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ACHIEVEMENT VALUES, STANDARDS AND EXPECTATIONS:
THEIR EFFECT ON CHILDREN'S TASK PERSISTENCE
AND ACADEMIC COMPETENCE

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By
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*****

The Ohio State University
1963

Approved by

Adviser
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Chapter 1
INTRODUCTION

The following study was conceived within the context of Rotter's Social Learning Theory (1954). It is an attempt to explain experimental task persistence and academic competence by means of an integrated psychological theory. Several new theoretical relationships will also be examined.

I. The nature of persistent behavior: Webb (1915) in an attempt to understand the "w" or "will" factor, spoke of persistence as "a tendency not to abandon tasks for mere changeability." Twenty years later, Clark (1935) described persistence as "perseverative behavior": a tendency to stay with a task to avoid change. A factor analysis by Thornton and Guilford (1938) of some tasks purporting to measure persistence isolated two factors of persistence: (1) an ability and/or willingness to withstand discomfort to achieve a goal and (2) a tendency to "keep on" at a task, i.e. "plodding" behavior. A finer distinction was made by Peterson (1942), who objected to Rethlingshafer's explanation of persistence. "Resistance to interruption," which Rethlingshafer had included as one component of persistent behavior, was seen by Peterson as an indication of that rigidity characteristic of the feebleminded. He contrasted this with Rethlingshafer's second component, "the tendency to resume activity after interruption," as representative of a flexibility more characteristic of the normal individual. The more common interpretation today is one suggested by Webb (1915): persistence as a tendency not to abandon tasks in the face of obstacles. Such a definition includes behavior which has alternately been classed as
"resistance to extinction" and as persistence. The contemporary operational measures are the number of trials or the length of time which a subject will expend on an insoluble task.

II. Reasons for task persistence: A- Personality variables.

(1) Will. The concept of "will," replete with all its theological and philosophical connotations, was first considered to be the construct which would serve to explain persistent behavior. Indeed, Webb (1915) considered it under the topic of "character," isolating the three traits of reliability, tact, and persistence of motives as the components of the "w" factor. This approach is also reflected in the "Downey will-temperament measure," which used the medium of handwriting. Stone (1922) observed that there was a disparity between intelligence and scholarship. He concluded that the subject's perseverance was uncontrolled and varying and that the "Downey will-temperament measure" was unable to deal with factor of perseverance.

(2) Interest. Eventually, these evaluative interpretations of persistence gave way to the inclusion of persistent behavior under the rubric of motivation. The behavior was considered individually variable, specific to particular situations, and dependent on organic drive; or, in humans, on interest operating at a given time and providing the "set" for further activity. The Hartshorne, May and Maller studies in the Nature of Character (1939) emphasized the importance of interest as the main determinant of persistent behavior. It was recognized that this sustaining interest might be either in the task itself or in the end to be gained. Feather (1961) stresses the necessity of reassuring a subject that the problem is, in fact, soluble. He also suggests that
the subject must be sure that the absent incentive will be forth-coming if the full effect of the goal is to operate.

The importance of this approach was that both persistence and non-persistence were felt to be learned indexes of self-control. Thus, persisting or refraining from an act (where there was no external compulsion) was believed to be a function of previous experience.

(3) Approval-seeking. Keister (1937) attempted to train nursery school children in persistent behavior. She presented the child with increasingly difficult tasks appropriately accompanied by praise and reproof for persistent and quitting behavior. It is reported that this training led to increased persistence in later testing with different tasks.

In 1914, Bronner compared delinquent and college girls in their willingness to persist at holding two pound dumbbells at their shoulders. She concluded that the college girls were more willing to endure physical discomfort for the sake of a good record than were the delinquents. Child (1954) also reports the development of persistent striving for achievement as contingent on social approval of this behavior and disapproval of its absence.

A series of studies have recently been focussed on the "approval-motivated individual" (Crowne & Marlowe, 1960; Marlowe and Crowne, 1961 and others). The results have led to a characterization of such a person as one highly dependent on social sanction for his behavior. He is consequently more sensitive and responsive to the cues in social situations which will increase the probability of obtaining approval and decrease the likelihood of being disapproved. This dependence on
external sanctions is then expected to result in compliance and con-
formity to the demands perceived in inter-personal situations. Clearly, it is important to isolate the reason why a person continues to persist at a frustrating task. One must be able to demonstrate whether the persistent behavior is solely a response to the perceived demands of the experimenter -- an attempt to gain approval, or whether it represents the effect of other personality dynamics which will operate outside the experimental context.

James Coleman, the sociologist, stresses the importance of the "adolescent subculture" in the determination of those who will "go out" for scholarly achievement. He states that in most American schools the stress is on athletics as the first choice activity in the peer group. In this situation, those with most intellectual ability will cultivate those skills which they recognize will bring maximum social rewards. In such an adolescent society, those who come to be seen as "intellectuals" and who come to think so of themselves, won't be really those of the highest ability, but only those willing to work hard at relatively unrewarded activity.

(4) Achievement standards. Wolf (1938) related children's task persistent behavior to their family background. He concluded that high levels of persistence were associated with a level of performance demanded by adults which was consonant with the child's ability. Unreasonably high or insufficient demands led to less persistent behavior. Clark, Teevan and Ricciuti (1956) use the achievement standards as a means of inferring the level of aspiration. Aspiration behavior was
deduced from the relationship between the grade a student said he'd "settle for" and his realistic expectation.

Gould (1939) stresses the importance of deciding whether the individual attributes absolute or relative qualities to his success and failure experiences. She states that neither success nor failure can be generally defined in terms of absolute or relative achievement scores. Some subjects see all success and failure as relative experiences, while others have absolute standards for success and relative ones for failure, or vice versa. In this way, perfection may be a sufficient but not a necessary condition for the feeling of success.

(5) **Motives to achieve success and avoid failure.** Basing his work on Atkinson's theory of the achievement motive (1958), Feather (1961, 1963) has studied task persistent behavior as the interaction of relatively stable personality dispositions or motives and more transient situational influences. The achievement-related motivation to perform a task refers to the combination of the motivation to achieve success at the task and motivation to avoid failure. According to Atkinson, the two motives sum algebraically to give positive achievement related motivation (approach), for subjects in whom the motive to achieve success is stronger than the motive to avoid failure and negative achievement related motivation (avoidance), for subjects in whom the motive to avoid failure is greater than the motive to achieve success.

(6) **Expectancy for success and failure.** The more transient situational influences to which Feather refers are the expectations of the individual, i.e. his subjective probabilities. His intent was to study the variation in achievement related motivation while the probability of
success increased and decreased. The probabilities were experimentally manipulated by reporting false norms.

Thornton (1939) revealed a factor, which he called "feelings of adequacy," from a factor analysis of a battery of performance tests and 12 other measures of persistence in a college population. Clearly, this is related to the expectations one would hold about one's future performance.

More directly, Todd, Terrell, and Frank (1962) studied the relationship between academic achievement and an individual's expectancy for success in academic activities. The study, which was focussed on the behavior of college students of superior ability, was conceived within the context of Rotter's social learning theory (1954). The results supported the hypothesis that normal achievers would have greater expectations for academic success than would underachievers.

B- Task variables.

(1) Task difficulty. A more specific case of expectancy, this variable refers to the assessed difficulty level of a given task as it is calculated by an individual.

Elsa Robinson (1940) completed two studies of task persistence on insoluble anagram problems. In the first experiment, the 52 college student subjects were told at the beginning of each set of 10 problems the number of solvable anagrams in that set. Four of the eight sets of anagrams presented were solvable to preserve the face validity of the task. Thus, each subject was told that in one set there was only one solvable anagram in the ten presented; in the next he had 5 chances out of 10; the third gave him 9 chances out of 10; and the fourth provided
10 chances of success out of 10 trials. Robinson concluded from her results that when the chances for solution of a problem are considered perfect (ten out of ten), the time spent on it is strikingly longer than when the chances are all but perfect. Similarly, "even" chances result in earlier resignation than perfect, but later resignation than when the chances are considered slight. She notes that in normal experience the conviction that an activity will issue in success usually derives, not from instructions to this effect as in the experiment, but from successful activity in similar situations in the past, i.e. from a strong association between activity and situation-complex.

Feather (1961) discusses the importance of controlling the subjective probability of success for the alternative achievement task to which the subject might turn after the persistence task.

(2) Nature of alternative activities. Robinson (1940) also concludes that the amount of time spent in a given activity is an inverse function of the number of alternative and equally promising activities which the individual knows are open to him as substitute means to the same end. The nature of the alternative activity and the motives involved in its performance are stressed by Feather (1961) as worthy of consideration if one is to predict whether a person will abandon his original task.

(3) Number of task trials. Robinson's second experiment (1940) demonstrated that a subject with only one chance to solve a problem will persist with it much longer than when his first trial represents one of two attempts. When there are as many as seven trials, he abandons the first very readily.
(4) **Nature of the experimental situation.** Feather (1961) includes this as one aspect of the extrinsic motivation to perform the task. This variable accounts for the fact that the subject is in a social situation in which he has the role of a subject in an experiment, expected to make some attempt at the task. Consideration of this fact suggests that motives like affiliation may be systematically related to task performance in a situation where no achievement orientation is given, but cooperation is requested. In addition, it might be assumed that the extrinsic motivation to perform the initial task is stronger than that to perform the alternative since the experimenter asks the subject to start with the initial problem.

It might be mentioned that these situational variables are correlates of the personality variable: "approval seeking."

C- **Ability variables.**

A number of studies have focussed on intelligence as the principal determinant of persistent behavior and have found it to be relatively unrelated or representing only a low, positive relationship with persistence (Ryans, 1938, Nelson, 1931, Kremer, 1932 and others).

Ryans (1939), Rethlingshafter (1942) and Thornton (1941) stress the importance of the reality factors of endurance, strength, or aptitude as they interact with other motivational factors in determining the length of persistence.

It is proposed that constructs such as "ability," "intelligence," and past performance (as reflected in grades or achievement tests) provide an arid explanation of persistent behavior. These variables may be more meaningfully considered as factors which contribute to a dynamic process
such as the acquisition of expectancies for success. An approach such as this permits prediction and explanation from one situation to another. Insofar as persistence is one component of academic competence, a study of non-intellectual factors (such as expectancy) which contribute to persistent behavior, should eventually also help to explain phenomena such as the "over- and under-achiever", i.e., one whose performance is not consonant with his capabilities.

One example of an attempt to understand the more dynamic aspects of intelligence, is represented in Kounin’s work (1943) with intellectual development and rigidity. The nature of his experimental design and sample bears little relationship to that examined in the present study. The relevance derives from the fact that he too was attempting to relate one referent of intelligent behavior to a type of task persistence. Kounin extended Lewin’s concept of "boundary" and "region" and conducted a series of experiments to examine the behavior of older versus younger and feeble-minded versus normal subjects. The most relevant conclusion was that the young normal had less need than the older, feeble-minded subject to participate in a drawing activity which was related to one in which he had already been satiated.

D- Additional variables.

A study by Brachman and Costello (1963) examined the relationship between persistence with a mathematical problem and with a hand dynamometer. Using the Junior Maudsley Personality Inventory with 80 school children 14 to 16 years of age, they found normals to be more persistent on the mathematics problem than neurotics. Eysenck’s constructs of "extraversion-introversion" appeared to be unrelated to length of
persistence time. A comparison of males with females showed males to be more persistent than females on "physical persistence" (the hand dynamometer). Females proved to be more persistent than males on the mathematics magic square when the alternative task was a magic square made up of words. In almost all cases, persistance testing in a group setting increased the length of time a subject would spend before quitting.

Socio-economic status. Elizabeth Douvan (1958) discusses the differential achievement orientations of the middle class and manual worker and their effect on the pattern of performance. She suggests that the occupational role of the middle class adult requires a high degree of competent performance, the product of which is individual and the responsibility for success and failure personal. In contrast, the industrial, manual worker is more familiar with non-personal causality and the effect of external factors (such as lay-offs) on goal attainment. His labor contributes to a group product; because of this, the value of personal competitiveness is minimal in the occupational role. In this situation there is little need to strive unless success involves some meaningful and apparent reward.

The attribution of responsibility for success and failure has been examined by means of the construct: "internal versus external control of reinforcements" (Rotter, Seeman and Liverant, 1962). The internally controlled individual believes that his successes and failures are due to his own efforts or lack of them. The externally controlled see luck, chance, fate or other people as the agents which determine one's experience. Situations may also be categorized according to the degree to
which they are seen by the subject as a matter of skill rather than chance. In a recent study (Battle and Rotter, in press) it was demonstrated that the internal-external control attitude is related to social class, specifically, that the higher the class, the more one feels in control of his destiny.

James and Rotter (1958) found differences in the extinction of verbalized expectancies to be a function of skill versus chance instructions under conditions of partial versus 100% reinforcement. They found that with chance instructions, the usual superiority of partial over 100% reinforcement no longer held up. Rather, 100% reinforcement resulted in longer extinction times. One would expect greater persistence from subjects who perceive that solution of a task is a matter of skill, and that their efforts will determine success, than from those who feel that other factors will determine the outcome of the situation, independently of their behavior.

The Bialer "locus of control" scale (1961), an approach to the internal-external control attitude with children, was related to both "over and under achievement" and to task persistence. Cromwell (1960) reports a study by Butterfield in which a group form of the Bialer scale was given to 60, intellectually superior seventh and eighth grade pupils. Mental ages of subjects derived from Lorge-Thorndike were subtracted from achievement ages (Stanford Achievement Test) and discrepancies were correlated with "locus of control" scores. There was no relationship between the two measures. A second study reported by Cromwell was completed by Shipe, to test the relationship between locus of control and two measures of persistence with mentally retarded and
normal subjects. The first task was designed to determine how long an individual will persist under painful circumstances. The child had to stand on tiptoe as long as possible. The second was a dotting task designed to see how long an individual would persist under monotonous or unrewarding circumstances. No relationship was found between "locus of control" and either of these two behavioral variables.
Chapter 2

THE PRESENT STUDY: HYPOTHESES TO BE TESTED

The present study represents an attempt to meet the following goals:

(1) to provide an explanation of why some individuals persist longer at an experimental task in the face of difficulty than do others;

(2) to approach this problem of explanation by means of an integrated psychological theory in an effort to contribute to the validity of the constructs which are used;

(3) to test out some aspects of this theory which have not been previously explored, in the hope that the "nomological network" may be extended;

(4) to examine the relationship between persistence at an academic-type experimental task and competence of performance on similar academic tasks in the classroom (as this is reflected in report card grades);

(5) to study the relationship between the explanatory variables and other psychological and demographic characteristics of these subjects;

(6) to investigate the use of measures which are easily administered in a group and with a particular method for the study of persistence behavior.

