PROBLEM-SOLVING PERSISTENCE AS A FUNCTION OF TYPE OF REINFORCEMENT AND NEED FOR APPROVAL AMONG COLLEGE STUDENTS

Thesis for the Degree of Ph. D.
MICHIGAN STATE UNIVERSITY
MARLOT W. WILLIAMS
1970

This is to certify that the

thesis entitled

Problem-Solving Persistence as a Function of Type of Reinforcement and Need for Approval Among College Students

presented by

Marlot W. Williams

has been accepted towards fulfillment of the requirements for

Ph. D. degree in Education

David S. Kim

Date April 24, 19

O-169

ABSTRACT

PROBLEM-SOLVING PERSISTENCE AS A FUNCTION OF TYPE OF REINFORCEMENT AND NEED FOR APPROVAL AMONG COLLEGE STUDENTS

Marlot W. Williams

Statement of the Problem

For years researchers have explored the hypothesis that college students differ in the degree to which they are capable of performing the kinds of academic tasks which are generally demanded of them. Since there are demands other than academic which are made upon college students, there are other than academic reasons why some students do not perform as well as they are capable while in college. In trying to understand why some college students succeed while others fail, it is especially important to understand both the academic and non-academic variables associated with learning. Problem-solving persistence is one such non-academic variable. Some individuals are willing to work on a task for longer periods of time than other individuals, and some individuals are more willing to withstand discomfort in order to achieve a goal than others. Persistent behavior varies according to the way it is motivated. Some college students respond readily, and with sustained activity, to a minimum of motivation, while others appear unresponsive to any except the most extreme pressure.

The purpose of this study was to determine those differences which exist among college students in regard to the amount of persistence they display toward a problem-solving task with different types of incentive, or reinforcement, and according to different levels of need for approval. As used in this study, persistence referred to an active, voluntary, productive, continuous response to a task in order to achieve a goal. Need for approval referred to a motivational variable characteristic of individuals who are highly sensitive to self-evaluative and social-evaluative conditions.

Procedure

Three hundred forty-three college students were asked to provide objective measures of problem-solving persistence, socio-economic status, and need for approval. Persistence was measured in terms of the time spent working number series problems. Socio-economic status was operationalized by obtaining a rating assigned the father's occupational status according to Duncan's Socio-economic Status Scale. Need for approval was operationalized by obtaining a score on the Marlowe-Crowne Social Desirability Scale.

The students were randomly assigned to one of three experimental groups (social reinforcement group, material reinforcement group, no reinforcement control group).

Reinforcement was considered to be optimal in each condition. Encouragement was considered to be optimal social reinforcement. Money was considered to be optimal material reinforcement.

A least squares solution to a fixed effects model factorial analysis of variance with unequal cell sizes was computed to test main effects of type of reinforcement, socio-economic status, need for approval, and sex as well as their interactions. Level of significance was set at the .05 level.

Summary of the Findings

1. There were differences in the problem-solving persistence of students according to the type of reinforcement they received. Social reinforcement was significantly more effective than material reinforcement, but either was significantly more effective than no reinforcement.

2. Socio-economic status made no difference as to how the students responded according to type of reinforcement. Both low and high socio-economic status students were more responsive to social reinforcement than material reinforcement.

3. Females persisted longer than males even without reinforcement, but both males and females were more

responsive to social reinforcement than material reinforcement.

4. There was no difference in the amount of persistence displayed toward the different types of reinforcement between the high need for approval students and the low need for approval students. Both high and low need for approval students persisted longer for social reinforcement than material reinforcement.

5. There was no difference found in this study in need for approval according to socio-economic status.

6. There was no difference found in this study in need for approval according to sex.

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By

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A THESIS

Submitted to

Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Counseling, Personnel Services, and Educational Psychology

1970

This dissertation is dedicated to:

Kay, Doug, Leigh Ann, and Todd

...who have waited a long time.

ACKNOWLEDGMENTS

The author wishes to express appreciation to his committee chairman, Dr. James Costar, for his support throughout the doctoral program. Special thanks are due Dr. Ralph Kron for his willingness to serve as dissertation chairman. His valuable suggestions and wholehearted assistance made this study possible. Thanks are also due to other members of the committee, Dr. Norman Abeles and Dr. David Smith. Dr. Bart M. James made a valuable contribution to the author's early professional development.

The author also wishes to express his regards to a colleague, Dr. Larry McOmber, whose interest and encouragement was most helpful, and to Arval Williams and Pearl Williams who were willing to make many sacrifices to make hope become a possibility.

Finally, grateful appreciation is expressed to Kay, who was willing to experience much adversity to share in her husband's undertaking.

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STATEMENT OF THE PROBLEM

Need for the Study

For years researchers have explored the hypothesis that college students differ in the degree to which they are capable of performing the kinds of academic tasks which are generally required of them. Of course, there are demands other than academic which are made upon college students and, therefore, there are reasons other than academic reasons why some students do not perform as well as they are capable while in college. In trying to understand why some college students succeed while others fail, it is especially important to understand both the academic and non-academic variables associated with learning. Persistence is one such non-academic variable. Some individuals are willing to work on a task for longer periods of time than other individuals, and some individuals are more willing to withstand discomfort in order to achieve a goal than others.

Persistent behavior varies according to the way it is motivated. Some college students respond readily, and with sustained activity, to a minimum of motivation,

while others appear unresponsive to any except the most extreme pressure. Some students are capable of continued effort with no apparent incentive influence. On the other hand, some students with high ability refuse to exert themselves. Why some students persist longer in their efforts to accomplish a given task than others, and why some respond more readily to different types of incentive are significant issues on which more information is needed.

Purpose of the Study

This study is an attempt to determine those differences which exist among college students in regard to the amount of persistence they display toward a problem-solving task with different types of incentive, or reinforcement, and according to different levels of need for approval. As used in this study, persistence refers to an active, voluntary, productive, continuous response to a task in order to achieve a goal. Need for approval refers to a motivational variable characteristic of individuals who are highly sensitive to self-evaluative and social-evaluative conditions.

Research Hypotheses

Hypothesis I: There will be differences between high socio-economic status students and low socio-economic status students in the amount of persistence they display toward the different types of reinforcement.

Hypothesis II: There will be differences between males and females in the amount of persistence they display toward the different types of reinforcement.

Hypothesis III: There will be differences between high need for approval students and low need for approval students in the amount of persistence they display toward the different types of reinforcement.

Hypothesis IV: There will be no difference in need for approval according to socio-economic status.

Hypothesis V: There will be no difference in need for approval according to sex.

Theoretical Foundation of the Study

The model provided by Rotter's Social Learning Theory[1] will be employed in this research. It is a "social" learning theory because it stresses the fact that the basic modes of behavior are learned in social situations and are inextricably fused with needs requiring interaction with other persons for their satisfaction. There are several reasons for selecting Social Learning Theory as the theoretical construct for this study. It is an explicit theory of personality which gives central importance to the goal-oriented character of behavior. It is usually recognized that motivational constructs which use situational variables provide greater accuracy in prediction than constructs which place little or no importance on immediate environmental factors. Rotter provides all his constructs with operational definitions.

According to Rotter, reinforcement value is one of the variables which determines strength of reinforcement. The reinforcement value of any external reinforcement may be ideally defined as the degree of preference for any reinforcement to occur if the possibilities of its occurring were all equal to each other.

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[1]For a complete and comprehensive discussion of Rotter's Social Learning Theory, see J. Rotter, Social learning and clinical psychology. New York: Prentice-Hall, 1954.

Strength of reinforcement is a function of a specific goal or the reinforcement value of a group of functionally related goals. Reinforcements become functionally related primarily on the basis of two generalization principles. The first manner is through a similarity predictable by means of stimulus generalization principles. For example, a slap on the wrist and a slap on the arm are two negative reinforcements that could become functionally related on the basis of stimulus generalization. The second manner is through an extension of mediated stimulus generalization, in which a number of different reinforcements that tend to lead to the same reinforcement become related. For example, a number of different responses of the mother, all of which lead to increasing the mother's attention, tend to develop some type of functional relationship. The greater the reinforcement value of a goal, the greater is the effect associated with the attainment or non-attainment of that goal.

Strength of reinforcement also serves to change expectancy. Expectancy may be defined as a probability or contingency held by the subject that any specific reinforcement or group of reinforcements will occur in any given situation or situations. Expectancy may be considered to be both (1) a function of probability, which can be calculated from past histories of reinforcements, necessitating the consideration of special problems such

as patterning and reducing increments, and (2) a generalization of expectancies from other related behavior-reinforcement sequences. Such generalization effects may represent the failure to make the differentiations that are necessary for adequate or efficient adjustment to any given situation. Such effects may be illustrated by the person who has been rebuffed or rejected by his parents and who therefore consistently expects rejection from other people even though such rejection is not likely to occur. The stronger the reinforcement associated with a particular event, the greater the change in expectancy for future occurrence of that event.

The effects of the strength of reinforcement may be measured in the change of expectancy for the behavior being reinforced or by the degree of generalization of change in expectancy for other behavioral responses leading to similar goals.

Substantial emphasis is placed on the interrelationships of four classes of variables:

(1) the subject's measurable behavior,

(2) the subject's expectation that his behavior will be followed by particular kinds of reinforcements,

(3) the value of these reinforcements, and

(4) the psychological environment in which behavior occurs.

In Social Learning Theory, need is the behavioral abstraction of primary consequence. The environmental conditions determining the direction of behavior are referred to as goals. Both needs and goals have the same referent, goal-directed behavior. Various behaviors become functionally related through a process of learning and generalization. The theory assumes that the person functions in an integrated, holistic manner.

The fundamental proposition of Social Learning Theory is that knowledge of the significance of stimuli for an individual permits prediction of that individual's behavior. Behavior is conceived of as being the outcome of one activity taking precedence over all other activities available to an individual in a given situation. Which behavioral pattern takes precedence depends upon how the situation is perceived and interpreted by the individual. Consequently, behavioral prediction depends upon knowledge of certain factors which determine the meaning of a situation for an individual and the knowledge of his responses. In other words, there is no objective reality. What a person perceives is, for that person, reality.

Rotter's Social Learning Theory states that the study of personality is the study of learned behavior. Learned behavior is modifiable. Therefore, the relevance of Rotter's Social Learning Theory to this research involves the assumption that problem-solving persistence is

modifiable precisely because it is a learned pattern of behavior.

Definition of Terms

1. Persistence is operationally defined as an active, voluntary, productive, continuous response to a task in order to achieve a goal.

2. Material reinforcement is operationally defined as a known amount of money, $ 3.00.

3. Social reinforcement is operationally defined as verbal encouragement.

4. Socio-economic status is operationally defined in terms of the rating of the father's occupational status according to Duncan's Socio-economic Status Scale.

5. Need for approval is operationally defined in terms of a score obtained on the Marlowe-Crowne Social Desirability Scale.

Delimitations of the Study

1. The study includes only undergraduate students at Central Michigan University, Mt. Pleasant, Michigan.

2. The study includes only Caucasian students.

Limitation of the Study

1. The possible lack of validity of criteria used in making the socio-economic status classifications is a limitation of this study.

Overview of the Study

In this introductory chapter, the need for the study and the purpose of the study were spelled out, the research hypotheses were set forth, the theoretical model was explained, and a definition of the principal terms and concepts utilized in the study was presented.

In Chapter II, the pertinent literature is reviewed.

Chapter III deals with methodological procedures. A description of the sample used in the investigation is presented. The research design, including the instrumentation, the working hypotheses, and the methods and techniques employed to test the hypotheses is elaborated.

Chapter IV constitutes the essential core of the investigation. It is considered essential because it deals with the statistical tests used to analyze the data.

Attention is now turned to a review of literature concerning persistence and need for approval, the variables of primary consequence to this research.

CHAPTER II

BACKGROUND OF THEORY AND RESEARCH

Review of Literature on Persistence

Historical Perspective

Historically, there have been three different approaches to the study of persistence.[2] The first approach has been concerned with persistence as a trait. In such studies, a common technique has been to show the relationship between persistence scores, usually in terms of time, for a variety of different tasks. Initially, these studies were essentially correlational in nature. In more recent studies, factor analytic techniques have been used in an attempt to account for the obtained relationships. The area of primary interest in these studies is in consistency of behavior, whether a person who persists at one task will also tend to persist at another. Proponents of this approach have assumed that such consistency allows the inference of the existence of

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[2]For a complete and comprehensive discussion of persistence, see N. T. Feather, "The Study of Persistence," Psychological Bulletin, 59, 1962, 94-115.

a relatively stable personality characteristic. The role of situational factors in the determination of behavior tends to be ignored since the emphasis is on personality factors which transcend the situation. This approach has difficulty in accounting for variations in persistence from situation to situation.

The second approach has been concerned with the issue of resistance to extinction. In such studies, the subject typically has performed a task without reinforcement after having been subjected to a particular type of reinforcement schedule during an acquisition series. Extinction studies usually ignore the possible effect of personality differences and focus on the influence of situational variables, particularly differences in the pattern and amount of reinforcement in the acquisition series. This approach has difficulty in accounting for variations in persistence from person to person.

