72-13,472

McMAHAN, Ian Douglass, 1940-
CAUSAL ATTRIBUTIONS AND EXPECTANCY OF SUCCESS: AGE AND SEX DIFFERENCES.

The City University of New York, Ph.D., 1972
Psychology, experimental

University Microfilms, A XEROX Company, Ann Arbor, Michigan

CAUSAL ATTRIBUTIONS AND EXPECTANCY OF SUCCESS: AGE AND SEX DIFFERENCES

by

IAN DOUGLASS McMAHAN

A dissertation submitted to the Graduate Faculty in Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York.

1971

This manuscript has been read and accepted for the Graduate Faculty in Psychology in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

November 19 1971
date

Charles P. Smith
Chairman of Examining Committee

November 19, 1971
date

Walter Weiss
Executive Officer

Charles P. Smith

Irwin Katz

Samuel Messick

Supervisory Committee

FOREWORD

By intent, a doctoral dissertation is supposed to exemplify the solitary research endeavor. In reality, of course, it is no such thing. Its successful completion must depend on good will and efforts of many people other than the author. The present study is no exception.

I wish first to acknowledge the contributions of Charles P. Smith, who first introduced me to the theory of achievement motivation, who encouraged an interest in sex differences in achievement behavior, and who, as chairman of the dissertation committee, gave unstintingly of his time and knowledge at every step, from the earliest conception of the study to the editing of the final draft. The advice and interest of the other members of the dissertation committee, Irwin Katz and Samuel Messick, was of great value. I wish also to acknowledge the seminal role played by Bernard Weiner of the University of California, Los Angeles, whose theoretical approach to achievement behavior informed this study and who served on the dissertation committee while a Visiting Professor at the City University of New York.

For assistance in gaining access to subjects, I am indebted to Charles V. Sansone and Malcolm F. Rizzuto of the Fox Lane Middle School, Bedford, New York, and to Bernard Seidenberg of the Department of Psychology, Brooklyn College of the City University of New York. The cooperation of the teachers in the Department of English at the Fox Lane School and in the Department of Psychology at Brooklyn College was greatly appreciated.

The Test Anxiety Scale for Children was ably administered to the sixth and tenth grade subjects by Jane Terman McMahan, while the Test Anxiety Questionnaire was given to the college subjects by Ethel Elman and Yaela Guday. Their assistance is gratefully acknowledged.

Data analysis was performed at the Computer Facility of the Graduate Center, City University of New York. The patient advice of Norm Rubin and Larry Jordan of the Facility staff helped greatly in carrying out the often-complex analyses.

The research reported in this dissertation was performed during the author's residency at the Russell Sage Foundation as a Graduate Student Fellow, and was supported by funds from the Russell Sage Foundation. The advice and encouragement of the professional staff of the foundation, and particularly that of Orville G. Brim, Jr. and Hugh F. Cline, was of incalculable value.

The task booklets and several preliminary drafts of the dissertation, as well as the bulk of the final draft, were typed by Mrs. Joan Pifer of the Russell Sage Foundation staff. Her patience, efficiency, and good humor are gratefully acknowledged.

Finally, I wish to acknowledge my debt to the students at the Fox Lane Schools and Brooklyn College, who cheerfully put up with proceedings that must have seemed a bit odd, who expressed interest in the explanations offerred them at the conclusion of the experimental session, and who asked some provocative questions about the theory as it was explained to them. Without their cooperation this study could not have been done.

TABLE OF CONTENTS

Chapter Page

LIST OF TABLES

Table | Page

Table Page

LIST OF FIGURES

CHAPTER I

INTRODUCTION

General Introduction

Every day a person is obliged to undertake tasks which require the use of some of his resources and the outcome of which can be judged by some standard to be successful or unsuccessful. Furthermore, a person generally approaches such a task with some expectation that the outcome will be relatively successful or unsuccessful, and when he has concluded the task, he often wishes to understand the obtained outcome. "Understanding the outcome" involves an examination of its possible causes and an assignment of weights to each. These attributions of causality which the person makes for his outcome are presumed to influence the formation of future expectations of success or failure on similar tasks. This, in brief, is the conception of achievement behavior that underlies the present study.

While achievement tasks, loosely defined, are a feature of everyday life, the environment with which they are perhaps most closely associated is the school. The report on equality of educational opportunity (Coleman et al., 1966) indicates that, among white grade-school students, the most important factor associated with variability in verbal skills is "self-concept," and the second most important factor is "control of the environment." Among black students these are also the two most important factors, but their positions are reversed. An examination of the questions on which these measures were based suggests that the first is strongly related to generalized expectations for intellectual success, while the second is, in effect,

asking the subject whether he perceives the causes of his successes and failures as within or outside of his own personal control.

It is not surprising to find that expectations of intellectual success are positively related to actual intellectual successes, since presumably these expectations are influenced by prior successes. However, there is reason to believe that the causal link between the two is not unidirectional. For example, Brim (1954) found that college grades and self-estimates of intelligence (with actual intelligence controlled) were positively related. Moreover, Brookover et al. (1965) found that experimental attempts to change self-estimates of mathematical ability lead to improvement in subsequent marks. The finding of Rosenthal and Jacobson (1968), that the expectations of teachers apparently influence the educational performances of their pupils, is also pertinent.

The present study has two major objectives. The first is to test the validity of a model of achievement behavior that draws upon three theoretical traditions: attribution theory (Heider, 1958; Kelley, 1967), social learning theory (Rotter, 1954), and the theory of achievement motivation (Atkinson and Feather, 1966). This model has been developed most explicitly by Weiner and his associates (Weiner and Kukla, 1970; Weiner, Freize, Kukla, Reed, Rest and Rosenbaum, 1971). The second objective is to gather a body of empirical data on the causal attributions and changes in expectancy of success associated with differing outcomes in males and females of different ages, and to examine these data for age and sex differences.

Expectancy of Success

Expectancy of success has been defined as "the subjective probability of an individual that his behaviors will result in a given

event (or reinforcement)" (Rotter, 1954). An operationalized definition, more suited to the purposes of this study, is "the subject's stated expectations that his subsequent achievement efforts would eventuate in success rather than failure" (Crandall, Katkovsky, and Preston, 1962). Expectancy of success is often used to refer to general expectations of this sort, while the term "subjective probability of success" refers to the subject's expectation of or confidence in a successful outcome on a particular task. In prior research the two concepts have often been measured differently: subjective probability of success is most often conceived of as a probability statement, varying from zero to one, while expectancy of success has been conceptualized in a number of different ways: as the number or proportion of a set of tasks the subject expects to have successful outcomes (e.g. Walls and Cox, 1971); as the subject's confidence in passing a test according to some announced norm (e.g. Feather, 1969); as the most difficult of a series of graded tasks that the subject expects to be able to solve (e.g. Crandall, 1969); and as the relative position within a group of subjects that the subject expects to attain on the task (e.g. Crandall, 1963). Despite these different operational conceptions, however, the theoretical determinants of generalized expectancy and specific subjective probability of success are essentially similar. In this sense, they may be regarded as alternative measures of the same underlying variable.

Both situational and intra-personal factors have been found to influence the formation of expectancies of success. A number of investigators (e.g. Crandall, 1963; Feather, 1966) have demonstrated that at least when the subject perceives the task as skill-oriented,

positive reinforcement or a success experience has the effect of raising expectancy of success on future trials while negative reinforcement or a failure experience has the effect of lowering expectancy on future trials. Among the intra-personal factors which have been found to affect expectancy, Feather (1965) has shown that a person with high need for achievement tends to judge his probability of success at a particular task as higher than does a person with a low need for achievement. Similarly, a person with high test anxiety tends to judge his probability at a particular task as lower than a person with low test anxiety. Later in this chapter, hypotheses will be advanced concerning specific cognitive processes that mediate between the perceived outcome and the formation of expectancies of success.

Sex Differences in Expectancy

Several investigators have reported that females state lower expectancies of success, both for particular tasks and for more generalized intellectual achievement efforts. Crandall (1969) reports two studies, one with elementary school age subjects and another with young adults, in which subjects were asked to state their subjective probability of success at novel tasks. In both studies the female subjects stated lower expectancies. Furthermore, in the study using young adult subjects, all subjects received 80% positive reinforcement across trials and were then asked for another expectancy estimate. The female mean expectancies were lower than the male means both before and after the task; however, the change scores, that is, the amount by which expectancy was raised after 80% positive reinforcement, were practically identical for males and females. This suggests that the

process mediating between outcome and expectancy is not different in the two sexes. Feather (1969) asked his male and female college age subjects to rate their confidence in passing a test that involved solving anagrams. The female subjects rated their confidence significantly lower than did the males.

Other research indicates that this sex difference in expectancy may not be solely task specific. In another study reported by Crandall (1969), an entire class at Antioch College was asked at registration each quarter to predict the grade they expected in each course being taken. The grades actually received were obtained from college records. While the females earned slightly higher grades than the males, their expectancies were consistently and significantly lower than those of the males. An examination of the discrepancies between received grades at the end of one quarter and expected grades for the next quarter showed that the females expected slightly better grades than they had just received and the males expected considerably better grades than they had just received. Brim, Goslin, Glass, and Goldberg (1965) found that, in a nationwide sample of tenth and twelfth graders, boys had higher estimates of their ability relative to their actual ability than did girls. Crandall, Katkovsky, and Preston (1962) studied a group of quite intelligent first-, second-, and third-graders, and found that the correlation between expectation of intellectual success and actual IQ test performance was .62 among males and -.41 among females, indicating that, the more intelligent the girl, the lower her expectancy of success. This finding needs replication. It should also be noted that, in this same study, no overall difference in expectation of success appeared between the boys and girls.

Other studies have also failed to find a sex difference in expectancy of success. Feather (1967) gave Australian college students a letter substitution task, presenting it either as a test of intelligence or as a chance-determined task, and found no sex difference in expectancy of success under either condition. In a recent study by Stein (1971), which measured expectancies for success in sixth and ninth grade students across six achievement areas, a significant sex difference in expectancy was found only in the achievement area of mechanical skills, and that only in subjects of lower social class. Moreover, Feather and Simon (1971), in a replication of Feather's (1969) study failed to find the sex difference in expectancy that was a prominent result of the earlier study. It appears, then, that the existence of generalized lower expectancies of success among females is still an open question, and that the age and socio-economic status of the subjects, as well as the specific nature of the task, may well be important determinants of this sex difference, when it is found.

Attribution Theory and Achievement Behavior

A major theoretical basis of the present study is an attributional model of achievement behavior, inspired by the social psychological theory of Heider (1958), and developed by Weiner and his associates (Weiner and Kukla, 1970; Weiner et al., 1971). According to this model, following success or failure at an achievement task, a person makes implicit attributions of causality for the outcome to some combination of four factors: ability, effort, the difficulty of the task, and luck. The person uses these attributions both for postdiction (to explain his outcome to himself) and for prediction (to form expectancies of success and failure on future, similar, tasks).

The four factors of ability, effort, task difficulty, and luck can be comprised within two dimensions, locus of control (internal vs. external) and degree of stability (fixed vs. variable), as shown in Table 1.

TABLE 1

CLASSIFICATION OF ATTRIBUTIONAL FACTORS[1]

	Locus of Control	
Stability	Internal	External
Fixed	Ability	Task Difficulty
Variable	Effort	Luck

[1]From Weiner et al., 1971

The locus of control dimension is seen as important in determining approach tendencies toward achievement tasks: internality for success leads to greater self-reward, which in turn increases response probability. This dimension will be discussed at greater length later in this chapter.

Initial expectancy of success is considered to be based on "the assumed level of ability in relation to perceived task difficulty (labeled by Heider as 'can'), as well as an estimation of intended effort and anticipated luck" (Weiner, et al., 1971). Because both level of ability and difficulty of the task are regarded as relatively fixed, these estimates place certain constraints on possible causal

attributions following an encounter with the task. For example, a person who perceives his ability at a task to be fairly high cannot consistently attribute a failure to lack of ability. If the same person succeeds, he need not attribute his success to high ability, but that option is open to him. It should also be noted that the status of ability and task difficulty as fixed factors is qualified by the fact that they are also estimates. It is possible for a person to revise his estimates as a result of his experience with the task and his causal attributions for the outcome. Following a perceived success, an attribution to high ability would tend to confirm or even raise the person's estimate of his ability, while an attribution to task ease would tend to confirm or lower his estimate of the difficulty of the task. Similarly, following perceived failure, an attribution to low ability would tend to lower the person's estimate of his ability, while an attribution to task difficulty would tend to raise his estimate of the difficulty of the task. These revised estimates would then affect subsequent expectancies, raising them in the case of success and lowering them in the case of failure.

However, attributions of success to high effort or good luck will not necessarily raise expectancy, may alter it not at all, and can even lower it by lowering the subject's anticipated effort or luck for subsequent trials. Similarly, attributions of failure to low effort or bad luck will not necessarily lower subsequent expectancy, may alter it not at all, and can even raise it, either by inducing the subject to intend to make a greater effort or through the operation of the "gambler's fallacy," the notion that bad luck makes subsequent good luck more probable.

Taken in conjunction with the previous paragraph, this suggests the following hypotheses:[1]

> Following success, an attribution to fixed factors is accompanied by higher expectancies of success than an attribution to variable factors.
>
> Following failure, an attribution to fixed factors is accompanied by lower expectancies of success than an attribution to variable factors.
>
> A change in expectancy downward following success or upward following failure is more likely to be preceded by an attribution to variable factors than an attribution to fixed factors.

It should be noted that Weiner (Weiner et al., 1971) arrives at similar hypotheses by way of a rather different train of thought. Inasmuch as ability and task difficulty are stable factors, the attribution of an outcome to them implies a high probability that another encounter with the task will result in the same outcome. However, since effort and luck are variable factors, attributions of an outcome to them do not carry this implication.

The distinction between fixed and variable factors has other implications as well. On a relatively familiar task for which the subject holds fairly well-defined estimates of his ability and the difficulty of the task, he should, if his expectancy is disconfirmed, tend to avoid attributing the disconfirming outcome to ability or task difficulty, which would involve altering his previously defined estimates, and attribute it instead to effort or luck. This relationship may be stated as a hypothesis:

---

[1]The hypotheses are restated, in a somewhat different order and form, in the last section of this chapter. For that reason, they are not numbered at this time.

> An outcome that disconfirms the subject's prior expectancy is more likely to be attributed to variable factors (effort and luck) than to fixed factors (ability and task difficulty).

Conversely:

> An outcome that confirms the subject's prior expectancy is more likely to be attributed to fixed factors (ability and task difficulty) than to variable factors (effort and luck).

Feather (1969) found that subjects who experience expectancy disconfirmation give greater attributions to luck. He interpreted this as a shift to an external locus of control, but since he contrasted only ability and luck attributions in this study, it can also be interpreted as a shift to an unstable factor. An argument can be made for his interpretation within the four-factor model, however. Since both ability and effort are internally controlled or determined, the subject may alienate a strongly disconfirming outcome from himself by attributing it to an external factor, be it luck or task difficulty. In effect, he may say to himself, "This turned out to be much harder (or easier) than I expected." This possibility suggests alternatives to the two hypotheses stated in the preceding paragraph:

> An outcome that disconfirms the subject's prior expectancy is more likely to be attributed to external factors (task difficulty and luck) than to internal factors (ability and effort).
>
> An outcome that confirms the subject's prior expectancy is more likely to be attributed to internal factors than to external factors.

It is also conceivable that individuals differ in the relative salience of the locus of control dimension and the stability dimension, in which case some might behave in accordance with the first two hypotheses

while others behave more in accordance with the second two. The method in the present study permits an examination of these possibilities.