It has been suggested that many of the attempts to explain differential task persistence have been inadequate because they invoke single explanatory concepts to deal with behavior which has multiple determinants. Three related variables have been isolated for examination in the present study as meaningful foci of explanation. They are: "attainment value," "expectancy" and "minimal goal level," all derivatives of Rotter's "Social Learning Theory" (1954).
Hypothesis I: The length of time which a subject will persist at an 'insoluble' mathematics problem will be positively related to the expectancy, minimal goal and absolute attainment values he holds for mathematics.

The basic formulation by Rotter\(^2\) states that the potential for a given type of previously acquired behavior to occur in a particular situation in relation to a given reinforcement, is a function of the expectancy that the reinforcement will occur in the particular situation and the value of the reinforcement in question. In the present study, the reinforcement is the successful solution of the mathematics problem, the type of behavior which is being considered is "task persistence," the situation is one of a "research study" and the value of the reinforcement is the importance of success in mathematics for a given individual. One other construct involved in this prediction is the "minimal goal level," or the lowest goal which the subject sees as satisfactory in the continuum of possible reinforcements for such behavior. A more detailed consideration of these constructs follows.

(a) Attainment value. This term is discussed by Crandall, Katkovsky and Preston (1960), and refers to the importance a subject attaches to the attainment of approval and the avoidance of disapproval regarding his competence of performance in a given area of achievement. The construct is similar to Lewin's "valence" (1935) and Rotter's "need value" (1954). It has been differentiated from need value and reinforcement value because it is more specific than the need to achieve and more general than the particular reinforcements associated with success in mathematics (such as good grades, computational ability, or skill in problem solving).
In the present study, attainment value deals with the question of how important it is to a subject that he excel in a given kind of achievement activity. This has been more specifically approached by asking about the importance of mathematics relative to other school subjects as well as obtaining an index of how important it is to do well in mathematics regardless of one's preference for other activities. In the task persistence situation, an additional precaution has been taken to define the alternative task only as non-mathematical in nature so that the preference for it and the tendency to turn to it will not be affected by its differential attractiveness.

"Absolute attainment value" is more akin to 'interest' and includes no assumption that a high degree of interest in one subject precludes the possibility that the individual may attach an equal importance to other forms of achievement. It is this latter measure which will be used to test the principal hypotheses relating to persistence.

(b) Expectancy for success. Statements which reflect this variable describe the level of performance which a subject feels he actually can achieve. Assuming that the individual accepts the mathematics problem as it has been presented, i.e. a matter of skill, one would anticipate that he would use his past experiences with success and failure to structure his future expectations. In this sense, I.Q. scores, grade point averages and achievement test scores represent indexes of expectancy.

The expectancy statement given by a student refers to his feelings of capability with respect to mathematics in general rather than his estimate of the chances for solution of this particular task. The
experimental problem was chosen because it appeared to be unique enough that most students would not have had experiences with it but would have to govern their expectations by past mathematics performance in general.

Another type of expectation involved concerns the student's assessed probability that persistence at an academic task is one way of attaining the desired reinforcement.

(c) Minimal goal level. This term refers to the lowest level of performance in an achievement area at which the subject will be more satisfied than dissatisfied. This goal level will be related to the individual's attainment value; however, it may not vary in a direct way with the degree of importance a subject attaches to the attainment of success in mathematics. One can formulate patterns in which the lowest goal considered satisfactory is incorporated wholesale from some outside source and bears little relationship to personal interest or capabilities. It is also possible that some students rigidly hold minimal goals which do not fluctuate in response to past experiences of success and failure nor with transient changes in the attainment value of mathematics.

Wolf's notion of "achievement standards" (1938) relates to the minimal goal construct. It is also closely related to the "level of aspiration" work. In this connection, Sears (1940) points out some of the pit-falls in the interpretation of the level of aspiration which is verbally expressed by the subject. The statement which is given may act as a protective response to establish the individual and shield him from failure. The student may set a falsely high goal, and get satisfaction from the social approval which accrues to his statement (even though he
doesn't expect to reach the goal); or he may set a low goal, and get satisfaction from over-reaching it.

Whatever the personality dynamics, each subject must be convinced that his statement of a "satisfactory" grade will not affect the grade which he will actually receive. In addition, he must understand that he is to state his achievement standards, however discrepant they may be from his achievement expectancy.

Hypothesis I asserts that individuals persist as a function of their expectations of how well they are going to do, their standards of the lowest acceptable grades to them, and the value which they attach to the attainment of success in a given type of achievement activity.

It is assumed that task persistence is a culturally recognized component of academic success. It is possible that the differential experience of rewards for task persistent behavior would account for the occurrence--or lack--of task persistent behavior in the present experiment. The latter possibility has not been tested at this time; it will be included as part of the error variance.

Hypothesis II. In addition to the direct relationship between the three theoretical variables and task persistence, as predicted above, it is expected that the interaction of these elements will affect the length of time a subject will persist. The four groups to which hypothesis II will refer are described below.

1. Subjects who hold minimal goals which are consonant with the level of performance they expect to reach, should persist until they reach the expected, "satisfactory" goal.

2. It is reasoned that individuals who hold unattainable minimal goals which are much higher than the grades they actually expect to get,
will have previously encountered frustration in their attempts to meet these high standards. When faced with a difficult task they will give up, rather than subjecting themselves to the evidence that their performance will never meet "satisfactory" levels of achievement. This prediction provides a qualification for the direct, positive relationship between minimal goal level and task persistence which is predicted in hypothesis I. The first hypothesis implies that the higher a person's minimal standards of success, the longer will he persist in trying to reach them. The second prediction refers to a special group of subjects, some of whom are among those who have high minimal goals; i.e. those whose goals are high relative to the grades they expect to achieve. Thus, it is theoretically possible that a student may have a large discrepancy between standards and expectations, regardless of the height of either standards or expectations.

3. It is also suggested that students who state that they would be satisfied were they to receive grades lower than those which they actually expect to get, but who attach great importance to the attainment of this kind of success, will persist far beyond the level of achievement consonant with their stated minimal goal level. In this case, the minimal goal statement may be described as a "defensive" one; the student is believed to be saying that he would be satisfied with low grades in an effort to defend himself against anticipated failure. An alternative way of explaining this pattern would be to consider the student's statement as a calculated way of insuring success; i.e. he structures the situation so that he cannot help but be successful. When actually confronted with the task, such a student is expected to be persistent--this would
be interpreted as evidence of the value of attainment to him as well as suggesting that the defense works successfully. Since he knows he cannot fail he can afford to subject himself to the frustration of this difficult task.

In this study, an additional construct of minimal goal certainty will be invoked as an intervening variable to explain the effect of an interaction between minimal goal level and expectancy on the amount of task persistence. This statement reflects the certainty which an individual feels that he will attain his minimal goal level. As it is described, it represents a kind of expectancy statement, but it is an expectation of reaching a minimal goal, rather than an expected grade or an optimal goal. The child with minimal goals which are inordinately high will have low minimal goal certainty; the one with minimal goals set much below the level he expects to achieve, will have high minimal goal certainty.

4. Finally, individuals who hold minimal standards of success which are much lower than the grades they expect to achieve and who place a low value on the attainment of success in this type of achievement will, according to the hypothesis, give up as soon as they feel they have reached this low standard, rather than persist until they reach the level which they feel capable of attaining.

These four combinations of variables are:

1. Minimal Goal = Expectancy
2. Minimal Goal > Expectancy
3. Minimal Goal < Expectancy with high attainment value
4. Minimal Goal < Expectancy with low attainment value
Hypothesis II: There will be a significant difference between the mean persistence times of individuals, depending on the relationships between their minimal goal level, expectancy and attainment value, such that groups 1 and 3 (singly or combined) will be more persistent than groups 2 and 4 (singly or combined).

Hypothesis IIIA: There will be a direct and positive relationship between the amount of task persistence and the degree to which grade point average scores exceed I.Q. scores.

IIIB: There will be a direct and negative relationship between the degree of discrepancy between minimal goal level - expectancy and that between grade point average and I.Q.

The question has been raised concerning the nature of non-experimental analogues to the relationships examined in this laboratory study. Factors contributing to the length of persistence time at an academic type of task in an experimental setting would presumably affect similar kinds of behavior in the classroom. Similarly, persistence itself has been recognized as a significant contributor to success or failure in school.

The problem of the student who doesn't work up to the level of his capabilities, the "underachiever," and the "mystery" of the "over-achiever," who seems to do so much better than one might expect, are explained by the relative tendency of a student to persist, given the inevitable academic hurdles.

Two indexes of a student's capabilities and performance have been obtained in this study: a measure of I.Q. to represent his abilities and the grade point average which will be taken to reflect his current level of achievement. The discrepancy between these two scores should provide a measure of over- and under-achievement.
It is also anticipated that inasmuch as persistence at this task is determined by factors which contribute to academic performance, prediction from the theoretical variables should be possible for both experiment and schoolwork. If the hypothesized relationships occur as predicted by hypothesis two, then one would also expect that the "over-achiever" (who has grades higher than his I.Q.) would be one who is highly persistent—stating a minimal goal level which is either "defensively lower" or consonant with the level of his expectancy. The "under-achiever" would be a non-persistent student with minimal goals either much higher than his level of expectancy or much lower (accompanied by a low attainment value). The effect of both the non-defensive negative discrepancy and the positive discrepancy would be to shorten persistence time. Thus, one would expect that students with highly discrepant goals and expectancies would be less likely to have a pattern of academic performance that exceeds their I.Q. level.

Additional data. The relationship of the central theoretical variables and task persistence to each other and to additional relevant psychological and demographic factors will be examined. Some of these will be described below without hypothesizing either the degree or the direction of the relationships.

Personality variables.

(1) Relative attainment value: the importance of achievement in mathematics relative to success in other academic subjects.

(2) Internal-external control: based on the construct of Rotter, Seeman and Liverant (1962), an abbreviated measure was designed for this study to represent the extent to which the child feels he is responsible for his academic successes and failures.
(3) Inner-other direction: taken from Riesman's distinction (1950), this variable refers to the source of the reinforcements which the child describes for his academic striving, i.e. whether he tries to do well in school to please himself (inner direction) or to meet the standards and approval of others (other direction).

(4) Social desirability: Measured with the "Children's Social Desirability Scale" (Crandall, Crandall and Katkovsky, manuscript) this variable deals with the degree to which an individual is motivated by his need for approval from others.

(5) Extra-curricular interests: the choice of a spare time activity; i.e. whether the child may be called academically oriented.

Status variables.

(6) Age
(7) Sex
(8) Grade in school
(9) Socio-economic status
(10) Ordinal position: whether the child is the eldest, youngest or middle child in the family hierarchy.

Ability variables.

(11) Intelligence
(12) Grade point average: a measure of academic competence
(13) Grade in mathematics: the grade for which the student is asked to state his expectancy.
(14) Best academic subject: whether the child is most proficient in mathematics or some other subject.
(15) Achievement test grades
(16) Favorite academic subject: the choice of mathematics rather than another school subject.

Family variables.

(17) Importance of grades to mother: how important the child thinks grades are to his mother.

(18) Importance of grades to father

(19) Mother's help with homework: the child's perception of how often his mother helps him with his homework.

(20) Father's help with homework

(21) Mother's mathematics' ability compared to the child: i.e. the child's estimate of how capable his mother was in mathematics when she was the same age as the child; one way of assessing a possible source of the child's standards.

(22) Father's mathematics' ability compared with the child.
A description of the test instruments used to assess the independent and dependent variables will be presented in this chapter.

I. Measures of Independent Variables.

(1) It was anticipated that minimal goal statements would be affected most by the subject's expectations of the grades which he would receive. In fact, it is theoretically logical that a "realistic" person has standards of success and failure mediated by his past experience with a given task and that he subsequently adjusts these standards to enhance his feelings of adequacy. While it is recognized that the nature of the grading system itself and the standards held by teachers for all students will influence the development of a given student's minimal goals; it was hypothesized that there are some individuals called "under" or "over-achievers" whose performance is closely related to the fact that their minimal goals are relatively independent of past achievement and future expectations. A test of this hypothesis rested on the ability to obtain the "purest" measure of each variable, uninfluenced by other factors.

The study was focussed on factors relating to persistence with a mathematics problem since the grading for mathematics is more objective than many other academic subjects and because it is so heavily stressed throughout school, students might be expected to have well formulated, polarized attitudes toward their mathematical ability.

In obtaining the minimal goal statement, it seemed wise to include questions related to another school subject among the buffer items, in
an attempt to allay the student's possible defensiveness about mathematics. The mathematics minimal goal statement as it appears in Appendix A is given below:

Circle the grade below which shows the lowest grade that you could get in Mathematics and still be satisfied.

A  A-  B+  B  B-  C+  C  C-  D+  D  D-  F

A similar question referring to English was given on the same questionnaire. It will be noted that the instructions which accompanied this statement stressed the anonymity of each individual as well as the fact that this questionnaire was unrelated to what had or would happen in school.

The standardized instructions for the minimal goal questionnaire were presented as follows:

I'm from the Fels Research Institute in Yellow Springs and would appreciate your cooperation in helping us to find out more about what grade students are like.

Our work has nothing to do with your school itself. None of the information that you give us will be shown to anyone here, so please tell us what you really feel, since that is the only thing that will help us.

I have a short questionnaire here which will probably be clear to you. If you should happen to have any questions, just raise your hand and I'll come and help you individually. Answer every question as well as you can and when you are through, turn it face down on your desk and go on with your own studying until everyone is done.

Thank you for your help.

Since no student could know that he would later be asked to state his expectations of achievement, it was felt that he would feel relatively free to state the grades which symbolized success and failure, independently of the probability of achieving them.
Plus and minus grades were included to represent the actual grading procedure and to extend the range of scores for subsequent analysis. An individual's minimal goal could range from scores of 1-12, with high scores reflecting high minimal standards for success.

(2) The minimal goal certainty statement referred directly to an individual's minimal goals and as such was necessarily obtained at the same time. Each pupil was asked to express himself along a ten point scale. The minimal goal certainty statement takes the following form as it appears on the questionnaire in Appendix A:

How certain are you that you could get at least the grade you circled above?

1 2 3 4 5 6 7 8 9 10

uncertain certain

It became apparent, during pre-testing, that the concept of this ten point scale was confusing to many of the children, so that additional instructions (as follows) were included in the final study:

Lots of people seem to be having trouble with question 6. When you answered question 5, you said what was the lowest grade that you could get in English and still be satisfied. Question 6 asks you to show how certain you are that you could get at least the grade you circled above. If you are very certain you could get at least the grade you would be satisfied with, circle a number around 8,9 or 10; if you are less sure, circle a number in the middle and if you are uncertain that you could get that satisfactory grade, circle a number around 1,2 or 3. Do you understand?