Finally, the third approach has been concerned with persistence as a motivational phenomenon. This approach conceives of personality characteristics interacting with expectations and incentives which are both situationally defined. This approach is thus unlike the two preceding ones for it has the potential of being able to account both for variations in persistence from situation to situation and for variations from person to person. In addition, it allows for the study of both in interaction.

The three approaches to the study of persistence may be viewed as falling on a continuum with personality-oriented trait studies at one end, situation-oriented extinction studies at the other end, and motivation studies which consider the interaction of personality and situation between the two extremes.

Persistence Conceived as a Trait

The first factorial study of persistence was done by Ryans (1938a) who used a number of objective tests of persistence with 40 college students. Ryans concluded that there was evidence of a "general factor of persistence...(which) seemed to be relatively independent of such other capacities as intelligence or perseveration." In later studies, Ryans (1938b, 1938c) showed that a battery of three tests measuring persistence was unrelated to general intelligence, but showed correlations of between 0.4 and 0.5 with success in school.

Ryans, D. G. An experimental attempt to analyze persistent behavior: I. Measuring traits presumed to involve persistence. Journal of General Psychology, 19:333-353. 1938a.

Ryans, D. G. An experimental attempt to analyze persistent behavior: II. A persistence test. Journal of General Psychology, 19:355-371. 1938b.

Ryans, D. G. The meaning of persistence. Journal of General Psychology, 19:79-96. 1938c.

Thornton (1939) criticized Ryans' findings because of the small number of subjects used, and reported a study of his own. His factor analysis of persistence tests was carried out with 22 variables derived from measuring 189 college students. A factor called "willingness to withstand discomfort in order to achieve a goal" was identified. A second factor, described as patience or "willingness to spend time at a task" was also identified.

Another factor analysis by Rethlingshafer (1942) was based on 29 variables involving persistence and other measures of continuance of activities. Although her analysis was based on the scores of only 38 subjects, a total of seven factors was obtained. Rethlingshafer's analysis agreed with previous work in identifying the factors of "keeping at a task once started" and "willingness to withstand discomfort in order to achieve a goal."

Kremer (1942) studied 156 boys and obtained ratings on 17 traits and scores on six persistence tests. In addition to the six persistence tests and the 17 ratings,

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Thornton, G. R. A factor analysis of tests designed to measure persistence. Psychological Monographs, 51, No. 229. 1939.

Rethlingshafer, D. Relationship of tests of persistence to other measures of continuance of activities. Journal of Abnormal and Social Psychology, 37:71-82. 1942.

Kremer, A. H. The nature of persistence. Studies in Psychology and Psychiatry, 5:1-40. 1942.

mental age and school grades were included in the matrix of intercorrelations, from which six factors were extracted. Kremer was able to suggest that a factor exists which allows for a distinction between persistence under group pressure and persistence in isolation.

The time spent by students on their final examinations is an easily obtained datum that could be taken as an indication of this persistence factor. It has been demonstrated by Briggs and Johnson (1942) that the first third of the students to hand in their papers get lower scores than would be expected from their intelligence, while the last third get higher scores than expected.

MacArthur (1955) intercorrelated and factor analyzed 21 variables for 120 subjects. MacArthur's conclusions agree with the best of the previous studies. He identified (1) the general persistence factor, (2) a factor contrasting individuality with prestige suggestibility which bears a close relationship to Kremer's factor, (3) a factor corresponding to Thornton's "willingness to spend time at a task", and (4) a factor corresponding to "willingness to withstand discomfort in order to achieve a goal." The

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Briggs, A. and Johnson, D. M. A note on the relation between persistence and achievement. Journal of Educational Psychology, 33:623-627. 1942.

MacArthur, R. S. An experimental investigation of persistence in secondary school boys. Canadian Journal of Psychology, 9:42-54. 1955.

rediscovery of these factors in this technically more perfect, methodologically more complete, investigation clarifies the psychological traits underlying persistence to a considerable extent.

Persistence Conceived as Resistance to Extinction

The rationale of considering how resistance to extinction, which is concerned with reinforcement schedules, is related to persistence needs to be clarified. Such investigations are not commonly classified as persistence studies. However, continuing an activity in the absence of uniform non-reinforcement is similar to the persistence situation in which the subject works at a task without success.

According to Semler (1967), the prototype of persistence can be found in the partial reinforcement effect where results generally show that resistance to extinction is greater following partial reward acquisition in comparison with continuous reward acquisition. Since it is possible to manipulate reward to increase persistence, it is reasonable to assume that individual differences in persistence are a function of variations in the individual's history of reward and non-reward.

Semler, I. J. Persistence and learning in young children. Child Development, 38:127-135. 1967.

Nakamura and Ellis (1964) conducted two experiments in which children were divided into four groups based on two levels of persistence and two reward treatments. The rewards given to the high and low persisters were either relatively high or relatively low with the absolute magnitude being the same in both conditions. The relative reward values were established by manipulating the perceived context from which the rewards were received. The experiments were designed to test the prediction that such relative rewards and rated levels of persistence would affect task performance and also task persistence following discontinuation of the rewards. The results clearly supported the first part of the prediction but were ambiguous on the second part regarding task persistence as measured by trials to extinction.

It was anticipated that the results could be accounted for by arguing that the relative sizes of the rewards were subjectively different for the low reward and high reward subjects. However, in a later experiment, Nakamura and Lowenkron (1964) studied incentive magnitude

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Nakamura, C. Y. and Ellis, F. F. Methodological study of the effects of relative reward magnitude on performance. Child Development, 35:595-610. 1964.

Nakamura, C. Y. and Lowenkron, B. Z. Incentive magnitude, task orientation, and persistence. Child Development, 35: 610-621. 1964.

in relation to task orientation and persistence. Their results clearly showed that reward treatment affected the high persistence subjects quite differently than it did the low persistence subjects.

Lewis and Duncan (1956) used a slot machine, modified so that payoffs could be controlled, to study resistance to extinction. The payoffs used were 100 percent, 75 percent, 50 percent, 37.5 percent, 25 percent, 12.5 percent, and 0 percent. Each payoff was worth 5 cents to the player. The total number of plays to quitting was found to be an inverse function of the percentage of reward with the 100 percent subjects quitting first and the 0 percent subjects quitting last.

In another experiment, with 100 percent, 67 percent, 33 percent, 11 percent, and 0 percent reward, Lewis and Duncan (1957) asked their subjects to state for each trial of the 9-trial acquisition series their "expectation" of winning or not winning on the next trial. The results showed that expectancies were a regular function of

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Lewis, D. G. and Duncan, C. P. Effect of different percentages of money reward on extinction of a lever pulling response. Journal of Experimental Psychology, 52:23-27. 1956.

Lewis, D. G. and Duncan, C. P. Expectation and resistance to extinction of a level pulling response as a function of percentage of reinforcement and amount of reward. Journal of Experimental Psychology, 54:115-120. 1957.

percentage of reinforcement both during acquisition and extinction, and that the expectancy of winning dropped off very rapidly during extinction for the 100 percent group. This was also the group that quit first.

These studies which involve percentage of reward suggest the existence of a non-monotonic function. Because a non-monotonic function usually means that at least two processes are operating, Grant and Schipper (1952) guessed as to what these two processes might be. The first process, they hypothesized, is a discriminative one. The higher the percentage of reinforcement, the more the acquisition series should "stand out" from the extinction series, and the less partial reinforcement effect should result. A discrimination process thus results in a decreasing function as a result of percentage of reinforcement. The second process is a learning one. With a response starting close to zero response strength, the greater the percentage of reward, for equal numbers of trials below some limit, the greater the response strength. Thus the learning process produces an increasing function, and the discrimination process should produce a trend in the opposite direction. The combination of these two results in a non-monotonic function.

Grant, D. A. and Schipper, L. M. The acquisition and extinction of conditioned eyelid responses as a function of the percentage of fixed-ratio random reinforcement. Journal of Experimental Psychology, 43:313-320. 1952.

Persistence Conceived as a Motivational Phenomenon

Within the framework of Atkinson's (1957) theory of achievement motivation, Atkinson and Litwin (1960) predicted that, holding task constant, stronger motive to achieve success should be associated with greater persistence, and stronger motive to avoid failure should be associated with less persistence. According to Atkinson's theory, the strength of motive to achieve, motive to avoid failure, incentive value of success, and expectancy of success, interact to determine the strength of achievement motivation. Using 149 college undergraduate subjects, Atkinson and Litwin observed their behavior in a simple ring toss game as indicative of risk taking, the grades they received on their final examination in a course as indicative of performance level, and the amount of time spent working at the final exam as a measure of persistence. They found, as predicted, that motive to achieve success was positively related and motive to avoid failure was negatively related to persistence.

Atkinson, J. W. Motivational determinants of risk-taking behavior. Psychological Review, 64:359-372. 1957.

Atkinson, J. W. and Litwin, G. H. Achievement motive and test anxiety conceived as a motive to approach success and motive to avoid failure. Journal of Abnormal and Social Psychology, 60:52-63. 1960.

It should be noted that the Atkinson-Litwin study was restricted to the investigation of persistence at a task in relation to differences in strength of achievement related motives. It made no attempt to vary systematically the subject's expectations of success and failure as related to situational cues or to specify clearly the subject's level of expectancy of success.

Feather (1961) focused on these problems and investigated persistence in relation to the interaction of motives and situationally elicited expectations by varying both factors simultaneously. He found, consistent with his hypotheses, that subjects in whom the motive to achieve success is stronger than the motive to avoid failure persist longer at a task for which the initial subjective probability of success is high than similar subjects for whom the initial subjective probability for success is low. Conversely, he also found that subjects in whom the motive to avoid failure is greater than the motive to achieve success persist longer at a task for which the initial subjective probability for success is low than similar subjects for whom the initial subjective probability for success is high.

Feather, N. T. The relationship of persistence at a task to expectation of success and achievement-related motives. Journal of Abnormal and Social Psychology, 63:552-561. 1961.

Blanton (1967) conducted a study on the effects of type of reinforcement and amount of information on the performance of lower and middle class children which was designed to test the hypothesis that while middle class children performed better with performance-oriented, abstract reinforcers than with praise or person-oriented reinforcers, the converse held for lower class children. A verbal conditioning situation was employed. Subjects were 168 third grade students. Blanton found that performance reinforcers produced significantly higher scores than did person reinforcers, regardless of socio-economic status. She also offered an alternative theory to the common assumption that differences in performance reflect differences in the incentive values of the reinforcers. In situations in which there is some degree of uncertainty about the reward-reinforcer contingency, she feels that performance reinforcers will tend to produce better performance than person reinforcers regardless of the socio-economic status of the subject.

Blanton, J. The effects of type of reinforcement and amount of information on the performance of lower and middle class children. Unpublished Ph.D. dissertation. Austin: University of Texas, 1967.

Marshall (1967), studying learning as a function of task interest, reinforcement, and social class variables, found that prior research results showing that high socio-economic status elementary school children learn better for symbolic rewards and low socio-economis status children learn better for material rewards were not supported. Marshall found that the second important conclusion to be drawn concerns the importance of the intrinsic interest of the task. The results indicate that on the task of high interest, there is no significant difference in performance between socio-economic status groups. That is, when given an interesting task, low socio-economic status children perform just as well as high socio-economic children.

Wasson (1967) studied the effects of achievement orientation, academic achievement, and monetary incentive on expectancy of success and persistence of sixth grade boys at an insoluble task. She found a complex interaction between achievement-orientation, academic achievement, and monetary incentive on expectancy of success scores.

Marshall, H. H. Learning as a function of task interest, reinforcement, and social class variables. Unpublished Ph.D. dissertation. Berkeley: University of California, 1967.

Wasson, B. B. The effects of achievement orientation, academic achievement, and monetary incentive on expectancy of success and persistence at an insoluble task of sixth grade boys. Unpublished Ph.D. dissertation. Minneapolis: University of Minnesota, 1967.

Brown (1969) studied the effect of alternating social approval comments and tangible rewards on task performance of kindergarten children. The task was key pressing. Twenty children were assigned to each of three experimental groups under social approval comments from an adult, tangible reinforcement, or alternated social and tangible reinforcement. There was no evidence that tangible reinforcement was better than social reinforcement except when they were alternated.

Review of Literature on Need for Approval

Marlowe and Crowne (1964) assert that individuals who have high need for approval are more sensitive to self-evaluative and social-evaluative conditions than persons low in need for approval. The approval-dependent individual is characterized by defensiveness and vulnerable self-esteem.

Barthel (1963) hypothesized that approval-oriented subjects (especially those with a low expectancy of

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Brown, R. A. The effect of alternating social and tangible rewards on task performance of kindergarten children. Unpublished Ph.D. dissertation. East Lansing: Michigan State University, 1969.

Marlowe, D. and Crowne, D. P. The approval motive. New York: John Wiley and Sons, 1964.