When the subject is presented with a relatively novel task, for which his ability and task difficulty estimates are not well defined, an attribution of the outcome to any of the four factors would appear to be equally possible, whether his expectancy is confirmed or disconfirmed. As he gains experience with the task, however, we may expect, first, that his expectancy will become more consonant with his previous outcomes, and second, if he then obtains a dissonant outcome, that he should attribute it to variable factors (or, by Feather's interpretation, to an external factor).

It also follows from these considerations that a series of successes or failures should lead to increasing attributions to fixed factors: first, because of the suitability of fixed factors as causes of a stable series of outcomes, and second, because as expectancy becomes more consonant with previous outcomes, its confirmation on subsequent trials should favor attributions to fixed factors. This leads to the following hypothesis:

> Repeated successes or failures tend to be attributed increasingly to fixed factors.

Previous Research on Causal Attributions

Most of the research to date on causal attributions for achievement outcomes is described at length in the Weiner et al. (1971) monograph. What follows is a review of those aspects of this research that are immediately relevant to the present study or to the deriviation of its hypotheses.

Frieze and Weiner (in press) gave subjects information about a

hypothetical person's percentage of past success on a task, his percentage of past success on similar tasks, and the percentage of others succeeding at the task, and asked them to judge the causes of a present success or failure. The results indicate that this information is systematically used to form attributions, that success is more likely to be attributed to internal factors than is failure, that performance consistent with that of others is attributed to the task, and that performance consistent with one's own past performance is ascribed to fixed factors while inconsistent performance is ascribed to variable factors. In addition, individual data analyses revealed considerable systematic but idiosyncratic use of the supplied information.

Success and failure appear to have a direct effect on estimates of causal factors. College-age males and females rate their ability, effort, and luck as higher following success on a number-guessing task than following failure (Weiner et al., 1971; McMahan, 1971). In addition, McMahan (1971) found that, on this task, the ability ratings of males were higher than those of females following both success and failure.

A study examining the relationship of attributions to expectancy is reported by Weiner, Heckhausen, Meyer and Cook (in press). German male high-school students were given five trials on a digit-symbol substitution task. On each trial failure was induced and the subject was then asked to allocate the perceived causes of his failure among the factors of ability, effort, task difficulty, and luck. He then estimated his probability of success for the next trial. The results indicate that expectancy of success following failure is significantly

lower for those subjects high in attribution to the combined fixed factors (ability and task difficulty) than for those low in attribution to these factors.

Cognitive Development and Causal Attributions

The attributional model put forth by Weiner et al. (1971) does not contain any specific hypotheses or speculations concerning developmental trends. However, it may be suggested that a younger subject will find a new task more novel simply because of a greater lack of experience. It would follow from this common-sense notion, first, that younger subjects might be less inclined to shift their attributions to variable factors when they experience expectancy disconfirmation, because their estimates of ability and task difficulty are relatively more fluid than those of older subjects, and second, that younger subjects might be less constrained in their attributions by the task characteristics than older subjects.

From Piagetian research on the development of concepts of probability (e.g. Piaget and Inhelder, 1951), we might expect that preadolescent subjects who have not yet attained the stage of formal operations have less well-formed concepts of probability. If so, these younger subjects would be more able to persist in attributing a series of similar outcomes to luck, whereas an older subject would perceive an inconsistency in such persistence. In addition, the expectancies of the younger subject might correspond less directly to his past experience than would be the case with an older subject.

More generally, since the attributional model posits a set of complex cognitive processes by which the subject weighs various cues,

including characteristics of the task, previous experiences with similar tasks, and information about the performance of others, in order to assign causality for his outcome, most theories of cognitive development (e.g. Piaget, 1970; Bruner, et al., 1966) would lead us to expect that the efficiency and accuracy of these processes, and hence of the attributions themselves, would increase with age. If so, it may be that deviations from the objective accuracy of attributions, associated with such personality characteristics as anxiety and unrealistic self-estimates of ability, are more readily discernable from "random" inaccuracy at later ages.

Achievement Motivation and Causal Attributions

One of the aims of the attributional model of achievement behavior is to provide a better explanation for the many well-established findings in the literature on achievement motivation. Furthermore, as was mentioned earlier, Feather (1965) demonstrated a relationship between the motivational variables in the achievement motivation model and expectancy of success. In the Atkinson model (Atkinson and Feather, 1966), these variables are the motive to succeed, operationalized as need achievement, and the motive to avoid failure, operationalized as test anxiety. Those in whom the motive to succeed is stronger than the motive to avoid failure are said to be high in resultant achievement motivation; those in whom the motive to avoid failure is stronger than the motive to succeed are said to be low in resultant achievement motivation. Weiner and his associates (Weiner et al., 1971) on the basis of a number of studies, state that individuals high in resultant achievement motivation tend to attribute success to high ability and effort and to ascribe failure to a lack of effort, while individuals

low in resultant achievement motivation tend to ascribe success to external rather than internal factors and to exclude effort as a causal factor, while they ascribe failure to a lack of ability. It should be noted, however, that Weiner and his colleagues have usually employed an objective questionnaire designed to measure resultant achievement motivation (Mehrabian, 1968). Because this measure is relatively new, it is not clear to what extent it is comparable to the more conventional measures of motive to succeed and motive to avoid failure, that is, fantasy need-achievement and test anxiety.

Age and Sex Differences in Achievement Motivation

The achievement motivation literature has been plagued from its beginnings by often uninterpretable sex differences. In the series of validity studies of the fantasy need-achievement measure reported by Veroff, Wilcox, and Atkinson (1953), it was found that the responses of males to projective pictures of males, as predicted, contained more achievement imagery under achievement-oriented conditions than under neutral conditions; however, female responses to the same pictures were significantly higher than male responses under neutral conditions, and slightly higher under achievement-aroused conditions, and did not significantly increase between conditions. When pictures of females were used as stimuli, the female need-achievement scores were again slightly higher than male scores in both conditions, and again did not increase under achievement arousal. Similar results were obtained when subjects were tested in all female groups which were presumed to eliminate any achievement cues resulting from the presence of males, and when subjects of high-school age, presumably not as select a sample,

were tested. As a result of these early studies, the bulk of research on achievement motivation has been performed using only male subjects, although there are notable exceptions (e.g. French and Lesser, 1964; Horner, 1968). Hoffman (in press) has reviewed the existing research on the developmental antecedents of achievement motivation in females.

Cross-sectional data on need-achievement across the elementary-school years have been reported by Veroff (1969). In response to male stimulus cards, the need-achievement scores of males in grades one through six are significantly higher than those of females. In view of the opposite pattern in late-high-school and college-age subjects, this finding is surprising, as Smith (1969) has noted. It suggests that at some point between the ages of 12 and 18 female need-achievement scores begin to surpass male scores. Some support for this suggestion can be found in the data of Kagan and Moss (1959), who found that at age 8 more males than females produced achievement themes to projective stimuli, that at age 11 the difference was in the same direction but smaller, and that at age 14 slightly more females than males produced achievement themes.

Reliable sex differences have also been found in test anxiety. Hill and Sarason (1966) report that girls score slightly higher than boys on test anxiety in the first grade, that the difference increases with age, and that by the fifth grade it is highly significant. Feld and Lewis (1969) found that white girls have significantly higher test test anxiety scores than white boys in the second grade. (This sex difference did not appear among black second-grade children.) One possible explanation for higher female test anxiety scores, suggested

by Sarason, Davidson, Lighthall, Waite, and Ruebush (1960), is that girls may be more willing than boys to admit anxiety. The finding (Hill and Sarason, 1966) that boys score higher than girls on defensiveness and lie scales supports this suggestion.

Locus of Control

Social learning theory (Rotter, 1954) has directed attention to the dimension of locus of control (reviewed by Lefcourt, 1966 and Rotter, 1966) and its possible relationship to expectancy of success. "In its simplest form, our basic hypothesis is that if a person perceives a reinforcement as contingent upon his own behavior, then the occurence of either a positive or negative reinforcement will strengthen or weaken potential for that behavior to occur in the same or similar situation. If he sees the reinforcement as being outside his own control or not contingent, that is, depending upon chance, fate, powerful others, or unpredictable, then the preceding behavior is less likely to be strengthened or weakened" (Rotter, 1966). Studies by Phares (1957), James and Rotter (1958), and Rotter, Liverant, and Crowne (1961) indicate that increments in expectancy following success, and decrements following failure, are significantly greater when the subjects perceive the task as controlled by skill or under internal control than when they perceive it as under the control of chance or externally controlled. As Weiner (Weiner, et al., 1971) points out, however, "skill" and "chance" differ not only along the dimension of locus of control, but also in the degree of stability which they are considered to possess. An attribution-theory interpretation of these results would assert that the differences in expectancy are primarily

the result of the difference in stability between skill and chance, or within the model, ability and luck, rather than the difference in locus of control. The study of German high school students reported by Weiner, Heckhausen, Meyer and Cook (in press) and discussed earlier in this chapter lends support to this assertion. Thus when the locus of control and stability dimensions are disentangled, it is the stability dimension, rather than the locus of control dimension, that appears more important in producing the expectancy differenced reported by Phares (1957) and others.

The locus of control dimension, on the other hand, is seen in the attributional model as mediating self-reward and self-punishment. It is intuitively reasonable to suppose that one might feel more pride in a successful outcome that is perceived as being one's own responsibility than in one perceived to be externally determined, and data to support this supposition is reported in Weiner, et al. (in press), as well as in Weiner and Kukla (1970). These studies also provide some support for the relationship between internality for failure and self-punishment. These relationships are stated as hypotheses:

> A subject who attributes a success to internal factors experiences greater positive affect than a subject who attributes it to external factors.
>
> A subject who attributes a failure to internal factors experiences greater negative affect than a subject who attributes it to external factors.

An interesting point is that subjects classified as high in resultant achievement motivation on the Mehrabian self-report measure do not exhibit what might be considered the hedonically optimal pattern of reactions to success and failure, that is, internality for success

and externality for failure. As mentioned earlier, these subjects are higher in attributions of success to internal factors, but in addition, they are more likely to attribute failure to a lack of effort (Kukla, 1970; Weiner and Kukla, 1970; Weiner and Potepan, 1970). It may be that they need to maintain a sense of personal control over their achievement outcomes, even when the immediate affective consequences are negative. In addition, as Weiner et al. (in press) point out, an attribution of failure to a lack of effort has positive motivating aspects as well as negative affective aspects.

Age Trends In Locus of Control

Because of its status as one of the dimensions in the attributional model, the body of research on locus of control may serve as another source of developmental hypotheses concerning causal attributions. Bialer (1961) developed a children's form of the James-Phares scale of internal-external control, and found a positive correlation between mental age and internality in both retarded and normal grade school children. In a more recent study Penk (1969), also found that internal scores increased between the ages of 7 and 11.

The Bialer scale, like the James-Phares scale, is intended to measure the expectation of internal control across a broad range of situations. A somewhat different approach is exemplified by the Intellectual Achievement Responsibility scale developed by Crandall, Katkovsky and Preston (1962) to assess internal-external control in situations that are specifically achievement task related. In this study of first, second, and third grade children, while the girls were higher in internality, it was found that internality predicted a variety

of behavorial measures of achievement activity for boys while for girls the correlations between internality scores and behavorial measures of achievement were near zero. In another study (Crandall, Katkovsky and Crandall, 1965), the Intellectual Achievement Responsibility scale was administered to over 900 subjects distributed across grades 3 through 12. The first result of interest is that the correlations between internality for success and internality for failure sub-scales were significant but fairly low for 6th through 10th graders ($r = .38, .40, .43$ for 6th, 8th, and 10th graders respectively) and in grades 3, 4, 5, and 12 the correlations do not reach significance. Scores increased only slightly with age, and these changes in total score did not attain significance. However, while the girls did not show a significant increase in their internality for success scores, they did significantly increase their internality for failure from the 3rd to the 5th grades and over the broad span from 6th to 12th grades. In addition, the girls' scores tended to be higher on <u>both</u> internality for success and internality for failure across the entire age range. In the earlier elementary grades these differences were not significant, but from the 6th through 12th grades girls were significantly higher in internality for failure at each grade level and were significantly higher in internality for success at the 6th and 12th grades. In the 8th and 10th grades these latter differences did not reach significance. In another study of this same sample, McGhee and Crandall (1968) found that both males and females who scored higher on the two internality sub-scales also had significantly higher report card grade averages.

Several tentative conclusions can be drawn from these cross-sectional studies of internal-external control. First, there appears to

be a fairly weak tendency for internality to increase with chronological or mental age. This relationship apparently holds whether the more global approach of Rotter is followed or whether internality is defined more specifically, as in the Intellectual Achievement Responsibility scale. Second, girls appear to be more internal for both success and failure across the 6th to 12th grade range, but this difference is more striking in the case of internality for failure than it is in the case of internality for success. Third, both internality for success and internality for failure appear to be reasonably good predictors of academic achievement.

As regards sex differences, these findings would appear to place locus of control theory in something of a dilemma. If, as Rotter (1966) states, internality is associated with larger changes in expectancy than externality, then on the basis of the studies just cited we would expect females to show larger changes in expectancy following both success and failure than males. But Crandall's (1969) results are quite clear: her young adult females stated lower expectancies than the male subjects both before and after 80% positive reinforcement, but the change scores, that is, the summed increments in expectancy as a result of 80% success experience, were practically identical for both sexes.

A way out of the dilemma is offered by the attributional model, which calls attention to the importance of the dimension of stability. Even if females are more internal for success and failure than males, we cannot draw implications about differences in expectancy without knowledge of whether this internality is directed toward ability (a fixed internal factor) or effort (a variable internal factor). Without

this knowledge, we can reach diametrically opposed conclusions. If females are internal (ability) for success and internal (effort) for failure, they should form very high expectancies; if, instead, they attribute success to effort and failure to lack of ability, they should form very low expectancies.

The reported sex difference in locus of control does have one interesting implication within the attributional model, however. Since locus of control is seen as mediating achievement-related affect, greater internality on the part of females suggests that they should both be happier over success and be more unhappy over failure.

Locus of Control and Achievement Motivation

A number of investigators have attempted to find significant relationships between individual differences in locus of control and achievement-related motives. These attempts, however, have met with relatively little success. Lefcourt (1966) reports two studies suggesting a negative relationship between external control and need achievement, but the relationship attains significance in only one. Crandall et al. (1962) found that, in their early-grade-school sample, scores on the Intellectual Achievement Responsibility scale were unrelated both to number of achievement themes given to thematic apperception cards and to scores on the Children's Manifest Anxiety Scale. Feather (1967) reports that, in one group of Australian college students, external control, as measured by the Rotter (1966) scale, was not related to either fantasy need achievement or facilitating anxiety (Alpert and Haber, 1960), but was positively and significantly related to debilitating anxiety in males, but not females. In a second

group of Australian undergraduate extension students, who were on the average ten years older than the first group, external control was again unrelated to fantasy need achievement, but was positively and significantly related to test anxiety in females, but not males. While these studies, taken as a whole, may suggest that subjects low in fantasy need achievement and subjects high in test anxiety tend to be more external (the assumption with which Feather (1967) began his study), they offer only the weakest support for the suggestion, and in fact contradict it at crucial points.