It might be noted that the subject is asked how certain he is that he will be able to obtain at least this grade. This distinction emphasizes that the student is indeed talking about a minimal goal; it also provides an opportunity to obtain some inferences as to the reasons why an individual holds the minimal standards he has chosen. For example, low minimal goals, held with very high certainty suggest a
need to at least meet the standards to which one is publicly committed (i.e. an insurance that one cannot possibly be classed as a failure).

High minimal goals, held with little certainty may reflect a need to strive for the best even though one has little hope of reaching it... and naturally involves a greater risk of failure. This same combination of minimal goal and minimal goal certainty may serve a wish-fulfilling function or the statement might be a defensive one, espousing goals so high that when one fails there is a ready-made excuse.³

There is some informal evidence that students did, in fact, accept the promise of anonymity and used the questionnaires to express many of their feelings, insofar as they were aware of them. For example, many students gave critical and socially undesirable responses to item eight of the same questionnaire, which asked the student to tell why he did or did not work in school.

(3) Expectancy statements. In this case, it was important to obtain an accurate statement of how capable the student felt he was in mathematics at the time of testing. This was obtained by asking him to indicate the grade which he actually expected to receive during the next grading period. Once again, the expectancy statement was obtained for both mathematics and English. Its final form, as given in Appendix B appears below:

Circle the grade below which shows the grade you really expect to get in Mathematics on your next report card for this grading period.

A A- B+ B B- C+ C C- D+ D D- F

The instructions which accompanied this second questionnaire were essentially the same as those given with the first, or minimal goal questionnaire.
The validity of the expectancy statement might be affected (a) in such a way as to produce an "erroneously high" value; either because the person states what he hopes to get or because he gives a statement which he believes will meet the examiner's approval, however dissonant this may be with his actual capabilities as he assesses them. (b) the expectancy statement may be much lower than that upon which the student operates because of his attempts to save face by avoiding failure with a stated expectancy he is certain of reaching. The child's recognition that the examiner probably had access to his cumulative record, was probably a factor which served to counteract these two tendencies toward inaccuracy. Pre-testing results (N = 76) suggested that the stated expectation for success is, in fact, closely related to the actual success experience of the student in mathematics (r = .86 for expectancy and the math grade most recently attained).

(4) Attainment value refers to the importance of reinforcements for performance in one achievement area, relative to reinforcements in other, equally available forms of achievement. Such a concept becomes critically relevant when one attempts to explain why an individual does or does not give up one activity to turn to another. A question designed to obtain this kind of information was included on the same questionnaire which asked for the student's expectancy statement (see Appendix B). The question was presented in this form:
Write on the lines below, the names of the following school subjects to show how important it is to you to be good in each of them.

Social Studies (History or Geography); Mathematics; Art; Science; English; Physical Education.

List them from the most important to the least important.

Very Important

Least Important

It might be noted that the question stresses the importance of the academic subject to the student himself. This was done in an attempt to reduce the tendency to give the socially desirable response: i.e., those subjects important to parents or teachers.

The information from this question was the ordinal position of mathematics relative to all other subjects listed. Scores could range from 1-7, with one representing a rating of "first in importance;" seven reflecting the fact that the person had not even included mathematics in his list, although instructed to do so. This score will subsequently be referred to as "relative attainment value."

In addition to the concept of relative attainment value, there was an attempt to examine the possibility of an "absolute attainment value."

This notion is associated with the belief that some individuals attach more importance to achievement-related reinforcements than do others. The problem was to obtain a meaningful picture of how important it was to the student to do well in a given academic subject, regardless of the importance of other academic subjects to him. This question also appeared on
the expectancy questionnaire (see Appendix B) and simply stated:

Circle the number below which shows how important it is to you to do well in English.

1 2 3 4 5 6 7 8 9 10

The same question was asked pertaining to mathematics.

Once again, it was stressed that the student was to say how important a subject was to him. The question form was prepared to reduce the likelihood of responses with inflated statements of importance, designed to satisfy the adult reader.

(5) The Children's social desirability scale developed by Crandall, Crandall and Katkovsky (in press) was included in the present study in an attempt to discover whether persistent behavior at a difficult task was a function of a "need for social approval" rather than the result of the variables hypothesized in this investigation.

The Children's Social Desirability scale (or CSD scale) is an adaptation of the Marlowe-Crowne (1960) social desirability (M-C SD) scale. The child's form of this test, like the adult, is a true-false questionnaire which calls the "socially desirable response" that which is given to meet situational or cultural demands in spite of the necessity of dissembling in order to do so. The operation for determining the strength of a subject's wish to appear socially desirable is the number of times he attributes highly improbable, but socially desirable attitudes and behaviors to himself. An illustrative item from the children's scale is: "I have never felt like saying unkind things to a person." The 48 item CSD scale has been found to have split-half (odd-even) reliabilities ranging from .74 to .90 in various samples.
Because of the time limitations in the testing schedule, it seemed wise to shorten the social desirability scale since the measure was to be used mainly as a control rather than as one of the principal variables under study. Twenty-five items were selected from the full scale as being particularly discriminative with previous samples. This scale was given following the expectancy-attainment value questionnaire, during the same administrative session. A copy of it appears in Appendix C. Instructions stated:

When you have finished every item (on the expectancy questionnaire) you may turn to the other questionnaire (CSD scale) and complete it. Then, turn both of your papers over and you may study something else until everyone is through.

Thank you for your help.

(6) Other additional information was available from items interspersed with the minimal goal, expectancy and attainment value statements.

(a) Age. The minimal goal and minimal goal certainty questionnaire (Appendix A) provided information about the subject's birth date so that the correlation of other independent variables with age might be examined.

(b) Inner and other direction. A second question, on the same test form, lent itself to the study of this and the following construct. An open-ended inquiry appeared in the following form:

Why do you try to do well in school? Or, if you feel you do not try, then why not?

Responses scored as inner directed were those in which the subject stated that he did or did not try because of some internal, personal feeling of pride at being successful or dissatisfaction at failure. "Other directed" responses, in contrast, were those in which the motivation for working was the attainment of approval from significant others. Scoring
directions and criteria are in Appendix D. The author served as a reliability rater for the criterion scoring which was completed by another psychologist who was familiar only with the scoring manual. 5
A total of 40 responses were examined; of these, 28 were called "inner directed" by one or both scorers. There was 93% agreement on the inner directed statements. Only five responses were scored as "other directed" with 40% agreement as to this classification. Twelve responses were designated as "non-scorable" with 92% agreement.

(c) Internal-external control. The same response was scored for inner and other direction and for internal-external control. Consideration of the internal-external control dimension was a derivative of the work by Rotter, Seeman and Liverant (1961). Internally controlled responses were those in which the student said that he tried in school because the goals he wished to attain could be obtained by his own efforts (i.e. were within his control). Externally controlled were those in which the child expressed feelings of futility, powerlessness or stated that discriminatory actions on the part of others prevented the attainment of goals, so that the student would give up trying. Successes attributed to good luck or the fortuitous intervention of others would be additional examples of external control. One final example of a statement scored as external control which is peculiar to this study is the response which is self-referent although there is the implication that the individual feels he cannot change his basic condition.

Scoring reliability for this construct according to the criteria developed (Appendix D) was determined on the same sample of forty as the inner-other directed analysis. Percentages of agreement
were: internal control, \(N = 36\), agreement: 89%; external control, \(N = 4\), agreement: 100%; non-scorable, \(N = 6\), agreement: 33%.

(d) Socio-economic status. The expectancy and attainment value questionnaire (Appendix B) yielded information on the father's occupation, permitting determination of socio-economic status and its relation to other variables. The Hollingshead classification of occupation (1957) was used for this purpose. This system assigns occupations to one of seven categories with a rating of one representing the highest class, seven, the lowest.

(e) Best academic subject. Each person was asked to name his best academic subject. This provided an additional indication of which students felt particularly competent in mathematics and a means of assessing their persistence behavior in this context.

(f) Favorite academic subject. It was possible to examine the relationship between academic competence in mathematics and liking for the subject by means of a question asking each student to name his favorite academic subject.

(g) Spare time activity. Each child was asked to name two things that he liked to do in his spare time. These activities were classified into academic versus non-academic groups according to the criteria given in Appendix E. This categorization provided some indication of whether or not a subject's behavior in a free choice situation was of an academic nature.

In order to provide a standard, neutral task to follow the task persistence problem, a questionnaire was developed which provided another source of data relevant to the study (see Appendix F).
(h) **Ordinal position.** The subject's ordinal position in the family constellation was obtained by asking him to list all the children in his family (from oldest to youngest) with their ages.

(i) **Parents' absolute attainment value** as perceived by the child, was obtained by asking him to state how important it was to his parents that he receive good grades. The ratings were obtained on a four point scale ranging from very important to unimportant.

(j) **Parents' participation** in academic affairs as perceived by the child, was obtained by asking the child to state how often the mother and father helped with homework. This was rated on a four point scale, ranging from "often" to "never".

(k) **Parents' mathematics capabilities.** It was thought possible that one source of a child's standards of success and failure would be his assessment of his parent's mathematical capabilities relative to his own, were both of a comparable age. This information was obtained on a three point response in which the child rated the mother and father as "better, the same or worse" than himself, with respect to mathematics.

II. **Measure of dependent variable.**

**Task persistence** has been described in this study as the length of time a subject will persist at a task in the face of difficulty.

The requirements for choosing a task were: (a) that it was a task which was insoluble within the pre-arranged time limit so that even the brightest student would have a test of persistence; (b) that the problem, or some part of it, seem solvable so that each student would have reason to persist; (c) that the task was clearly a mathematics problem similar to that which the subject might receive in school; (d) that it was a
novel enough problem so that most students would not have had experience trying this kind of mathematics problem and bring their expectations of success or failure to the situation as they related to the task rather than to mathematics in general. Expectations regarding a novel task, defined only by its mathematical attributes, should be governed by one's past experience in mathematics. For example, if a child felt generally capable in mathematics but knew that he was poor on this kind of problem, his experimental behavior would be a poor sample of other kinds of mathematical persistence; (e) that the task be seen as a unitary problem, so that success and failure refer to the problem as a whole, with no opportunity to redeem early failure with later success; (f) that the student would have some independent way of assessing his success or failure so that he could tell, without reinforcement from the experimenter, that he was or was not finished; (g) that the solution be complex enough so that even if a subject was told the answer, it would be impossible for him to remember it well enough to communicate it to others not yet tested.

A mathematics "magic square" was used to fit these criteria. These problems often appear in books on "mathematical recreations" (Kraitchick, 1942) accompanied by the formula for solving them. It seemed unlikely that any child would know the formula or would be able to figure it out (this was later proven to be so). It is possible to solve a given problem by trial and error if one has sufficient patience. A description of the task will be given, accompanied by the actual experimental
Instructions:  

Instructions for mathematics problem

I have a few things for you to do today. First, I would like you to work on a mathematics problem which is like this one.

(Example on card shown)

I will give you another square divided up like this one except that there will be four boxes across this way and four down this way (point) so that it will be a bit larger than this square. Also, there won't be any numbers in the boxes. Your job will be to put them in the right places.

You will notice that all the numbers from one through nine are used to solve this problem (illustrate). If you add the numbers across each row (point), down each column (point) or along the main diagonals (point) the total sum always equals 15 (demonstrate by adding along one row, column and diagonal). Since the square I will show you is larger than this one, you will need to use all the numbers from 1 to 16, using each number once, so that they add up correctly to 34. Do you understand?

The task and solution appear in Appendix G. During the pre-testing, ten of the twenty-one subjects persisted up to the 30 minute limit which had been arbitrarily set. Because of this large proportion, the maximum possible persistence time was increased to 45 minutes in the final testing. The score for this variable is: number of minutes a child spends working on the problem before he turns to the second task.
Chapter 4  
GENERAL TESTING PROCEDURE

I. Experimental situation.

All tests were administered in the Central Junior High School in Fairborn, Ohio. This is an almost-exclusively white school in a neighborhood largely populated with personnel from Wright Patterson Air Force Base which is located nearby. The junior high school is housed in the same building as the elementary grades so that the total population is over 1,000 students.

The minimal goal and expectancy measures were administered by female examiners in individual classrooms or study-hall gatherings which ranged from 20-35 students each.

The task persistence measure was obtained by two female examiners, one who tested in a small room associated with the guidance office; the other using the Fels research trailer; a specially equipped, 17 foot house trailer which was parked adjacent to the school. In both cases, only the examiner and the subject were in the room for the administration of the task persistence measure.

All testing was done within the period of five weeks near the end of the school year.

II. Subjects.

The only restriction in the sample was that exceptionally bright or exceptionally slow classes not be included so that probable floor and ceiling effects in achievement might be eliminated; i.e. school is not difficult enough for the bright child to be an "over-achiever" nor easy enough for the dull child to be an "under-achiever". Boys and girls
from the seventh, eighth and ninth grades participated in the study. There were no Negro students in any of the classes tested.

III. Procedure.

1) Two or three examiners administered the minimal goal questionnaire (Appendix A) one in each classroom. This took approximately 15 to 20 minutes per class. The oral instructions for this session appear in Chapter three, page 24.

2) One week later, a different examiner appeared to present the expectancy statement form (Appendix B) and the Children's Social Desirability Scale (Appendix C). At this time, the following instructions were given to assist the child in completing the questions which dealt with parents' occupations:

When you get to question two on this first questionnaire, you will notice that it asks about your mother and father's occupation. If both of your parents work, write in their exact job. If your parents are not living or divorced, cross out the name of the person with whom you do not live and write "divorced", "separated" or "not living" after it. If you live with someone other than your parents, cross out both names and write in the names of those with whom you do live, such as "grandmother, aunt, uncle or guardian." In each case tell what kind of work they do, if any.

When you tell the kind of work, please say the real job they have, not just the name of their employer. For example, say "cashier at such and such a bank, or secretary at Wright Field or sixth grade teacher at such and such a school."

The expectancy statement questionnaire was mimeographed on blue paper to give it separate identity from the minimal goal questionnaire and to reduce the influence of minimal goal statements on expectancy statements. An effort was made to present this second testing session as something quite separate from the first.
3) On the basis of the discrepancy scores between the minimal goal level and that of the expectancy statement, four groups were formed. It was found that the discrepancy scores of minimal goal relative to expectancy had a mean of 2.2 and a standard deviation of 1.6. This means that subjects who had minimal goals at least a grade and a half above or below their expectancy level had a discrepancy which was one standard deviation from the mean. Subjects in group one had the same minimal goal level as expectancy. Group two subjects had minimal goals at least a grade and a half higher than their expectancy level. Group three was made up of subjects with minimal goals at least a grade and a half below the expectancy level and with attainment value scores above the median. It was necessary to increase the sample size to include ninth grade students in order to get a sufficient number of subjects with the group four pattern of attainment value scores below the median and discrepancy scores of a minimal goal level at least a grade and a half below the level of expectancy. Despite the sampling of over 500 subjects, it was possible to get only 14 subjects for the fourth group. The groups are described below, with the number of subjects in each given in parentheses.