Barthel, C. E. The effects of the approval motive, generalized expectancy, and situational cues upon goal-setting and social defensiveness. Unpublished Ph.D. dissertation. Columbus: Ohio State University, 1963.

success) would exhibit greater defensive rigidity of goal-setting than would subjects less dependent upon approval (especially those with a relatively high expectancy of success). This hypothesized differentiation of behavior would be enhanced under conditions of increased threat to self-esteem and minimized under conditions designed to bolster a subject's self-concept. One hundred twenty subjects participated in the study and were categorized on the basis of their scores of need for approval and level of generalized expectancy. In order to study goal-setting behavior, a dart-throwing task was employed in which subjects were allowed to choose the distance at which they would like to stand during each of 15 performance trials. The variance in shifts of position constituted the measure of rigidity; a low score would indicate constricted, rigid goal-setting behavior. Subjects were assigned to one of three experimental conditions: neutral, threatening, and positive self-esteem. Consistent with predictions, results showed that approval-oriented persons, especially those with low expectancy of success, exhibited greater rigidity under neutral experimental conditions than those with high expectancy of success. Subjects less dependent upon approval were relatively less affected by experimental conditions.

Cooper (1964) tested the hypothesis that high need for approval subjects would avoid the recognition of failure in contrast to low need for approval subjects. Moreover, it was hypothesized that high need for approval subjects in contrast to low need for approval subjects would attempt to represent themselves as being relatively successful. Subjects were undergraduate students from an introductory course in psychology. Prior to the main experiment they were pretested to measure their level of need for approval, and to obtain projective material from which their base level of failure fantasy was determined. Subsequent to the pretest, subjects from the same course were given failure feedback on a perceptual judgment task. The reaction to failure feedback was compared to control groups who received success feedback, or no feedback, on the perceptual task. The results showed that low need for approval subjects, in contrast to high need for approval subjects, increased their decision time to a significant degree during failure feedback on the perceptual judgment task. This was interpreted as indicating that because high need for approval subjects deny failure they do not adapt to the situation by increasing their decision time as did the low need for approval subjects. It was also found that

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Cooper, J. R. The need for approval and the reaction to failure. Unpublished Ph.D. dissertation. Evanston: Northwestern University, 1964.

even in the face of failure high need for approval subjects estimated their percentile rank to be significantly higher than the estimate given by the low need for approval subjects.

Smith (1964) hypothesized that subjects with high need for approval are initially more responsive to social reinforcement than are subjects less motivated to receive approval. The hypothesis was not confirmed. Differences in need for approval did not differentially affect responsivity scores.

Warehime (1965) proposed that (1) mode of reaction to psychological interpretations depends on the social desirability or social undesirability of those interpretations, and that (2) mode of reaction to psychological interpretations is associated with the Marlowe-Crowne Social Desirability Scale score of the person evaluated. The dependent variables were subject's ratings of the quality of the interpretations given, subject's reactions

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Smith, C. O. Interpersonal responsivity in a free responding verbal conditioning situation as a function of need for approval, expectancy of experimenter congeniality, and evaluation of task performance. Unpublished Ph.D. dissertation. Palo Alto: Stanford University, 1964.

Warehime, R. G. The approval motive and mode of reaction to socially desirable and socially undesirable psychological interpretations. Unpublished Ph.D. dissertation. Columbus: Ohio State University, 1965.

toward the psychological interpreter, subject's reactions toward the study, and subject's personal reactions to the interpretations (unhappiness, anger, and discomfort). As predicted, high need for approval subjects rated the experimenter more favorably and attributed more scientific value to the study than did low need for approval subjects no matter whether they received socially desirable or socially undesirable interpretations. Contrary to prediction, high need for approval subjects reported as much unhappiness and anger associated with the receiving of the interpretations as low need for approval subjects. When given socially undesirable interpretations, high need for approval subjects reported more discomfort than low need for approval subjects.

Barber (1966) conducted a study in which it was hypothesized that (1) subjects who received a high percentage of reinforcement for imitative responses would imitate more than subjects who received a low percentage of reinforcement for imitative responses, (2) subjects with a high need for approval would imitate more than subjects with a low need for approval, and (3) subjects with simulated compatible partners would

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Barber, K. J. Imitative behavior as a function of task reinforcement, need for social approval, and simulated interpersonal compatibility. Unpublished Ph.D. dissertation. Philadelphia: Temple University, 1966.

imitate more than subjects with simulated incompatible partners. Using 144 male undergraduate college students in a 2 x 2 x 2 factorial design, Barber found that imitative behavior was not a function of need for approval or compatible partners. The major conclusion was that imitative behavior was a function of behavioral consequences and not of personality or social variables.

Moffett (1967) was concerned with investigating whether individuals who were high and low in need for social approval respond differentially but in a predictable fashion to a fixed category attitude scale with respect to the regions of acceptance and non-commitment, and subsequent shifts in these variables after the application of treatment effects. Two hundred eighty-seven introductory psychology students were dichotomized into high and low need for approval groups and subsequently administered a nine-point attitude scale on the Viet Nam War. Subjects' responses were evaluated with respect to the frequencies of acceptance, and non-commitment for each of the nine positions. Subjects were readministered the attitude scale following the application of treatment effects to three of four groups. The fourth group served

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Moffett, F. L. Effects of need for social approval on judgments of statements about a central issue. Unpublished Ph.D. dissertation. Stillwater: University of Oklahoma, 1967.

as a control. All groups contained high and low approval-motivated subjects. Treatment effects consisted of reinforcing a different attitude position for each of the experimental groups by stating to the subjects that a large majority of them had chosen a particular attitude position as most acceptable on the first administration of the attitude scale. As predicted, high approval-motivated subjects had larger regions of non-commitment on the first administration of the attitude scale. High approval-motivated subjects shifted their most acceptable position to conform to the treatment effects on the second administration of the attitude scale. Contrary to the prediction, high approval-motivated subjects did not significantly decrease their regions of non-commitment on the second administration of the attitude scale.

These studies tend to provide corroborating evidence that the individual with high need for approval is a more conforming and restrictive individual than is the person with low need for approval. Such an interpretation is supported by evidence that individuals who score high on the Marlowe-Crowne Social Desirability Scale give less revealing and shorter projective test protocols, leave psychotherapy sooner, and display less hostility and aggression following frustration than do low scorers. The approval-dependent individual is characterized by defensiveness and vulnerable self-esteem.

Summary

In this chapter, research on persistence was reviewed. The research findings were separated on the basis of different historical approaches to the study of persistence. The different historical approaches were persistence conceived as a trait, persistence conceived as resistance to extinction, and persistence conceived as a motivational phenomenon.

In studies of persistence as a trait, a common technique has been to study consistency of behavior by demonstrating the relationship between persistence scores and a variety of different tasks. Using factor analytic techniques, several investigators identified the factor called "willingness to spend time at a task" and the factor called "willingness to withstand discomfort in order to achieve a goal." These early investigators also concluded that there existed a general factor of persistence which seemed to be relatively independent of other capacities. This approach has difficulty in accounting for variations in persistence from situation to situation.

In studies of persistence conceived as resistance to extinction, the subject typically has performed a task without reinforcement after having been subjected to a particular type of reinforcement schedule during an acquisition series. Studies involving resistance to extinction are essentially concerned with the effect of

partial reinforcement in comparison with continuous reinforcement. They are usually concerned with magnitude of reinforcement, percentage of reinforcement, and expectation of reinforcement. This approach has difficulty in accounting for variations in persistence from person to person.

The study of persistence conceived as a motivational phenomenon allows the investigator to account both for variations in persistence from situation to situation and for variations from person to person. In addition, it allows for the study of both in interaction. These studies tend to provide evidence that motivational determinants affect achievement orientation, task interest, risk taking, and expectancy of success and failure. Several of the investigators were concerned with social class variables, but most were concerned with subjects who were elementary school children.

A review of literature on need for approval was also included in this chapter. The individual with high need for approval is characterized as a more conforming, restrictive, defensive individual than is the person with low need for approval. Such an interpretation is supported by evidence that individuals who score high on the Marlowe-Crowne Social Desirability Scale give less revealing and shorter projective test protocols, leave psychotherapy sooner, and display less hostility and aggression following frustration than do

individuals with low scores.

The review of literature included no sex comparisons, either in terms of the amount of persistence displayed or in response to type of reinforcement. The present study will include sex comparisons between these variables. Several other variables, including socio-economic status and need for approval, are important to this study because the study is concerned totally with college students.

CHAPTER III

DESIGN OF THE STUDY

Sample

The population from which the sample was chosen consisted of all Caucasian undergraduate students enrolled in Central Michigan University during the 1969-70 academic school year. The sample included 343 students. The sample of 153 males and 190 females was drawn and randomly assigned to treatment groups.

Instrumentation

Objective measures of persistence, socio-economic status, and need for approval were obtained from individuals in the sample. The following instruments were selected to measure the above variables.

Persistence--Time spent working number series problems on the Numerical Ingenuity Test.

Socio-economic Status--Rating assigned the subject's father's occupational status according to Duncan's Socio-economic Status Scale

Need for Approval--Score obtained on the Marlowe-Crowne Social Desirability Scale.

Numerical Ingenuity Test

The Numerical Ingenuity Test (Appendix A) consists of 30 number series problems. The subjects were asked to find the rule governing the construction of six numbers and then to write the seventh and eighth numbers in the series. The items range from medium difficulty to extreme difficulty, with two items having no solution whatsoever (numbers 3 and 8). In the directions to the test, the subjects are told that some of the items have no solution. They are told to respond to such items by entering an X in the appropriate answer space. This feature is designed to encourage the unpersistent subjects to give up early, using a large number of X's. The subjects are told that they may work on the task for as long as they wish. The "score" corresponds to the number of minutes the subject works on the test.

Socio-economic Status Scale

To operationalize socio-economic status, subjects were asked to respond to the following items on the demographic information sheet: (1) What does your father (or whomever supports your family) do for a living? (2) Describe what your father (or whomever supports your family) does on the job. Occupations indicated by the subjects were assigned decile ratings

according to Duncan's Socio-economic Status Scale (Appendix B). Where occupation of the father was not clearly specified by the subject in response to the first item, the description given in response to the second item was used to classify the occupation. A subject's socio-economic status thus becomes the rating on the Duncan Scale of his father's occupation or the occupation of whomever supports his family. A decile score of 1-5 will be considered "low" on the socio-economic status scale. A decile score of 6-10 will be considered "high" on the socio-economic status scale.

Marlowe-Crowne Social Desirability Scale

The 33 true-false items which constitute the Marlowe-Crowne Social Desirability Scale (Appendix C) are items which are regarded as being highly socially desirable (or undesirable) statements to attribute to oneself. Persons who endorse socially desirable items or reject socially undesirable ones are said to be demonstrating a social-desirability response set. The Marlowe-Crowne Social Desirability Scale is composed of 15 culturally acceptable but probably untrue statements and 18 probably true but undesirable statements, making an acquiescence interpretation highly improbable. It is not necessary to assume either that subjects who acknowledge the "good" items and reject the "bad"

items on the Marlowe-Crowne Social Desirability Scale are accurately describing how they actually behave or that they are consciously lying and that their responses represent deliberate deceit. Marlowe and Crowne assume that people conform to social stereotypes of what is good to acknowledge concerning oneself in order to receive approval from others. The Marlowe-Crowne Social Desirability Scale is thus an indirect measure of need for approval. A score of 12 or less will be considered as indicative of low need for approval. A score of more than 12 will be considered as indicative of high need for approval.

To determine the reliability of the scale, both internal consistency and test-retest coefficients were obtained. Using the Kuder-Richardson formula 20, the internal consistency coefficient for the scale was found to be .88. After an interval of one month, a test-retest correlation of .88 was obtained. These correlations indicate that reliability was very satisfactorily achieved. The mean score of the Central Michigan University experimental sample was 10.83 with a standard deviation of 5.16. The Kuder-Richardson formula 21 coefficient for the Central Michigan University experimental sample was .75.

Experimental Design

The design of the study includes three levels of reinforcement (social, material, and none). Additionally, there are two levels of socio-economic status (low and high), two levels of sex (male and female), and two levels of need for approval (low and high). Therefore, there are 3 x 2 x 2 x 2 = 24 cells in the design.

	Need for Approval	No Reinforcement		Material Reinforcement		Social Reinforcement	
High Socio-economic Status	High	M	F	M	F	M	F
	Low	M	F	M	F	M	F
Low Socio-economic Status	High	M	F	M	F	M	F
	Low	M	F	M	F	M	F

Procedures Used in the Study

Subjects were randomly assigned to one of three experimental groups (social reinforcement group, material reinforcement group, no reinforcement control group). Reinforcement is considered to be optimal in each condition. Encouragement is considered to be optimal social reinforcement. Money is considered to be optimal material reinforcement. Each subject was tested alone in a private office.

Social Reinforcement Condition

Subjects assigned to the social reinforcement condition received optimal encouragement of a specific nature, in a specific sequence, in a precise timed pattern, varying only the name of the subject. The following protocol was followed:

1. The experimenter explained to the subject that the research project was part of the requirements for a Ph.D. degree in counseling psychology.

2. After the subject was given the test, the experimenter remained with him until he completed reading the instructions. The subject was then asked, "Do you understand the directions?"

3. When the subject answered in the affirmative, the experimenter said, "Okay, why don't you start and I'll be back in a few minutes." The experimenter inconspicuously noted the precise time.

4. Exactly 15 minutes later, the experimenter returned to the office and said, "How are you doing, _____? (Looks at test.) Oh, you're doing fine. See you later."