Katz (1967) has suggested that a person low in achievement motivation "has been socialized to impose failure upon himself," (p. 164), that is, tends to be internal for failure. Two studies reported by Weiner and Kukla (1970) were directed at testing this hypothesis. In the first (Experiment IV), the Intellectual Achievement Responsibility scale was given to groups of third-, fourth-, fifth-, sixth-, and tenth-graders. The high school students, all males, were also given the conventional fantasy need achievement and test anxiety measures as well as the Mehrabian self-report questionnaire. The elementary-school subjects, both male and female, were administered a previously-untested children's form of the Mehrabian measure. Responses on the Intellectual Achievement Responsibility scale were coded into internality for success and internality for failure scores, and subjects were divided by grade and sex at the median on the measures of achievement motivation. In the fifth, sixth, and tenth grades, males who were high on the Mehrabian scale were also significantly more internal for success. In the fifth grade, but no other, they were also significantly <u>less</u> internal for failure. Scores on the Mehrabian scale did not differentiate any of the female groups on internality for either success

or failure. In the tenth grade, joint classification on fantasy need achievement and test anxiety also did not differentiate on internality for success or failure.

In the second study (Weiner and Kukla, 1970, Experiment V), male college students were given a number-guessing task, then asked to estimate the number of correct items attributable to skill rather than chance. Among those who succeeded on the task, those classified as high in achievement motivation (by scores on the Mehrabian scale) gave themselves significantly more skill points than those low in achievement motivation, that is, they made greater internal attributions for success. Among those who failed on the task, high-achievement-motivation subjects gave themselves somewhat ($p < .10$) fewer skill points than low-motivation subjects. As the authors note, this result is equivocal. It may be that, in assigning fewer points to skill, and hence more to chance, the high-motivational subjects are being more external for failure than the low-motivation subjects. It may also be that, by giving skill a smaller role in determing their correct items, they are in effect accepting personal responsibility for their failure, that is, are more internal for failure than the low-motivation subjects.

In summary, while it is fairly clear that males who are high in resultant achievement motivation as measured by the Mehrabian scale are also higher in internality for success as measured by the Intellectual Achievement Responsibility scale, and while there is some evidence that debilitating anxiety (Alpert and Haber, 1960) and test anxiety are positively related to external control as measured by the Rotter scale, little else can be said with any confidence about the

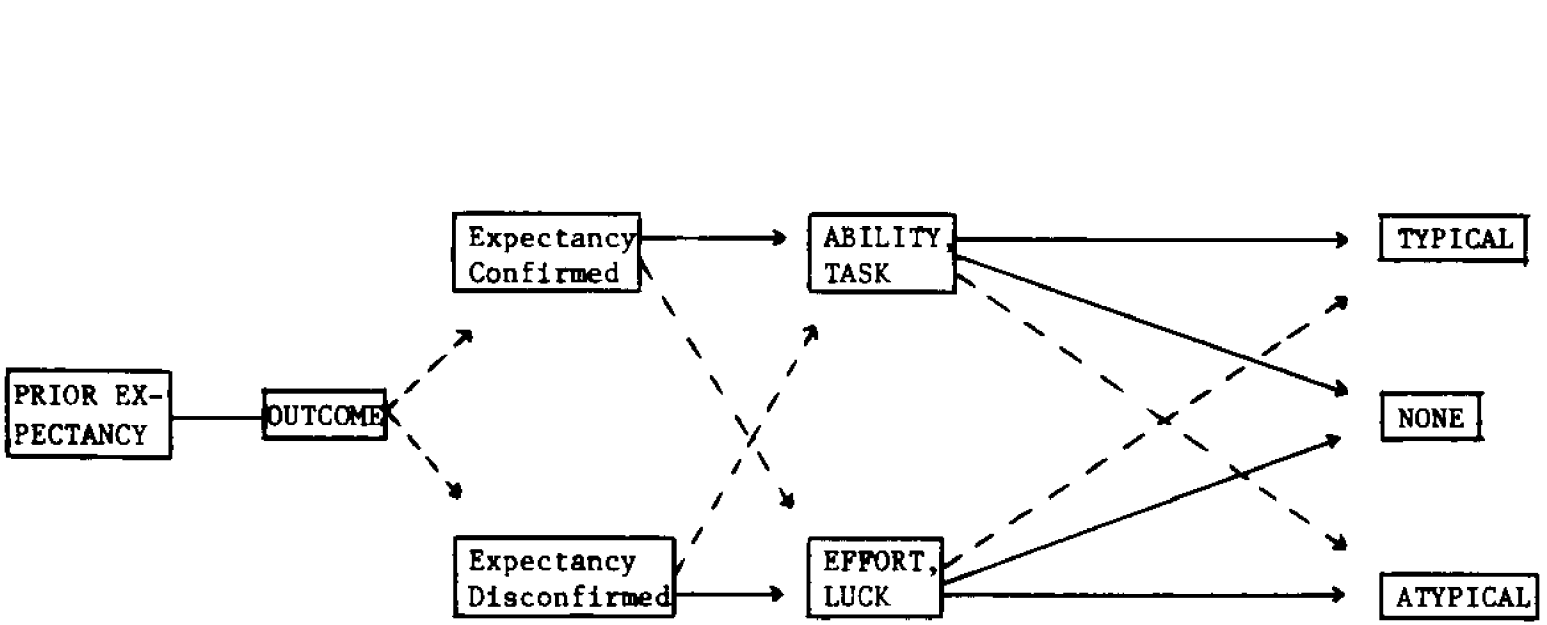
relationship between achievement-motivation variables and locus of control. In particular, no study has so far offered clear support either to Katz's (1967) suggestion that persons low in achievement motivation are internal for failure, or to the suggestion advanced by Rotter (1966) and Feather (1967), that persons low in achievement motivation tend to be generally external. Possibly the attributional model of achievement behavior, which attempts to synthesize the theories of achievement motivation and locus of control, can shed some light on these problems.

Hypotheses

A major purpose of the present study is to examine the validity of a theoretical model of achievement behavior. Figure 1 presents a schematic diagram of this model in the context of a single encounter with a task. The subject enters the task situation with some expectancy of success and obtains an outcome which confirms or disconfirms this expectancy. By hypothesis, this confirmation or disconfirmation influences the causal attributions he makes for the outcome. Also by hypothesis, these attributions in turn influence any changes that take place in his expectancy of success for future encounters with the task. A "typical" change in expectancy refers to an increased expectancy following success and a decreased expectancy following failure, while the term "atypical" refers to the contrary.

The first set of hypotheses concerns the relationship between the confirmation or disconfirmation of a prior expectancy and the causal attributions made for the outcome.

I. An outcome that confirms the subject's prior expectancy is more likely to be attributed to fixed factors (ability and task difficulty) than to variable factors (effort and luck).



NOTE: Solid arrows indicate paths hypothesized to be more probable.

FIGURE 1. Schematic diagram of hypothesized cognitive processes in an achievement task situation.

II. An outcome that disconfirms the subject's prior expectancy is more likely to be attributed to variable factors than to fixed factors.

III. Repeated successes or failures tend to be attributed increasingly to fixed factors.

Alternatives to these hypotheses (designated by an "a") are derived from Feather's (1969) suggestion that expectancy disconfirmation is associated with a shift to an external locus of control.

Ia. An outcome that confirms the subject's prior expectancy is more likely to be attributed to internal factors (ability and effort) than to external factors (task difficulty and luck).

IIa. An outcome that disconfirms the subject's prior expectancy is more likely to be attributed to external factors than to internal factors.

IIIa. Repeated successes or failures tend to be attributed increasingly to internal factors.

The second set of hypotheses concerns the relationship between the causal attributions for an outcome and subsequent expectancy changes.

IV. Following success, the expectancies of subjects who attribute the outcome to fixed factors will be higher than those of subjects who attribute the outcome to variable factors.

V. Following failure, the expectancies of subjects who attribute the outcome to fixed factors will be lower than those of subjects who attribute the outcome to variable factors.

Alternative hypotheses are derived from Rotter's (1966) statement that internal attributions result in larger changes in expectancy in the typical direction than do external attributions.

IVa. Following success, the expectancies of subjects who attribute the outcome to internal factors will be higher than those of subjects who attribute the outcome to external factors.

Va. Following failure, the expectancies of subjects who attribute the outcome to internal factors will be lower than those of subjects who attribute the outcome to external factors.

The third set of hypotheses concerns the relationship between causal attributions for an outcome and the affect experienced by the subject in connection with the outcome.

VI. A subject who attributes a success to internal factors will experience greater positive affect than one who attributes it to external factors.

VII. A subject who attributes a failure to internal factors will experience greater negative affect than one who attributes it to external factors.

The previous research reviewed in this chapter suggests a great many other possible hypotheses, particularly concerning age and sex differences in attribution and the relationships between individual differences in attribution and individual differences in other personality variables. However, it is often difficult to state precisely the relationship of the variables used in prior research to the attributional model; in some cases there are contradictions among prior findings as well. Since to a large extent the present study must be considered exploratory, it may be more appropriate to state a number of questions to be asked of the data, rather than to test formal hypotheses which do not rest on particularly strong theoretical or empirical bases. Among these questions are the following:

1. Do females have generalized lower expectancies of success than males? If so, is there any indication that this is in part a function of the nature of the task? Are there age differences in this sex difference?

2. If there are age or sex differences in expectancy of success, are they accompanied by differences in causal attributions, as the hypotheses would lead us to expect?

3. Do age and sex differences in the locus of attributions in a task situation agree with previously reported differences in locus of control derived from questionnaire measures?

4. What is the relationship between test anxiety and causal attributions for success and failure?

CHAPTER II.

METHOD

Overview of Method

Sixth grade, tenth grade, and college students in intact classes were given five anagrams to solve. Prior to undertaking the anagrams, each subject stated his perceived ability to solve anagrams, the number of anagrams he expected to solve, and his confidence in being able to solve the first anagram (expectancy of success). Following each trial the solution was announced, then the subject stated his attributions of causality for his outcome (success or failure) by means of a paired-comparisons questionnaire and rated his confidence in being able to solve the next anagram. Following the five trials, the subject rated his performance on the task as a whole and assessed the factors responsible for it. The level of difficulty of the anagrams was manipulated in order to create success and failure treatment groups.

Following the anagrams task, the subject stated the number of simple addition problems he expected to be able to solve in a limited amount of time, undertook the problems, then rated his performance and the factors responsible for it. Scores on the Test Anxiety Scale for Children (sixth and tenth graders) or the Test Anxiety Questionnaire (college students) were obtained from the subjects in a prior session. Scores and percentile ranks on the verbal ability scales of the School and College Aptitude Tests (sixth grade) or the Differential Aptitude Tests (tenth grade) were obtained from school records. Aptitude scores were not available for the college subjects.

Subjects

The school-age subjects were drawn from the middle school and high school of a fairly remote and well-to-do surburb of New York City. In this school system, the sixth, seventh, and eighth grades are centralized in the middle school. On entering, students are assigned to one of three "academic houses," which are intended to be heterogeneous. Following the eighth grade, the students move on to the adjoining high school.

Sixth Grade Subjects. The sixth grade sample consisted of all sixth graders in one of the academic houses who were present on the day of testing. In all, 113 children, 56 males and 57 females, were tested. Of these, two classes, containing 26 males and 28 females, received the Success form of the anagrams task and two classes, containing 30 males and 29 females, received the Failure form. One male and one female subject in the Success condition and two males in the Failure condition were dropped from the study for failure to follow instructions. This information, together with comparable information on the other two age groups, is summarized in Table 2. The mean age

TABLE 2

NUMBER OF SUBJECTS BY GRADE, SEX, AND TREATMENT

Grade	Sex	Success		Failure	
		Tested	Dropped	Tested	Dropped
Sixth	Male	26	1	30	2
	Female	28	1	29	0
Tenth	Male	24	1	23	2
	Female	21	0	16	0
College	Male	40	1	28	1
	Female	46	1	38	3

at the time of testing was, for the males, 12 years 1 month (SD = 4.7 mo.), for the females, 11 years 11 months (SD = 5.7 mo.), and for the entire group, 12 years 0 months (SD = 5.2 mo.).

Verbal aptitude scores were available for 105 of the sixth-grade subjects. Means and standard deviations of the raw scores, as well as medians and ranges of the percentile scores, appear in Table 3. A two-way (Treatment by Sex) analysis of variance of the raw scores revealed a significant effect of sex ($F = 5.24$, $df = 1,102$, $p < .05$). Inspection of the means in Table 3 indicates that the verbal aptitude scores of the females are lower than those of the males in both treat-

TABLE 3

VERBAL ABILITY SCORES OF SIXTH AND TENTH GRADE SUBJECTS

Grade	Sex	Treatment	Raw Scores Mean	SD	Percentiles Median	Range
Sixth[1]	Male	Success	263.32	13.35	83	14-99
		Failure	264.96	12.26	83	27-99
	Female	Success	258.82	13.03	74	23-98
		Failure	258.21	11.92	72	6-95
Tenth[2]	Male	Success	27.71	9.06	72	15-97
		Failure	25.88	9.46	60	5-95
	Female	Success	27.53	8.45	72	5-95
		Failure	28.83	10.99	70	25-99

[1]Verbal Aptitude scale of the School and College Aptitude Test (Educational Testing Service).

[2]Verbal Aptitude scale of the Differential Aptitude Test (Psychological Corporation).

ment groups. This is somewhat surprising, inasmuch as girls are more commonly found to have higher verbal aptitude scores than boys (e.g. Hobson, 1947). Some possible implications of this finding are discussed

in later chapters.

Tenth Grade Subjects. The tenth grade sample consisted of the students in four Regent-track English classes. The Regents track in this high school contains those students who are not qualified for, or do not choose to take, Honors classes, but who do not require special education. As is shown in Table 2, 84 subjects, 45 male and 39 female, were tested. Of these, 24 males and 21 females were in the Success condition, while 23 males and 16 females were in the Failure condition. One male in the Success condition and two males in the Failure condition were dropped for failure to follow instructions. Mean age at the time of testing was, for the males, 15 years 11 months (SD = 5.2 mo.), for the females, 16 years 0 months (SD = 3.3 mo.), and for the group, 15 years 11 months (SD = 4.5 mo.).

Verbal aptitude scores were available for 65 of the tenth-grade subjects. Raw score means and standard deviations, and percentile-score medians and ranges, by sex and condition, appear in Table 3. No significant effects were revealed by a two-by-two (treatment by sex) analysis of variance.

The ranked verbal-aptitude percentile scores of the sixth- and tenth-grade subjects were compared, separately by sex, by means of Mann-Whitney U tests. The results suggest that the sixth grade males have higher verbal ability than the tenth grade males ($z = 2.24$, $p < .05$), but that there is no difference between the sixth and tenth grade females ($z = 0.33$, n.s.). It should be borne in mind that the percentile scores are based on different tests for the two age groups. In addition, scores were available for approximately 91 percent of the sixth grade males and 95 percent of the sixth grade females, but less

than 80 percent of the tenth grade males or females.

College Subjects. The college sample consisted of two introductory psychology classes at a publicly-supported college in New York City. Several characteristics of the student body at this college should be noted. The students are overwhelmingly of urban background. In one study conducted at the college, 65 to 75 percent of the students identified their religious background as Jewish (Smith, Ryan and Diggins, in press). The atmosphere on campus is highly competitive and oriented toward graduate school; the college ranks among the top twenty colleges in the nation in the number of graduates who have gone on to receive a Ph.D. degree and second in the number of graduates who have received a Ph.D. in psychology.[1] While it is desirable to compare the three age groups in order to discover age-related trends, these characteristics of the college sample place obvious strains on the assumption of comparability with the two school-age samples, and dictate caution in interpreting any differences that are found.

A total of 152 college students, 68 males and 84 females, participated in the study. The class assigned to the Success condition contained 86 subjects, 40 male and 46 female. The class assigned to the Failure condition contained 66 subjects, 28 male and 38 female. One male and one female in the Success condition, and one male and three females in the Failure condition, were dropped for failure to follow instructions. These data are summarized in Table 2. Mean age at the time of testing was, for the males, 19 years 0 months (SD = 22.7 mo.), and for the females, 18 years 4 months (SD = 9.4 mo.). The difference between these means is significant ($t = 2.74$, $df = 141$, $p < .01$).