I- minimal goal = expectancy (N = 20)
II- minimal goal > expectancy by 3 to 6 (N = 20)
III- minimal goal < expectancy by -3 to -6 with attainment value of 9 or 10 (N = 20)
IV- minimal goal < expectancy by -3 to -6 with attainment value of 8 or less. (N = 14)

4) Subjects were scheduled so that testing for persistence was done with all students from one classroom tested in a single day. This procedure was followed in order to minimize communication among subjects.
Students were tested for task persistence as soon as possible after the administration of the expectancy questionnaire.

5) Each subject was summoned to the trailer or testing room by the office personnel or by appointment slip. The examiner introduced herself and began the instructions for the "mathematics" problem (see page 34). Following these directions, the examiner stated:

There are plenty of forms here for you to use if you need another one.

The other things I would like for you to do have nothing to do with mathematics. They are on the papers next to you (points to face-down "general information" questionnaire) and you may begin them at any time that you want to, you don't have to tell me. When you do start the second task, you can't return to the first one.

Any questions?

When the child indicated that he understood, the examiner withdrew to one side where she was still within the subject's view but she appeared to be engrossed in other work, i.e. reading and occasionally taking notes. Among the examiner's possessions were recording sheets on which the time the child began the task and the time when he picked up the "general information" questionnaire were noted.

Subjects asked four questions frequently enough so that standard answers were prepared. These were:

I- Any time limit? "work as long as you wish on this and then start the second task."

II- What's this for? "we're studying mathematics in the junior high school."

III- Has anyone solved this? "I'm sorry, I can't tell you."

IV- Should I stop this one now (task)? "you may work as long as you wish."
After both parts were completed, the examiner reassured the subject that the problem was, indeed difficult and briefly showed a card bearing the solution, so that the child was aware that there really was an answer.

Each subject was asked not to tell the other children what he had done since this would "give them a head start when they try."

IV. Information from school records.

1) Academic grades were obtained from the child's cumulative folder. These consisted of his report card grades for the last marking period of the school year. They were the grades which he had been asked to estimate on his expectancy statement. Academic subject matter varied from one child to another, including the following assortment: mathematics, English, American history, Ohio history, science and Spanish. Grades for the following subjects were not included as data: art, physical education, music, guidance and home economics. Using the twelve point equivalents for the plus and minus letter grades (see above explanation), grade point averages were computed for each child.

2) Intelligence test data were available for every child who had been at the school since the sixth grade, at which time I.Q. tests are given. The test used was the Henmon-Nelson test of mental ability (1957).
Chapter 5
RESULTS

Descriptive statistics of all variables were prepared with the IBM 1620 computer on total and sub-samples. These included the means, standard deviations and the Fisher $G_1$ and $G_2$ statistics (the last two are measures of skewness and kurtosis respectively). Since many of the $G_1$, $G_2$ values exceeded the 1.96 cut-off value, all variables were normalized with McCall T scores for the samples in which they would be examined.

It is important to note the special treatment given to the two discrepancy scores: minimal goal-expectancy and grade point average--I.Q.

It was the theoretical expectation that subjects with large discrepancies between their minimal goals and expectancies would be less persistent than subjects with consonant minimal goal-expectancy values. The absolute discrepancy score was taken for this variable and normalized so that positive and negative discrepancy scorers were treated as if there were no essential differences between them for predictive purposes. Since group three subjects were believed to have given "defensive" minimal goal statements, the normalizing procedure was done on the 54 subjects remaining after this group had been removed from the total sample. All correlations with this discrepancy score were computed with the 54 normalized scores. Because hypothesis II involves specific comparisons between the four discrepancy groups, the total sample of 74 subjects was normalized and all subjects were used for the necessary comparisons.
The discrepancy between grade point average and I.Q. involved a different set of assumptions. In this case, it was hypothesized that subjects with grade point averages higher than I.Q. scores, i.e. "over-achievers," would behave in a way which was different from those with negative discrepancies between grade point average and I.Q. scores ("under-achievers"). The normalizing procedure was done on the total sample (N = 74) such that the algebraic discrepancy scores were given McCall T scores.

In order that all correlations could be computed separately for boys and girls as well as for the total group, the sex of each subject was listed as part of the identifying data. Throughout this section all results will be reported in this way.

All tests of significance were two-tailed.

**Dependent variable.** Task persistence scores were the "number of minutes" a child worked on the mathematics puzzle before picking up the general information questionnaire. The maximum persistence time possible was 45 minutes. With the sample of 74 subjects, the mean for this variable was 29.25 minutes with a range of 3 to 45 minutes. Fifteen subjects persisted the full 45 minutes.

**Independent variables.**

I. The three central theoretical variables isolated so that their independent effects on task persistence might be examined were "expectancy, minimal goal level and absolute attainment value."

a) Expectancy statements took the form of a numerical score ranging from 1-12 to represent the twelve grading positions from A through F with plus and minus grades included. High scores represent high grades.
The prediction with respect to this variable is that there will be a positive correlation between the expectation of good grades in mathematics on the next report card and the length of persistence time.

Both expectancies and persistence scores were plotted and examined to reveal that they were continuous and were rectilinearly related. A Pearson $r$ was calculated with the following results.

**Table 1**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>$r$</th>
<th>level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total group</td>
<td>74</td>
<td>.47</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Boys</td>
<td>46</td>
<td>.52</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Girls</td>
<td>28</td>
<td>.38</td>
<td>&lt;.05</td>
</tr>
</tbody>
</table>

From this table it is clear that the level of expectancy is positively and significantly related to the length of persistence time. This relationship appears to be stronger for boys than for girls.

b) The minimal goal statement was also made in terms of a twelve point, letter grading system with the plus and minus grades included. The score was the lowest grade that a student indicated he could receive in mathematics and still feel satisfied.

It was predicted that there would be a positive correlation between the height of the minimal goal score and the length of persistence time.

It will be recalled that minimal goal statements were called "defensive" when they occurred as low minimal goal scores accompanied by absolute attainment value scores which were above the median. It seemed clear that this group, who were not "really" giving the grade with which
they would be satisfied, would not behave in accord with such an erroneous statement. The scores of the 20 subjects in this group were deleted from this analysis.

The remaining minimal goal scores, which ranged from 1-12, were assumed to be continuously distributed and were correlated with task persistence by means of a Pearson r. The results appear in Table 2.

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<thead>
<tr>
<th>Correlation of Minimal Goal Level with Persistence Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>Total group</td>
</tr>
<tr>
<td>Boys</td>
</tr>
<tr>
<td>Girls</td>
</tr>
</tbody>
</table>

The data in Table 2 do not support the expectation that the minimal goal level will be positively and significantly related to the length of task persistence. It might be noted that the correlation of these two variables for the girls, though fairly strong, was computed with only a small number of subjects.

c) The absolute attainment value statement is made in terms of a ten point scale with low scores representing a child's allegation that doing well in mathematics is "unimportant" while high scores reflect the fact that the child feels it is "very important" to do well. Scores ranged from 1-10 and were assumed to be continuously distributed.

It was expected that there would be a positive correlation between the level of the absolute attainment value and the length of persistence time. The results of this comparison appear in Table 3.
Table 3

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>r</th>
<th>level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total group</td>
<td>74</td>
<td>.16</td>
<td>not sig.</td>
</tr>
<tr>
<td>Boys</td>
<td>46</td>
<td>.16</td>
<td>not sig.</td>
</tr>
<tr>
<td>Girls</td>
<td>28</td>
<td>.14</td>
<td>not sig.</td>
</tr>
</tbody>
</table>

The results in Table 3 do not support the prediction that there would be a positive correlation between the absolute attainment value score and the length of persistence time.

The foregoing results provide only partial support for hypothesis I:

The length of time which a subject will persist at an 'insoluble' mathematics problem will be positively related to the expectancy, minimal goal and absolute attainment values he holds for mathematics.

It is only possible to assert for this sample that "the length of time which a subject will persist at an 'insoluble' mathematics problem will be positively related to the level of performance at which he expects to succeed in mathematics."

Although these three variables did not all relate significantly to task persistence, their relationship to other experimental variables will be examined in the section of "Additional Data."

II. In addition to a simple direct relationship between the three central theoretical variables, it was hypothesized that their interaction, in specific combinations, would differentially affect the length of time a subject would persist.

Four groups of subjects with the following characteristics were selected from the total sample of over 500 students.
Group 1: \( (N = 20) \) Minimal goal equals expectancy

Group 2: \( (N = 20) \) Minimal goal three or more points (at least one full grade level) greater than expectancy

Group 3: \( (N = 20) \) Minimal goal three or more points less than expectancy with attainment value of 9 or 10 (by a median split)

Group 4: \( (N = 14) \) Minimal goal three or more points less than expectancy with attainment value of 8 or less.

The means and standard deviations of the persistence times for the four groups appear in Table 4. All persistence times will be given in minutes.

Table 4

<table>
<thead>
<tr>
<th>Group</th>
<th>Minimal Goal</th>
<th>( N )</th>
<th>Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>( MG = Ex )</td>
<td>20</td>
<td>30.05</td>
<td>10.71</td>
</tr>
<tr>
<td>Group 2</td>
<td>( MG &gt; Ex )</td>
<td>20</td>
<td>22.85</td>
<td>11.64</td>
</tr>
<tr>
<td>Group 3</td>
<td>( MG &lt; Ex, AV high )</td>
<td>20</td>
<td>33.45</td>
<td>10.04</td>
</tr>
<tr>
<td>Group 4</td>
<td>( MG &lt; Ex, AV low )</td>
<td>14</td>
<td>30.50</td>
<td>14.36</td>
</tr>
</tbody>
</table>

A one-way analysis of variance procedure was completed after it was demonstrated with the \( F_{max} \) test that there was homogeneity of variance (Walker & Lev). McCall T scores were assigned so that the new means and standard deviations were:

Table 5

<table>
<thead>
<tr>
<th>Group</th>
<th>Minimal Goal</th>
<th>( N )</th>
<th>Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>( MG = Ex )</td>
<td>20</td>
<td>50.48</td>
<td>8.24</td>
</tr>
<tr>
<td>Group 2</td>
<td>( MG &gt; Ex )</td>
<td>20</td>
<td>45.12</td>
<td>8.30</td>
</tr>
<tr>
<td>Group 3</td>
<td>( MG &lt; Ex, AV high )</td>
<td>20</td>
<td>53.31</td>
<td>7.91</td>
</tr>
<tr>
<td>Group 4</td>
<td>( MG &lt; Ex, AV low )</td>
<td>14</td>
<td>50.36</td>
<td>12.42</td>
</tr>
</tbody>
</table>
Table 6 presents a summary of the Analysis of Variance.

Table 6

One-way Analysis of Variance of Persistence Times for Minimal Goal-Expectancy Groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups</td>
<td>697.12</td>
<td>3</td>
<td>232.4</td>
<td>2.80*</td>
</tr>
<tr>
<td>Within</td>
<td>5802.42</td>
<td>70</td>
<td>82.9</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6492.54</td>
<td>73</td>
<td>88.9</td>
<td></td>
</tr>
</tbody>
</table>

* significant at the .05 level

This analysis suggests that there is indeed a difference between the mean persistence times of the four groups divided on the basis of their minimal goal-expectancy discrepancy. A series of comparisons by "t" test between single and combined groups reveals the source of this difference.

Table 7

"t" Tests for Analysis of Variance Persistence Data

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>t</th>
<th>sig. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 vs 2</td>
<td>40</td>
<td>2.04</td>
<td>&lt; .05</td>
</tr>
<tr>
<td>1 vs 3</td>
<td>40</td>
<td>-1.10</td>
<td>n.s.</td>
</tr>
<tr>
<td>1 vs 4</td>
<td>34</td>
<td>.03</td>
<td>n.s.</td>
</tr>
<tr>
<td>2 vs 3</td>
<td>40</td>
<td>-3.19</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>2 vs 4</td>
<td>34</td>
<td>-1.38</td>
<td>n.s.</td>
</tr>
<tr>
<td>3 vs 4</td>
<td>34</td>
<td>.78</td>
<td>n.s.</td>
</tr>
<tr>
<td>1&amp;3 vs 2&amp;4</td>
<td>74</td>
<td>2.09</td>
<td>&lt; .05</td>
</tr>
</tbody>
</table>

Table 7 provides data showing that groups one and three combined have significantly longer persistence times than does the combination of groups two and four. It is true that group one (with consonant
minimal goals and expectancies) is significantly more persistent than group two (that characterized by minimal goals which are higher than expectancies). It is also clear that there is no evidence to support the hypothesis that group four represents those who truly hold minimal goals below their expectations and as such would tend to be less persistent than those with consonant minimal goals and expectancies.

The most significant analysis is that of group two (with positive discrepancies of minimal goals and expectancies) with significantly shorter persistence times than group three (those with "defensive" minimal goal statements).

It would appear that it is this comparison of group two with group three that accounts for the significance of the combined group analysis. It is also clear that it is group two which behaves in a manner significantly different from the other groups.

It is necessary to demonstrate that it is in fact the discrepancy between minimal goals and expectancies which explains these results and not just the expectancy variable alone. It will be recalled that there was a significant correlation \( r = .47 \) of expectancy and task persistence for the total group. It may be that group two is a sub-sample with significantly lower expectancy scores while group three may have atypically higher expectations. This possibility was examined with a one-way analysis of variance procedure on the four discrepancy groups using the expectancy scores. Homogeneity of variance was demonstrated with the \( F_{\text{max}} \) test. McCall T scores were assigned, yielding the following means and standard deviations.
Table 8

Means and Standard Deviations of Expectancy Scores for Minimal Goal-Expectancy Groups

<table>
<thead>
<tr>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>51.82</td>
<td>8.58</td>
</tr>
<tr>
<td>20</td>
<td>39.32</td>
<td>6.03</td>
</tr>
<tr>
<td>20</td>
<td>57.66</td>
<td>6.34</td>
</tr>
<tr>
<td>14</td>
<td>51.58</td>
<td>4.90</td>
</tr>
</tbody>
</table>

The analysis of variance summary table for this data is presented below.