5. Exactly 15 minutes later, the experimenter returned to the office, glanced at the test over the subject's shoulder, and said, "Very good. Keep at it. I'll be back in a few minutes."

6. Exactly 15 minutes later, the experimenter returned to the office, glanced at the test and remarked, "How are you doing now? (Answers own question.) Good. I'll be back soon."

7. Thereafter, at precise 15 minute intervals, the experimenter alternated number 5 and number 6.

8. At any point in the above sequence, when the subject made a negative statement (such as, "I can't do any more."), the experimenter said, "Stay with it a little longer. Do all you can."

9. The experimenter noted the precise time when the subject turned the test in.

Material Reinforcement Condition

Subjects assigned to the material reinforcement condition were told that the research project was part of the requirements for a Ph.D. degree in counseling psychology. They were told that if they obtained or exceeded the average score of Central Michigan University students on the Numerical Ingenuity Test, they would be paid $3.00 at the completion of their testing period. It was explained to subjects who wanted to know what the average score was that the information could not be divulged until all the data were gathered. For the same reason, they were not told their own score, but

were told that such information could be shared with them later.

No Reinforcement Control Condition

Subjects assigned to the no reinforcement control condition were told that the research project was part of the requirements for a Ph.D. degree in counseling psychology and asked if they would participate. Upon answering in the affirmative, the subject was given the test, told to be sure and read the directions carefully, told where to turn the test in when they were finished with it, and placed in the testing office. As in the other reinforcement conditions, all subjects were tested alone. Conversation was held to a minimum in order to avoid inadvertently reinforcing the subject.

Statistical Hypotheses

Five hypotheses were developed from theory as discussed in Chapter I. These are presented below in null and alternate form.

H_0 I: No statistically significant differences exist between the low socio-economic status students and the high socio-economic status students in the amount of persistence they display toward the different types of reinforcement.

H_A I: There will be statistically significant differences between the low socio-economic status students and the high socio-economic status students in the amount of persistence they display toward the different types of reinforcement.

a. Low socio-economic status students will persist longer for material reinforcement than for social reinforcement.

b. High socio-economic status students will persist longer for social reinforcement than for material reinforcement.

H_0 II: No statistically significant differences exist between males and females in the amount of persistence they display toward the different types of reinforcement.

H_A II: There will be statistically significant differences between males and females in the amount of persistence they display toward the different types of reinforcement.

a. Male students will persist longer for material reinforcement than for social reinforcement.

b. Female students will persist longer for social reinforcement than for material reinforcement.

H_0 III: No statistically significant differences exist between high need for approval students and low need for approval students in the amount of persistence they display toward the different types of reinforcement.

H_A III: There will be statistically significant differences between high need for approval students and low need for approval students in the amount of persistence they display toward the different types of reinforcement.

a. High need for approval students will persist longer for social reinforcement than for material reinforcement.

b. Low need for approval students will persist

longer for material reinforcement than for social reinforcement.

H_0 IV: There will be no statistically significance difference in need for approval according to socio-economic status.

H_0 V: There will be no statistically significance difference in need for approval according to sex.

Methods of Testing Hypotheses

The data will be analyzed by a least squares solution to a factorial analysis of variance technique. The statistical hypotheses will be stated in null form and will be rejected at the .05 level of significance. Where null hypotheses of effects have been rejected, appropriate post hoc procedures will be applied to comparisons within these effects.

Assumptions of Analysis of Variance

The statistical assumptions of the analysis of variance procedure are normality, homoscedasticity, and independence. Normality refers to the assumption of randon selection of subjects. Homoscedasticity refers

to the requirement that the coefficient is such that the distribution of Y scores have the same standard deviation as the distribution of X scores. Independence refers to the assumption of mutual exclusiveness of treatment effects. Within the limitations of this study, it was decided that none of these assumptions was violated. Therefore, analysis of variance is an appropriate statistical technique to use in analyzing the data.

Summary

The population of the study consisted of all Caucasian undergraduate students enrolled in Central Michigan University during the 1969-70 academic school year.

The instruments used in the study were the Numerical Ingenuity Test, Duncan's Socio-economic Status Scale, and the Marlowe-Crowne Social Desirability Scale. All instruments were assumed, on the basis of prior research, to have sufficient reliability and validity to be used as the criterion measures for this study.

An analysis of variance technique was used to analyze the data. Analysis of variance is a statistical procedure for analyzing data which assumes normality, homoscedasticity, and independence. The data used in this study meet these requirements. The .05 level of significance was used as the criterion of acceptance or non-acceptance of the null hypotheses. The results of the analysis are presented in the following chapter.

CHAPTER IV

ANALYSIS OF THE DATA

Results of the Analysis

As a measure of problem-solving persistence, the amount of time each subject worked on the Numerical Ingenuity Test was computed. The time is reported to the nearest minute. The minimum value obtained was 16, while the maximum score obtained was 165. The mean score, across reinforcement groups, was 64.56 with a standard deviation of 27.11.

A least squares solution to a fixed effects model factorial analysis of variance with unequal cell sizes was computed[3] to test main effects of type of reinforcement, socio-economic status, need for approval, and sex as well as their interactions. Level of significance was set at the .05 level.

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[3]For a complete and comprehensive discussion of the least squares method, see Walter R. Harney, Least Squares Analysis of Data With Unequal Subclass Numbers. Bulletin ARS-20-8. Agriculture Research Service, U.S. Department of Agriculture. July, 1960.

The data for the overall regression are reported in Table 1.

TABLE 1

ADJUSTED ANALYSIS OF VARIANCE
OVERALL REGRESSION (ABOUT MEAN)

Source	Sum of Squares	df	Mean Squares	F
Regression	81,051.56	23	3,523.98	6.60
Error	170,285.08	319	533.81	
Total	251,336.64	342		

The obtained F value of 6.60 with 23 and 319 degrees of freedom is significant beyond the .05 level of confidence.

To find the effects due to type of reinforcement, the analysis of variance technique was used to compare the differences among treatment means for the three groups: social reinforcement, no reinforcement, and material reinforcement. The data are reported in Table 2.

TABLE 2.

ADJUSTED ANALYSIS OF VARIANCE
TYPE OF REINFORCEMENT

Source	Sum of Squares	df	Mean Squares	F
A	23,951.29	2	11,975.64	22.43
Error	170,285.08	319	533.81	
Total	194,236.37	321		

The obtained F value of 22.43 with 2 and 319 degrees of freedom is significant beyond the .05 level of confidence.

To find the effects due to socio-economic status, the analysis of variance technique was used to compare the differences among means for the low socio-economic status as opposed to the high socio-economic status students. Low socio-economic status students were identified as having a score of 5 or less on the Duncan Socio-economic Status Scale. High socio-economic status students were identified as having a score greater than 5 on this scale. The data are reported in Table 3.

TABLE 3.

ADJUSTED ANALYSIS OF VARIANCE
SOCIO-ECONOMIC STATUS

Source	Sum of Squares	df	Mean Squares	F
B	21.99	1	21.99	.04
Error	170,285.08	319	533.81	
Total	170,307.07	320		

The obtained F value of .04 with 1 and 319 degrees of freedom is not significant at the .05 level of confidence.

To find the effects due to need for approval, the analysis of variance technique was used to compare the differences among means for the low need for approval students as opposed to the high need for approval students. Low need for approval students were identified as having a score of 12 or less on the Marlowe-Crowne Social Desirability Scale. High need for approval students were identified as having a score greater than 12 on this scale. The data are reported in Table 4.

TABLE 4.

ADJUSTED ANALYSIS OF VARIANCE
NEED FOR APPROVAL

Source	Sum of Squares	df	Mean Squares	F
C	65.24	1	65.24	.12
Error	170,285.08	319	533.81	
Total	170,350.32	320		

The obtained F value of .12 with 1 and 319 degrees of freedom is not significant at the .05 level of confidence.

To find the effects due to sex, the analysis of variance technique was used to compare the differences among males and females. The data are reported in Table 5.

TABLE 5.

ADJUSTED ANALYSIS OF VARIANCE
SEX

Source	Sum of Squares	df	Mean Squares	F
D	3,646.81	1	3,646.81	6.83
Error	170,285.08	319	533.81	
Total	173,931.89	320		

The obtained F value of 6.83 with 1 and 319 degrees of freedom is significant beyone the .05 level of confidence.

The analysis of variance technique was used to find the effects of the type of reinforcement x socio-economic status interaction. The data are reported in Table 6.

TABLE 6.

ADJUSTED ANALYSIS OF VARIANCE
TYPE OF REINFORCEMENT x SOCIO-ECONOMIC STATUS

Source	Sum of Squares	df	Mean Squares	F
A x B	1,218.51	2	609.26	1.14
Error	170,285.08	319	533.81	
Total	171,503.59	321		

The obtained F value of 1.14 with 2 and 319 degrees of freedom is not significant at the .05 level of confidence.

The analysis of variance technique was used to find the effects of the type of reinforcement x need for approval interaction. The data are reported in Table 7.

TABLE 7.

ADJUSTED ANALYSIS OF VARIANCE
TYPE OF REINFORCEMENT x NEED FOR APPROVAL

Source	Sum of Squares	df	Mean Squares	F
A x C	802.04	2	401.02	.75
Error	170,285.08	319	533.81	
Total	171,087.12	321		

The obtained F value of .75 with 2 and 319 degrees of freedom is not significant at the .05 level of confidence.

The analysis of variance technique was used to find the effects of the type of reinforcement x sex interaction. The data are reported in Table 8.

TABLE 8.

ADJUSTED ANALYSIS OF VARIANCE
TYPE OF REINFORCEMENT x SEX

Source	Sum of Squares	df	Mean Squares	F
A x D	1,059.39	2	529.69	.99
Error	170,285.08	319	533.81	
Total	171,344.47	321		

The obtained F value of .99 with 2 and 319 degrees of freedom is not significant at the .05 level of confidence.

The analysis of variance technique was used to find the effects of the socio-economic status x need for approval interaction. The data are reported in Table 9.

TABLE 9.

ADJUSTED ANALYSIS OF VARIANCE
SOCIO-ECONOMIC STATUS x NEED FOR APPROVAL

Source	Sum of Squares	df	Mean Squares	F
B x C	320.90	1	320.90	.60
Error	170,285.08	319	533.81	
Total	170,605.98	320		

The obtained F value of .60 with 1 and 319 degrees of freedom is not significant at the .05 level of confidence.

The analysis of variance technique was used to find the effects of the socio-economic status x sex interaction. The data are reported in Table 10.

TABLE 10.

ADJUSTED ANALYSIS OF VARIANCE
SOCIO-ECONOMIC STATUS x SEX

Source	Sum of Squares	df	Mean Squares	F
B x D	145.77	1	145.77	.27
Error	170,285.08	319	533.81	
Total	170,430.85	320		

The obtained F value of .27 with 1 and 319 degrees of freedom is not significant at the .05 level of confidence.

The analysis of variance technique was used to find the effects of the need for approval x sex interaction. The data are reported in Table 11.

TABLE 11.

ADJUSTED ANALYSIS OF VARIANCE
NEED FOR APPROVAL x SEX

Source	Sum of Squares	df	Mean Squares	F
C x D	1,887.72	1	1,887.72	3.54
Error	170,285.08	319	533.81	
Total	172,172.80	320		

The obtained F value of 3.54 with 1 and 319 degrees of freedom is not significant at the .05 level of confidence.

The analysis of variance technique was used to find the effects of the type of reinforcement x socio-economic status x need for approval interaction. The data are reported in Table 12.

TABLE 12.

ADJUSTED ANALYSIS OF VARIANCE
TYPE OF REINFORCEMENT x SOCIO-ECONOMIC
STATUS x NEED FOR APPROVAL

Source	Sum of Squares	df	Mean Squares	F
A x B x C	1,328.31	2	664.16	1.24
Error	170,285.08	319	533.81	
Total	170,613.39	321		

The obtained F value of 1.24 with 2 and 319 degrees of freedom is not significant at the .05 level of confidence.

The analysis of variance technique was used to find the effects of the type of reinforcement x socio-economic status x sex interaction. The data are reported in Table 13.

TABLE 13.

ADJUSTED ANALYSIS OF VARIANCE
TYPE OF REINFORCEMENT x SOCIO-ECONOMIC STATUS x SEX

Source	Sum of Squares	df	Mean Squares	F
A x B x D	1,005.11	2	502.56	.94
Error	170,285.08	319	533.81	
Total	171,290.19	321		

The obtained F value of .94 with 2 and 319 degrees of freedom is not significant at the .05 level of confidence.

The analysis of variance technique was used to find the effects of the type of reinforcement x need for approval x sex interaction. The data are reported in Table 14.

TABLE 14.

ADJUSTED ANALYSIS OF VARIANCE
TYPE OF REINFORCEMENT x NEED FOR APPROVAL x SEX

Source	Sum of Squares	df	Mean Squares	F
A x C x D	450.72	2	225.36	.42
Error	170,285.08	319	533.81	
Total	170,735.80	321		

The obtained F value of .42 with 2 and 319 degrees of freedom is not significant at the .05 level of confidence.

The analysis of variance technique was used to find the effects of socio-economic status x need for approval x sex. The data are reported in Table 15.

TABLE 15.