---

[1] New York Times, July 26, 1971.

Experimental Design and Choice of Tasks

The study made use of a full factorial design, with three levels of age, two conditions, and two sexes. Within subjects, repeated measures were taken on five variables: the four attributional factors and subjective probability of success. The task was administered to all groups by the same male experimenter, while the test anxiety measures were administered by female experimenters.

The choice of an anagrams task was suggested by several considerations. While it is likely that such a task actually taps some specialized intellectual ability, such as cognition of visual-symbolic units (Guilford, 1967), it was thought that a verbal task would reduce possible sex differences in perceived ability that may contribute to sex differences in expectancy of success. The task also makes possible a series of discrete success or failure experiences, avoiding the problems associated with such techniques as calling subjects who perform above the mean "successes," or relying on subjective ratings of success and failure by the subject himself. A related point is that the objective level of difficulty of anagrams can be manipulated to create success and failure groups without deceiving subjects about their performance or asking them to accept incorrect norms.

The use of an anagrams task does entail some costs, however, particularly in subject attrition. If anagrams are chosen such that 85% or 90% of subjects solve them, or fail to solve them, and it is desirable that a subject succeed (or fail) on five in succession, across five trials subject losses could run as high as 50% to 75% of the sample, without even considering other factors such as cheating among

subjects who are intended to fail or distractions among subjects who are intended to succeed.

The speed addition task was included primarily in order to provide an expectancy measure on a task for which females might be expected to perceive their ability as lower than that of males. A second reason was that the task could be used to provide subjects with a success experience, in order to counteract in some degree any aftereffects of failure on the anagrams taks.

Materials

The anagrams used in this study were five-letter single-solution anagrams, most of them drawn from Tresselt and Maysner (1966) and chosen on the basis of extensive pretesting. Six sets were selected, one for each condition at each age level; these appear in Table 4. It should be noted that the anagrams in the tenth-grade and college sets were identical, although the order is different in the Failure condition. Pretesting was performed only with elementary-school and high-school subjects, since it was felt that the Success form for tenth graders would certainly be easy enough for college students, while the Failure form could be made more difficult by shortening the time per trial. In addition, the tenth-grade Failure form already contained some of the most difficult five-letter anagrams in Tresselt and Maysner's (1966) monograph, with reported median solution times by college students of about four minutes. It seemed a safe assumption that, with a trial time of ten seconds, most college subjects would fail to solve them. However, this turned out to be a most unsafe, and in fact quite mistaken, assumption, as will be made clear in the next chapter.

TABLE 4

STIMULUS WORDS FOR ANAGRAMS TASK
BY GRADE AND TREATMENT

Sixth		Tenth		College	
Success	Failure	Success	Failure	Success	Failure
MSUIC	OLDME	IUMSC	BNLOE	IUMSC	BNLOE
CHBEA	GSRUA	EGUJD	GSRUA	EGUJD	GSRUA
JUDEG	ANTIR	EOUHS	AEUVL	EOUHS	SPEUA
CHIAR	OCBNA	ODELM	OCBNA	ODELM	OCBNA
FRTUI	SPEUA	HMNUA	SPEUA	HMNUA	AEUVL

Specimen pages of the anagram booklet appear in Appendix A; the other five forms differ only in the anagrams they contain. The cover sheet requests information for subject identification; following it is a page on which the subject is asked, first, to assess the amount of ability he has for solving anagrams, on a ten-interval graphic scale anchored at the extremes with "very low ability" and "very high ability;" second, to state how many of the five anagrams he expects to solve correctly, by circling a number from zero through five; and third, to rate his confidence in being able to solve the first anagram, on an eleven point (0 to 1) graphic scale anchored at the extremes by "I'm sure I won't get it right" and "I'm sure I will get it right." The two extreme intervals on this scale are each half the length of the other intervals, an arrangement that was intended to express in graphic terms the narrower category width of probabilities of zero and one. The scale that results can be thought of as an eleven-interval scale proceeding in steps of 0.10 units from -0.05 to 1.05, each interval being scored at its midpoint, that is, 0.00, 0.10, and so forth. However, since the range of interest is 0.00 to 1.00, the two extreme

intervals are truncated. Following this page is a page containing the first anagram.

The next page in the task booklet contains two sets of six paired-comparison questions. The subject is to answer the top set if he solved the preceeding anagram, and the bottom set if he failed to solve it. The questions are of the form:

(Success Set)

"2. I got the last word right mainly because:

_____ I tried hard OR _____ I was lucky"

(Failure Set)

"2. I didn't get the last word right mainly because:

_____ I didn't try hard enough OR _____ I was unlucky"

The order and position of the paired comparisons differ in each of the five Success and five Failure sets. Other constraints were also placed on the arrangement of the paired-comparison items. No attributional factor appears twice in succession on the same side; no factor appears all three times on the same side; the side on which a factor appears twice is approximately balanced between left and right; across the five sets, a given pair of factors appears with approximately equal frequency in the beginning, middle, and end of the set. Other constraints insured that responding on only one side of the questionnaire would not result in a consistent set of scores, nor would it lead to misleadingly high or low scores for internality or stability.

It should be noted that the use of a paired-comparison method of measuring causal attributions is an innovation with this study. As yet, no single method has received wide acceptance and use. Among those that have appeared in the literature have been rating scales similar

to those in the post-task questionnaire in the present study (Weiner and Kukla, 1970); graphic scales on which the subject is asked to indicate the extent to which, e.g., ability was a factor in determining his performance (Frieze and Weiner, in press); and methods in which the subject is asked to distribute one hundred percentage points, representing his total performance, among the factors according to their perceived importance. (Weiner, Heckhausen, Meyer and Cook, in press).

Among the considerations that led to the adoption of the present method of measuring attributions in preference to those used previously was that the cognitive operations it demands seemed simpler. The subject is not asked to quantify rather abstract concepts, but merely to choose which of two simple statements is more applicable to himself. There appears to be a gain in clarity as well; during the experimental session, a few subjects complained that "all the questions were the same," but when asked to read them more carefully, they apparently realized that the questions differed and responded accordingly. At no time did a subject object that the questions were unclear. One possible drawback of the paired-comparisons method is that the scores on the factors are not independent; however, there is some evidence (Weiner et al., 1971) that attributions to the four factors tend to be disjunctive even when independent rating scales are used.

The next page contains a confidence scale for the next anagram, which appears on the following page. This sequence of confidence scale, anagram, attribution questions, is continued through the fifth attribution questionnaire.

Following the last attribution questionnaire is a page containing seven questions concerning the subject's performance on the task as a

whole, to be answered on ten-interval graphic scales. The questions (with anchors in parentheses) are:

"1. How do you think you did on the scrambled words task? Do you think your performance was a success or a failure? (extreme failure / so-so / extreme success)

2. How do you feel about how you did on the scrambled words task? Did your performance make you feel very happy, or very unhappy, or indifferent? (very unhappy / indifferent / very happy)

3. How hard did you try to solve the scrambled words? Did you give them all the care and attention you could, or did you work at them without much effort? (very low effort / very high effort)

4. How hard do you think this task is? Independent of your own level of ability, could very many people do well on this task, or does it require a high level of ability to do well? (very easy / very difficult)

5. How lucky were you in working on the scrambled words? To what extent did you do better or worse than you expected because of good or bad luck? (very unlucky / very lucky)

6. How much ability do you have for doing scrambled words? How good are you at solving them, if you try as hard as you can? (very low ability / very high ability)

7. How willing would you be to try to solve another set of scrambled words? Would you be very happy, or very unhappy, or indifferent? (very unhappy / indifferent / very happy)"

Responses on the right side of the scales correspond to extreme success, very unhappy, very high effort, very easy, very lucky, very high ability, and very unhappy. The changes in position of the high score ends of

the scales was intended to control for position bias. However, responses on the extreme right on each scale could be consistent and meaningful, particularly if the subject was unhappy at having made a high effort on a very easy task.

On the last page of the anagrams booklet, the subject is asked to assume hypothetically that he is about to undertake five more anagrams and to state, by circling a number from zero to five, how many he would expect to be able to solve correctly.

The speed addition task booklet (Appendix B) consists of a cover sheet, on which appear identification blanks, a sample problem, and a question concerning the number of problems the subject expects to be able to solve in the time allowed, to be answered by circling a number from zero to twenty; a page containing twenty simple addition problems (adding four two-digit numbers); a page containing seven questions on the subject's performance on the task, exactly analagous to the seven questions at the conclusion of the anagrams task; and, on the last page, a question concerning the number of problems the subject would expect to solve if given another, similar, set of twenty.

Procedure

All testing was conducted in the classroom, during regular class hours. In all but one instance, testing took place at the beginning of the class period; the exception, a tenth-grade Failure group, had to be tested during the last half of the period, as a result of a planned film showing in the earlier half.

The classroom teacher introduced the experimenter approximately as follows: "This is Mr. McMahan, from the City University, who would like

your help in some research he is doing." The experimenter distributed the anagrams task booklets, then delivered a prepared set of instructions, which appear verbatim in Appendix C. These explain what an anagram is, present a very simple example, and ask the subject to answer the questions on the first page of the booklet. The amount of time allowed for each trial was announced to be 15 seconds. In fact, Success groups were allowed 20 seconds, while sixth- and tenth-grade Failure groups were permitted only 12 seconds, and the college Failure group only 10 seconds.

After the first trial, the experimenter announced the solution, then delivered further instructions emphasizing the possible role of each of the four attributional factors in contributing to a success or failure, then explained how to complete the paired-comparison questionnaire. When most of the subjects appeared to have finished answering the questionnaire, they were asked to turn to the next page and state their confidence in solving the next anagram. The next trial was not begun until all subjects in the group indicated their readiness to proceed. At the conclusion of the last trial, and after the subjects had answered the last set of paired-comparisons, the experimenter delivered further instructions on completing the rating scales and final expectancy measure, then collected the task booklets.

The speed addition booklets were then distributed and the instructions (Appendix D) were read. The time alloted to work on the twenty problems was announced to be four minutes (in the college samples, three and one-half minutes); in fact, the amount of time allowed varied between four and five minutes, sufficient to insure that the performance of all, or almost all, subjects would substantially exceed their expec-

tations. The objective of this procedure was to provide the subjects with a reasonably convincing success experience at the conclusion of the experimental session. When the subjects had completed the rating scales and the final expectancy measure, the experimenter collected the booklets and then asked for questions. If none was forthcoming, he spoke briefly about the theoretical basis of the research and answered questions. In some classes this developed into a lively discussion. In Failure condition classes, the experimenter worked into the discussion the facts that solving or not solving anagrams is not a measure of IQ, and that the anagrams they had attempted were quite difficult. In concluding, he asked the subjects not to talk about the study to friends in other classes until the next day, when testing at that age level would have been completed, and thanked them for their cooperation.

The Test Anxiety Scale for Children was administered to the sixth and tenth grade subjects by a female experimenter one week prior to the experimental session. After distributing answer sheets, which consist simply of identification blanks and thirty numbered pairs of "YES" and "NO", to be circled, the experimenter read an abbreviated version of the standard instructions (Sarason et al., 1960, pp. 86-89), then read the questions. Minor alterations (e.g. the substitution of "English" for "reading" and "mathematics" for "arithmetic") were made in the questions, in order to make them more appropriate to sixth and tenth grade students. The abbreviated instructions and the revised questions, with alterations noted, appear in Appendix E. Completed questionnaires were obtained from 96, or 85 percent of the sixth-grade subjects, and 50, or 60 percent of the tenth-grade subjects.

The lower response rate among tenth graders resulted from three factors: class attendance is less mandatory in the high school; there was an unseasonable snowstorm on the day the test anxiety measure was given to the tenth grade, which increased absenteeism; one of the classes coincided with a schoolwide assembly at which athletic awards were to be distributed. Other considerations precluded make-up testing.

The Test Anxiety Questionnaire was administered to the two college classes by female undergraduate psychology majors at the college. The form used contains only the first of the three sections in the full Test Anxiety Questionnaire, which has been shown (Smith, 1965) to correlate highly with the full form. The experimenter distributed the questionnaires, then read the standard instructions, which also appear at the top of the questionnaire. Completed questionnaires were obtained from 113, or 71 percent, of the college subjects.

Scoring and Analysis

For the modified Test Anxiety Scale for Children, each "yes" response was scored as one point, giving a possible range of zero through 30, with high scores indicating high anxiety. The abbreviated Test Anxiety Questionnaire was scored by summing scores from one to five on each of the questions, with high scores again indicating high anxiety. The first three questions are "filler items" and are not scored, giving a possible range of 12 through 60.

The initial ability scale and the seven graphic scales at the conclusion of the task, as well as the similar scales following the speed addition task, were scored from 1 to 10, with high scores corresponding to very successful outcome, very happy, very high ability, very high effort, very difficult task, and very lucky. The eleven point confidence (expectancy of success) scales were considered to be measures

of subjective probability of success, and were scored from zero to one. For ease of analysis, however, the decimal point was omitted, yielding an effective range of zero to 10.

The paired-comparison attribution questionnaires were scored by giving one point to a factor each time it was picked over another. There are thus six points to be distributed among the four factors. Moreover, if the subject is self-consistent, his scores will always show the configuration 3, 2, 1, 0, although of course each score can be given to any of the factors, with the constraint that any three of the scores determine the fourth. It is of interest to note that few subjects at any age level were in fact inconsistent in answering the paired-comparison questions; those few were not excluded from the analyses.

The method of statistical analysis most frequently used in the study was the analysis of variance. Certain analyses required the use of data only from those subjects for whom the treatment manipulation was completely effective; that is, those in the Success condition who solved all five anagrams and those in the Failure condition who failed all five anagrams. This group is identified in such cases as "restricted subjects." Because of the possible lack of comparability between the college subjects and the two school-age groups, many of the analyses were performed both including and excluding data from the college sample. Only the results of the more inclusive analyses will be presented, except in those cases in which the exclusion of the college data led to substantially different results.

Ethical Considerations

The method in this study does not involve deception of the subject, with the possible exception that the experimenter did not reveal the

manipulation of difficulty level. An attempt was made, through the exposition at the conclusion of the testing session, to give the subjects sense of closure and to assure them that performance on the task was not a measure of IQ. Subjects in the Failure condition were also told that the anagrams they had attempted to solve were very difficult. As was stated earlier, one of the purposes of including the speed addition task was to give all subjects a success experience at the end of the session, in the hope of minimizing any anxiety or negative affect aroused by the anagrams task.

In almost every class, the teacher informed the students prior to the experiment that they were under no obligation to participate. At the specific request of the responsible administrators in the middle school and high school, no attempt was made to obtain signed permission slips from the pupils' parents, however, the school did inform the parents of sixth-grade subjects, in advance, that a research project would be conducted in the school.

Subjects are identified only by code number on data sheets. Cover sheets from the anagrams task booklet, which contain only personal information about the subjects, have been detached from the booklets and destroyed. On all other forms, the subjects' names have been obliterated. One copy of a master sheet, identifying subject number with name, has been made and is kept securely, apart from other materials from the study. After a limited period of time, it too will be destroyed.

CHAPTER III

RESULTS

Effectiveness of Manipulation

The proportion of subjects in each group who successfully solved each anagram is presented in Table 5. In the Success condition, the proportion of sixth grade subjects solving the anagrams ranged from 84 percent to 100 percent; among tenth grade subjects the range was from 90 percent to 100 percent. In the Failure condition, the proportion of sixth grade subjects solving the anagrams ranged from seven percent to 29 percent; the range among the tenth grade subjects was from zero to 29 percent; and in the college sample the range was from 15 percent to 51 percent.

