between Rokeach's Doodlebug problem and Part II of the present investigation. In the Doodlebug problem subjects were said to reach the analytic stage when they indicated verbally that they had rejected three beliefs concerning the characteristics of bugs commonly found in nature. In the present study the analytic stage was that point at which subjects realized that the programme had been changed. There is an important difference between the two studies. In the present study, the experimenter controlled the learning apparatus and hence the paired associations to be learned and then changed. Consequently it was possible for subjects to see the experimenter

as a major determinant of his success at the task. This is not the case in the Doodlebug problem. It follows that subjects in the present study would have less trust in the integrity of the experimenter.

If this were the case, then perhaps high dogmatic subjects realized relatively early that the programme had been changed because they were more suspicious of the experimenter and his manipulation of the apparatus. This is consistent with Rokeach's description of the dogmatic person who is said to be somewhat distrustful and paranoid concerning people.

It will also be recalled that Rokeach states that the difference between persons high and low in Dogmatism can be found in synthetic ability. Low dogmatic individuals are said to be superior in their ability to integrate new facts during the solution of a task. In many ways the synthetic stage is analogous to learning which occurs after the analytic stage. Low dogmatic subjects do appear to be relatively superior in synthetic ability.

The correlations noted in Table 2 add a note of caution to the interpretation of the results. The low correlation between Dogmatism and Neuroticism or Extroversion indicate that the conclusions made about the effects of Dogmatism on performance are relatively free from confounding by Extroversion and Neuroticism. As the significant correlations between Anxiety and Extroversion

and Neuroticism indicate, this is not the case for Anxiety. The interpretation of the generally superior performance of high anxious subjects does not have to be restricted to Spence's formulations. It can be said that High Anxiety Groups performed relatively well because they are neurotic introverts in which exaggerated cortical excitation facilitates learning.

It is appropriate at this point to discuss the findings of this investigation in the context of past and future "personality" research. The results of this study support the contention that meaningful results can be obtained by comparing measures of experimental learning with scores on paper and pencil questionnaires. Questionnaires successfully discriminated relatively poor "learners" from those who learned relatively well. In most cases, differences in subject performance were in a direction which supported the construct validity of each questionnaire (TMAS and D Scale).

Another general conclusion which can be made from the results of this study is that Dogmatism is a distinct variable which affects learning differently than the drive Anxiety. If, as the results indicate, Dogmatism inhibits learning in complex tasks, and, if Dogmatism is a frequent correlate with Anxiety, it follows that future investigations into the effects of Anxiety on learning must control for the independent variable Dogmatism. Past ex-

periments which have demonstrated the inhibiting effect of Anxiety on performance in complex tasks, may, in fact, be demonstrating the effect of Dogmatism. This investigation suggests that there are individual differences in a variable which is independent from the drive Anxiety and that this variable affects the tendency to use old responses in new situations.

One of the most interesting conclusions can be drawn from the simple observation that levels of Dogmatism as determined by the D Scale, affect performance in a learning task. It will be recalled that the concept of Dogmatism formulated by Rokeach dealt with the individual differences in resistance to change, authoritarianism and narrowed time perspective only in the context of individual differences in the structure of belief systems. This investigation suggests that a cognitive system, which is characteristically dogmatic, ramifies in learning tasks and not just in those studies dealing with belief systems. The results suggest that Dogmatism is a relatively pervasive cognitive variable which affects behavior in a broad number of situations.

CHAPTER V
SUMMARY AND CONCLUSION

This study was an attempt to assess the possible effect of different levels of Anxiety and Dogmatism on non-verbal paired-associate learning in a negative transfer paradigm. The theories of Spence and Rokeach suggested the following hypothesis:

I) In a new learning situation performance varies inversely with Dogmatism.

II) In a negative transfer situation, performance varies inversely with Dogmatism.

III) High and low dogmatic subjects do not differ in the time taken to reach the analytic stage.

IV) In a simple learning task performance varies directly with Anxiety.

V) In a complex learning task performance varies inversely with Anxiety.

The Dogmatism Scale and the Taylor Manifest Anxiety Scale were used to measure Dogmatism and Anxiety respectively. Part I (A-B) of a negative transfer paradigm was described as a "simple" learning task. Part II (A-C) of the paradigm was described as a "complex" task. The

time taken in Part II for a subject to realize that the stimulus response connections had been changed was set as a measure of the analytic stage. The criterion established to determine the time taken to reach the analytic stage in Part II was also applied to Part I and termed the analytic stage.

Initially 145 subjects were given the TMAS and D Scales during a scheduled first year psychology class. From this sample 60 subjects were divided into High, Medium and Low Dogmatism groups according to scores on the D Scale. Each Dogmatism group was divided into High, Medium and Low levels of Anxiety according to TMAS measures. The final results of subject selection was three levels of Dogmatism which did not significantly differ in the mean TMAS measure and three levels of Anxiety which did not significantly differ in the mean D Scale measure. The aim of selecting subjects to meet this criterion was to "partial out" the separate effects of Dogmatism and Anxiety on learning.