ADJUSTED ANALYSIS OF VARIANCE
SOCIO-ECONOMIC STATUS x NEED FOR APPROVAL x SEX

Source	Sum of Squares	df	Mean Squares	F
B x C x D	711.69	1	711.69	1.33
Error	170,285.08	319	533.81	
Total	170,996.77	320		

The obtained F value of 1.33 with 1 and 319 degrees of freedom is not significant at the .05 level of confidence.

The analysis of variance technique was used to find the effects of the type of reinforcement x socio-economic status x need for approval x sex interaction. The data are reported in Table 16.

TABLE 16.

ADJUSTED ANALYSIS OF VARIANCE
TYPE OF REINFORCEMENT x SOCIO-ECONOMIC
STATUS x NEED FOR APPROVAL x SEX

Source	Sum of Squares	df	Mean Squares	F
A x B x C x D	243.95	2	121.98	.22
Error	170,285.08	319	533.81	
Total	170,529.03	321		

The obtained F value of .22 with 2 and 319 degrees of freedom is not significant at the .05 level of confidence.

All the basic data for the preceding information is summarized in Table 17 which follows.

TABLE 17.

SUMMARY OF
ADJUSTED ANALYSIS OF VARIANCE
DEPENDENT VARIABLE-NIT

Source	Sum of Squares	df	Mean Squares	F
A	23,951.29	2	11,975.64	22.43
B	21.99	1	21.99	.04
C	65.24	1	65.24	.12
D	3,646.81	1	3,646.81	6.83
A x B	1,218.51	2	609.26	1.14
A x C	802.04	2	401.02	.75
A x D	1,059.39	2	529.69	.99
B x C	320.90	1	320.90	.60
B x D	145.77	1	145.77	.27
C x D	1,887.72	1	1,887.72	3.54
A x B x C	1,328.31	2	664.16	1.24
A x B x D	1,005.11	2	502.56	.94
A x C x D	450.72	2	225.36	.42
B x C x D	711.69	1	711.69	1.33
A x B x C x D	243.95	2	121.98	.22
Error	170,285.08	319	533.81	

Interpretation of the Main Effects

The type of reinforcement main effect indicates that the three means, averaged over the two levels of socio-economic status, the two levels of need for approval, and the two levels of sex, differ significantly. Similarly, the sex main effect indicates that the two means, averaged over the three levels of type of reinforcement, the two levels of socio-economic status, and the two levels of need for approval, differ significantly. The fact that significance is obtained according to type of reinforcement does not indicate which type of reinforcement is most effective. Similarly, the fact that significance is obtained according to sex does not indicate which sex has the higher score.

Interpretation of the Interaction Effects

None of the interaction effects is significant. The fact that significance does not occur indicates that the difference between the means of one level of a main effect is not significantly different from the difference between the other level of the main effect across the other main effects. Specifically, the fact that the A x B interaction, for example, is not significant indicates that the difference between the means of the different reinforcement types for the first level of B is not

significantly different from the difference between the means of the different reinforcement types for the second level of B. With a nonsignificant A x B interaction, it may be concluded that the A effect, the difference between the three types of reinforcement, is independent of B. The same rationale is applicable for all the other nonsignificant interaction effects.

Post hoc Comparisons

Scheffe's test[4] for multiple comparisons was applied to the type of reinforcement main effect to determine how the main effect was significant.

The formula $$F = \frac{(A_1 - A_2)^2}{\text{Error Mean Square}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$$

was used to compare the mean of the social reinforcement group with the mean of the no reinforcement group, the mean of the material reinforcement group with the mean of the no reinforcement group, and the mean of the social reinforcement group with the mean of the material reinforcement group.

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[4]For a complete and comprehensive discussion of Scheffe's test, see A. L. Edwards, Experimental Design in Psychological Research. New York: Holt, Rinehart and Winston, 1960.

Scheffe's test is rather conservative; that is, larger differences are required for significance than are necessary for planned orthogonal comparisons. Scheffe suggests, therefore, that alpha level be .10 rather than .05.

The comparisons were evaluated by the formula

$$F' = (k-1)F$$

where F' is k-1 times the tabled value of F for k-1 and k(n-1) degrees of freedom. In this instance, with alpha equal to .10, F' = 18.98. The data are reported in Table 18.

TABLE 18.

SCHEFFE'S TEST FOR MULTIPLE COMPARISONS
TYPE OF REINFORCEMENT

Comparison	F value	F' value
Social Reinforcement vs. No Reinforcement	422.16	18.98
Material Reinforcement vs. No Reinforcement	268.94	18.98
Social Reinforcement vs. Material Reinforcement	32.26	18.98

The obtained F values with 2 and 319 degrees of freedon are significant at the .10 level of confidence.

Statement and Results of Hypotheses

Hypothesis I predicted that there will be differences between the low socio-economic status students and the high socio-economic status students in the amount of persistence they display toward the different types of reinforcement. It was predicted that low socio-economic status students would persist longer for material reinforcement (money) than for social reinforcement (encouragement), and that high socio-economic status students would persist longer for social reinforcement than for material reinforcement.

The data for type of reinforcement, upon which several other hypotheses are based, are reported in Table 19.

TABLE 19.

MEAN, VARIANCE, AND STANDARD DEVIATION OF NUMERICAL INGENUITY TEST (NIT) SCORES ACROSS LEVELS OF REINFORCEMENT

	Social Reinforcement	No Reinforcement	Material Reinforcement
N	116	121	106
Mean	77.18	46.36	71.50
Variance	707.56	231.04	723.61
S. D.	26.66	15.22	26.97

The data for the low socio-economic status students are reported in Table 20.

TABLE 20.

MEAN, VARIANCE, AND STANDARD DEVIATION OF LOW SOCIO-ECONOMIC STATUS STUDENTS ON NUMERICAL INGENUITY TEST (NIT) SCORES ACROSS LEVELS OF REINFORCEMENT

	Social Reinforcement	No Reinforcement	Material Reinforcement
N	26	32	29
Mean	79.65	47.15	66.17
Variance	646.68	190.44	636.55
S. D.	25.43	13.80	25.23

The data for the high socio-economic status students are reported in Table 21.

TABLE 21.

MEAN, VARIANCE, AND STANDARD DEVIATION OF HIGH SOCIO-ECONOMIC STATUS STUDENTS ON NUMERICAL INGENUITY TEST (NIT) SCORES ACROSS LEVELS OF REINFORCEMENT

	Social Reinforcement	No Reinforcement	Material Reinforcement
N	90	89	77
Mean	76.47	46.07	73.50
Variance	727.38	246.18	746.93
S. D.	26.97	15.69	27.33

The hypothesis that there will be differences between the low socio-economic status students and the high socio-economic status students in the amount of persistence they display toward the different types of reinforcement is rejected. The directional prediction that low socio-economic status students would persist longer for material reinforcement than for social reinforcement was not substantiated. The directional prediction that high socio-economic status students would persist longer for social reinforcement than for material reinforcement was substantiated.

Hypotheses II predicted that there will be differences between the males and the females in the amount of persistence they display toward the different types of reinforcement. It was predicted that male students would persist longer for material reinforcement than for social reinforcement, and that female students would persist longer for social reinforcement than for material reinforcement.

The data for the males are reported in Table 22.

TABLE 22.

MEAN, VARIANCE, AND STANDARD DEVIATION OF MALE STUDENTS ON NUMERICAL INGENUITY TEST (NIT) SCORES ACROSS LEVELS OF REINFORCEMENT

	Social Reinforcement	No Reinforcement	Material Reinforcement
N	60	48	45
Mean	71.36	41.22	63.91
Variance	769.51	147.62	619.01
S. D.	27.74	12.15	24.88

The data for the females are reported in Table 23.

TABLE 23.

MEAN, VARIANCE, AND STANDARD DEVIATION OF FEMALE STUDENTS ON NUMERICAL INGENUITY TEST (NIT) SCORES ACROSS LEVELS OF REINFORCEMENT

	Social Reinforcement	No Reinforcement	Material Reinforcement
N	56	73	61
Mean	83.42	49.73	77.09
Variance	572.64	258.24	733.33
S. D.	23.93	16.07	27.08

The hypothesis that there will be differences between the males and the females in the amount of persistence they display toward the different types of reinforcement was not rejected. Significance was obtained at the .05 level of probability as reported in Table 5. The directional prediction that male students would persist longer for material reinforcement than for social reinforcement was not substantiated. The directional prediction that female students would persist longer for social reinforcement than for material reinforcement was substantiated.

Hypothesis III predicted that there will be differences between the high need for approval students and the low need for approval students in the amount of persistence they display toward the different types of reinforcement. It was predicted that high need for approval students would persist longer for social reinforcement that for material reinforcement, and that low need for approval students would persist longer for material reinforcement than for social reinforcement.

The data for the high need for approval students are reported in Table 24.

TABLE 24.

MEAN, VARIANCE, AND STANDARD DEVIATION OF HIGH NEED FOR APPROVAL STUDENTS ON NUMERICAL INGENUITY TEST (NIT) SCORES ACROSS LEVELS OF REINFORCEMENT

	Social Reinforcement	No Reinforcement	Material Reinforcement
N	41	41	41
Mean	75.07	47.24	73.48
Variance	508.05	199.94	656.38
S. D.	22.54	14.14	25.62

The data for the low need for approval students are reported in Table 25.

TABLE 25.

MEAN, VARIANCE, AND STANDARD DEVIATION OF LOW NEED FOR APPROVAL STUDENTS ON NUMERICAL INGENUITY TEST (NIT) SCORES ACROSS LEVELS OF REINFORCEMENT

	Social Reinforcement	No Reinforcement	Material Reinforcement
N	75	80	65
Mean	78.34	45.91	70.24
Variance	817.96	247.73	767.84
S. D.	28.60	15.73	27.71

The hypothesis that there will be differences between the high need for approval students and the low need for approval students in the amount of persistence they display toward the different types of reinforcement was rejected. The directional prediction that high need for approval students would persist longer for social reinforcement than for material reinforcement was substantiated. The directional prediction that low need for approval students would persist longer for material reinforcement than for social reinforcement was not substantiated.

Hypothesis IV predicted that there will be no difference in need for approval according to socio-economic status. The data are reported in Table 26.

TABLE 26.

MEAN, VARIANCE, AND STANDARD DEVIATION ON THE MARLOWE-CROWNE SOCIAL DESIRABILITY SCALE (MC-SDS) SCORES ACROSS LEVELS OF SOCIO-ECONOMIC STATUS

	High	Low
N	256	87
Mean	10.95	10.49
Variance	69.55	23.22
S. D.	8.34	4.82

The hypothesis that there will be no difference in need for approval according to socio-economic status was not rejected at the .05 level of confidence.

Hypothesis V predicted that there will be no difference in need for approval according to sex. The data are reported in Table 27.

TABLE 27.

MEAN, VARIANCE, AND STANDARD DEVIATION ON THE MARLOWE-CROWNE SOCIAL DESIRABILITY SCALE (MC-SDS) SCORES ACROSS LEVELS OF SEX

	Males	Females
N	153	190
Mean	10.01	11.49
Variance	41.33	49.69
S. D.	6.43	7.05

The hypothesis that there will be no differences in need for approval according to sex is not rejected at the .05 level of confidence. As a matter of interest, however, it may be noted that the obtained level of significance was .06, so the margin of substantiation for the hypothesis was rather small.

Summary

In Chapter IV an analysis of the data obtained in the study was presented. The data was obtained from Central Michigan University students who completed the Numerical Ingenuity Test (Appendix A) under different conditions of reinforcement. In addition, the students also completed the Marlowe-Crowne Social Desirability Scale (Appendix C) and a bibliographical information sheet (Appendix D). A decision was made to reject or not reject each of the statistical hypotheses.

A summary of the findings, together with conclusions and suggestions for further research arising from them, will be found in Chapter V.

CHAPTER V

SUMMARY, CONCLUSIONS, AND SUGGESTIONS FOR FURTHER RESEARCH

Summary

This study was an attempt to demonstrate that problem-solving persistence is a function of type of reinforcement and need for approval among college students. As used in this study, persistence refers to an active, voluntary, productive, continuous response to a task in order to achieve a goal. Need for approval refers to a motivational variable characteristic of individuals who are highly sensitive to self-evaluative and social-evaluative conditions.

Five hypotheses were advanced:

Hypothesis I.

There will be differences between high socio-economic status students and low socio-economic status students in the amount of persistence they display toward the different types of reinforcement.

Hypothesis II.

There will be differences between males and females in the amount of persistence they display toward the different types of reinforcement.

Hypothesis III.

There will be differences between high need for approval students and low need for approval students in the amount of persistence they display toward the different types of reinforcement.

Hypothesis IV.

There will be no difference in need for approval according to socio-economic status.

Hypothesis V.

There will be no difference in need for approval according to sex.

Summary of the Findings

Within the limitations imposed by the nature of the sample, the instrumentation, and the design of the study, the following findings were obtained:

1. There are differences in the problem-solving persistence of students according to the type of reinforcement they receive. Social reinforcement is significantly more effective than

material reinforcement, but either is significantly more effective than no reinforcement.

2. Socio-economic status makes no difference as to how the students will respond according to type of reinforcement. Both low and high socio-economic status students are more responsive to social reinforcement than material reinforcement.