Table 9

One-way Analysis of Variance of Expectancy Scores for Minimal Goal-Expectancy Groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups</td>
<td>3555.25</td>
<td>3</td>
<td>1185.08</td>
<td>12.87**</td>
</tr>
<tr>
<td>Within</td>
<td>3167.26</td>
<td>70</td>
<td>45.25</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6722.51</td>
<td>73</td>
<td>92.09</td>
<td></td>
</tr>
</tbody>
</table>

** significant at the .01 level

This analysis indicates that there is indeed a difference between the mean expectancy scores of the four groups, divided on the basis of their minimal goal-expectancy discrepancy. A series of comparisons by "t" test between groups reveals the source of this difference.
Table 10

"t" Tests for Analysis of Variance Expectancy Data

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>t</th>
<th>sig. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 vs 2</td>
<td>40</td>
<td>5.34</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>1 vs 3</td>
<td>40</td>
<td>-2.46</td>
<td>&lt;.025</td>
</tr>
<tr>
<td>1 vs 4</td>
<td>34</td>
<td>1.04</td>
<td>n.s.</td>
</tr>
<tr>
<td>2 vs 3</td>
<td>40</td>
<td>-9.36</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>2 vs 4</td>
<td>34</td>
<td>-6.52</td>
<td>&lt;.025</td>
</tr>
<tr>
<td>3 vs 4</td>
<td>34</td>
<td>3.16</td>
<td>&lt;.01</td>
</tr>
</tbody>
</table>

Table 9 provides data which is essentially similar to the analysis of task persistence on the basis of the four discrepancy groups; i.e. it is the effect of groups two and three which mostly accounts for the combined groups analysis.

It is clear that the discrepancy groups may be differentiated on the basis of their expectancy scores alone, so that group two with low task persistence and low expectancy has a pattern of minimal goals which exceed the expectancy level. The more highly persistent groups one and three have a high level of expectancy.

These analyses reveal that there is confounding of two variables in this study so that a clear test of hypothesis two is impossible. One cannot say whether the discrepancy between minimal goal and expectancy is a sufficient predictor of task persistence without completing a representative sampling of expectancy for each type of discrepancy score.

III. The third hypothesis deals with the prediction of persistence time from the relationship between a student's capabilities as represented
by his I.Q. and his present level of achievement, reflected in his grade
point average.

Two comparisons will be made. The first deals with the relationship
between the amount of task persistence as it is associated with the degree
to which grade point average exceeds I.Q. This is tested with a Pearson
\( r \) for all those subjects for whom I.Q. scores were available.

\[
\text{Table 11}
\]

Correlation of Task Persistence with grade point average-I.Q.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>r</th>
<th>level of sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total group</td>
<td>58</td>
<td>.18</td>
<td>not sig.</td>
</tr>
<tr>
<td>Boys</td>
<td>35</td>
<td>.14</td>
<td>not sig.</td>
</tr>
<tr>
<td>Girls</td>
<td>23</td>
<td>.16</td>
<td>not sig.</td>
</tr>
</tbody>
</table>

These findings offer no support for hypothesis III A, that a prediction
from this measure of task persistence to over- and under-achievement
in the classroom can be made.

The second comparison (hypothesis III B) deals more directly with
the question of how well the experimental measure approximates classroom
analogues. It relates minimal goal-expectancy discrepancies to grade
point average-I.Q. discrepancies. The sample size is reduced both
because the twenty "defensive" subjects are omitted as well as those for
whom I.Q. scores are missing. A Pearson \( r \) is computed on those for whom
there is complete data.
Table 12

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>r</th>
<th>level of sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total group</td>
<td>48</td>
<td>-.15</td>
<td>not sig.</td>
</tr>
<tr>
<td>Boys</td>
<td>32</td>
<td>-.02</td>
<td>not sig.</td>
</tr>
<tr>
<td>Girls</td>
<td>16</td>
<td>-.56</td>
<td>&lt;.05</td>
</tr>
</tbody>
</table>

From Table 12 it is clear that despite the small number of girls, it may be said for them that the larger the discrepancy between minimal goal and expectancy (whatever the direction) the less does grade point average exceed I.Q. Hypothesis III B is only partially supported.

Since it is impossible to examine the effect of the minimal goal-expectancy discrepancy score independently of the level of expectancy, the correlation of expectancy with the grade point average-I.Q. score will be presented as a necessary aspect if one is to understand the relationship of persistence factors and school achievement.

Table 13

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>r</th>
<th>level of sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total group</td>
<td>58</td>
<td>.42</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Boys</td>
<td>35</td>
<td>.24</td>
<td>not sig.</td>
</tr>
<tr>
<td>Girls</td>
<td>23</td>
<td>.58</td>
<td>&lt;.01</td>
</tr>
</tbody>
</table>

These results demonstrate that it is probably the girls who account for the finding in the total group that the higher the expectancy level, the more does grade point average exceed I.Q.; i.e. the girl with high expectancy is more likely to be an "over-achiever."
IV. Additional data. A large number of additional comparisons were made among the three independent variables as well as between them and a variety of other factors. These will be presented in Table 14; providing a summary statement without comment. All correlations in this case are Pearson r's. The upper half of each cell of the table contains the sample size, correlation coefficient and level of significance for the total group; the lower half contains the same information first for boys and then for girls.

The Children's social desirability scale proved not to correlate significantly with anything other than I.Q. The OSD, I.Q. relationship is described in Table 15. This 25 item "true-false" scale had a range of 0-21 in the experimental sample. A number of subjects were eliminated from this analysis because of missing data.
<table>
<thead>
<tr>
<th>Persistence</th>
<th>Age</th>
<th>Socio-economic status</th>
<th>Grade point average</th>
<th>Math grade</th>
<th>Initial goal</th>
<th>Attachment value - at</th>
<th>Attachment value - rel</th>
<th>Expectancy</th>
<th>Initial goal certainty</th>
<th>Initial goal expectancy</th>
<th>Grade point average</th>
<th>locus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0.20</td>
<td>0.00</td>
<td>0.10</td>
<td>0.00</td>
<td>0.00</td>
<td>0.10</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Low</td>
<td>0.20</td>
<td>0.00</td>
<td>0.10</td>
<td>0.00</td>
<td>0.00</td>
<td>0.10</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Low</td>
<td>0.20</td>
<td>0.00</td>
<td>0.10</td>
<td>0.00</td>
<td>0.00</td>
<td>0.10</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Low</td>
<td>0.20</td>
<td>0.00</td>
<td>0.10</td>
<td>0.00</td>
<td>0.00</td>
<td>0.10</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Table 14
Intercorrelation Matrix, (N = 74)
Table 15

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>r</th>
<th>level of sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total group</td>
<td>56</td>
<td>-.28</td>
<td>&lt; .05</td>
</tr>
<tr>
<td>Boys</td>
<td>33</td>
<td>-.32</td>
<td>not sig.</td>
</tr>
<tr>
<td>Girls</td>
<td>23</td>
<td>-.05</td>
<td>not sig.</td>
</tr>
</tbody>
</table>

This data suggests that it is the boys who account for the finding that subjects with lower I.Q. scores score significantly higher on the Children's Social Desirability scale.

A series of point-biserial correlation coefficients were computed to test the relationships between task persistence, examiner differences and items on the general information questionnaire. These will be presented in Table 16 in summary form, giving the sample size, correlation coefficient and level of significance in each case. All variables dichotomized were done so on the basis of "median splits."
Table 16

Point-biserial Correlation Coefficients with Persistence
as the Continuous Variable

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>r</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examiner</td>
<td>74</td>
<td>-.10</td>
<td>not sig.</td>
</tr>
<tr>
<td>Favorite subject</td>
<td>71</td>
<td>-.19</td>
<td>not sig.</td>
</tr>
<tr>
<td>Spare time activity</td>
<td>74</td>
<td>-.18</td>
<td>not sig.</td>
</tr>
<tr>
<td>Best school subject: math vs other</td>
<td>74</td>
<td>-.27</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Internal-external control</td>
<td>68</td>
<td>-.17</td>
<td>not sig.</td>
</tr>
<tr>
<td>Inner vs other directed</td>
<td>53</td>
<td>-.23</td>
<td>&lt;.02</td>
</tr>
<tr>
<td>Ordinal position: first born vs other</td>
<td>67</td>
<td>-.12</td>
<td>not sig.</td>
</tr>
<tr>
<td>Ordinal position: last born vs other</td>
<td>67</td>
<td>.06</td>
<td>not sig.</td>
</tr>
<tr>
<td>Importance of grades to mother: very important vs other</td>
<td>74</td>
<td>-.00</td>
<td>not sig.</td>
</tr>
<tr>
<td>Importance of grades to father: very important vs other</td>
<td>72</td>
<td>.04</td>
<td>not sig.</td>
</tr>
<tr>
<td>Mother helps with homework: often vs other</td>
<td>74</td>
<td>.17</td>
<td>not sig.</td>
</tr>
<tr>
<td>Father helps with homework: often vs other</td>
<td>72</td>
<td>.23</td>
<td>&lt;.02</td>
</tr>
<tr>
<td>Mother's math and you: mother better vs other</td>
<td>73</td>
<td>.32</td>
<td>&lt;.005</td>
</tr>
<tr>
<td>Father's math and you: father better vs other</td>
<td>72</td>
<td>.11</td>
<td>not sig.</td>
</tr>
</tbody>
</table>
These results suggest (1) **Best subject**: Students who cite mathematics spontaneously as their best school subject, tend to be more task persistent. (2) **Inner vs other directed**: Students who say they try to do well to meet their own, internalized standards, tend to be more task persistent than those who say they work to please others etc.. (3) **Father and homework**: Subjects whose fathers help them often with their homework tend to be less task persistent than those who receive help less frequently. (4) **Mother's math**: Children who state that their mothers were the same or worse than they are now in mathematics tend to be more task persistent than those who see their mothers as better.
Chapter 6
DISCUSSION

The primary objective of this study was to predict differential task persistence at an insoluble mathematics puzzle with the use of three central constructs derived from Social Learning Theory. While the principal focus was on the explanation of the task persistent behavior itself, a concomitant interest was the manner in which these theoretical variables would interact with each other and with variables which represent other characteristics of the subject's life situation.

Two attempts were made to assess the influence of the "demand characteristics" of the situation on the task persistent behavior. The Children's Social Desirability Scale was given in an abbreviated form, furnishing a wide range of scores and was found not to bear any systematic relationship to task persistence itself (r = .05) nor to the main theoretical variables: expectancy (r = -.08); minimal goal (r = -.06); and absolute attainment value (r = -.03). Thus, there is some support for the assumption that the children's responses were directed at the question content rather than at the perceived demands of the experimenter.

A point biserial correlation coefficient was computed to test whether subjects persisted in any predictable way on the basis of the person who examined them. The correlation of .10 dispels any doubt that the experimenters had any differential effect on the length of persistence time. Both the experimental situation and the instructions were designed to make it as easy as possible for the subject to turn to the second task at his own volition. There was no evidence that any student suspected that the true nature of the experiment was task
persistence rather than competence in mathematics.

It is worth noting, for methodological reasons, that performance in mathematics does appear to be representative of academic achievement in general. The correlation of math grade with the grade point average of the remaining school subjects is an \( r = .72 \) for the girls and an \( r = .97 \) for the boys.

Before turning to a discussion of the results, it should be mentioned that the weaknesses of all verbal statements which have been used as measures is recognized. It has been noted that the minimal goal and expectancy statements were given a week apart in an effort to reduce contamination and that every attempt was made to eliminate any possible motive for dissimulation on the part of the subject. Discrepancies between the stated and the internally held dispositions may still exist.

The first two hypotheses dealt with the direct and interactive effects of the three theoretical constructs: expectancy, minimal goal level and absolute attainment value. Of these, only expectancy successfully differentiated persistent from non-persistent subjects. The correlation of \( .52 \) (\( p < .001 \)) for boys suggests that it is their persistence behavior which is more directly ruled by expectancy factors. It is clear, however, that girls too (\( r = .38, p < .05 \)) seem to operate from some "economic utility" model; that is, is it worth my while to keep trying at this task; are my chances of success great enough to expand the energy? Since neither absolute nor relative attainment value related to persistence (\( AV_{ab}: r = .16; AV_{rel}: r = .16 \)) it would appear that the question is a more direct probability statement, not one which weighs the reasonableness of persisting with this task rather than turning to something else.
There was also a crude test of Coleman's hypothesis that it is the child who puts all his eggs in the academic basket, despite the peer group pressure to be an athletic star, who becomes an intellectual rather than the "truly bright" child. No significant relationship was found between persistence and the choice of a spare time activity which might be called "academically oriented" ($r_{pt bis} = .18$). There was not even a relationship between the choice of mathematics as a favorite school subject and the length of persistence time ($r_{pt bis} = .19$).

Rotter (1954) has discussed the dynamic origin and operation of expectancies and stressed their association with a person's history of experience with given classes of behavior-reinforcement sequences. He states that in a relatively novel situation (such as our experiment) a person's expectancies would be largely a function of the generalization he has made from past experience in situations perceived as similar. This prediction is dramatically supported when one examines the correlations between math grade and expectancy in particular: $r = .63$ for boys and $r = .84$ for girls (both less than the .001 level of significance). The relationship between expectancy and grade point average is also strong: $r = .55$ for boys and $r = .63$ for girls (both less than the .001 level of significance). Finally, children who spontaneously listed mathematics as their best academic subject proved to be more task persistent than those who did not ($r_{pt bis} = .27, p < .01$).

These results suggest that these children have "realistic" views of how well they can expect to perform in the academic setting and that they are willing to state this expectation, without gross distortion, when asked.
It should be mentioned that expectancy is not fully accounted for by I.Q., which was the only available index of ability ($r = .21$ for I.Q. and expectancy).

The relationship between minimal goal level and task persistence did not prove to be significant, however, there is one theoretical gap in the interpretation of these results. It is difficult to assess what "completion" of the task signified to each individual. As Gould has said (1939) it is possible that standards may be absolute or relative depending on the individual or task. In this context, it may be that some individuals interpreted 25 minutes of work as an "A's worth" while others saw solution of the problem as the minimal requirement if one were to pass (a grade of D). This absence of a one to one correspondence between height of standards and length of persistence time may have destroyed any empirical consistency which one might have theoretically expected.

Rotter has discussed the independence of the minimal goal level from the level of expectancy (1954). It will be recalled that in this sample, three-quarters of the subjects were selected because of their discrepant minimal goal and expectancy values; twenty of these had minimal goals above expectancies, the other 34 had minimal goals below their expectancy level. Because of this selection, the correlation of minimal goal level with expectancy cannot be examined in this sub-sample. It is legitimate to examine the relationship of minimal goal to expectancy for the total sample of over 500 subjects. The correlation is .61 for the boys and .70 for the girls, both significant at less than the .001 level.
The girls' minimal goal level correlated more highly than the boys with grade point average (girls: $r = .62, p < .001$; boys: $r = .36, p < .02$) and with grade in mathematics (girls: $r = .81, p < .001$; boys: $r = .33, p < .05$).