In the experimental procedure subjects were required to learn paired associations between six white stimulus lights and six response buttons. Subjects indicated their pairings by depressing the response button on the illumination of one of the white stimulus lights. A green light was employed to indicate a correct response. Half way through the experimental session the reinforced white

light-response button pairs were changed without the knowledge of the subjects.

Using performance after the analytic stage as a measure of learning, an analysis of variance indicated that performance in Part I varies directly with Dogmatism ($P < .10$). This was an exact reversal of Hypothesis I. This finding was discussed in terms of a dogmatic individual's intolerance for ambiguity. A detailed analysis of the results generally supported Hypothesis II. A separate analysis of variance indicated that high dogmatic subjects realized the programme change significantly earlier than low dogmatic subjects ($P < .01$). This finding is not in accord with Hypothesis III. It was suggested that high dogmatic subjects reached the analytic stage in this study relatively earlier because they are relatively more suspicious of change when the experimenter is an integral determinant of their success at the task. Although between group differences were generally in the right direction, the data did not confirm Hypothesis IV. This failure was said to be a function of the limited number of learning trials given to subjects in Part I. Contrary to Hypothesis V, performance in Part II varied directly with Anxiety ($P < .01$). It was decided that Part II (A-C), although it encouraged interference from Part I (A-B) was not "complex" enough to discriminate the inhibiting effects of Anxiety.

In conclusion, it was decided that this study

illustrated the need for better operational definitions concerning those situations in which Anxiety and/or Dogmatism are said to affect performance. The findings of this investigation also suggest that Dogmatism is a relatively independent and pervasive variable which affects learning differently in "simple" and "complex" tasks.

APPENDIX A
DOGMATISM SCALE

AGE _____ SEX _____ STREET _____

The following is a study of what the general public thinks and feels about a number of important social and personal questions. The best answer to the statements below is your personal opinion. We have tried to cover many different and opposing points of view; you may find yourself agreeing strongly with some of the statements, disagreeing just as strongly with others, and perhaps uncertain about others. Whether you agree or disagree with any statement, you can be sure many other people feel the same way you do.

Mark each statement in the left margin according to how much you agree or disagree with it. Please mark every one. Write +1, +2, +3, or -1, -2, -3, depending on how you feel in each case.

+1 I AGREE A LITTLE	-1 I DISAGREE A LITTLE
+2 I AGREE PRETTY MUCH	-2 I DISAGREE PRETTY MUCH
+3 I AGREE VERY MUCH	-3 I DISAGREE VERY MUCH

1. A person who thinks primarily of his own happiness is beneath contempt.
2. The main thing in life is for a person to want to do something important.
3. In a discussion, I often find it necessary to repeat myself several times to make sure I am being understood.
4. Most people just don't know what's good for them.
5. In times like these, a person must be pretty selfish if he considers his own happiness primarily.
6. A man who does not believe in some great cause has not really lived.
7. I'd like it if I could find someone who would tell me how to solve my personal problems.
8. Of all the different philosophies which have existed in this world, there is probably only one which is correct.
9. It is when a person devotes himself to an ideal or cause that his life becomes meaningful.
10. In this complicated world of ours, the only way we can know what is going on is to rely upon leaders or experts who can be trusted.

11. There are a number of persons I have come to hate because of things they stand for.
12. There is so much to be done and so little time to do it in.
13. It is better to be a dead hero than a live coward.
14. A group which tolerates too much difference of opinion among its own members cannot exist for long.
15. It is only natural that a person would have a much better acquaintance with ideas he believes in than with ideas he opposes.
16. While I don't like to admit this even to myself, I sometimes have the ambition to become a great man, like Einstein, or Beethoven, or Shakespeare.
17. Even though freedom of speech for all groups is a worthwhile goal, it is unfortunately necessary at times to restrict the freedom of certain political groups.
18. If a man is to accomplish his mission in life, it is sometimes necessary to gamble "all or nothing at all".
19. Most people just don't give a damn about others.
20. Any person who gets enthusiastic about a number of causes is likely to be a pretty wishy-washy sort of person.
21. To compromise with our political opponents is dangerous because it usually leads to the betrayal of our own side.
22. If given the chance I would do something that would be of great benefit to the world.
23. In times like these, it is often necessary to be more on guard against ideas put out by certain people or groups in one's own camp than by those in the opposing camp.
24. In a heated discussion I usually become so absorbed in what I am going to say that I forget to listen to what others are saying.
25. Once I get wound up in a heated discussion, I just can't stop.
26. There are two kinds of people in this world; those who are on the side of truth, and those who are against it.
27. Man on his own is a helpless and miserable creature.