3. Females persist longer than males even without reinforcement, but both males and females are more responsive to social reinforcement than material reinforcement.

4. There is no difference in the amount of problem-solving persistence displayed toward the different types of reinforcement between the high need for approval students and the low need for approval students. Both high and low need for approval students will persist longer for social reinforcement than for material reinforcement.

5. There was no difference found in this study in need for approval according to socio-economic status.

6. There was no difference found in this study in need for approval according to sex.

Conclusions

Personality can be defined as a construct describing the aspect of a unified, complexly organized person which influences his characteristic modes of interpreting the world in which he lives. However, such a theoretical definition should be accompanied by working definitions which deal with observable behavior. The theoretical construct within which this study was developed is Rotter's Social Learning Theory.

Persistence and success are bound together in the popular mind. Achievement through aptitude or ability alone is undoubtedly the exception rather than the rule, however. Most tasks demand more than brilliance. Examples of persistence and its rewards are not difficult to find. It is not unusual to learn that many years of effort were devoted to the production of one of the recognized masterpieces of music, art, or literature. Certainly in the province of science, where nature has been particularly resistant to efforts to penetrate her secrets, success has been attained only after continued and diligent research. Persistence, then, is defined as an active, voluntary, productive, continuous response to a task in order to achieve a goal.

Another sort of a response, one usually considered to be diametrically opposite in nature, perseveration, has also been associated and confused with persistence.

Confusion of these terms probably arises from the fact that both persistence and perseveration apply to continued response. But there is a distinction. Whereas persistence refers to an active, voluntary, productive, continuous response, perseveration refers to an unproductive repetition of response through inability to shift to another.

That academic success is a compound of effort and aptitude is a truism. Knowledge that effort is strongly affected by the student's motivation to learn has also become a generally accepted fact. The relationship between effort and aptitude, however, is not so well known. Since this study has been concerned with problem-solving persistence, the implicit assumption is that persistence is related to academic success. In many instances, however, academic success may be related to speed, as in timed tests. Thus, it may be that academic success is as much a function of intellectual ability as of persistence.

In this study, significant differences were obtained on persistence scores for type of reinforcement and for sex. Both were related to socio-economic status and need for approval. The evidence in the literature concerning the effects of type of reinforcement on performance according to socio-economic status is quite contradictory. The findings of the present study are supported by

Marshall (1967) who studied learning as a function of task interest, reinforcement, and social class variables. Marshall concluded that prior research results showing that high socio-economic status elementary school children learn better for social rewards and low socio-economic status children learn better for material rewards were not supported. Marshall found that on tasks of high intrinsic interest, there is no significant difference in performance between the two socio-economic status groups.

Blanton (1967) studied the effects of type of reinforcement and amount of information on the performance of lower and middle class children. Her study was designed to test the hypothesis that while middle class children performed better with performance-oriented reinforcers, the converse held for lower class children. Blanton found that performance reinforcers produced significantly higher scores than did person reinforcers, regardless of socio-economic status.

It should be pointed out that both Marshall and Blanton were using children as subjects. Only the present study dealt with college students. Considering the fact that most college students have an interest in learning irrespective of socio-economic status, perhaps the non-significant findings of the present study may be explained by the task having a similar interest for both the high and the low socio-economic status students.

It may be, too, that task orientation differs between children and college students. So without resolving the contradictory effects of type of reinforcement on performance, the results of this study do suggest that the same kinds of educational procedures are equally valid for college students as for elementary school children with respect to type of reinforcement.

The issue that the money and the encouragement reinforcement conditions used in this study may not have been truly equivalent needs some clarification. The students who received encouragement were reinforced every fifteen minutes. The students who were promised money were required to wait until completion of their task to learn whether or not they would be reinforced. While these conditions were considered optimal, the finding that persistence is greater under conditions of social reinforcement may be an artifact.

Rotter's theory specifies that the reinforcement value of any external reinforcement may be defined as the degree of preference for any reinforcement to occur if the possibilities of its occurring were equal to any other. Therefore, apparently social reinforcement is as meaningful for students of low socio-economic status as for students of high socio-economic status, because they feel the possibilities of its occurring are as great for them as for high socio-economic status students.

In other words, the strength of reinforcement criteria is such that no distinction is made relative to the reinforcement value of social reinforcement between the high and the low socio-economic status students. These findings suggest that the same kinds of educational procedures are equally valid for high or low socio-economic status college students. Similar motivational techniques and instructional methods would appear to be equally appropriate for high or low socio-economic status students once it has been determined that they have equivalent academic skills.

This investigation has been concerned with the study of certain motivational variables in situ, which is consistent with the importance that Social Learning Theory places on immediate environmental factors. The finding of this study that social reinforcement is more effective than material reinforcement tends to emphasize Rotter's premise that behavior is inextricably interwoven with needs, and needs require interaction with other persons for their satisfaction. The findings also suggest that individuals attach more reinforcement value to social reinforcers than to material reinforcers. They accept money and are stimulated by it, but it apparently does not have the motivating properties which were initially attributed to it. One explanation for this may be that all college students, of both high and low socio-economic

status, have enough money to meet their immediate financial needs. In other words, because of the availability of jobs, because of the availability of grants and scholarships, and because of the ability of most parents to assist students, there apparently has been a great leveling phenomenon in the financial condition of students. In terms of educational planning, these findings suggest that colleges and universities should strive even more to meet the personal needs of students through adjunctive services. Health care, counseling services, off-campus housing, and a social environment conducive to need satisfaction are becoming more important to students than many prevailing artificial conditions now existing. With increased awareness of the influence they can exert through student power, and because of their own affluence, students are now less dependent upon institutions than ever before. The institutions must adjust accordingly by striving to involve the students more in the institutional decision-making process.

As previously mentioned, the review of literature included no sex comparisons, either in terms of the amount of persistence displayed or in response to type of reinforcement. The finding of this study was that females display more problem-solving persistence than males, but that both males and females are more responsive to social reinforcement than to material reinforcement.

This finding might be explained in terms of reinforcement value. The reader may recall that reinforcement value is one of the variables which determines strength of reinforcement. It is important to avoid the confusion of considering a reinforcement value and a reinforcement as synonymous. Reinforcements may have the same value but still be quite different in nature. Further, for different individuals the same objectively described reinforcements may have considerably different values.

The finding that there are differences between males and females in the amount of persistence they display toward the different types of reinforcement may lend credence to the assumption that the strength of reinforcement was greater for females than for males because of the sex of the experimenter. Before going further, it should be noted that the data of this study do not suggest that males are more difficult to motivate than females. It may suggest that sex itself is a powerful motivating force which could not be partialed out of the results of the study.

The findings in this study of no difference according to socio-economic status, sex, or the amount of persistence displayed toward the different types of reinforcement between the high need for approval students and the low need for approval students suggest that the students respond similarly irrespective of their need

for approval. The reader will recall that earlier in this discussion it was stated that the same kinds of educational procedures were equally valid for high and low socio-economic status students. In terms of these findings of no difference in need for approval, therefore, educational programs need to focus on other issues. An appropriate focus would be in terms of individual differences in need for approval rather than on differences according to socio-economic status. The finding in this study was that the hypothesis of no difference in need for approval according to sex was not rejected. The margin of substantiation for the hypothesis was rather small, .06, so any conclusions based upon this hypothesis must be considered highly tentative. A more desirable approach would be to find a discriminating measure for the hypothesis in a study designed more precisely to test it.

The approval motive, as conceived in Social Learning Theory, is defined in terms of both generalized expectancy and need value. These are involved with dependence on the favorable evaluations of others and an avoidance of self-criticism. From the totality of needs and generalized expectancies is derived the desire for social encouragement, self-protection, and avoidance of failure that has been labeled the approval motive.

It seems reasonable to assume that the high need for approval individual has learned that conformity and

submission entail the fewest risks of social rejection and threats to self-esteem. His self-justification and attempts to validate his own self-worth appear to represent defensive efforts to cope with anticipated failures.

The research on the approval motive and the Social Learning Theory conceptualization of the findings casts the issue of personal **maladjustment** in an interesting light. In a sense, high need for approval individuals are normal in that they exemplify many of the values of the American middle class. Approval-oriented individuals say the right things about themselves, appear to hold the proper attitudes, reflect common language associations in their speech, set goals of acceptable intermediate risk, do not show hostility, and seem in general to reflect the values defining the well-adjusted individual. On closer scrutiny, however, those individuals identified as approval-dependent frequently seem to resolve personal and social conflicts in ways that result in detriment to themselves. As traditionally conceived, maladjustment is associated with personal dissatisfaction, self-rejection, and inappropriate social behavior. However, viewed in another manner, these criteria of maladjustment are fallible. More to the point, perhaps, would be to recognize the importance of the individual's goals and his expectancies of success or failure in achieving them.

Suggestions for Further Research

This study has raised several questions regarding research in the area of problem-solving persistence, the effectiveness of different types of reinforcement, and need for approval among college students.

1. To more appropriately validate the findings of this study, a replication of the study should be done. Because this study utilized a fixed effects model analysis of variance, the person who tried to generalize the data beyond this study would be in a very tenuous position.

2. Some interesting conclusions were reached regarding the function of sex roles. There is some doubt whether there are differences in need for approval between males and females. One might wonder if the sex of the experimenter affected the subjects' scores differentially according to sex.

3. Perhaps the hypothesis that there will be differences between Caucasian and Negro students in the amount of persistence they display toward the different types of reinforcement should be tested.

4. Perhaps the hypothesis that there will be differences between Caucasian and Negro students in need for approval should be tested.

5. Perhaps a future study might investigate whether the money and encouragement reinforcements used in this study were truly equivalent. The students who received encouragement were reinforced every fifteen minutes. The students who were promised money were required to wait until completion of their task to learn whether or not they would be reinforced. In other words, a future study could partial out the reinforcing effects which come from success.

6. Perhaps a future study might use actual performance indices rather than time as the relevant dimension for measuring persistence.

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APPENDICES

APPENDIX A

NUMERICAL INGENUITY TEST

On the following page is a test called the Numerical Ingenuity Test. The test is designed to test your problem solving ability. However, the fact that you may not have a strong background in mathematics will not constitute a serious limitation in your performance on this test:

Directions:

The Numerical Ingenuity Test consists of 30 number series problems. You are to find the rule governing the construction of six numbers and then write the seventh and eighth numbers in the series.

The number series

2 6 3 9 6 18 ___ ___

May be analyzed as follows:

2 (x3) 6 (-3) 3 (x3) 9 (-3) 6 (x3) 18 (-3) 15 (x3) 45

DO NOT PROCEED FURTHER UNTIL YOU UNDERSTAND THE ABOVE SAMPLE PROBLEM !

Some of the test items have no solution. You are to respond to such items by placing an X in the appropriate space. You will receive full credit for all problems properly answered, including those correctly answered with an X.

You may turn the test in to the experimenter whenever you are finished. There is no time limit.

NUMERICAL INGENUITY TEST

1.	35	34	32	29	25	20	___	___
2.	3	7	11	15	19	23	___	___
3.	2	4	6	8	10	15	___	___
4.	13	14	15	13	17	12	___	___
5.	16	23	28	38	49	62	___	___
6.	140	139	137	131	118	95	___	___
7.	2	3	9	21	41	72	___	___
8.	1	2	4	8	17	34	___	___
9.	60	64	32	36	18	22	___	___
10.	51	47	44	43	46	57	___	___
11.	5	10	18	29	43	60	___	___
12.	100	95	85	80	70	65	___	___
13.	1	3	6	18	21	63	___	___
14.	11	14	10	15	9	16	___	___
15.	8	3	9	4	16	11	___	___
16.	4	8	11	22	25	50	___	___
17.	34	25	36	49	38	81	___	___
18.	13	15	51	53	35	37	___	___
19.	30	15	22	11	18	9	___	___
20.	137	73	41	25	17	13	___	___
21.	11	13	17	19	23	29	___	___
22.	59	10	46	21	37	28	___	___
23.	1	3	7	15	31	63	___	___
24.	25	82	58	16	91	49	___	___
25.	1	4	11	25	50	91	___	___
26.	1	7	3	9	5	1	___	___
27.	3	4	4	7	7	12	___	___
28.	1	3	9	19	35	61	___	___
29.	1	1	2	3	5	8	___	___
30.	18	16	22	24	28	36	___	___

ANSWER SHEET
NUMERICAL INGENUITY TEST

1.	14	7	16.	53	106
2.	27	31	17.	40	121
3.	X	X	18.	46	48
4.	19	11	19.	16	8
5.	70	77	20.	11	10
6.	59	7	21.	31	35
7.	118	184	22.	32	31
8.	X	X	23.	127	255
9.	11	15	24.	25	82
10.	53	50	25.	154	246
11.	80	103	26.	7	3
12.	55	50	27.	12	19
13.	66	198	28.	103	161
14.	8	17	29.	13	21
15.	35	30	30.	42	44

APPENDIX B
DUNCAN'S SOCIO-ECONOMIC STATUS SCALE

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES*
Professional, technical, and kindred workers			
Accountants and auditors	78	10	a
Actors and actresses	60	9	
Airplane pilots and navigators	79	10	a
Architects	90	10	a
Artists and art teachers	67	10	b
Athletes	52	9	
Authors	76	10	a
Chemists	79	10	a
Chiropractors	75	10	
Clergymen	52	9	a
College presidents, professors, and instructors (n.e.c.)	84	10	a
Dancers and dancing teachers	45	8	
Dentists	96	10	a
Designers	73	10	
Dieticians and nutritionists	39	7	d
Draftsmen	67	10	
Editors and reporters	82	10	a
Engineers, technical	85	10	c
Aeronautical	87	10	
Chemical	90	10	
Civil	84	10	a
Electrical	84	10	
Industrial	86	10	
Mechanical	82	10	
Metallurgical, and metallurgists	82	10	

*See end of table for explanation of "Notes."