The mean number of anagrams solved by subjects in each group is presented in Table 6. The analysis of variance revealed a highly significant main effect for treatment, indicating that the manipulation of difficulty level to induce success and failure produced the desired contrast, although an even greater difference would have been preferable. The effectiveness of the manipulation is also confirmed by the subjects' ratings of perceived outcome at the conclusion of the task. The mean rating for subjects in the Success condition was 8.88 (SD = 1.67) where 10 represented extreme success, while in the Failure condition the mean was 3.52 (SD = 2.56). The difference between these means is highly significant ($t = 22.89$, $df = 333$, $p < .001$).

The analysis in Table 6 also showed a highly significant main effect for grade. In the Success condition, comparisons among the means

TABLE 5

PROPORTION OF SUBJECTS SOLVING EACH ANAGRAM

Treatment	Grade	Sex	N	1st Anagram	% Solving	2nd Anagram	% Solving	3rd Anagram	% Solving	4th Anagram	% Solving	5th Anagram	% Solving
Success	6	M	25	MSUIC	96%	CHBEA	84%	JUDEG	84%	CHIAR	100%	FRTUI	96%
		F	27		93		85		93		100		96
	10	M	23	IUMSC	100	EGUJD	87	EOUHS	91	ODELM	83	HMNUA	61
		F	21		100		95		95		81		76
	Coll.	M	39	IUMSC	97	EGUJD	95	EOUHS	100	ODELM	97	HMNUA	90
		F	45		98		100		100		91		93
Failure	6	M	28	OLDME	14	GSRUA	7	ANTIR	29	OCBNA	18	SPEUA	18
		F	29		10		21		21		17		10
	10	M	21	BNLOE	14	GSRUA	10	AEUVIL	10	OCBNA	29	SPEUA	10
		F	16		0		6		13		13		6
	Coll.	M	27	BNLOE	22	GSRUA	15	SPEUA	26	OCBNA	19	AEUVL	41
		F	35		26		23		29		31		51

TABLE 6

MEAN NUMBER OF ANAGRAMS SOLVED

Grade	Sex	Success N	Success Mean	Failure N	Failure Mean
6	M	25	4.60	28	0.86
	F	27	4.67	29	0.79
10	M	23	4.22	21	0.71
	F	21	4.48	16	0.38
Coll.	M	39	4.77	27	1.19
	F	45	4.82	35	1.60

Analysis of Variance[1]

Source of Variance	df	Mean Square	F
Grade (A)	2	10.98	9.63**
Treatment (B)	1	1050.37	921.38**
Sex (C)	1	0.33	< 1.0
A x B	2	1.40	1.23
A x C	2	0.57	< 1.0
B x C	1	0.29	< 1.0
A x B x C	2	1.50	1.31
Within Ss	324	1.14	

* $p < .01$
** $p < .001$

[1]Unweighted-means solution.

(Scheffe, 1959) indicated that the college group performed better than the tenth grade (F = 5.09), while in the Failure condition the college students performed better than either the sixth grade (F = 8.32) or the tenth grade (F = 14.36). These contrasts were significant (F (crit) .05 = 4.39).

Given these age-related differences in overall performance, it is of interest to note in Table 5 the absence of such differences in the proportion of subjects solving those anagrams which were given to all three age groups: GSRUA (X^2 = 5.31, df = 5, p > .30); OCBNA (X^2 = 4.06, df = 5, p > .50); and SPEUA (X^2 = 7.49, df = 5, p > .10). These results become even more striking when it is recalled that the sixth and tenth grade samples represented relatively unselected public school populations, while the college samples were drawn from a population that is well above average in intelligence and verbal skills.

It should also be noted that, as Table 6 indicates, sex did not affect performance on the anagrams task, either directly or in interaction with other factors.

Some aspects of the present study, such as the analysis of repeated measurements of attributions and expectancy, across trials, require that the subject succeed (or fail) on <u>every</u> trial. From data gathered in pilot testing, it was anticipated that up to 40 percent of the subjects might fail to meet this requirement; larger samples were therefore tested to allow for this potential loss. Table 7 shows that the attrition rate ranged from 11 percent to 60 percent, and was noticeably high in the sixth grade and college Failure groups. It should be noted that this attrition is relative only to certain analyses and not to the study as a whole. Analyses which do use the smaller

TABLE 7

PROPORTION OF SUBJECTS EXPERIENCING CONSISTENT SUCCESS OR FAILURE ON FIVE TRIALS

Grade	Sex	N	% Consistent Success	N	% Consistent Failure
6	M	25	72%	28	54%
	F	27	74	29	52
10	M	23	57	21	62
	F	21	67	16	75
Coll.	M	39	82	27	59
	F	45	89	35	40

groups are qualified by the term, "consistent subjects."

The manipulation of difficulty level could have been made more efficient, and the attrition rates lower, simply by using much easier anagrams in the Success condition and much more difficult anagrams in the Failure condition. This possibility was considered and rejected. In order to study causal attributions for an outcome, it is of great importance that there be some ambiguity about the determining causes. If a task is obviously very easy or very difficult, such ambiguity does not exist; the primary determinant of the subject's outcome is obvious to him. The choice of a less efficient but more ambiguous task was made in the hope that the loss of subjects from some analyses would be outweighed by the gain in information from all subjects. One implication of this choice should be pointed out, however. The inconsistent subjects in the Success condition tend to be those in the sample who are worst at solving anagrams (as evidenced by the fact that they fail to solve one or more of the easy anagrams), while the inconsistent subjects in the Failure condition tend to be those in the

sample who are best at solving anagrams (as evidenced by the fact that they solve one or more of the difficult anagrams). Some implications of this differential loss are discussed later in this chapter.

Effects of Prior Expectancy on Attribution

In this section, results are presented which bear on hypotheses I. and II. and their alternatives, Ia. and IIa. Hypotheses I. and II. state that a confirming outcome is likely to be attributed to fixed factors (ability and task difficulty) while a disconfirming outcome is likely to be attributed to variable factors (effort and luck). Hypotheses Ia. and IIa. state that a confirming outcome is likely to be attributed to internal factors (ability and effort) while a disconfirming outcome is likely to be attributed to external factors (task difficulty and luck).

From hypotheses I. and II. it follows that a confirmed expectancy should be associated with high ability and task attributions and low effort and luck attributions, while a disconfirmed expectancy should be associated with high effort and luck attributions and low ability and task attributions. Since a successful outcome confirms high expectancies, the relationships between expectancy and attributions to ability and task should be positive: the higher the expectancy, the greater the attribution to these factors, and the lower the expectancy, the lower these attributions. Conversely, given success, the relationships between expectancy and attributions to effort and luck should be negative; the lower the expectancy (and hence the greater the extent of disconfirmation) the higher the attributions to effort and luck, and the higher the expectancy, the lower the attributions to effort and luck. Since an unsuccessful outcome confirms low expectancies and

disconfirms high expectancies, the direction of these relationships is exactly reversed: expectancy should be negatively related to ability and task attributions and positively related to effort and luck attributions.

A similar line of reasoning leads from hypotheses Ia. and IIa. to the prediction that prior expectancy is related positively to ability and effort attributions and negatively to task and luck attributions given a successful outcome, and that, for an unsuccessful outcome, prior expectancy is related negatively to ability and effort attributions and positively to task and luck attributions. These predictions are summarized in Table 8.

TABLE 8

PREDICTED DIRECTION OF RELATIONSHIPS BETWEEN PRIOR EXPECTANCY AND ATTRIBUTIONS

Outcome	Hypotheses	Ability	Effort	Task	Luck
Success	I., II.	+	-	+	-
	Ia, IIa	+	+	-	-
Failure	I, II	-	+	-	+
	Ia, IIa	-	-	+	+

All subjects in each age group were divided on each trial into those who succeeded and those who failed on that trial, without regard to their treatment group. Correlations were then computed between the expectancy score immediately preceding that trial and the paired-comparison attribution scores immediately following it. These correlations are reported in Table 9.

TABLE 9

CORRELATIONS BETWEEN PRIOR EXPECTANCY AND ATTRIBUTION SCORES

Outcome[1]	Grade	Trial	N	Ability	Effort	Task	Luck
Success	6	1	56	0.42**	-0.18	0.03	-0.29**
		2	52	0.55**	-0.35**	-0.03	-0.29*
		3	60	0.55**	-0.21	0.10	-0.52**
		4	62	0.51**	-0.35**	0.17	-0.49**
		5	58	0.53**	-0.33*	0.21	-0.54**
	10	1	46	0.27	-0.01	-0.06	-0.20
		2	43	0.43**	-0.04	0.02	-0.35*
		3	45	0.47**	-0.05	0.08	-0.53**
		4	44	0.52**	-0.33*	0.34*	-0.53**
		5	33	0.63**	0.09	0.02	-0.69**
	Coll.	1	97	0.47**	-0.19	0.13	-0.44**
		2	94	0.60**	-0.25*	0.00	-0.44**
		3	101	0.53**	-0.18	-0.10	-0.37**
		4	95	0.53**	-0.27**	0.00	-0.38**
		5	105	0.58**	-0.23*	-0.02	-0.50**
Failure	6	1	53	-0.18	0.22	-0.12	0.11
		2	57	-0.18	0.02	0.10	0.12
		3	49	-0.30*	0.30*	-0.19	0.20
		4	47	-0.25	-0.01	0.14	0.17
		5	51	-0.06	-0.05	-0.07	0.20
	10	1	34	-0.40*	0.20	-0.03	0.30
		2	38	-0.48**	0.38*	0.02	0.16
		3	36	-0.21	0.17	-0.31*	0.37*
		4	37	-0.40*	0.24	0.11	0.16
		5	47	-0.26	0.23	-0.17	0.24
	Coll.	1	49	-0.65**	0.13	0.17	0.44**
		2	52	-0.51**	0.43**	-0.09	0.23
		3	45	-0.44**	0.21	0.05	0.29*
		4	51	-0.57**	0.18	0.15	0.31*
		5	41	-0.69**	0.52**	-0.11	0.29

* $p < .05$, two-tailed
** $p < .01$, two-tailed

[1]"Outcome" refers to the subject's obtained outcome on that trial, not to his treatment group.

The prediction that ability attributions are related positively to prior expectancy given a successful outcome and negatively given an unsuccessful outcome is clearly confirmed by the data. The correlations are in the predicted direction on every trial in each age group. Following success, 14 of the 15 correlations are significant at beyond the .01 level. Following failure, one correlation reached significance in the sixth grade group, three in the tenth grade group, and all five in the college group.

The prediction that attributions to luck are negatively related to prior expectancy following success and positively related following failure is also confirmed by the results in Table 9. Following success, all 15 correlations are negative, and 14 of them reached significance. Following failure, all 15 correlations are positive; however, none reached significance in the sixth grade group, only one in the tenth grade group, and three in the college group.

As Table 8 indicates, the predictions regarding ability and luck attributions follow both from hypotheses I. and II. and from hypotheses Ia. and IIa. With regard to effort and task difficulty, however, the two sets of hypotheses lead to opposite predictions. Hypotheses I. and II. predict that effort attributions will be related negatively to prior expectancy given success and positively given failure, while Ia. and IIa. predict the opposite. Similarly, I. and II. predict that task attributions will be related positively to prior expectancy given success and negatively given failure, while Ia. and IIa. predict the opposite.

The correlations between prior expectancy and effort attributions reported in Table 9 clearly contradict the prediction from hypotheses Ia. and IIa., and tend to confirm the prediction from hypotheses I. and II. Given success, 14 of the 15 correlations are negative; three

reached significance in the sixth grade group, three in the college group, and one in the tenth grade group. Given failure, 13 of the 15 correlations are positive; however, only one reached significance in the sixth grade group, one in the tenth grade group, and three in the college group.

The relationships between prior expectancy and task attributions in Table 9 do not support either prediction. Although it may be noted that the only significant correlation given success and the only significant correlation given failure are both in the directions predicted by hypotheses I. and II., the most parsimonious conclusion to be drawn from these results is that attributions to task are essentially independent of prior expectancy. This is in itself an interesting point, which will be discussed at greater length in the next chapter.

As a further check on the hypotheses, subjects on each trial were divided simultaneously by outcome and by prior expectancy. A probability of success rating preceding the trial of less than or equal to five was considered low, while a rating of greater than five was considered high. Scores on each attributional factor were then analysed by means of 3 x 2 x 2 (Grade x Outcome x Prior Expectancy) analyses of variance. The prediction from both sets of hypotheses was that outcome and prior expectancy would interact. The differential predictions, again, concerned effort and task attributions. Hypotheses I. and II. predicted for effort that the high expectancy/failure and low expectancy/success means would be greater than the high expectancy/success and low expectancy/failure means, while hypotheses Ia. and IIa. predicted the opposite. For task difficulty, I. and II. predicted higher means in the high expectancy/success and low expectancy/failure groups, while Ia. and IIa. predicted higher means in the high expectancy/failure and low expectancy/success groups.

TABLE 10

ATTRIBUTIONS ON TRIAL ONE AS A FUNCTION OF OUTCOME AND PRIOR EXPECTANCY

Grade	Expectancy[1]	Success N	Success Ability	Success Effort	Success Task	Success Luck	Failure N	Failure Ability	Failure Effort	Failure Task	Failure Luck
6	High	34	1.50	1.50	2.29	0.71	28	1.11	1.96	1.07	1.86
	Low	22	0.82	1.73	2.41	1.05	25	1.76	1.24	1.28	1.72
10	High	20	0.95	1.45	2.55	1.05	5	1.00	1.80	1.20	2.00
	Low	26	0.69	1.38	2.69	1.23	29	1.66	1.66	1.24	1.45
Coll.	High	58	1.60	1.02	2.66	0.72	12	0.75	2.00	2.00	1.25
	Low	39	0.82	1.28	2.44	1.46	45	2.04	1.36	1.62	0.98

Analyses of Variance[2]

Source of Variance	Ability df	Ability MS	Ability F	Effort df	Effort MS	Effort F	Task df	Task MS	Task F	Luck df	Luck MS	Luck F
Grade (A)	2	1.41	1.28	2	0.55	< 1.0	2	3.02	4.39*	2	2.60	2.63
Outcome (B)	1	6.36	5.78*	1	5.08	5.49*	1	71.69	104.42**	1	13.63	13.79**
Expectancy (C)	1	1.42	1.29	1	1.46	1.58	1	0.05	< 1.0	1	0.05	< 1 .0
A x B	2	0.45	< 1.0	2	1.75	1.90	2	1.92	2.80	2	4.44	4.49*
A x C	2	0.46	< 1.0	2	0.12	<1.0	2	1.41	2.05	2	0.70	< 1.0
B x C	1	30.73	27.92**	1	5.22	5.64*	1	0.10	< 1.0	1	8.67	8.78**
A x B x C	2	1.86	1.69	2	1.02	1.10	2	0.13	< 1.0	2	0.51	< 1.0
Within Ss	323	1.10		323	0.93		323	0.69		323	0.99	

* $p < .05$
** $p < .01$

[1]High = expectancy rating of greater than five preceding the trial; low = rating of less than or equal to five.

[2]Unweighted - means solutions.