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28. The United States and Russia have just about nothing in common.
 29. In this history of mankind there have probably been just a handful of really great thinkers.
 30. The highest form of government is a democracy and highest form of democracy is a government run by those who are most intelligent.
 31. The present is all too often full of unhappiness; it is the future that counts.
 32. Unfortunately, a good many people with whom I have discussed important social and moral problems don't really understand what is going on.
 33. Fundamentally, the world we live in is a pretty lonely place.
 34. It is often desirable to reserve judgement about what's going on until one has had a chance to hear the opinions of those one respects.
 35. The worse crime a person can commit is to attack publicly the people who believe in the same thing he does.
 36. In the long run, the best way to live is to pick friends and associates whose tastes and beliefs are the same as one's own.
 37. Most of the ideas that get published nowadays aren't worth the paper they are printed on.
 38. It is only natural for a person to be rather fearful of the future.
 39. My blood boils whenever a person stubbornly refuses to admit he is wrong.
 40. When it comes to differences of opinion in religion, we must be careful not to compromise with those who believe differently from the way we do.
1. Have you ever seen this questionnaire before? _____
 2. Do you know what this questionnaire measures? _____
 3. If your answer is Yes, please indicate what you think this questionnaire measures' _____
-

TAYLOR MANIFEST ANXIETY SCALE

Place a T in front of those questions which you personally consider true of yourself, and an F in front of those questions which you personally think are false of yourself.

1. I do not tire quickly.
2. I am often sick of my stomach.
3. I am about as nervous as other people.
4. I have very few headaches.
5. I work under a great deal of strain.
6. I cannot keep my mind on one thing.
7. I worry over business and money.
8. I frequently notice my hand shakes when I try to do something.
9. I blush as often as others.
10. I have diarrhea ("the runs") once a month or more.
11. I worry quite a bit over possible troubles.
12. I practically never blush.
13. I am often afraid that I am going to blush.
14. I have nightmares every few nights.
15. My hands and feet are usually warm enough.
16. I sweat very easily even on cool days.
17. When embarrassed I often break out in a sweat which is annoying.
18. I do not often notice my heart pounding and I am seldom short of breath.
19. I feel hungry almost all the time.
20. Often my bowels don't move for several days at a time.

21. I have a great deal of stomach trouble.
22. At times I lose sleep over worry.
23. My sleep is restless and disturbed.
24. I often dream about things I don't like to tell other people.
25. I am easily embarrassed.
26. My feelings are hurt easier than most people.
27. I often find myself worrying about something.
28. I wish I could be as happy as others.
29. I am usually calm and not easily upset.
30. I cry easily.
31. I feel anxious about something or someone almost all the time.
32. I am happy most of the time.
33. It makes me nervous to have to wait.
34. At times I am so restless that I cannot sit in a chair for very long.
35. Sometimes I become so excited that I find it hard to get to sleep.
36. I have often felt that I faced so many difficulties I could not overcome them.
37. At times I have been worried beyond reason about something that really did not matter.
38. I do not have as many fears as my friends.
39. I have been afraid of things or people that I know could not hurt me.
40. I certainly feel useless at times.
41. I find it hard to keep my mind on a task or job.
42. I am more self-conscious than most people.
43. I am the kind of person who takes things hard.

44. I am a very nervous person.
45. Life is often a strain for me.
46. I am not at all confident of myself.
47. At times I think I am no good at all.
48. At times I feel that I am going to crack up.
49. I don't like to face a difficulty or make an important decisions.
50. I am very confident of myself.

INITIAL _____

MAUDSLEY PERSONALITY INVENTORY

Instructions: Please answer each question by putting a circle round the "Yes" or the "No" following the question; if you simply cannot make up your mind, encircle the "?". Work quickly and do not ponder too long about the exact shade of meaning of each question. There are no right or wrong answers, and no trick questions.

Remember to answer each question.

- | | | |
|-----|--|----------|
| 1. | Are you happiest when you get involved in some project that calls for rapid action? | Yes ? No |
| 2. | Do you sometimes feel happy, sometimes depressed without any apparent reason? | Yes ? No |
| 3. | Does your mind often wander while you are trying to concentrate? | Yes ? No |
| 4. | Do you usually take the initiative in making new friends? | Yes ? No |
| 5. | Are you inclined to be quick and sure in your actions? | Yes ? No |
| 6. | Are you frequently "lost in thought" even when supposed to be taking part in a conversation? | Yes ? No |
| 7. | Are you sometimes bubbling over with energy and sometimes very sluggish? | Yes ? No |
| 8. | Would you rate yourself as a lively individual? | Yes ? No |
| 9. | Would you be very unhappy if you were prevented from making numerous social contacts? | Yes ? No |
| 10. | Are you inclined to be moody? | Yes ? No |
| 11. | Do you have frequent ups and downs in mood, either with or without apparent cause? | Yes ? No |
| 12. | Do you prefer action to planning for action? | Yes ? No |
| 13. | Are your daydreams frequently about things that can never come true? | Yes ? No |