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Mining	85	10	
Not elsewhere classified	87	10	
Entertainers (n.e.c.)	31	6	
Farm-and home-management advisors	83	10	b
Foresters and conservationists	48	8	
Funeral directors and embalmers	59	9	a
Lawyers and judges	93	10	a
Librarians	60	9	
Musicians and music teachers	52	9	b
Natural scientists (n.e.c.)	80	10	b
Nurses, professional	46	8	
Nurses, student professional	51	9	d
Optometrists	79	10	
Osteopaths	96	10	
Personnel and labor-relations workers	84	10	
Pharmacists	82	10	
Photographers	50	9	
Physicians and surgeons	92	10	a
Radio operators	69	10	
Recreation and group workers	67	10	b
Religious workers	56	9	
Social and welfare workers, except group	64	9	a
Social scientists	81	10	b
Sports instructors and officials	64	9	
Surveyors	48	8	

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Teachers (n.e.c.)	72	10	a
Technicians, medical and dental	48	8	
Technicians, testing	53	9	
Technicians (n.e.c.)	62	9	
Therapists and healers (n.e.c.)	58	9	
Veterinarians	78	10	
Professional, technical, and kindred workers (n.e.c.)	65	9	
Farmers and farm managers			
Farmers (owners and tenants)	14	3	b
Farm managers	36	7	
Managers, officials, and proprietors, exc. farm			
Buyers and department heads, store	72	10	
Buyers and shippers, farm products	33	7	
Conductors, railroad	58	9	a
Credit men	74	10	
Floormen and floor managers, store	50	9	
Inspectors, public administration	63	9	c
Federal public administration and postal service	72	10	
State public administration	54	9	

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Local public administration	56	9	
Managers and superintendents, building	32	7	
Officers, pilots, pursers, and engineers, ship	54	9	
Officials and administrators (n.e.c.), public administration	66	10	c
Federal public administration and postal service	84	10	
State public administration	66	10	
Local public administration	54	9	
Officials, lodge, society, union, etc.	58	9	b
Postmasters	60	9	
Purchasing agents and buyers (n.e.c.)	77	10	
Managers, officials, and proprietors (n.e.c.)-salaried	68	10	c
Construction	60	9	
Manufacturing	79	10	
Transportation	71	10	
Telecommunications, and utilities and sanitary services	76	10	
Wholesale trade	70	10	
Retail trade	56	9	c
Food- and dairy-products stores, and milk retailing	50	8	
General merchandise and five- and ten-cent stores	68	10	

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Apparel and accessories stores	69	10	
Furniture, home furnishings, and equipment stores	68	10	
Motor vehicles and accessories retailing	65	9	
Gasoline service stations	31	7	
Eating and drinking places	39	8	
Hardware, farm implement, and building material, retail	64	9	
Other retail trade	59	9	
Banking and other finance	85	10	
Insurance and real estate	84	10	
Business services	80	10	
Automobile repair services and garages	47	8	
Miscellaneous repair services	53	9	
Personal services	50	9	
All other industries (incl. not reported)	62	9	
Managers, officials, and proprietors (n.e.c.)-self-employed	48	8	c
Construction	51	9	a
Manufacturing	61	9	a
Transportation	43	8	
Telecommunications and utilities and sanitary services	44	8	
Wholesale trade	59	9	

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Retail trade	43	8	a, c
Food- and dairy-products stores, and milk retailing	33	7	
General merchandise and five- and ten-cent stores	47	8	
Apparel and accessories stores	65	9	
Furniture, home furnishings, and equipment stores	59	9	
Motor vehicles and accessories retailing	70	10	
Gasoline service stations	33	7	
Eating and drinking places	37	7	b
Hardware, farm implement, and building material, retail	61	9	
Other retail trade	49	8	
Banking and other finance	85	10	a
Insurance and real estate	76	10	
Business services	67	10	
Automobile repair services and garages	36	7	
Miscellaneous repair services	34	7	
Personal services	41	8	
All other industries (incl. not reported)	49	8	
Clerical and kindred workers			
Agents (n.e.c)	68	10	

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Attendants and assistants, library	44	8	d
Attendants, physician's and dentist's office	38	7	d
Baggagemen, transportation	25	6	
Bank tellers	52	9	
Bookkeepers	51	9	a
Cashiers	44	8	
Collectors, bill and account	39	8	
Dispatchers and starters, vehicle	40	8	
Express messengers and railway mail clerks	67	10	
Mail carriers	53	9	a
Messengers and office boys	28	6	
Office-machine operators	45	8	
Shipping and receiving clerks	22	6	
Stenographers, typists, and secretaries	61	9	
Telegraph messengers	22	6	
Telegraph operators	47	8	
Telephone operators	45	8	
Ticket, station, and express agents	60	9	
Clerical and kindred workers (n.e.c.)	44	8	
Sales Workers			
Advertising agents and salesmen	66	10	
Auctioneers	40	8	

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Demonstrators	35	7	
Hucksters and peddlers	8	2	
Insurance agents and brokers	66	10	a
Newsboys	27	6	
Real-estate agents and brokers	62	9	
Stock and bond salesmen	73	10	
Salesmen and sales clerks (n.e.c.)	47	8	c
Manufacturing	65	9	
Wholesale trade	61	9	b
Retail trade	39	7	a
Other industries (incl. not reported)	50	9	
Craftsmen, foremen, and kindred workers			
Bakers	22	6	
Blacksmiths	16	4	
Boilermakers	33	7	
Bookbinders	39	7	
Brickmasons, stonemasons, and tile-setters	27	6	
Cabinetmakers	23	6	
Carpenters	19	5	a
Cement and concrete finishers	19	5	
Compositors and typesetters	52	9	
Cranemen, derrickmen, and hoistmen	21	5	
Decorators and window-dressers	40	8	

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Electricians	44	8	a
Electrotypers and stereotypers	55	9	
Engravers, except photoengravers	47	8	
Excavating, grading, and road-machinery operators	24	6	
Foremen (n.e.c.)	49	8	c
Construction	40	8	
Manufacturing	53	9	c
Metal industries	54	9	
Machinery, including electrical	60	9	
Transportation equipment	66	10	
Other durable goods	41	8	
Textiles, textile products, and apparel	39	8	
Other nondurable goods (incl. not specified mfg.)	53	9	
Railroads and railway express service	36	7	
Transportation, except railroad	45	8	
Telecommunications, and utilities and sanitary services	56	9	
Other industries (incl. not reported)	44	8	
Forgement and hammermen	23	6	
Furriers	39	7	
Glaziers	26	6	
Heat treaters, annealers, and temperers	22	6	

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Inspectors, scalers, and graders, log and lumber	23	6	
Inspectors (n.e.c.)	41	8	c
Construction	46	8	
Railroads and railway express service	41	8	
Transport, exc. r.r., communication, and other public util.	45	8	
Other industries (incl. not reported)	34	7	
Jewelers, watchmakers, goldsmiths, and silversmiths	36	7	
Job-setters, metal	28	6	
Linemen and servicemen, telegraph, telephone, and power	49	8	
Locomotive engineers	58	9	a
Locomotive firemen	45	8	
Loom fixers	10	2	
Machinists	33	7	a
Mechanics and repairmen	25	6	c
Airplane	48	8	
Automobile	19	5	a
Office machine	36	7	
Radio and television	36	7	
Railroad and car shop	23	6	
Not elsewhere classified	27	6	
Millers, grain, flour, feed, etc.	19	5	
Millwrights	31	7	
Molders, metal	12	2	
Motion-picture projectionists	43	8	

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Opticians, and lens grinders and polishers	39	7	
Painters, construction and maintenance	16	4	
Paperhangers	10	2	
Pattern- and model-makers, except paper	44	8	
Photoengravers and lithographers	64	9	
Piano and organ tuners and repairmen	38	7	
Plasterers	25	6	
Plumbers and steam-fitters	34	7	a
Pressmen and plate printers, printing	49	8	
Rollers and roll hands, metal	22	6	
Roofers and slaters	15	4	
Shoemakers and repairers, except factory	12	2	
Stationary engineers	47	8	
Stone-cutters and stone-carvers	25	6	
Structural-metal workers	34	7	
Tailors and tailoresses	23	6	
Tinsmiths, coppersmiths, and sheet-metal workers	33	7	
Toolmakers, and die-makers and setters	50	9	
Upholsterers	22	6	
Craftsmen and kindred workers (n.e.c.)	32	7	
Members of the armed forces	18	4	e

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Operatives and kindred workers			
Apprentices	35	7	c
Auto mechanics	25	6	
Bricklayers and masons	32	7	
Carpenters	31	6	
Electricians	37	7	
Machinists and tool-makers	41	8	
Mechanics, except auto	34	7	
Plumbers and pipe-fitters	33	7	
Building trades (n.e.c.)	29	6	
Metalworking trades (n.e.c)	33	7	
Printing trades	40	8	
Other specified trades	31	6	
Trade not specified	39	7	
Asbestos and insulation workers	32	7	
Attendants, auto service and parking	19	5	a
Blasters and powdermen	11	2	
Boatmen, canalmen, and lock-keepers	24	6	
Brakemen, railroad	42	8	
Bus-drivers	24	6	
Chainmen, rodmen, and axmen, surveying	25	6	
Conductors, bus and street railway	30	6	
Deliverymen and routemen	32	7	
Dressmakers and seamstresses, except factory	23	6	

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Dyers	12	2	
Filers, grinders, and polishers, metal	22	6	
Fruit, nut, and vegetable graders and packers, exc. factory	10	2	
Furnacemen, smeltermen, and pourers	18	4	
Heaters, metal	29	6	
Laundry and dry-cleaning operatives	15	4	b
Meat-cutters, except slaughter and packing house	29	6	
Milliners	46	8	d
Mine operatives and laborers (n.e.c.)	10	2	c
Coal mining	2	1	a
Crude petroleum and natural gas extraction	38	7	
Mining and quarrying, except fuel	12	2	
Motormen, mine, factory, logging camp, etc.	3	1	
Motormen, street, subway, and elevated railway	34	7	a
Oilers and greasers, except auto	15	4	
Painters, except construction and maintenance	18	5	
Photographic-process workers	42	8	
Power-station operators	50	9	
Sailors and deck hands	16	4	
Sawyers	5	1	
Spinners, textile	5	1	

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Stationary firemen	17	4	
Switchmen, railroad	44	8	
Taxicab-drivers and chauffeurs	10	2	a
Truck- and tractor-drivers	15	4	a
Weavers, textile	6	1	
Welders and flame-cutters	24	6	
Operatives and kindred workers (n.e.c.)	18	4	c
Manufacturing	17	4	a, c
Durable goods			
Sawmills, planing mills, and misc. wood products	7	2	c
Sawmills, planing mills, and mill work	7	2	
Miscellaneous wood products	9	2	
Furniture and fixtures	9	2	
Stone, clay and glass products	17	4	c
Glass and glass products	23	6	
Cement; and concrete, gypsum; and plaster products	10	2	
Structural clay products	10	2	
Pottery and related products	21	5	
Misc. nonmetallic mineral and stone products	15	4	

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Metal industries	16	4	c
Primary metal industries	15	4	c
Blast furnaces, steel works, and rolling mills	17	4	
Other primary iron and steel industries	12	2	
Primary nonferrous industries	15	4	
Fabricated metal ind. (incl. not spec. metal)	16	4	c
Fabricated steel products	16	4	
Fabricated nonferrous metal products	15	4	
Not specified metal industries	14	3	d
Machinery, except electrical	22	6	c
Agricultural machinery and tractors	21	5	
Office and store machines and devices	31	6	
Miscellaneous machinery	22	6	
Electrical machinery, equipment, and supplies	26	6	
Transportation equipment	23	6	c
Motor vehicles and motor vehicle equipment	21	5	
Aircraft and parts	34	7	
Ship and boat building and repairing	16	4	

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Railroad and misc. transportation equipment	23	6	
Professional and photographic equipment and watches	29	6	c
Professional equipment and supplies	23	6	
Photographic equipment and supplies	40	8	
Watches, clocks, and clockwork-operated devices	28	6	
Miscellaneous manufacturing industries	16	4	
Nondurable goods			
Food and kindred products	16	4	c
Meat products	16	4	
Dairy products	22	6	
Canning and preserving fruits, vegetables, and sea foods	9	2	
Grain-mill products	14	4	
Bakery products	15	4	
Confectionery and related products	12	2	
Beverage industries	19	5	
Misc. food preparations and kindred products	11	2	
Not specified food industries	19	5	
Tobacco manufactures	2	1	
Textile mill products	6	1	
Knitting mills	21	5	