Table 10 presents the cell means and summaries of the analyses of variance for Trial 1. The analyses of ability and luck scores show the predicted interactions to be highly significant. The analysis of effort scores reveals a significant interaction in the direction predicted from hypotheses I. and II. and opposite to that predicted from hypotheses Ia. and IIa. The analysis of task difficulty scores, however, does not reveal the predicted interaction. (Other significant effects revealed by these analyses are discussed in later sections of this chapter in connection with other analyses.) The results for Trials 2 through 5 were identical in all essentials with those for Trial 1, and are not reported here. Cell means and summary tables of the analyses for the four later trials may be found in Table 1, Appendix F.

The results of the variance analyses confirm and lend additional strength to the conclusions drawn from the correlational analyses. Hypotheses Ia. and IIa. are rejected by the weight of the evidence, while hypotheses I. and II. receive support. However, the obtained results may be better represented by the following statements:

1. An outcome that confirms the subject's prior expectancy of success tends to be attributed to ability.

2. An outcome that disconfirms the subject's prior expectancy of success tends to be attributed to effort and luck.

3. Task attributions are relatively unaffected by the subject's prior expectancy of success.

Hypothesis III., which states that a consistent series of outcomes leads to increasing attribution to fixed factors, is discussed later in this chapter, in the section reporting the repeated-measures analyses.

Effects of Attributions on Subsequent Expectancy

This section considers the relationships hypothesized to exist between causal attributions and subsequent expectancies of success on similar tasks. From hypothesis IV. it was predicted that, following success, scores on fixed factors (ability and task) would be positively related to subsequent expectancy, while scores on variable factors (effort and luck) would be uncorrelated with or even negatively related to subsequent expectancy. Hypothesis IVa. led to the prediction that, following success, scores on internal factors (ability and effort) would be positively related to subsequent expectancy while scores on external factors (task and luck) would be unrelated or even negatively related to subsequent expectancy. Following failure, hypothesis V. predicts negative relationships between scores on fixed factors and subsequent expectancy, and no relationship or even a positive relationship between scores on variable factors and subsequent expectancy, while hypothesis Va. leads to the prediction that scores on internal factors will be negatively related to subsequent expectancy and scores on external factors will be unrelated or even positively related to subsequent expectancy. These predictions are summarized in Table 11.

TABLE 11

PREDICTED DIRECTION OF RELATIONSHIPS BETWEEN ATTRIBUTIONS AND SUBSEQUENT EXPECTANCY

	Success		Failure	
Attribution	IV.	IVa.	V.	Va.
Ability	+	+	-	-
Effort	(0,-)	+	(0,+)	-
Task	+	(0,-)	-	(0,+)
Luck	(0,-)	(0,-)	(0,+)	(0,+)

In Table 12 correlations are reported, separately by obtained outcome and grade, between causal attributions on each trial and stated expectancy of success on the following trial. The correlations between ability scores and expectancy, as predicted, are positive on every trial following success and negative on every trial following failure. Following success, all 12 correlations are significant at beyond the .01 level; following failure, the correlations reach significance on two of the four trials for the sixth grade and tenth grade groups, and on all four trials for the college group. The relationships between luck attributions and subsequent expectancy are also as predicted: following success, all 12 are negative and highly significant; following failure, all 12 are positive, although they are significant on only one trial in the sixth grade group, one trial in the tenth grade group, and all four in the college group. These results support the predictions common to both sets of hypotheses.

The relationships between effort attributions and subsequent expectancy reported in Table 12 confirm the predictions derived from hypotheses IV. and V. and contradict those derived from hypotheses IVa. and Va. Following success, effort attributions are negatively related to subsequent expectancy on every trial; the relationships attained significance on every trial in the sixth grade group, on one trial in the college group, and on no trial in the tenth grade group. Following failure, the relationships were positive on every trial and attained significance on two trials in the sixth grade group and on three trials in both the tenth grade and college groups.

The relationships between task attributions and subsequent expectancy conform somewhat more closely to the predictions from hypotheses IV. and V. than to those from IVa. and Va; as predicted, they are positive on ten of

TABLE 12

CORRELATIONS BETWEEN ATTRIBUTION SCORES AND SUBSEQUENT EXPECTANCY

Outcome[1]	Grade	Trial[2]	N	Ability	Effort	Task	Luck
Success	6	1	56	0.49**	-0.31*	0.16	-0.34**
		2	52	0.46**	-0.42**	0.24	-0.39**
		3	60	0.54**	-0.31*	0.20	-0.50**
		4	62	0.44**	-0.29*	0.25*	-0.53**
	10	1	46	0.58**	-0.12	0.10	-0.46**
		2	43	0.59**	-0.10	0.07	-0.48**
		3	45	0.55**	-0.16	0.13	-0.55**
		4	44	0.49**	-0.23	0.27	-0.54**
	Coll.	1	97	0.54**	-0.14	0.09	-0.53**
		2	94	0.61**	-0.33**	0.09	-0.46**
		3	101	0.51**	-0.18	-0.05	-0.39**
		4	95	0.48**	-0.14	-0.02	-0.42**
Failure	6	1	53	-0.30*	0.39**	-0.11	0.08
		2	57	-0.22	0.11	0.04	0.12
		3	49	-0.33*	0.31*	-0.34*	0.35*
		4	47	-0.19	0.06	0.02	0.19
	10	1	34	-0.37*	0.42*	-0.28	0.28
		2	38	-0.31	0.45**	-0.12	0.02
		3	36	-0.24	0.18	-0.30	0.38*
		4	37	-0.41**	0.33*	-0.03	0.21
	Coll.	1	49	-0.67**	0.20	0.15	0.41**
		2	52	-0.49**	0.34*	-0.10	0.31*
		3	45	-0.49**	0.34*	-0.07	0.35*
		4	51	-0.65**	0.28*	0.04	0.41**

* $p < .05$, two-tailed
** $p < .01$, two-tailed

[1]"Outcome" refers to the subject's obtained outcome on that trial, not to his treatment group.

[2]The expectancy measure was not taken following Trial 5.

12 trials following success and negative on eight of 12 trials following failure. However, the correlations are manifestly low on almost every trial, reaching significance only on one sixth grade trial following success and one sixth grade trial following failure.

While these results appear to give striking confirmation to the predictions derived from hypotheses IV. and V., their interpretation is made less straightforward by the relationships between prior expectancy and attributions demonstrated in the previous section of this chapter. The problem is this: a subject who succeeds on a particular trial and attributes his success to fixed factors is likely to have experienced expectancy confirmation, that is, to have entered the trial with a high expectancy, while a subject who attributes his success to variable factors is likely to have experienced expectancy disconfirmation, that is, to have entered the trial with a low expectancy. Similar arguments apply in the case of failure. Furthermore, consecutive expectancy estimates in this study show strong positive correlations with each other: the expectancies prior to and following trial one correlate 0.60 ($N = 334$), and on succeeding trials the correlations increase ($r = 0.82, 0.90, 0.92$). Hence a subject's expectancy on entering a trial is a good predictor both of his attributions for his outcome and of his subsequent expectancy, and the correlations reported in Table 12 could conceivably have been obtained even if attributions have no effect whatever on subsequent expectancy.

Two approaches were taken in attempting to deal with this problem. The first was to correlate attribution scores on each trial with changes in expectancy across that trial (that is, $Exp_n - Exp_{n-1}$). These correlations are reported in Table 13. Although the majority of the correlations is in the direction predicted from hypotheses IV. and V., very few were

TABLE 13

CORRELATIONS BETWEEN ATTRIBUTION SCORES AND CHANGES IN EXPECTANCY

Outcome[1]	Grade	Trial[2]	N	Ability	Effort	Task	Luck
Success	6	1	56	0.05	-0.11	0.12	-0.05
		2	52	-0.12	-0.09	0.35*	-0.13
		3	60	-0.04	-0.17	0.18	0.06
		4	62	-0.17	0.14	0.13	-0.06
	10	1	46	0.18	-0.10	0.15	-0.16
		2	43	0.36*	-0.12	0.10	-0.29
		3	45	0.22	-0.31*	0.13	-0.02
		4	44	-0.05	0.24	-0.16	-0.05
	Coll.	1	97	0.02	0.10	-0.07	-0.06
		2	94	0.01	-0.13	0.14	-0.02
		3	101	-0.04	-0.01	0.09	-0.04
		4	95	-0.14	0.32**	-0.06	-0.09
Failure	6	1	53	-0.08	0.11	0.02	-0.03
		2	57	-0.06	0.10	-0.05	0.01
		3	49	-0.03	0.00	-0.19	0.20
		4	47	0.02	0.11	-0.17	0.08
	10	1	34	0.05	0.20	-0.23	-0.03
		2	38	0.29	0.03	-0.18	-0.20
		3	36	-0.10	0.06	-0.05	0.10
		4	37	-0.03	0.16	-0.23	0.10
	Coll.	1	49	-0.11	0.13	-0.01	0.00
		2	52	0.01	-0.11	-0.02	0.13
		3	45	-0.02	0.26	-0.30*	0.10
		4	51	-0.03	0.19	-0.31*	0.16

* $p < .05$, two-tailed
** $p < .01$, two-tailed

[1]"Outcome" refers to the subject's obtained outcome on that trial, not to his treatment group.

[2]The expectancy measure was not taken following Trial 5. The change score represents the difference between the expectancy estimate given just after a particular trial and the estimate given just prior to that trial.

significantly different from zero. This may indicate that attributions have little effect on changes in expectancy; on the other hand, the problems of reliability inherent in difference scores (cf. McNemar, 1962, pp. 155-158) may bear primary responsibility. It should also be noted that, as Table 14 indicates, many subjects who gave high attributions to ability and task also stated extreme expectancies which limited the extent to which they could change expectancies in the typical direction.

Since the problem is to arrive at estimates of the relationships between attributions and subsequent expectancy, independent of the effects of prior expectancy, the second approach adopted was to compute correlations between attribution scores and subsequent expectancy on each trial with prior expectancy partialled out. These are presented in Table 15. Although the partial correlations, as might be expected, are generally lower than the unpartialled correlations reported in Table 12, they nevertheless tend to confirm the predictions from hypotheses IV. and V. Following success, attributions to ability are positively related to subsequent expectancy on 11 of the 12 trials; the relationships are significant on one trial in the sixth grade group, two trials in the college group, and three trials in the tenth grade group. Following failure, ability attributions are negatively related to subsequent expectancy on ten of 12 trials, significantly so on no trial in the tenth grade group, on one trial in the sixth grade group, and on two trials in the college group.

The relationships between task attributions and subsequent expectancy also tend to conform to the prediction. Following success, they are positive on nine of 12 trials, significantly so on one in the sixth grade group; following failure they are negative on 11 of 12 trials, significantly so on one sixth grade trial and two college trials.

TABLE 14

PROPORTION OF SUBJECTS STATING EXTREME EXPECTANCIES AS A FUNCTION OF ATTRIBUTION TO FIXED FACTORS

		Low A+T[1]		Mod. A+T		High A+T	
Grade	Trial	Success[2]	Failure	Success	Failure	Success	Failure
6	1	0%	12%	6%	14%	50%	29%
	2	0	10	33	22	32	21
	3	6	6	35	25	48	48
	4	11	25	17	63	60	48
10	1	0	0	0	29	27	54
	2	0	0	7	10	33	25
	3	0	8	7	25	38	43
	4	9	9	15	15	45	38
Coll.	1	0	7	7	29	41	28
	2	0	0	14	17	51	48
	3	20	0	19	17	58	56
	4	19	0	26	22	57	45

[1] Low = Ss whose summed attributions to ability and task on that trial equal one or two; Mod. = Ss whose summed attributions equal three; High = Ss whose summed attributions equal four or five.

[2] Data indicate the proportion of Ss in that category obtaining that outcome who stated expectancies following that trial of nine or ten, in the case of success, or zero or one, in the case of failure.

The variable factors, effort and luck, also tend to display the predicted relationships to subsequent expectancy. Following success, effort attributions are negatively related to expectancy on eight of twelve trials, significantly on three sixth grade trials, one tenth grade trial, and one college trial. However, on one college trial, effort showed a significant positive relationship to subsequent expectancy following success. Following failure, the relationships between effort and expectancy, as predicted, were positive on every trial and significant on one trial in both the sixth and tenth grade groups and

TABLE 15

CORRELATIONS BETWEEN ATTRIBUTION SCORES AND SUBSEQUENT EXPECTANCY, WITH PRIOR EXPECTANCY PARTIALLED OUT

Outcome[1]	Grade	Trial[2]	N	Ability	Effort	Task	Luck
Success	6	1	56	0.39**	-0.27*	0.16	-0.27*
		2	52	0.13	-0.26*	0.36**	-0.28*
		3	60	0.16	-0.25*	0.22	-0.12
		4	62	0.00	0.03	0.20	-0.26*
	10	1	46	0.54**	-0.14	0.15	-0.42**
		2	43	0.45**	-0.12	0.11	-0.35*
		3	45	0.36*	-0.33*	0.15	-0.16
		4	44	0.02	0.21	-0.13	-0.13
	Coll.	1	97	0.31**	0.01	-0.01	-0.34**
		2	94	0.26*	-0.22*	0.15	-0.18
		3	101	0.10	-0.05	0.07	-0.14
		4	95	-0.04	0.28**	-0.06	-0.19
Failure	6	1	53	-0.27*	0.35**	-0.08	0.05
		2	57	-0.15	0.12	-0.01	0.07
		3	49	-0.17	0.14	-0.29*	0.31*
		4	47	0.01	0.11	-0.16	0.09
	10	1	34	-0.22	0.38*	-0.30	0.17
		2	38	0.06	0.28	-0.19	-0.14
		3	36	-0.12	0.08	-0.09	0.15
		4	37	-0.14	0.23	-0.21	0.14
	Coll.	1	49	-0.33*	0.16	0.03	0.11
		2	52	-0.18	0.02	-0.05	0.22
		3	45	-0.22	0.38**	-0.30*	0.23
		4	51	-0.40**	0.31*	-0.27*	0.35*

* $p < .05$, two-tailed
** $p < .01$, two-tailed

[1]"Outcome" refers to the subject's obtained outcome on that trial, not to his treatment group.

[2]The expectancy measure was not taken following Trial 5.

two trials in the college group. The correlations between luck attributions and expectancy were negative on every trial following success, significantly so on three sixth grade trials, two tenth grade trials, and one college trial, and were positive on all but one trial following failure, significantly so on one trial in both the sixth grade and college groups and on no trial in the tenth grade group.

These results are regarded as disconfirming hypotheses IVa and Va and confirming hypotheses IV and V. In view of the conclusion, in the preceding section, that task attributions are independent of prior expectancy, it is especially interesting that task attributions do appear to affect subsequent expectancy as was hypothesized, and that the result of partialling out the effect of prior expectancy was, on the whole, to show this relationship more clearly.

The results presented in this section can be summarized in the following statements, numbered consecutively with the concluding statements in the last section:

> 4. Following success, attributions to fixed factors (ability and task) tend to be positively related to expectancy of success on succeeding tasks, while attributions to variable factors (effort and luck) tend to be negatively related to expectancy of success on succeeding tasks.
>
> 5. Following failure, attributions to fixed factors tend to be negatively related to expectancy of success on succeeding tasks, while attributions to variable factors tend to be positively related to expectancy of success on succeeding tasks.

Hypotheses VI and VII, which deal with the relationship between attributions for an outcome and the affect associated with the outcome, are considered in a later section of this chapter.

Interrelationship of Attribution Scores

It has been pointed out that, because the attribution scores are derived from a paired-comparison measure, they are not independent of each other. The interrelationships among the four factors obtained in this study may be thought of as having two components, one of which reflects the psychological relationships among the factors and the other of which reflects the structure of the test. If the psychological relationships among the factors are negligible, we would expect that the structure of the test would lead to moderately low negative intercorrelations among the factors.