14. Are you inclined to keep in the background on social occasions? Yes ? No
15. Are you inclined to ponder over your past? Yes ? No
16. Is it difficult to "lose yourself" even at a lively party? Yes ? No
17. Do you ever feel "just miserable" for no good reason at all? Yes ? No
18. Are you inclined to be overconscientious? Yes ? No
19. Do you often find that you have made up your mind too late? Yes ? No
20. Do you like to mix socially with people? Yes ? No
21. Have you often lost sleep over your worries? Yes ? No
22. Are you inclined to limit your acquaintances to a select few? Yes ? No
23. Are you often troubled about feelings of guilt? Yes ? No
24. Do you ever take your work as if it were a matter of life or death? Yes ? No
25. Are your feelings rather easily hurt? Yes ? No
26. Do you like to have many social engagements? Yes ? No
27. Would you rate yourself as a tense or "highly-strung" individual? Yes ? No
28. Do you generally prefer to take the lead in group activities? Yes ? No
29. Do you often experience periods of loneliness? Yes ? No
30. Are you inclined to be shy in the presence of the opposite sex? Yes ? No
31. Do you like to indulge in a reverie (daydreaming)? Yes ? No
32. Do you nearly always have a "ready answer" for remarks directed at you? Yes ? No
33. Do you spend much time in thinking over good times you have had in the past? Yes ? No

34. Would you rate yourself as a happy-go-lucky individual? Yes ? No
35. Have you often felt listless and tired for no good reason? Yes ? No
36. Are you inclined to keep quiet when out in a social group? Yes ? No
37. After a critical moment is over, do you usually think of something you should have done and failed to do so? Yes ? No
38. Can you usually let yourself go and have a hilariously good time at a gay party? Yes ? No
39. Do ideas run through your head so that you cannot sleep? Yes ? No
40. Do you like work that requires considerable attention? Yes ? No
41. Have you ever been bothered by having a useless thought come into your mind repeatedly? Yes ? No
42. Are you inclined to take your work casually, that is as a matter of course? Yes ? No
43. Are you touchy on various subjects? Yes ? No
44. Do other people regard you as a lively individual? Yes ? No
45. Do you often feel disgruntled? Yes ? No
46. Would you rate yourself as a talkative individual? Yes ? No
47. Do you have periods of such great restlessness that you cannot sit long in a chair? Yes ? No
48. Do you like to play pranks on others? Yes ? No

APPENDIX B

Instructions for TMAS D Scale + MPI

1. You are asked to complete the questionnaire which is now being passed out. The purpose of this questionnaire is to give us, the graduate students in psychology, certain information which will aid us in our research.
2. The information which you will be asked to give will be dealt with in a confidential manner. This information in no way affects your academic work or position in this university.
3. Work quickly, don't spend too much time over any question; we want your first reaction, not a long drawn-out thought process. The whole questionnaire should not take more than a few minutes. Be sure not to omit any questions.

APPENDIX C

INSTRUCTIONS FOR LEARNING TASK

1. Please refer to the row of 6 white lights and underneath it, the row of six response buttons.
2. Each response button is electrically connected with a different white light.
3. Your task now is to learn the correct response button white-light connections.
4. When a white light comes on you are to indicate your choice by firmly depressing and releasing one and only one response button. Please respond to each white light.
5. When a green light comes on at the left of the panel it means that you have pushed the correct button.
6. For example, if white light #3 comes on and then you push response button #4 and a green light comes on, this indicates that white light #3 is connected to response button #4.
7. In order to show how the study will work I will now present a series of white lights, the correct responses to which are in a 1 to 1 relation. That is, when white light #3 comes on the correct button to push is #3, when #2 comes on push #2 etc.

(12 trials presented here)

I repeat, I did this only to show you how the panel works. You must learn entirely new associations when the experiment begins.

8. There are alternating test and training phases in this study. In the training phases you will receive a green light every time you push a correct button. In the test phase you will receive no green light.
9. The test phases will begin after the buzzer has been sounded once, the training phase will begin after the buzzer has sounded twice.
10. Let us review that again, when you hear the buzzer sound twice you will receive a green light everytime you push a correct response, - when you hear the buzzer sound once you will not get a green light.
11. Please respond to each white light with the button you think is connected to the white light.
12. Please push only one response button.
13. Please do not talk.
14. We will begin with a test phase and then go into a training phase, where you will receive green lights.
15. Please begin when you hear the buzzer sound.
16. Are there any questions.

Thank you.

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