On the basis of these findings, one might hypothesize that the girls have essentially more realistic standards of achievement for themselves with respect to performance in mathematics. Opposite results might occur if one were to take an activity which is sex-typed for girls. Because mathematics is a subject in which all boys are expected to be good, with the consequently greater pressure on boys to achieve in this manner, there is more tendency for them to resort to both socially acceptable statements of expectancy or standards and to use wish-fulfilling statements as a means of handling unmanageable demands. Secondly, high and low scores represent greater deviance for girls than for boys and thus prove to have greater predictive validity for the former.

A more complete discussion of the minimal goal level will be included when the relationship between minimal goal-expectancy is discussed with the second hypothesis.

The absolute attainment value represented the child's rating of how important it was to him to do well in mathematics. Because of the larger range of scores and the possibility that children might judge it equally important to do well in all school subjects; this score was used to test the main hypotheses rather than the relative attainment value. There was nothing which supported the expectation that subjects for whom it was most important to do well in mathematics would be more
persistent. Since the attainment value scores did not correlate with social desirability scores, it would appear that the high median (a score of 9 in a scale of 1 to 10) represents the fact that almost all students have incorporated the stress upon mathematics as a basic subject as it has been presented by school authorities. This refers to those students for whom school itself is important.

Further support for the validity of the attainment value measure lies in the fact that it was found to correlate with socio-economic status. In line with most sociological reasoning, students from higher social classes deemed it more important to do well in this academic task than those from lower socio-economic backgrounds. The correlation for total group was $r = .28, p < .05$; for boys: $r = .24$ and for girls: $r = .27$. As with sex differences, were one to consider another school subject such as typing or manual arts, the results might have been reversed.

The first hypothesis has been supported only to the extent that knowledge of a student's mathematics grade expectancy enables one to predict the length of time which he will persist on an insoluble mathematics puzzle. One can say further, that students in general and girls in particular appear to have accurate ideas of the future performance which they can expect to achieve and that they are willing to express these when asked. Factors of social desirability played no measurable part in the statement of expectations and standards, nor in the length of persistence at the experimental task.

It might be mentioned in passing that the mean persistence times for subjects in this experiment differ quite dramatically from those
reported by Brachman and Costello (1963) who used the same experimental task. Both samples used students of comparable age. There was no information given for the socio-economic make-up of the Brachman and Costello study. The contrast will be documented, however, it must be recalled that in this study students had the choice of turning to a "neutral," non-mathematical task while in the Brachman and Costello study students turned to a magic square made up of words. The differential reinforcement values of these alternative activities should be considered in making any interpretation of these results.

Table 17

<table>
<thead>
<tr>
<th></th>
<th>Brachman &amp; Costello</th>
<th>Battle</th>
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</thead>
<tbody>
<tr>
<td>Total group</td>
<td>13.62</td>
<td>29.22</td>
</tr>
<tr>
<td>Boys</td>
<td>12.53</td>
<td>29.37</td>
</tr>
<tr>
<td>Girls</td>
<td>14.72</td>
<td>29.07</td>
</tr>
</tbody>
</table>

The results from the Brachman & Costello group show much shorter persistence times in contrast with the present study. One explanation for the difference lies in the nature of the Brachman & Costello instructions. The student was given the insoluble math problem and an invitation to switch to a magic word square five minutes after he started and thereafter at ten minute intervals. He may have interpreted this invitation as a request to turn to the second task so that he gave up more quickly than he would if left alone.

The second hypothesis dealt with the discrepancy between minimal goal level and expectancy and the associated attainment value as these predicted to persistence.
It became apparent during the analysis of the relationship between the discrepancy score, level of expectancy and task persistence, that usually, one finds a high level of expectancy associated with a discrepancy pattern in which the minimal goal is less than the expectancy. A low expectancy was associated with the pattern of expectancy exceeded by the minimal goal level. Although it is impossible to deal with hypothesis two in a definitive way without sampling to get all levels of expectancy in each group, it is worthwhile to examine some possible reasons why certain discrepancy patterns appear with given levels of expectancy.

A straightforward relationship between level of expectancy and task persistence has been documented. In order to understand the behavior of the group with minimal goals which exceed the level of expectancy, (group two) one may refer to Rotter's discussion of the 'wish-fulfilling' properties of the minimal goal statement (1954). He asserts that when the chances of success are perceived as poor (low expectancy) the subject may obtain satisfaction merely by stating high minimal standards. Not only does this serve as wishful thinking, but the setting of socially acceptable minimal goals will bring some satisfaction for seeming to hold the high aspirations which are heralded by our competitive American culture. The task persistence of the third group (with minimal goals lower than expectancy and a high level of expectancy) has been explained by the fact that the subject's expectancy is high as a function of the minimal standards he sets for himself. By setting a very low minimal goal level, he has insured himself against subjective failure and can afford to persist because of the low risk.
Two alternative explanations must be considered. In chapter two, it was suggested that subjects in group two, whose minimal goals are much higher than their expectancies, would experience repeated frustration because of their inability to reach the minimal level of satisfaction. In this case the causal relationship is reversed: inordinately high minimal standards result in low expectancies with an eventual unwillingness even to subject oneself to the stress (i.e. low persistence).

Another kind of "defensiveness" may be attributed to group three. It may be that these subjects, who state that their minimal goals are below their level of expectancy, are making their publicly committed minimal standard lower than the level they expect to reach so that they will not fail in others' eyes. This explanation assumes that these subjects, in fact, hold minimal standards which are much higher than those stated and that their long persistence represents an attempt to reach these higher standards, coupled with a high level of expectancy.

None of these explanations may be ruled out with this data. A more intensive study would have to be made with these possibilities in mind were one to come to any definite conclusion.

It is relevant to examine the association of minimal goal certainty with other variables. This construct was conceptualized as a kind of expectancy statement with the particular characteristic that it represented the probability of reaching one's minimal standard rather than the optimal or expected score. It will be recalled that the minimal goal score correlated with expectancy. Furthermore, it was apparent that the standards and expectations were closely associated with the actual academic performance of the students. This clustering of variables
would suggest that the high correlation of minimal goal certainty with expectancy ($r = .53, p < .001$ for boys and $r = .40, p < .05$ for girls) reflects the fact that the more competent student expects to do well, does in fact do well, and gradually establishes minimal standards of performance which are in accord with his ability with some confidence that he will reach them. The less capable pupil has the opposite pattern: a history of poor performance, expectancy of low grades in the future and uncertainty that he will even be able to reach his minimal goals. The fact that the minimal goal certainty correlates positively with expectancy, as does minimal goal level, suggests that there is more pressure for the child to set "realistic" goals (i.e. minimal goals close to his past level of performance) despite his uncertainty; rather than protecting himself by setting very low goals which he knows he can reach.

Interestingly enough, the minimal goal certainty score, like expectancy, did correlate significantly with persistence ($r = .36, p < .02$ for boys and $r = .54, p < .01$ for girls) even though the minimal goal level itself did not.

The data in this study do not permit one to tell whether students would, in fact, have been satisfied and quit were they given information at some point that they had reached their minimal goal level or whether they hold some internalized standard of "acceptability" for which they strive when the chances of success are good. It is also possible that the student is working for an optimal goal.

Questions concerning the source of a child's standards and the means by which they are supported were dealt with by some of the parental and additional personality variables.
(a) **Ordinal position.** It had been predicted that the child's position in the family hierarchy would have some effect on his expectations and standards for achievement. This would be true because of the differential pressures and allowances brought to bear on him as the "eldest son," only child or "baby of the family." A comparison of the oldest child versus later born in their persistence times revealed no essential difference. Nor was there any difference between the persistence times for the youngest child in contrast with earlier born. Naturally, because of the nature of the sample, it was not possible to make intra-family comparisons. There might be some interaction between the achievement orientation of the family and its role allocation for the accomplishment of its goals.

(b) **Importance of grades to mother and father.** This question represented an attempt to assess the relation of one or both parent's attainment value for their offspring to the child's persistence behavior. Wolfe (1938) has questioned the connection between the standards of achievement demanded by parents and the child's performance. In the present study, there was no demonstrable relationship between the child's perception of how important good grades were to his parents and the length of time he persisted at the task. There was no independent assessment of parental attitudes in this study.

(c) **Amount of help with homework from mother and father.** This question was directed at the amount of involvement of one or both parents with the child's academic life and the effect of such participation on his independent efforts. Tested with a point-biserial correlation, the results showed that children whose fathers helped them "often" or
"sometimes" with their homework, were less persistent than those who saw him as helping "rarely" or "never" ($r_{pt} bis = .23, p < .02$). There was a non-significant relationship between the amount mother helped and the length of persistence time.

One interpretation of this finding is that the father, who is usually less involved in the child's day to day life, only intervenes when there is some academic trouble. Thus, it is the child with a previous history of poor grades who expects trouble in the future and who either solicits his father's help or must submit to his father's intervention. An alternative and less probable explanation would be that children who become dependent on their father's assistance are less able to continue on their own in the face of difficulty, such as with the persistence task.

(d) Parent's ability in mathematics when they were of comparable age. Children who saw their mothers as having been more capable in mathematics when they were young, were less persistent than those whose mothers were described as similar or worse in mathematics than they ($r_{pt} bis = .32, p < .005$). There was no significant relationship found for fathers and children. Since mathematics has been described as a boys' subject, these results suggest that when the child sees himself as worse than his mother, he feels he is really in trouble and that this contributes to his generally low feelings of self-esteem and capability so that he gives up more readily.

(e) Inner-other direction. This construct is compatible with previous results since it was shown that children who look to others for their source of reinforcements, i.e. "other directed," are less task
persistent than those whose behavior is mediated by their own, internalized standards of success and failure. The relationship of this outlook to the hypothesized "conficence syndrome" seems apparent. This and the internal-external control construct, which did not predict length of task persistence, bear further and more refined examination since they provide a broader theoretical basis from which to predict and explain various kinds of achievement behavior.

Hypothesis two, which dealt with the discrepancy score of minimal goal-expectancy, could not be isolated for testing in this study. The level of expectancy alone was found to predict the amount of task persistence. The variable: minimal goal certainty, was examined in more detail and appears to represent another type of expectancy statement, predictive of task persistence because the minimal goal level itself is correlated with expectancy. The result of this analysis was a clustering of variables into a "competence" and "uncertainty" syndrome, both closely related to the past history of success and failure in the academic setting. It was also found that children who stated that their fathers helped them often, those who saw their mothers as more capable in mathematics than they and those subjects who looked to others for their academic reinforcements were less persistent than their opposites.

The third hypothesis dealt with classroom performance of the children as it related to the theoretical and experimental variables. The weaknesses of the I.Q. measure, as an index of ability which differs from school performance, have been recognized by the author. Liverant (1960) reviews the arguments and research evidence which call
into question common, every-day uses of the "intelligence" concept. One can describe a given kind of performance in a given situation; the existence of "innate capacity" may only be assumed. In this context, the meaninglessness of the term "over-achievement" becomes apparent. It makes sense only insofar as one means that an individual has produced more capable performance in one situation than another. One cannot say that a person has exceeded the level of performance of which he is capable. It is true that educators frequently take the I.Q. measure as an index of innate capacity and that it influences their perception of the student's classroom performance; with subsequent effects on the grades he receives, his expectations and eventual behavior in school.

Similarly, a student's grade point average is the result of many factors in addition to his actual performance. Persistence itself may be a factor which the teacher takes into account when assigning grades (r = .41 for persistence and grade point average) not to mention classroom conduct and other non-academic variables.

Because of the reasons above, all results with the discrepancy between grade point average and I.Q. are particularly suspect. The limitations are recognized but the analysis has been made because the "over- and under-achievement" concept is a popular one with teachers and because no more meaningful measure of non-classroom performance than I.Q. is available.

It has been demonstrated that the higher the expectancy level, the more grade point average exceeds I.Q., that is, classroom performance exceeds "ability." The length of persistence did not relate
significantly to this discrepancy score. The female "over-achiever" was characterized by higher math grades ($r = .58, p < .01$), higher minimal goals ($r = .56, p < .01$), higher absolute attainment value ($r = .46, p < .05$) and a higher expectancy level ($r = .58, p < .01$). The only significant relationship for boys was between absolute attainment value and "over-achievement", such that it was the boy to whom success in mathematics was unimportant who was more likely to have his performance in school exceed his I.Q. level. It is to be noted that a significantly greater number of boys had grade point averages below the median ($x^2 = 8.22, p < .01$) although the girls were more evenly distributed.

Because of this disproportionate representation and because grade point averages and I.Q.'s correlated for both sexes ($r = .51$ for boys, $p < .01$; and $r = .64, p < .001$ for girls) it is clear why the incidence of "over-achievement" is less frequent in the male group.

These results suggest that the discrepancy between school performance and I.Q. may be explained by many of the same factors which have been used to understand task persistent behavior; although the possibility remains that any findings may be an artifact of the I.Q. and grade point average measures themselves. "Over-achievement," in this context, becomes one more manifestation of the effects of a high expectancy level, accompanied by the establishment of realistic standards and a stress on the importance of doing well in mathematics. Once again, the results lend support to the use of mathematics as a subject representative of academic performance in general. Because of the disproportionate number of boys who were not achieving at the median level, these findings may be stated with more certainty for girls than for boys,
although there is no reason to expect a different dynamic to operate in males. The low grades of the boys in this sample may be representative in that girls at this age do place more stress on academic competence than boys.

It is important to mention the variable of socio-economic status which was found to relate significantly to a number of other variables but has not yet been discussed. These findings are in accord with psychological and sociological theory that the stress of one's socio-economic orientation in the academic realm is stronger for males than for females. In this context especially, preparation for occupational fitness would tend to heighten the importance of academic competence.

Socio-economic data for boys indicated that the higher the class, the more task persistent \( (r = .42, p < .01) \), the higher the grade point average \( (r = .61, p < .001) \), the higher the grade in mathematics \( (r = .60, p < .001) \), the higher the expectancy level \( (r = .51, p < .001) \), and the higher the minimal goal certainty score \( (r = .35, p < .05) \). Socio-economic status for girls was related to the following variables such that the higher the class, the higher the grade point average \( (r = .47, p < .02) \), the higher the grade in mathematics \( (r = .50, p < .02) \) and the higher the level of expectancy \( (r = .44, p < .05) \).