The intercorrelations among the factors were computed for each trial separately by the subject's outcome on that trial and by grade. These correlations were then averaged across grade level, by means of Fisher's r to z transformation (McNemar, 1962, p. 140). The averaged correlations are presented in Table 16.

Several points about the results in Table 16 are suggestive. First, it appears that the intercorrelations reflect more than simply the structure of the test: they range from essentially zero to moderately high, and the correlations between any two factors appear quite stable across trials. Second, the pattern of interrelationships seems to be clearly relevant to the theoretical model presented earlier. The lowest negative correlations are between effort and luck, the two variable factors, and between ability and task, the two fixed factors. The negative correlations between task and luck, the two external factors, are somewhat higher, while those between ability and effort, the two internal factors, are higher still, as are those between ability and luck and between effort and task, the pairs that cross the two dimensions

TABLE 16

INTERCORRELATIONS AMONG ATTRIBUTIONS BY OUTCOME AND TRIAL, AVERAGED ACROSS GRADES[1]

Outcome	r between: Trial	N	Ability and Effort	Ability and Task	Ability and Luck	Effort and Task	Effort and Luck	Task and Luck
Success	1	199	-0.29**	-0.19**	-0.06**	-0.45**	-0.30**	-0.13
	2	189	-0.42**	-0.12	-0.57**	-0.46**	-0.08	-0.35**
	3	206	-0.36**	-0.18*	-0.64**	-0.57**	-0.07	-0.17*
	4	201	-0.49**	-0.32**	-0.56**	-0.55**	-0.03	-0.29**
	5	196	-0.37**	-0.25**	-0.60**	-0.47**	-0.10	-0.19**
Failure	1	136	-0.45**	-0.24**	-0.52**	-0.34**	-0.15	-0.28**
	2	147	-0.54**	-0.25**	-0.45**	-0.36**	-0.05	-0.41**
	3	130	-0.59**	-0.17	-0.41**	-0.34**	-0.03	-0.47**
	4	135	-0.44**	-0.34**	-0.43**	-0.35**	-0.11	-0.31**
	5	139	-0.50**	-0.27**	-0.39**	-0.31**	-0.23**	-0.28**

* $p < .05$, two-tailed
** $p < .01$, two-tailed

[1]The averaged correlations were derived by transforming the individual correlations to z, taking a weighted average of the z's, and retransforming to r. For the complete procedure, see McNemar (1962), page 140. "Outcome" refers to the subject's obtained outcome on that trial.

of the model.

These relationships are not offered as proof of the validity of the model, nor are any tests of significance reported. The component contributed by the paired-comparison technique would make interpretation of such tests quite difficult, if not impossible. It is of interest to note, however, that the results in Table 16 do not contradict the model at any point and that they further suggest that, in an achievement situation, the dimension of stability is more salient than the locus of control dimension. We may translate the correlations approximately into several disjunctive relationships: between ability and luck, between effort and task, between ability and effort, and between task

and luck. Taken together, these relationships suggest that a subject who says, for example, that a success was due mainly to high ability is unlikely to say also that it was due to good luck or to high effort, while a subject who says that a success was due mainly to high effort is unlikely to say also that it was due to high ability or to an easy task. The possible implications of this are discussed in the next chapter.

Initial Group Differences

Prior to attempting to solve the first anagram, subjects were asked three questions: how much ability they thought they had for solving anagrams (scored 1 to 10); how many of the five anagrams they expected to solve (scored 0 to 5); and how confident they were of solving the first anagram (scored 0 to 10). The results, by cell, appear in Table 17, together with summaries of the analyses of variance.

The main effect for grade was significant for all three variables. For initial ability estimates, Scheffe comparisons indicated that the sixth grade mean was significantly higher than the tenth grade mean ($F = 5.40$, $p < .05$), while the college mean did not differ significantly from either the sixth or tenth grade mean. For overall expectancy, the sixth grade mean was greater than either the tenth grade mean ($F = 17.75$, $p < .01$) or the college mean ($F = 10.44$, $p < .01$); the latter did not significantly differ from each other. For expectancy of success on trial one, the sixth grade mean was again higher than either the tenth grade mean ($F = 16.95$, $p < .01$) or the college mean ($F = 6.67$, $p < .01$); the difference between the tenth grade and college means was not significant.

TABLE 17

SCORES ON INITIAL QUESTIONNAIRE
(ALL SUBJECTS)

Grade	Treatment	Sex	Estimated Ability N	Estimated Ability Mean	Estimated Ability SD	Overall Expectancy N	Overall Expectancy Mean	Overall Expectancy SD	Trial 1 Expectancy N	Trial 1 Expectancy Mean	Trial 1 Expectancy SD
6	Suc	M	24	6.04	1.72	25	3.68	0.79	24	6.67	1.97
		F	27	6.11	1.64	27	3.48	0.74	27	6.04	2.06
	Fail	M	28	6.36	1.80	28	3.61	0.77	28	6.39	2.51
		F	29	5.52	1.69	29	3.14	0.90	29	5.69	2.14
10	Suc	M	23	5.78	1.59	23	2.87	1.15	23	5.32	2.26
		F	21	5.76	1.57	21	3.10	0.43	21	5.38	2.06
	Fail	M	21	5.00	1.41	21	3.00	0.69	21	4.71	1.67
		F	16	4.88	1.73	16	2.75	0.90	16	3.94	2.63
Coll.	Suc	M	39	6.21	1.99	39	3.21	1.02	39	6.03	2.13
		F	45	6.60	1.99	45	3.73	0.90	45	6.80	2.42
	Fail	M	27	5.74	2.20	27	3.00	0.90	27	5.07	2.02
		F	35	5.00	2.27	35	2.51	0.84	35	3.94	2.11

Analyses of Variance[1]

Source of Variance	Estimated Ability df	Estimated Ability MS	Estimated Ability F	Overall Expectancy df	Overall Expectancy MS	Overall Expectancy F	Trial 1 Expectancy df	Trial 1 Expectancy MS	Trial 1 Expectancy F
Grade (A)	2	12.46	3.47*	2	8.08	10.40**	2	47.70	9.64**
Treatment (B)	1	34.73	9.66**	1	9.15	11.78**	1	90.12	18.20**
Sex (C)	1	3.44	<1.0	1	0.91	1.18	1	12.41	2.51
A x B	2	5.70	1.58	2	2.73	3.51*	2	16.43	3.32*
A x C	2	0.66	<1.0	2	1.00	1.29	2	1.57	<1.0
B x C	1	9.96	2.77	1	6.71	8.64**	1	17.07	3.45
A x B x C	2	1.90	<1.0	2	0.96	1.23	2	5.46	1.10
Within Ss	323	3.59		324	0.78		323	4.95	

* $p < .05$
** $p < .01$

[1]Unweighted-means solution (Winer, 1962, pp. 222-224).

Although groups were randomly assigned to the Success and Failure conditions, all three initial measures showed highly significant main effects for treatment group. Comparisons among the means yielded essentially the same results for all three variables. While the Success treatment group means were larger than the Failure group means at all three grade levels, the differences were significant only at the college level (for estimated ability, $F = 10.45$; for overall expectancy, $F = 23.02$; for trial one expectancy, $F = 25.83$; all $p < .01$). These differences were also responsible for significant interactions of grade and treatment group on overall expectancy and expectancy on trial one.

The analysis of overall expectancy also showed a significant effect of the interaction between treatment group and sex. The appropriate comparisons indicated that while the male mean in the Success condition was slightly, nonsignificantly, lower than the female mean, the male mean in the Failure condition was significantly higher than the female mean ($F = 7.60$, $p < .01$). That this result was produced mostly by the college subjects is indicated by the fact that males and females in the sixth and tenth grades did not differ significantly in overall expectancy in either treatment group, but at the college level, the females were significantly higher than the males in the Success condition ($F = 7.51$, $p < .01$) in overall expectancy, and significantly lower in the Failure condition ($F = 4.63$, $p < .05$).

Given the fact that these three measures were taken before subjects had any experience with the task, these significant effects for treatment group are surprising. Although the differences could have arisen by chance, it is sufficiently unlikely as to raise the possibility that there was a problem somewhere in the experimental procedure. It may be

that the experimenter's behavior during the administration of the task contained subtle cues that differed between treatment groups. However, the comparisons among means indicate that the effect was strongest among the college groups, who were tested in large lecture halls, and weaker in the school-age groups, who were tested in the somewhat more intimate surroundings of a classroom; an explanation based on subtle cues would thus have to explain why these cues became more powerful as a function of increased physical and social distance.

Apart from these hypothetical cues, two aspects of the experimental procedure were different in the two treatment groups: the actual time allowed per trial (as distinct from the announced time, which was identical in the two conditions); and the task booklets themselves. The first could not have affected responses on the three initial measures because there was no conceivable way the subjects could have known of it. The task booklet, however, was right in front of them. The paper on which the booklets were printed is of good quality, but it is not perfectly opaque: by pressing a page down hard, it is possible to make out some of the letters on the page beneath. Furthermore, through an accident of reproduction, the college forms of the booklet were printed somewhat darker than the sixth and tenth grade forms and hence more easily seen through.

In short, it is suggested that the explanation of the initial differences between the treatment groups is that some subjects cheated. A subject in the Success condition who saw the first anagram ahead of time might easily see the solution as well and state a very high expectancy of success, while a subject in the Failure condition who saw the first anagram would be much less likely to recognize the solution instantly; this premature failure would tend to bias his expectancy of

success downward. A relatively small proportion of subjects behaving in this way would be sufficient to produce the observed effects.

Unfortunately there is no way to prove or disprove this explanation; however, two other considerations give it additional credibility. First, the treatment effects were strongest in the college samples, where the supervision was weakest, and weakest in the sixth grade, where the supervision was the strongest (the teacher remained in the back of the classroom during the administration of the task). Second, the variable most strongly affected was expectancy of success for the first trial. Overall expectancy was less strongly affected, and estimated ability still less strongly. Since a subject who is fairly certain that he will succeed (or fail) on the first trial may still be in some uncertainty about his probable performance on the other trials and in even greater uncertainty about the implications of his outcome on trial one for his general ability to solve anagrams, this ordering of effects is in line with the proposed explanation. Finally, it is noteworthy that, in a recent study of cheating behavior conducted at the same college as the present study, 91 percent of the male subjects and 97 percent of the female subjects admitted to having cheated on at least one examination (Smith, Ryan, and Diggins, in press). While the experimental task may have aroused less motivation to cheat than an examination, the consequences of being caught were also less forbidding.

These initial differences between the treatment groups should not obscure other interesting features of the results in Table 17. First, the main effect of sex is not significant for any of the three initial measures; that is, for this task and these samples, there is no sex difference in initial expectancy of success. Second, the higher ratings of perceived ability in the sixth grade recall the fact, cited in

Chapter II, in the discussion of sample characteristics, that the sixth-grade male subjects had higher verbal aptitude scores than the sixth grade females or the tenth grade males or females. This opens two questions: why the sex difference in verbal aptitude in the sixth grade sample is not more strongly reflected in the subjects' ratings of perceived ability for a verbal task; and whether the age difference in perceived ability is related to the age difference in measured ability.

Table 18 presents the correlation coefficients between verbal aptitude scores and the three initial measures for the sixth and tenth grade males and females. Perceived (estimated) ability for solving anagrams is significantly related to measured verbal aptitude only in the sixth grade females. In the sixth grade males the relationship is positive but small and not significant; in the tenth grade males and females the two variables are essentially uncorrelated. It is possible that the age difference in the strength of this relationship is produced by differences between the two aptitude tests. However, the fact that the sixth grade subjects were in untracked classes while the tenth grade subjects were tested in middle-track classes gives rise to the speculation that in a tracked classroom the students may adopt the "official" definition of their abilities rather than defining them on the basis of actual performance capabilities. If so, the age difference in estimated ability might reflect the tenth grade subjects' perception of their "middle" status. In fact the tenth grade mean is practically on the midpoint of the ten-interval scale, and the standard deviations show a slight tendency to be smaller than those of the sixth grade, two points that at least do not contradict the speculation that has been advanced.

TABLE 18

CORRELATIONS BETWEEN VERBAL APTITUDE AND SCORES ON INITIAL MEASURES

Grade	Sex	N	r between verbal aptitude and: Ability Estimate	Overall Expectancy	Trial 1 Expectancy
6	M	51	0.17	0.12	0.15
	F	55	0.35**	0.02	0.29*
10	M	34	0.06	-0.16	0.01
	F	31	-0.05	-0.20	-0.03

* $p < .05$, two-tailed
** $p < .01$, two-tailed

It was indicated earlier in this chapter that one probable side effect of the experimental manipulation would be to create groups of consistent subjects who differed in initial expectancy due to the loss of some of the less able subjects from the Success group and some of the more able subjects from the Failure group. To test this possibility, scores on the three initial measures were analyzed by means of four-way (grade by treatment by sex by consistent vs. non-consistent performance) analyses of variance. As anticipated, the interaction of treatment group with consistency of performance had significant effects on estimated ability ($F = 9.44$, $df = 1/312$, $p < .01$), overall expectancy ($F = 7.23$, $df = 1/312$, $p < .01$), and expectancy on trial one ($F = 18.22$, $df = 1/312$, $p < .01$).

Results from the initial measures for the consistent subjects only are reported in Table 19. Apart from differences in the strength of effects, the analyses in Table 19 differ in only one particular from those for all subjects, reported in Table 17. On estimated ability,

TABLE 19

SCORES ON INITIAL QUESTIONNAIRE
(CONSISTENT SUBJECTS)

Grade	Treatment	Sex	N	Estimated Ability Mean	Estimated Ability SD	Overall Expectancy Mean	Overall Expectancy SD	Trial 1 Expectancy Mean	Trial 1 Expectancy SD
6	Suc	M	18	5.78	1.81	3.44	0.76	6.17	1.86
		F	20	6.65	1.42	3.60	0.74	6.65	1.88
	Fail	M	15	5.73	1.24	3.40	0.71	5.47	2.66
		F	15	5.60	1.82	3.20	0.83	5.47	1.75
10	Suc	M	13	6.00	1.84	3.23	1.12	6.23	2.29
		F	14	5.86	1.60	3.14	0.35	4.64	1.84
	Fail	M	13	4.92	1.73	2.85	0.66	4.23	1.53
		F	12	5.00	1.92	2.75	1.01	3.33	2.39
Coll.	Suc	M	32	6.31	2.04	3.25	1.06	6.28	2.21
		F	40	6.73	2.04	3.83	0.89	7.00	2.34
	Fail	M	16	4.75	1.71	2.75	0.75	4.13	1.50
		F	14	4.07	1.67	2.21	0.67	3.21	1.52

Analyses of Variance[1]

Source of Variance	Estimated Ability df	Estimated Ability MS	Estimated Ability F	Overall Expectancy df	Overall Expectancy MS	Overall Expectancy F	Trial 1 Expectancy df	Trial 1 Expectancy MS	Trial 1 Expectancy F
Grade (A)	2	5.12	1.49	2	3.65	4.84**	2	29.00	6.47**
Treatment (B)	1	71.15	20.76**	1	15.06	19.97**	1	168.07	37.49**
Sex (C)	1	0.22	< 1.0	1	0.05	< 1.0	1	6.53	1.46
A x B	2	10.61	3.10*	2	3.16	4.19*	2	17.24	3.84*
A x C	2	1.15	< 1.0	2	0.05	< 1.0	2	9.85	2.20
B x C	1	4.78	1.39	1	2.95	3.91*	1	2.74	< 1.0
A x B x C	2	2.19	< 1.0	2	1.29	1.71	2	5.47	1.22
Within Ss	210	3.43		210	0.75		210	4.48	

* $p < .05$
** $p < .01$

[1]Unweighted-means solution.

the main effect of grade, significant for all subjects, is not significant for the consistent subjects, while the interaction of grade and treatment, which did not reach significance for all subjects, is significant for the consistent subjects.