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Dyeing and finishing textiles, exc. knit goods	8	2	
Carpets, rugs, and other floor coverings	14	4	
Yarn, thread, and fabric mills	2	1	
Miscellaneous textile mill products	10	2	
Apparel and other fabricated textile products	21	6	c
Apparel and accessories	22	6	
Miscellaneous fabricated textile products	17	4	
Paper and allied products	19	5	c
Pulp, paper, and paperboard mills	19	5	
Paperboard containers and boxes	17	4	
Miscellaneous paper and pulp products	19	5	
Printing, publishing, and allied industries	31	6	
Chemicals and allied products	20	5	c
Synthetic fibers	9	2	
Drugs and medicines	26	6	
Paints, varnishes, and related products	15	4	
Miscellaneous chemicals and allied products	23	6	
Petroleum and coal products	51	9	c
Petroleum refining	56	9	
Miscellaneous petroleum and coal products	14	3	

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Rubber products	22	6	
Leather and leather products	16	4	c
Leather: tanned, curried, and finished	10	2	
Footwear, except rubber	9	2	
Leather products, except footwear	14	3	
Not specified manufacturing industries	16	4	
Nonmanufacturing industries (incl.not reported)	18	4	c
Construction	18	5	
Railroads and railway express service	15	4	
Transportation, except railroad	23	6	
Telecommunications, and utilities and sanitary services	21	5	
Wholesale and retail trade	17	4	
Business and repair services	19	5	
Personal services	11	2	
Public administration	17	4	
All other industries (incl.not reported)	20	5	
Private-household workers			
Housekeepers, private household	19	5	c
Living in	10	2	d
Living out	21	5	

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Laundresses, private household	12	2	d
Living in	-	-	d
Living out	12	2	d
Private-household workers (n.e.c.)	7	2	c
Living in	12	2	
Living out	6	1	
Service workers, except private household			
Attendants, hospital and other institution	13	2	
Attendants, professional and personal service (n.e.c.)	26	6	
Attendants, recreation and amusement	19	5	
Barbers, beauticians, and manicurists	17	4	a
Bartenders	19	5	a
Boarding- and lodging-house keepers	30	6	
Bootblacks	8	2	a
Charwomen and cleaners	10	2	
Cooks, except private household	15	4	a
Counter and fountain workers	17	4	a
Elevator operators	10	2	
Firemen, fire protection	37	7	
Guards, watchmen, and doorkeepers	18	5	a

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Housekeepers and stewards, except private household	31	7	
Janitors and sextons	9	2	a
Marshals and constables	21	6	
Midwives	37	7	d
Policemen and detectives	39	8	c
Government	40	8	a
Private	36	7	
Porters	4	1	
Practical nurses	22	6	
Sheriffs and bailiffs	34	7	
Ushers, recreation and amusement	25	6	
Waiters and waitresses	16	4	a
Watchmen (crossing) and bridge-tenders	17	4	
Service workers, except private household (n.e.c.)	11	2	
Farm laborers and foremen			
Farm foremen	20	5	
Farm laborers, wage workers	6	1	b
Farm laborers, unpaid family workers	17	4	
Farm-service laborers, self-employed	22	6	
Laborers, except farm and mine			
Fishermen and oystermen	10	2	b
Garage laborers, and car-washers and greasers	8	2	
Gardeners, except farm, and groundskeepers	11	2	

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Longshoremen and stevedores	11	2	b
Lumbermen, raftsmen, and wood-choppers	4	1	b
Teamsters	8	2	
Laborers (n.e.c.)	8	2	c
Manufacturing			
Durable goods			
Sawmills, planing mills, and misc. wood products	3	1	c
Sawmills, planing mills, and mill work	3	1	
Miscellaneous wood products	2	1	
Furniture and fixtures	5	1	
Stone, clay and glass products	7	2	c
Glass and glass products	14	3	
Cement; and concrete, gypsum, and plaster prod.	5	1	
Structural clay products	5	1	
Pottery and related products	7	2	
Misc. nonmetallic mineral and stone products	5	1	
Metal industries	7	2	c
Primary metal industries	7	2	c
Blast furnaces, steel works, and rolling mills	9	2	

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Other primary iron and steel industries	4	1	
Primary nonferrous industries	6	1	
Fabricated metal ind. (incl. not spec. metal)	7	2	c
Fabricated steel products	7	2	
Fabricated nonferrous metal products	10	2	
Not specified metal industries	9	2	d
Machinery, except electrical	11	2	c
Agricultural machinery and tractors	14	3	
Office and store machines and devices	17	4	d
Miscellaneous machinery	10	2	
Electrical machinery, equipment, and supplies	14	3	
Transportation equipment	11	2	c
Motor vehicles and motor vehicle equipment	13	2	
Aircraft and parts	15	4	
Ship and boat building and repairing	2	1	
Railroad and misc. transportation equipment	8	2	
Professional and photographic equipment, and watches	11	2	
Professional equipment and supplies	10	2	d
Photographic equipment and supplies	16	4	d

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Watches, clocks, and clockwork-operated devices	-	-	d
Miscellaneous manufacturing industries	12	2	
Nondurable goods			
Food and kindred products	9	2	c
Meat products	8	2	
Dairy products	13	2	
Canning and preserving fruits, veget., and sea foods	6	1	
Grain-mill products	6	1	
Bakery products	10	2	
Confectionery and related products	10	2	
Beverage industries	16	4	
Misc. food preparation and kindred products	5	1	
Not specified food industries	14	3	
Tobacco manufactures	0	1	f
Textile mill products	3	1	c
Knitting mills	4	1	d
Dyeing and finishing textiles, exc. knit goods	9	2	d
Carpets, rugs and other floor coverings	14	3	
Yarn, thread, and fabric mills	1	1	
Miscellaneous textile-mill products	6	1	d
Apparel and other fabricated textile products	9	2	c

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Apparel and accessories	11	2	
Miscellaneous fabricated textile products	6	1	d
Paper and allied products	7	2	c
Pulp, paper, and paperboard mills	6	1	
Paperboard containers and boxes	10	2	
Miscellaneous paper pulp products	8	2	
Printing, publishing, and allied industries	23	6	
Chemicals and allied products	8	2	c
Synthetic fibers	4	1	
Drugs and medicines	22	6	d
Paints, varnishes, and related products	8	2	
Miscellaneous chemicals and allied products	8	2	
Petroleum and coal products	22	6	c
Petroleum refining	26	6	
Miscellaneous petroleum and coal products	3	1	
Rubber products	12	2	
Leather and leather products	6	1	c
Leather:tanned, curried, and finished	2	1	
Footwear, except rubber	10	2	
Leather products, except footwear	12	2	d
Not specified manufacturing industries	8	2	

OCCUPATIONS, BY MAJOR OCCUPATION GROUP	SOCIO-ECONOMIC SCALE	POPULATION DECILE SCORE	NOTES
Nonmanufacturing industries (incl. not reported)	7	2	b, c
Construction	7	2	
Railroads and railway express service	3	1	
Transportation, except railroad	9	2	
Telecommunications, and utilities and sanitary services	6	1	
Wholesale and retail trade	12	2	
Business and repair services	9	2	
Personal services	5	1	
Public administration	7	2	
All other industries (incl. not reported)	6	1	
Occupation not reported	19	5	

Explanation of Notes:

a. One of 45 occupations used in deriving socio-economic index from predictors of National Opinion Research Center prestige ratings.

b. One of 16 occupations poorly or partially matched to National Opinion Research Center titles.

c. Occupation omitted from statistical analysis of 425 detailed occupations, because it is a grouping of specific titles listed below it.

d. Occupation omitted from statistical analysis of 425 detailed occupations, because census data are based on fewer than 100 sample cases (corresponding to an estimated population of fewer than 3,000 males).

e. Occupation omitted from statistical analysis. The census data do not pertain to current members of the armed forces, but to currently unemployed civilians whose last occupational experience was in the armed forces. The data for this occupation do not, therefore, describe soldiers, sailors, and related occupations.

f. The computed value of the socio-economic index for this occupation was -3. To avoid the inconvenience of having one index value with a negative sign, this index was arbitrarily changed to zero, which remains the lowest value in the table.

g. This scale includes all occupations listed in the detailed classification of the Bureau of the Census: 1950.

h. n. e. c. means "not elsewhere classified".

APPENDIX C

MARLOWE-CROWNE SOCIAL DESIRABILITY SCALE

PERSONAL REACTION INVENTORY

Listed below are a number of statements concerning personal attitudes and traits. Read each item and decide whether the statement is true or false and circle the correct response.

T F 1. Before voting I thoroughly investigate the qualifications of all the candidates.

T F 2. I never hesitate to go out of my way to help someone in trouble.

T F 3. It is sometimes hard for me to go on with my work if I am not encouraged.

T F 4. I have never intensely disliked anyone.

T F 5. On occasion I have had doubts about my ability to succeed in life.

T F 6. I sometimes feel resentful when I don't get my way.

T F 7. I am always careful about my manner of dress.

T F 8. My table manners at home are as good as when I eat out in a restaurant.

T F 9. If I could get into a movie without paying and be sure I was not seen, I would probably do it.

T F 10. On a few occasions, I have given up doing something because I thought too little of my ability.

T F 11. I like to gossip at times.

T F 12. There have been times when I felt like rebelling against people in authority even though I knew they were right.

T F 13. No matter who I'm talking to, I'm always a good listener.

T F 14. I can remember "playing sick" to get out of something.

T F 15. There have been occasions when I took advantage of someone.

T F 16. I'm always willing to admit it when I make a mistake.

T F 17. I always try to practice what I preach.

T F 18. I don't find it particularly difficult to get along with loud mouthed, obnoxious people.

T F 19. I sometimes try to get even, rather than forgive and forget.

T F 20. When I don't know something, I don't mind admitting it.

T F 21. I am always courteous, even to people who are disagreeable.

T F 22. At times I have really insisted on having things my own way.

T F 23. There have been occasions when I felt like smashing things.

T F 24. I would never think of letting someone else be punished for my wrongdoings.

T F 25. I never resent being asked to return a favor.

T F 26. I have never been irked when people expressed ideas very different from my own.

T F 27. I never make a long trip without checking the safety of my car.

T F 28. There have been times when I was quite jealous of the good fortune of others.

T F 29. I have almost never felt the urge to tell someone off.

T F 30. I am sometimes irritated by people who ask favors of me.

T F 31. I have never felt that I was punished without cause.

T F 32. I sometimes think when people have a misfortune they only got what they deserved.

T F 33. I have never deliberately said something that hurt someone's feelings.

ANSWER SHEET
MARLOWE-CROWNE SOCIAL DESIRABILITY SCALE

1. True
2. True
3. False
4. True
5. False
6. False
7. True
8. True
9. False
10. False
11. False
12. False
13. True
14. False
15. False
16. True
17. True
18. True
19. False
20. True
21. True
22. False
23. False
24. True
25. True
26. True
27. True
28. False
29. True
30. False
31. True
32. False
33. True

APPENDIX D

PERSONAL DATA SHEET

PERSONAL DATA SHEET

1. Name.....
   Last First Middle Initial

2. Local Address.....

3. Date of Birth.....

4. Sex: (a) Male..... (b) Female.....

5. Class Standing: (a) Freshman... (b) Sophomore...
   (c) Junior..... (d) Senior.....

6. Marital Status: (a) Single..... (b) Married.....
   (c) Divorced, Widowed, or Separated.....

7. What does your father (or whomever supports your family) do for a living?

8. Describe what your father (or whomever supports your family) does on the job.

9. Does someone other than your father support your family?.....

   If so, who?.....

10. What particular feelings or thoughts would you like to express now that you have completed your involvement in this research project?

APPENDIX E

STATISTICS OF NUMERICAL INGENUITY TEST (NIT) SCORES FOR ALL CELLS IN THE EXPERIMENTAL DESIGN

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	Need For Approval	Social Reinforcement		No Reinforcement		Material Reinforcement	
		Males	Females	Males	Females	Males	Females
High Socio-Economic Status	High	N=11 M=69.45 SD=28.47	N=20 M=78.30 SD=17.83	N= 8 M=40.75 SD= 5.57	N=25 M=49.24 SD=14.93	N=12 M=73.50 SD=27.22	N=17 M=81.35 SD=26.51
	Low	N=35 M=72.06 SD=30.46	N=24 M=84.63 SD=27.11	N=29 M=39.41 SD=12.07	N=27 M=51.89 SD=19.22	N=15 M=60.20 SD=24.00	N=33 M=75.52 SD=28.63
Low Socio-Economic Status	High	N= 5 M=68.00 SD=26.50	N= 5 M=81.60 SD=26.76	N= 1 M=63.00 SD= 0.00	N= 7 M=45.29 SD=17.91	N= 8 M=64.25 SD=21.31	N= 4 M=58.50 SD=23.91
	Low	N= 9 M=72.89 SD=21.20	N= 7 M=95.29 SD=28.05	N=10 M=44.70 SD=15.27	N=14 M=48.71 SD=11.44	N=10 M=57.70 SD=27.43	N= 7 M=84.86 SD=23.72