The socio-economic data tends to contribute to the picture of the academically and culturally privileged youngster as the one most likely to persist in the face of difficulty.
Chapter 7
SUGGESTIONS FOR FUTURE STUDY

The most obvious first step in any extension of this research, would be to separate out the effects of the minimal goal-expectancy discrepancy from the level of expectancy alone. If one were to sample all levels of expectancy for each discrepancy group, it would be possible to test whether the expectancy and discrepancy variables had independent and/or interactive effects. It may be that certain minimal goal-expectancy discrepancies occur only when the individual is faced with a low expectation of success. Should the relationship of the discrepancy score to task persistence hold up independently of the level of expectancy, it would then become necessary to understand more clearly whether the combination of minimal goal exceeded by expectancy with a high attainment value (group three's pattern) is, in fact "defensive" and in what way. It may be that another variable such as "test anxiety" is characteristic of the kind of person who has need of such manoeuvres. Perhaps such a person, who has been postulated to state his minimal goal low enough to insure success, would be less persistent if he were working on his own, with no need to meet others' immediate approval. This subject may be more sensitive to external, social reinforcement.

The practical implications of the unattainable minimal goal, coupled with a low expectancy are most directly related to the kind of child seen by the teacher as an "underachiever." It is often asserted that the "bright" child who doesn't live up to his promise is not motivated to learn; i.e. he "just doesn't care about school." If in fact the problem is that he cares "too much" (has incorporated the
socially acceptable high achievement goals wholesale, with no reference
to his own abilities) one would not want to reinforce his "unrealistic"
goals but teach him to find and set goals which are more appropriate
and/or to raise his expectancy level if it appears to be "unrealistically"
low.

If one examines the descriptive statistics for the four discrepancy
groups, it becomes apparent, from the large variance of the fourth
group, that those who stated minimal goals lower than their expectancy
level, coupled with a low attainment value, did not behave in a homo­
geneous way. This and other groups with deviant minimal goal-expectancy
patterns constitute the principal focus of interest since it is their
academic performance which is predicted to differ from the norm. Even
though a large sample was originally tested, from which the 74 experi­
mental subjects were isolated, only 14 students possessed the attributes
necessary to be included in the fourth group. It would seem appropriate
to confine a study to a group of students with severe learning problems
in order to get a large sample of deviant performers. Continued experi­
ence with academic failure would eventually lower the child's level
of expectancy, in which case the sample would represent only one segment
of the range of possible expectancies. The range of persistence times
one would expect with this group would probably differ from those of a
"normally achieving" sample.

One problem which was mentioned in the body of the paper is charact­
eristic of any research approach which relies on the use of verbal state­
ments as indexes of mediational processes. A related, but separate study
would involve an attempt to either test and establish the validity of
the present verbal statements (as representative of the subject's attitudes) or to develop new, behavioral measures of the main theoretical variables. For example, one might develop a behavioral measure of minimal goal level by first obtaining the verbally stated minimal goal level separated in time from the task persistence situation. It would, of course, be necessary to obtain the behavioral measure in reference to the same task as the verbal so that the generalization made would not be too tenuous. The task would be structured so that the subject would be required to start with the experimental problem although he would be given the freedom to turn to a second, highly desirable problem as soon as he chose. It would be important to create some sort of situational pressure which enticed him to abandon the task as soon as he could do so without feeling negligent. The subject would then be provided with continual feed-back about the level of performance he had achieved; i.e. "an A's worth," "a B's worth" etc. and would be observed to see the point at which he quit; whether at the level of his stated minimal goal or elsewhere. The same type of design might be modified to test for attainment value, expectancy etc.

Similarly, one might attempt to obtain a behavioral measure of relative attainment value by presenting a subject with a wide range of achievement tasks, all of which would appear to be of equal difficulty (either very, very difficult or very easy for the age of the subject). This procedure should hold expectancy constant for all subjects. The subject's choice from among these problems would be taken as the operational measure of his highest attainment value.
Two possible research projects are related to the generality-specificity of the minimal goal, expectancy and attainment values within or across individuals. The first would compare these variables between sexes. It would be designed to answer the question of whether mathematics is indeed a "male" subject. It will be noted that expectancy, minimal goal level, minimal goal certainty and attainment value scores were obtained from each subject for mathematics and English. Since English is commonly accepted as a more popular subject with girls; it will be possible to examine the attitudes toward academic achievement in English and to compare them with those which refer to mathematics.

The second possible research interest would be directed at the theoretically important question of the consistency of one's expectancies, minimal goals and attainment values from one type of achievement situation to another. For example, one might sample the level of expectancy for a number of tasks in the intellectual, physical, artistic and mechanical skills areas to examine the amount of ipsative variation. It may be that it is a more frequent occurrence for an individual to have the same level of attainment value across achievement areas than to have large discrepancies between the amount of importance attached to achievement in one field versus another. This would be a more refined approach to the differentiation attempted in the present study with the concepts of "absolute" and "relative" attainment value.

The source of a child's attitudes and standards was given only cursory attention in the present study. It would be interesting and important to obtain direct observation of the parent-child interaction in a problem solving situation to see the amount and type of parental
intervention and the extent to which the child models the parent's achievement behavior and the attitudes which he assumes lie behind their action. This would be another attempt to go beyond the verbal report of either parent or child in the belief that there is less camouflage in a behavioral than in a verbal sample of response and to establish the genesis of the child's attitudes.

An additional factor which may have implications for the achievement behavior in general and persistence in particular is the amount of discrepancy between the standards, expectancies and attainment values of parent and child. Nor need this be confined to parental-child interaction; a discrepancy between the attitudes and belief of a child and any of his "significant others" (parents, teachers or older sibs) may result in frustration or lack of interest with a measurable effect on persistence and eventually academic achievement.

Finally, one might investigate more thoroughly the internal-external control and inner-other direction attitudes of the child as they relate to the amount of task persistence he evidences. It is recognized that in this study, the use of one question devoted to the measurement of these constructs is insufficient. In any kind of replication, it would be a simple matter to include the "Intellectual Achievement Responsibility" scale (Crandall, Katkovsky and Preston, 1962) which refers to the feelings of internal-external control as they relate to intellectual-academic achievement.
Chapter 8

SUMMARY

The following experiment was conceived within the context of Rotter's Social Learning Theory (1954). It represents an attempt to explain experimental task persistence and academic competence by means of an integrated psychological theory. Several new theoretical relationships were also examined.

The social learning theory variables: "expectancy for success," "minimal goal level" and "attainment value" have been described and examined in other experimental contexts; this study was devoted to an examination of the manner in which they are predictive of academic task persistence in an experimental and classroom context.

Seventh, eighth and ninth grade students were asked for statements of the grade in mathematics which they expected to get on their next report card ("expectancy"); the lowest grade they could get and still be satisfied ("minimal goal level"); how important it was for them to do well in mathematics ("attainment value") and how certain they were that they would be able to reach their minimal goal level ("minimal goal certainty"). On the basis of these statements, four groups totaling 74 subjects were composed:

(1) Subjects with minimal goals equal to their expectancy level

(2) Subjects with minimal goals at least one grade level above their expectancy

(3) Subjects with minimal goals at least one grade level below their expectancy and with a high attainment value

(4) Subjects with minimal goals at least one grade level below their expectancy and with a low attainment value.
It was found that of the three main theoretical variables: expectancy, minimal goal level and attainment value, only the level of expectancy related to the length of task persistence. A direct and positive relationship was established between these two variables. The minimal goal certainty score was also found to have a direct, positive relationship with task persistence.

A comparison of the task persistent behavior of the four minimal goal-expectancy groups revealed that group two was the least and group three the most persistent. It was also discovered that group two all had expectancies below the sample median and that group three had expectancies above the median. Without representative sampling for all levels of expectancy in each discrepancy group, it is impossible to separate out the effects of the discrepancy and expectancy variables.

Persistent behavior is believed to be one component of academic competence. Insofar as this experiment approximates the classroom situation, students who are highly task persistent (with high expectancies and a given minimal goal-expectancy pattern) should be more likely to have a pattern of grade point average which exceeds the I.Q. score. Non-persistent students would be expected to have an "under-achieving" academic history, i.e. their I.Q.'s would exceed their grades. The results indicated that there was no demonstrable relationship between task persistence and the relationship of grade point average to I.Q. The minimal goal-expectancy discrepancy score was found to predict to "over- and under achievement" as was the expectancy variable so that the same problem of confounding occurred here as with the first hypothesis.
Additional results were that: (a) social class was found to relate positively and directly with task persistence; (b) students who said they tried to do well to meet their own, internalized standards were more persistent than those who worked to please others; (c) subjects whose fathers were reported to help them often with their homework were less persistent than those who received help less frequently.

The experimental task and testing situation proved to be a reasonable approach to the study of academic task persistence. Questions about the experimental variables were raised, implications of the present findings and suggestions for future study were presented.
Supplementary Results

It will be recalled that it was necessary to give the preliminary questionnaires to all students in the seventh, eighth and ninth grades in order to get a representative group in each of the four minimal goal-expectancy discrepancy groups. Since the computer facilities were available, an intercorrelation matrix was prepared for the total sample. It is presented as Table 18, although the results will not be discussed separately. It provides a kind of reliability check on the smaller sample. It should be recognized that the scores were given new McCall T scores for this analysis. Since a correlation of .24 was significant at the .05 level for the sample of 74, this value was taken as the cut-off value below which the correlation was listed as "non-significant," even though it may have been listed as if it was statistically significant due to its sample size. In Table 18, the first figure is the number of subjects on which the correlation was computed, then the correlation coefficient and finally the level of significance. As with Table 14, the information is given for total group, boys and girls respectively. Listed below are the discrepant correlations between the sub and total sample:

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<th>Variables</th>
<th>experimental grp.</th>
<th>total sample</th>
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Table 18
Intercorrelation Matrix, (N = 500)
Footnotes

1. The support of Mrs. Virginia Crandall and the late Dr. Vaughn Crandall, who offered moral and theoretical support to this research attempt, is gratefully acknowledged. The study was sponsored as part of a larger project, "Parents as identification models and reinforcers of children's achievement development," partially supported by USPH Grant M-02238, Vaughn J. Crandall, senior investigator.

2. Rotter's formula for the relationships to be described below follows:

\[ B.P_{x,s1,R_a} = f (E_x, R_a, s_1 & R.V_a) \]

"The potential for behavior \( x \) to occur in situation 1 in relation to reinforcemement \( a \) is a function of the expectancy of the occurrence of reinforcement \( a \) following behavior \( x \) in situation 1 and the value of reinforcement \( a \)."

Rotter, J.B., Social Learning and Clinical Psychology, page 108

3. A more detailed discussion of this subject is given with reference to LOA board patterns, pages 319-326, Rotter, J.B. Social Learning and Clinical Psychology.

4. Personal communication, Virginia Crandall.

5. The assistance of Mrs. Nancy Teepen for her help in establishing the reliability of the scoring procedures of the "Internal-external control," and the "Inner-other directed" categories was appreciated.

6. Thanks are due to Miss Beverly Collins for her scoring of responses in this category.

7. The collection of data for this study was facilitated by the unusual cooperation of the teaching and administrative staff of the Fairborn Central Junior High School. Special help was given by Mr. Robert Martin, principal and Mrs. Roger Middleswart, secretary.

8. It was necessary to have the help of a large number of different examiners to administer the questionnaires in separate classrooms, on different days. Many thanks to Virginia Crandall, Elinor Waters, Suzanne Good, Janet Robbins, Shelley Wing and Beverly Collins for their help with this phase of the study.

9. In an effort to complete the study before the end of the current academic year, half of the task persistence data was collected by Miss Beverly Collins. Her assistance in this and other phases of the study was indispensable.
10. The availability of the Fels Institute facilities and the assistance of Carl Black and Shirley Kristensen in the use of the computer facilities was greatly appreciated.

11. Because of an insufficient number of girls, it was possible only to repeat this "analysis of variance" for the boys' persistence. The total group results were supported and the comparison of group two with group three resulted in a "t" of -3.74, significant at less than the .001 level.
References


Battle, Esther S., & Rotter, J.B., "Children's feelings of personal control as related to social class and ethnic group." J. Pers., in press.


Stone, C.L. "Disparity between intelligence and scholarship," J. educ. psychol., 1922, 13, 241-244.


Appendix A

1. What is your name? ________________________________________________

2. What grade are you in? ________

3. What school do you attend? _________________________________________

4. When were you born? __________ month ________ day ________ year

5. Circle the grade below which shows the lowest grade that you could get in English and still be satisfied.

   A  A-  B+  B  B-  C+  C  C-  D+  D  D-  F

6. How certain are you that you could get at least the grade you circled above?

   1  2  3  4  5  6  7  8  9  10
   uncertain  certain

7. In which two of all your school subjects are you the best?

   (1) __________________________

   (2) __________________________

8. Why do you try to do well in school?
   Or, if you feel you do not try, then why not? __________________________

   __________________________________________

   __________________________________________

   __________________________________________

   __________________________________________

9. Circle the grade below which shows the lowest grade that you could get in Mathematics and still be satisfied.

   A  A-  B+  B  B-  C+  C  C-  D+  D  D-  F

10. How certain are you that you could get at least the grade you circled above?

    1  2  3  4  5  6  7  8  9  10
    uncertain  certain
Appendix B

1. What is your name? ________________________________________________

2. What kind of work does your father do? ____________________________

3. What kind of work does your mother do? ____________________________

4. What is your favorite subject in school? ____________________________

5. Circle the grade below which shows the grade you really expect to get in Mathematics on your next report card for this grading period.
   A A- B- B- C- C- D- D- D- F

6. What grade are you in? ________________

7. What school do you attend? ____________________________

8. Circle the grade below which shows the grade you really expect to get in English on your next report card for this grading period.
   A A- B- B- C- C- C- D- D- D-

9. What kind of job would you like to have when you grow up? ____________

10. What is your favorite athletic sport? ____________________________

11. Circle the number below which shows how important it is to you to do well in Mathematics.
   1 2 3 4 5 6 7 8 9 10
   not very important very important

12. Name at least 2 things that you like to do in your spare time. ____________________________

13. Circle the number below which shows how important it is to you to do well in English.
   1 2 3 4 5 6 7 8 9 10
   not very important very important
Write on the lines below, the names of the following school subjects to show how important it is to you to be good in each of them.

Social Studies (History or Geography); Mathematics; Art; Science; English; Physical Education

List them from the most important to the least important.

Very important

Least important
Appendix C
The CSD Scale

Name ___________________________________________

Date ___________________________________________

Grade _________________________________________

Birthdate ________________________________
month day year

Sex (male or female) ____________________________

This questionnaire lists a number of experiences that most boys and girls have at one time or another. Read each of these carefully. After you have read one, decide whether it does or does not fit you. If it does, put a T (for true) in front of the statement; if it doesn't, put an F (for false) in front of the statement.

If you have any questions at any time, raise your hand and the person who passed out the questionnaire will come and explain it to you.

__ 1. I always enjoy myself at a party.

__ 2. I never get angry if I have to stop in the middle of something I'm doing to eat dinner or go to school.

__ 3. Sometimes I don't like to share my things with my friends.

__ 4. Sometimes I do not feel like doing what my teachers want me to do.

__ 5. I never act "fresh" or "talk back" to my mother or father.

__ 6. When I make a mistake, I always show good judgment.

__ 7. I feel my parents do not always show good judgment.

__ 8. I have never felt like saying unkind things to a person.

__ 9. Sometimes I have felt like throwing or breaking things.

__ 10. I am always careful about keeping my clothing neat and my room picked up.

__ 11. Sometimes I argue with my mother to do something she doesn't want me to.

__ 12. I never say anything that would make a person feel bad.
13. I am always polite, even to people who are not very nice.

14. Sometimes I do things I've been told not to do.

15. I never get angry.

16. Sometimes I wish I could just "mess around" instead of going to school.

17. Sometimes I dislike helping my parents even though I know they need my help around the house.

18. I have never been tempted to break a rule or a law.

19. Sometimes I try to get even when someone does something to me I don't like.

20. I sometimes feel angry when I don't get my way.


22. I sometimes feel like making fun of other people.

23. I have never borrowed anything without asking permission first.

24. I always do the right things.

25. Sometimes I don't like it when another person asks me to do things for him.
Appendix D

Scoring Directions for "Why do you try to do well in school? Or, if you do not try, then why not?"

Responses will be scored according to their internal-external control qualities; i.e. the source to which the subject attributes the responsibility for his success and failure.

Internal control responses are those in which the respondent implies that he does or does not try to do well in school as a function of his own choice. They suggest that the person is in control over the grades that he receives; that he works because he feels like it or because he likes school and refuses to work because of "spite" toward his teacher, parents or other adults; prefers to do other things than school work or because he doesn't like school or feels that good grades aren't worth the effort.

Examples: I like school
          It makes me feel good
          I prefer to do other things
          I don't like the teacher so I don't work
          I don't like this particular subject so I don't try
          I'm lazy

The main implication in these responses is that it is the person's choice of working or not working which determines whether he does/does not do well in school.

External control responses are those in which the respondent implies a feeling of helplessness regarding his success and failure in school. In most cases external responses are given as an explanation for the subject's poor performance. Such responses state that unreasonable demands are made on the person; that he is the victim of immutable characteristics; that others interfere with and upset his efforts or that other people in his environment don't offer the support which the subject feels is necessary for his achievement.

Examples: I don't get good grades because the teacher is unfair
          I can't understand, no matter how hard I try
          They give us too much homework
          I can't remember as well as the others
          What's the use!
          * I'm just not intelligent enough.

* N.B. These responses do refer to the individual (i.e. he doesn't blame the environment) but they're scored as external because there is the implication that the subject can't change his basic condition (it's a "God-given" attribute). This is a modification by the present author of the original construct.

Non-scorable responses are those which don't deal with the issue of responsibilities for success and failure; they are clearly "socially desirable" statements or answers stated in the form of a cliche or those which reflect the wholesale acceptance of the adult ideology.
Examples: A thing worth doing is worth doing well
Education is important in every walk of life

Note: If a person gives an internal and an external response, it is not scored at all; if he gives an internal or an external response, coupled with a non-scorable response, the total response is scored as internal or external.

* * * * * * * * * *

Responses will be scored according to their \textit{inner-other directed} nature, based on the following reasoning. This scheme is an adaptation of the Reisman concepts. Categorization of this concept deals with the question of the \textit{source of reinforcement} and consequently the person's \textit{motivation} for working. Whether the individual is working to meet his own, internalized standards or whether his work, or lack of it, is a direct response to the approval/disapproval of others.

\textbf{Inner directed} responses are those in which the person does/does not work because of some intrinsic motivation, personal goals, likes or dislikes or cases in which he has internalized external standards so that he works because of feelings of pride, shame or satisfaction.

\begin{itemize}
\item \textbf{Examples:} I want to get good grades so that I can go to college.
\item I don't like math so I don't try in it.
\item When I get good grades it makes me feel good.
\item If I know I've done my best in school I'm satisfied.
\item I like / don't like school.
\end{itemize}

\textbf{Other directed} responses usually have reference to the fact that the reinforcements which motivate performance are external; either parental or academic. The person works either to please others and win approval for academic work or to avoid their disapproval. The notion of motivation coming from some outside source is clearly related to this classification.

\begin{itemize}
\item \textbf{Examples:} I work hard so that my parents will be proud of me.
\item If I don't get good grades my parents will punish me.
\item My parents put pressure on me.
\item The teachers aren't strict enough.
\end{itemize}

\textbf{Non-scorable} responses are mixtures of inner and other directed answers; responses which make no reference to the source of motivation or those for which there is insufficient information.

\begin{itemize}
\item \textbf{Examples:} I just can't understand, no matter how hard I try.
\item I work hard because I feel good when I get good grades and because my parents are pleased when I pass.
\item I want to get good grades.
\end{itemize}
N.B. Inner-other directed responses must be clearly differentiated from Internal-external control responses. The following combinations might occur.

**Internal control - Inner directed:** I don't work hard (Internal) because it's not important to me (Inner).

**Internal control - Other directed:** I work hard (Internal) to please my parents (Other).

**External control - Inner directed:** I fail no matter how hard I try so I quit (External) but it makes me feel horrible (Inner).

**External control - Other directed:** I try to please my parents by getting good grades (Other) but I haven't a chance with our English teacher (External).
Appendix E

Description of spare time activities coded as academic

I. Literary
   A- Reading
   B- Writing stories and poems

II. Musical
   A- Playing musical instrument - piano, organ, guitar, flute
      1- solo
      2- concert (band)
   B- Composing music

III. Artistic
   A- Draw or paint - portraits, landscapes etc.

IV. Dancing
   A- Ballet

V. Hobbies
   A- Ham radio and electronics
   B- "Scientific"
      1- "experiment"
      2- collect insects and classify them
      3- capture and study wildlife
      4- botanical study
   C- Photography

VI. Other
   A- Indian lore
Appendix F

1. What is your name? ______________________________

2. What grade are you in? _____

3. What school do you attend? ______________________________

4. List all the children in your family from oldest to youngest, including yourself.

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5. Make a check mark to show how important good grades are to your mother?

- very important
- important
- not so important
- unimportant

6. Make a check mark to show how important good grades are to your father?

- very important
- important
- not so important
- unimportant

7. My mother helps me with my homework: often ________
   sometimes ________
   (check one) rarely ________
   never ________
8. My father helps me with my homework: often ___
sometimes ___
rarely ___
ever ___

9. When your mother was your age, how do you think she was in Mathematics, compared to you now?
   (check one) better ___
                the same ___
                worse ___

10. When your father was your age, how do you think he was in Mathematics, compared to you now?
    (check one) better ___
                   the same ___
                   worse ___

11. Have you ever had a part-time job? yes ___ no ____. If so, what was it?

   __________________________________________
Appendix G
Mathematics Problem

Fill in the squares using all the numbers from 1 through 16 so that the sum of the numbers in each column, row and diagonal is equal to 34.

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<td>6</td>
<td>9</td>
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-103-
<p>| No. | Sex | Persist | Age | SES | I.Q. | G.P.A. | Math Gr. | M.G. | AVab | AVrel | Ex. | MGC | CSD | Ach | Ach | Ach | Ach | Ach |
|-----|-----|---------|-----|-----|-----|--------|----------|------|------|-------|-----|------|-----|-----|-----|-----|-----|-----|-----|
| 105 | F   | 14      | 159 | --- | --- | 3.6    | 01       | 02   | 10   | 2     | 05  | 04   | 08  | 4   | 3   | 7   | 6   |
| 107 | M   | 28      | 153 | 6   | 097 | 2.4    | 03       | 05   | 07   | 1     | 02  | 05   | 04  | 6   | 6   | 4   | 4   |
| 113 | M   | 45      | 160 | 3   | 112 | 5.0    | 04       | 06   | 08   | 2     | 06  | 08   | 21  | 6   | 7   | 7   | 7   |
| 114 | F   | 07      | 154 | 6   | 118 | 8.4    | 06       | 05   | 07   | 1     | 08  | 07   | 13  | 9   | 9   | 6   | 5   |
| 117 | M   | 15      | 151 | 4   | 114 | 5.6    | 05       | 09   | 09   | 1     | 05  | 10   | 03  | 9   | 7   | 6   | 7   |
| 119 | M   | 30      | 159 | 1   | --- | 10.6   | 10       | 07   | 09   | 2     | 10  | 09   | 04  | 9   | 9   | 9   | 9   |
| 128 | M   | 20      | 157 | 3   | 103 | 4.8    | 03       | 06   | 06   | 2     | 03  | 07   | 10  | 8   | 7   | 6   | 5   |
| 129 | F   | 25      | 159 | 7   | 100 | 2.6    | 02       | 05   | 06   | 2     | 05  | 05   | 04  | 6   | 7   | 5   | 5   |
| 136 | F   | 37      | 162 | 7   | 104 | 4.4    | 03       | 05   | 10   | 1     | 02  | 03   | 12  | 8   | 8   | 6   | 7   |
| 141 | M   | 45      | 162 | 3   | 110 | 7.8    | 09       | 10   | 10   | 1     | 10  | 09   | 12  | 9   | 9   | 5   | 6   |
| 144 | M   | 03      | 168 | 5   | 081 | 1.6    | 01       | 03   | 07   | 4     | 07  | 05   | 15  | 2   | 2   | 3   | 3   |
| 145 | M   | 14      | 168 | 5   | 084 | 4.8    | 03       | 07   | 01   | -     | 02  | 07   | 08  | 4   | 5   | 5   | 6   |
| 147 | F   | 38      | 153 | 1   | 127 | 10.8   | 09       | 10   | 10   | 1     | 10  | 09   | 10  | 9   | 9   | 9   | 9   |
| 148 | M   | 15      | 164 | --- | 084 | 2.0    | 01       | 09   | 05   | 3     | 02  | 05   | 19  | 6   | 4   | 5   | 7   |
| 154 | M   | 20      | 153 | 5   | 106 | 3.2    | 02       | 12   | 10   | 1     | 06  | 01   | --  | 8   | 7   | 8   | 8   |
| 163 | M   | 18      | 151 | 4   | 111 | 6.0    | 06       | 02   | 08   | 2     | 06  | 09   | 09  | 8   | 6   | 6   | 5   |
| 165 | M   | 32      | 177 | 3   | --- | 4.2    | 03       | 04   | 10   | 1     | 09  | 08   | 15  | 9   | 5   | 4   | 4   |
| 172 | M   | 45      | 162 | --- | 104 | 7.2    | 03       | 09   | 10   | 1     | 04  | 04   | 15  | 7   | 7   | 7   | 8   |
| 174 | M   | 31      | 162 | 3   | 115 | 1.4    | 01       | 05   | 10   | 1     | 01  | 05   | 01  | 5   | 5   | 4   | 4   |
| 187 | M   | 04      | 165 | --- | 103 | 2.2    | 01       | 06   | 10   | 1     | 01  | 04   | 09  | 4   | 5   | 5   | 6   |
| 190 | M   | 17      | 156 | 5   | 102 | 1.8    | 01       | 12   | 10   | 1     | 07  | 09   | --  | 7   | 3   | 6   | 6   |
| 200 | F   | 22      | 154 | --- | --- | 5.0    | 02       | 05   | 10   | 5     | 02  | 06   | 11  | 6   | 7   | 4   | 4   |
| 206 | M   | 22      | 151 | 5   | 106 | 2.2    | 01       | 04   | 08   | 4     | 04  | 09   | 10  | 6   | 5   | 5   | 5   |
| No. | Sec | Persis | Age | SES | I.Q. | G.P.A. | Math Gr. | M.G. | AVab | AVrel | Ex. | MGC | CSD | Ach | Ach | Ach | Ach |
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| 401 | F   | 31     | 166 | 7   | 113 | 4.6    | 07       | 05  | 10  | 1    | 08  | 10  | 08  | 60  | 30  | 45  |
| 402 | F   | 45     | 162 | 1   | 127 | 7.8    | 07       | 04  | 09  | 3    | 08  | 08  | 07  | 50  | 85  | 70  |
| 406 | M   | 30     | 168 | 5   | 125 | 8.2    | 09       | 06  | 09  | 3    | 01  | 08  | 00  | 95  | 95  | 97  |
| 411 | M   | 21     | 166 | 5   | 105 | 6.8    | 07       | 09  | 09  | -    | 09  | 06  | 02  | 50  | 65  | 55  |
| 421 | F   | 45     | 167 | 6   | 116 | 10.0   | 09       | 06  | 08  | 3    | 09  | 09  | 07  | 50  | 75  | 60  |
| 423 | F   | 20     | 171 | 3   | 105 | 4.5    | 04       | 03  | 08  | 3    | 03  | 08  | 08  | 15  | 30  | 20  |
| 425 | M   | 40     | 164 | 2   | --- | 7.0    | 05       | 06  | 09  | 1    | 09  | 07  | 05  | --  | --  | --  |
| 427 | M   | 24     | 179 | 6   | --- | 2.0    | 01       | 06  | 05  | 1    | 03  | 06  | 02  | 50  | 60  | 55  |
| 432 | M   | 38     | 163 | --- | 136 | 11.4   | 12       | 12  | 09  | 2    | 12  | 10  | 09  | 65  | 99  | 90  |
| 437 | M   | 45     | 174 | 2   | 124 | 11.0   | 11       | 11  | 08  | 2    | 11  | 08  | 06  | 95  | 97  | 97  |
| 439 | F   | 23     | 173 | 1   | 114 | 9.8    | 09       | 08  | 09  | 5    | 12  | 01  | 08  | 70  | 90  | 85  |
| 443 | M   | 45     | 164 | 1   | --- | 11.6   | 12       | 09  | 10  | 1    | 12  | 10  | 06  | --  | --  | --  |
| 446 | F   | 38     | 166 | --- | 112 | 9.5    | 11       | 12  | 10  | -    | 12  | 10  | 06  | 30  | 60  | 45  |
| 447 | F   | 34     | 165 | 6   | 115 | 9.6    | 09       | 07  | 09  | 2    | 10  | 08  | 03  | 55  | 55  | 55  |</p>
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I, Esther S. Battle, was born in Toronto, Ontario, Canada, May 26, 1937. I received my secondary-school education at the University High School, Columbus, Ohio. My undergraduate work was completed at Antioch College and the London School of Economics. In 1959, I received the Bachelor of Arts degree from Antioch College with Sociology as my major field of study. During my second year of study in Clinical Psychology in the Ohio State University graduate school, I was given a United States Public Health grant. The following two years were spent at the Veterans Administration Center, Dayton, Ohio, at which time I received supervised clinical internship experience. In 1962, I received the Master of Arts degree from Ohio State University and began work on my dissertation as part of a larger project at the Fels Research Institute, Yellow Springs, Ohio. The requirements for the Doctor of Philosophy degree were completed in 1963.