Attributions for a Series of Consistent Outcomes

In this section, results are presented from the repeated measurement of attributions across trials, for those subjects who experienced consistent success or failure on all five trials. Because of the complexity of these results and the interrelatedness of the four attributional factors, the following mode of presentation has been adopted: first, the results and analysis for each of the attributional factors are presented separately and briefly described. Following this, the results for all four factors are considered together in terms of the effects of treatment, grade level, sex, and interactions.

Ability Attributions. Mean attributions to ability on each trial, together with an analysis of variance, appear in Table 20. As the analysis indicates, the main effects of grade, treatment, and trials were significant. Comparisons among means indicated that the college mean was significantly higher than the tenth grade mean on trials one and three through five and was significantly higher than the sixth grade mean on trial two. The sixth and tenth grade means did not differ significantly on any trial. The large treatment main effect resulted from the fact that subjects in Failure treatment groups gave significantly higher attributions to ability on every trial than did subjects in Success treatment groups. The significant main effect for trials indicates that, as predicted by hypothesis III, attributions to ability tended to increase across trials (means for trials 1 - 5 = 1.42, 1.52. 1.75, 1.67, 1.70).

TABLE 20

MEAN ABILITY ATTRIBUTIONS ACROSS TRIALS
(CONSISTENT SUBJECTS)

Grade	Treatment	Sex	N	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
6	Suc	M	18	1.11	1.11	1.50	1.39	1.61
		F	20	1.30	1.35	1.55	1.55	1.55
	Fail	M	15	1.33	1.47	1.80	1.47	1.67
		F	15	1.67	1.40	2.00	2.27	2.00
10	Suc	M	13	0.62	1.23	1.08	1.08	1.08
		F	14	0.86	0.86	1.07	1.07	0.93
	Fail	M	13	1.85	2.00	2.08	1.69	1.77
		F	12	1.50	1.67	1.75	1.92	1.92
Coll.	Suc	M	32	1.22	1.38	1.56	1.25	1.41
		F	40	1.28	1.45	1.75	1.75	1.70
	Fail	M	16	2.06	2.13	2.25	2.00	2.13
		F	14	2.21	2.21	2.57	2.64	2.64

Analysis of Variance

Source of Variance	df	MS	F
Between Ss			
Grade (A)	2	19.48	4.37*
Treatment (B)	1	102.33	22.82**
Sex (C)	1	4.53	1.01
A x B	2	7.19	1.60
B x C	1	0.45	< 1.0
A x C	2	3.28	< 1.0
A x B x C	2	0.40	< 1.0
Error (between)	210	4.48	
Within Ss			
Trials (D)	4	3.71	10.58**
A x D	8	0.40	1.14
B x D	4	0.10	< 1.0
C x D	4	1.33	3.81**
A x B x D	8	0.08	< 1.0
A x C x D	8	0.15	< 1.0
B x C x D	4	0.58	1.66
A x B x C x D	8	0.26	< 1.0
Error (within)	840	0.35	

* $p < .05$
** $p < .01$

In addition to these main effects, the interaction of sex with trials was significant. Comparisons among means indicated that, while the two sexes did not differ significantly in their ability attributions on trials one through three or on trial five, on trial four females gave significantly greater attributions to ability than males ($F = 6.45$, $p < .01$).

Effort Attributions. Mean attributions to effort are presented in Table 21. As the summary of the analysis of variance indicates, the only significant main effect was that of trials. Inspection of the means reveals that attributions to effort tended to decrease across trials, as hypothesis III. predicted (means for trials 1 - 5 = 1.43, 1.34, 1.29, 1.20, 1.27).

The interaction of treatment group with trials also attained significance. Comparisons among the means revealed that, while the Success mean was greater than the Failure mean on trials three through five, the difference reached significance only on trial five ($F = 8.58$, $p < .01$).

In addition, two second-order interactions were significant. The grade by treatment by trials interaction resulted from a number of significant differences that appeared on trial three but no other trial. On trial three, the Success group gave higher attributions to effort than the Failure group in the sixth grade ($F = 9.48$, $p < .01$). Among the Failure groups on that trial, the tenth grade gave higher attributions to effort than either the sixth grade ($F = 7.63$, $p < .01$) or college ($F = 9.20$, $p < .01$) subjects. Some possible implications of these differences are presented later in this section.

The significant interaction of treatment by sex by trials produced the following differences: on trial one (but no other), attributions

TABLE 21

MEAN EFFORT ATTRIBUTIONS ACROSS TRIALS
(CONSISTENT SUBJECTS)

Grade	Treatment	Sex	N	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
6	Suc	M	18	1.78	1.94	1.72	1.44	1.56
		F	20	1.25	1.75	1.60	1.15	1.40
	Fail	M	15	1.27	1.00	0.67	1.07	1.00
		F	15	1.73	1.33	1.20	1.20	1.27
10	Suc	M	13	1.38	1.38	1.46	1.54	1.62
		F	14	1.36	1.21	1.43	1.43	1.79
	Fail	M	13	1.46	0.92	1.23	0.92	1.08
		F	12	1.92	1.83	2.08	1.17	1.00
Coll.	Suc	M	32	1.16	1.22	1.34	1.28	1.31
		F	40	0.88	1.23	0.95	1.15	1.20
	Fail	M	16	1.31	1.00	0.94	1.06	1.25
		F	14	1.64	1.29	0.79	1.00	0.71

Analysis of Variance

Source of Variance	df	MS	F
Between Ss			
Grade (A)	2	7.12	2.41
Treatment (B)	1	8.40	2.85
Sex (C)	1	0.70	< 1.0
A x B	2	2.47	< 1.0
B x C	1	10.97	3.72
A x C	2	2.17	< 1.0
A x B x C	2	1.14	< 1.0
Error (between)	210	2.95	
Within Ss			
Trials (D)	4	1.43	3.07*
A x D	8	0.63	1.34
B x D	4	3.26	6.97**
C x D	4	0.59	1.26
A x B x D	8	1.45	3.10**
A x C x D	8	0.35	< 1.0
B x C x D	4	1.29	2.75*
A x B x C x D	8	0.30	< 1.0
Error (within)	840	0.47	

* $p < .05$
** $p < .01$

to effort by females were significantly higher following failure than following success ($F = 9.93$, $p < .01$), while on trials two and three, attributions to effort by males were significantly lower following failure than following success ($F = 6.65$, 8.28 respectively; both $p < .01$). In addition, on trial two, female effort attributions were higher than male effort attributions following failure ($F = 5.10$, $p < .05$).

Task Attributions. Mean attributions to task appear in Table 22. In the analysis of variance, the main effects of treatment group and sex were highly significant. Comparisons indicated that the Success treatment groups gave significantly higher attributions to task than the Failure treatment groups on every trial. That is, more subjects said that they succeeded because the task was easy than said that they failed because the task was hard. As to the main effect of sex, male attributions to task were significantly higher than female attributions to task on trials four ($F = 18.72$, $p < .01$) and five ($F = 5.01$, $p < .05$). These latter differences also produced a significant interaction of sex by trials.

Two other first-order interactions, that of grade by treatment and that of treatment by trials, reached significance. The former, as well as a significant interaction of grade by treatment by trials, reflects the following significant differences: on trials two and three, attributions to task were greater following success than following failure in the tenth grade and college groups, but not in the sixth grade; on trial two, the tenth grade Success mean was greater than the sixth grade Success mean; and on trial three, the tenth grade Failure mean was lower than either the sixth grade or college Failure means. All these comparisons were significant at $p < .01$. The interaction of treatment with trials reflects the fact that the difference between the

TABLE 22

MEAN TASK ATTRIBUTIONS ACROSS TRIALS
(CONSISTENT SUBJECTS)

Grade	Treatment	Sex	N	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
6	Suc	M	18	2.39	2.17	2.39	2.78	2.44
		F	20	2.60	1.85	1.95	2.55	2.40
	Fail	M	15	1.60	1.67	1.93	2.13	2.00
		F	15	1.07	1.93	1.80	1.40	1.80
10	Suc	M	13	2.69	2.46	2.46	2.69	2.54
		F	14	2.79	2.64	2.64	2.43	2.00
	Fail	M	13	1.00	1.85	1.62	1.92	2.00
		F	12	1.33	0.92	0.75	1.00	1.58
Coll.	Suc	M	32	2.78	2.50	2.34	2.63	2.47
		F	40	2.75	2.20	2.38	2.10	2.05
	Fail	M	16	1.63	1.81	1.88	1.94	1.63
		F	14	1.43	1.57	1.71	1.43	1.57

Analysis of Variance

Source of Variance	df	MS	F
Between Ss			
Grade (A)	2	0.61	< 1.0
Treatment (B)	1	171.71	97.01**
Sex (C)	1	16.08	9.09**
A x B	2	5.86	3.31*
B x C	1	2.26	1.28
A x C	2	0.22	< 1.0
A x B x C	2	1.43	< 1.0
Error (between)	210	1.77	
Within Ss			
Trials (D)	4	0.43	< 1.0
A x D	8	0.78	1.70
B x D	4	4.32	9.42**
C x D	4	1.62	3.54**
A x B x D	8	1.14	2.50*
A x C x D	8	0.48	1.05
B x C x D	4	0.44	< 1.0
A x B x C x D	8	1.33	2.90**
Error (within)	840	0.46	

* $p < .05$
** $p < .01$

Success and Failure means tends to decrease across trials (values of the comparison (psi) for trials 1 - 5 = 7.94, 4.07, 4.47, 5.35, 3.32).

In addition to the effects already described, the third-order interaction (grade by treatment by sex by trials) reached significance. Separate analyses of variance for each trial revealed a significant interaction of grade by treatment by sex on trial two ($F = 3.81$, $df = 2/210$, $p < .05$) and a similar interaction that approached significance on trial three ($F = 2.63$, $df = 2/210$, $p < .10$). Inspection of the means for trial two indicates that, as we might expect from the main effect of sex, male task attributions are higher than female task attributions in the sixth grade/Success, tenth grade/Failure, and college Success and Failure groups ($F = 8.72$, $p < .01$). In the sixth grade/Failure and tenth grade/Success groups, however, the male means are slightly lower than the female means ($F = 0.89$, n.s.). It is not clear how this finding should be interpreted.

Luck Attributions. Mean attributions to luck are reported in Table 23. The analysis of variance revealed significant main effects of treatment and of trials. Comparisons among the means indicated that Failure treatment groups gave higher attribution to luck than Success treatment groups on every trial. The trials main effect resulted from the tendency for attributions to luck to decrease across trials, as predicted from hypothesis III (means for trials 1 - 5: 1.15, 1.17, 0.99, 1.04, 1.00).

Three first-order interactions reached significance. Grade interacted with treatment to produce the following differences: in the sixth grade, the Failure mean was significantly greater than the Success mean on every trial, but in the tenth grade this difference was significant only on trial four, and in the college group it was not significant on

TABLE 23

MEAN LUCK ATTRIBUTIONS ACROSS TRIALS
(CONSISTENT SUBJECTS)

Grade	Treatment	Sex	N	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
6	Suc	M	18	0.72	0.78	0.39	0.39	0.39
		F	20	0.85	1.05	0.90	0.75	0.65
	Fail	M	15	1.80	1.80	1.60	1.27	1.33
		F	15	1.53	1.33	1.00	1.13	0.93
10	Suc	M	13	1.31	0.93	1.00	0.69	0.77
		F	14	1.00	1.29	0.86	1.07	1.29
	Fail	M	13	1.69	1.23	1.08	1.46	1.15
		F	12	1.25	1.58	1.42	1.92	1.50
Coll.	Suc	M	32	0.84	0.91	0.75	0.84	0.81
		F	40	1.10	1.13	0.93	1.00	1.05
	Fail	M	16	1.00	1.06	0.94	1.00	1.00
		F	14	0.71	0.93	0.93	0.93	1.07

Analysis of Variance

Source of Variance	df	MS	F
Between Ss			
Grade (A)	2	6.58	2.25
Treatment (B)	1	33.84	11.58**
Sex (C)	1	1.24	< 1.0
A x B	2	9.08	3.11*
B x C	1	5.81	1.99
A x C	2	0.98	< 1.0
A x B x C	2	2.70	< 1.0
Error (between)	210	2.92	
Within Ss			
Trials (D)	4	1.48	4.19**
A x D	8	0.82	2.32*
B x D	4	0.24	< 1.0
C x D	4	0.93	2.64*
A x B x D	8	0.45	1.27
A x C x D	8	0.57	1.61
B x C x D	4	0.05	< 1.0
A x B x C x D	8	0.32	< 1.0
Error (within)	840	0.35	

* $p < .05$
** $p < .01$

any trial. In addition, the sixth grade/Failure group gave significantly higher luck attributions than the college/Failure group on trials one ($F = 9.96$, $p < .01$) and two ($F = 4.98$, $p < .05$), and the tenth grade/Failure group was higher than the college/Failure group on trials one ($F = 5.21$, $p < .05$) and four ($F = 8.84$, $p < .01$). On trial five, the sixth grade/Success group was lower in attributions to luck than either the tenth grade/Success ($F = 4.89$, $p < .05$) or college/Success ($F = 5.04$, $p < .05$) groups.

Grade also interacted significantly with trials. Comparisons among the means revealed that on trial one the tenth grade group gave higher luck attributions than the college group ($F = 5.16$, $p < .05$), while on trial four the tenth grade mean was higher than either the sixth grade ($F = 5.81$, $p < .01$) or college ($F = 4.65$, $p < .05$) means. No other comparisons between grades were significant.

Finally, the analysis in Table 23 indicates that the interaction of sex with trials was significant. Comparisons among the means showed that males gave higher luck attributions than females on trial one, but the females were higher on every trial thereafter. However, on no trial did the comparison reach significance. Inspection of the means suggests that the major contribution to this effect came from the tenth grade, in which female attributions to luck were substantially higher than male attributions to luck on trials two, four, and five. Since the overall grade by sex by trials interaction did not reach significance, however, comparisons within a single grade level could not be meaningfully interpreted and were not performed.

Effects of Treatment on Attributions. In order to illustrate the effects of treatment on the four attributional factors, unweighted means, collapsed across grade and sex, were calculated for the two treatments

on each trial. These are displayed in Figure 2. As has already been reported, there were strong treatment main effects on ability, task, and luck scores, while treatment interacted with trials to produce a highly significant effect on effort scores. What these differences mean is that a subject is more willing to attribute a success to an easy task or high effort than he is to attribute a failure to a hard task or low effort; at the same time, he is more willing to attribute a failure to low ability or bad luck than he is to attribute a success to high ability or good luck.

These differences between the treatment groups as compared to each other may be misleading, however. More important to the understanding of the results is a comparison across the four attributional factors. For example, as Figure 2 indicates, task attributions were significantly lower in the Failure group than in the Success group; however, they were still higher on most trials than the Failure group's attributions to effort and luck.

If the four factors are ranked in order of perceived importance, the result for the Success group is the same on every trial: task ease is most important, followed by high effort, high ability, and good luck. The gap between effort and ability tends to narrow across trials. The Success group, then, is saying in effect, "I succeeded because it was really easy; besides, I tried hard and I'm pretty good at doing this. Luck didn't have much to do with it."

In the Failure condition, the order of importance on trial one is low ability as most important, followed by low effort, with task difficulty and bad luck approximately tied as least important. By trial five, however, ability is still most important, but task difficulty is second, luck third, and effort last. This order might be translated as,

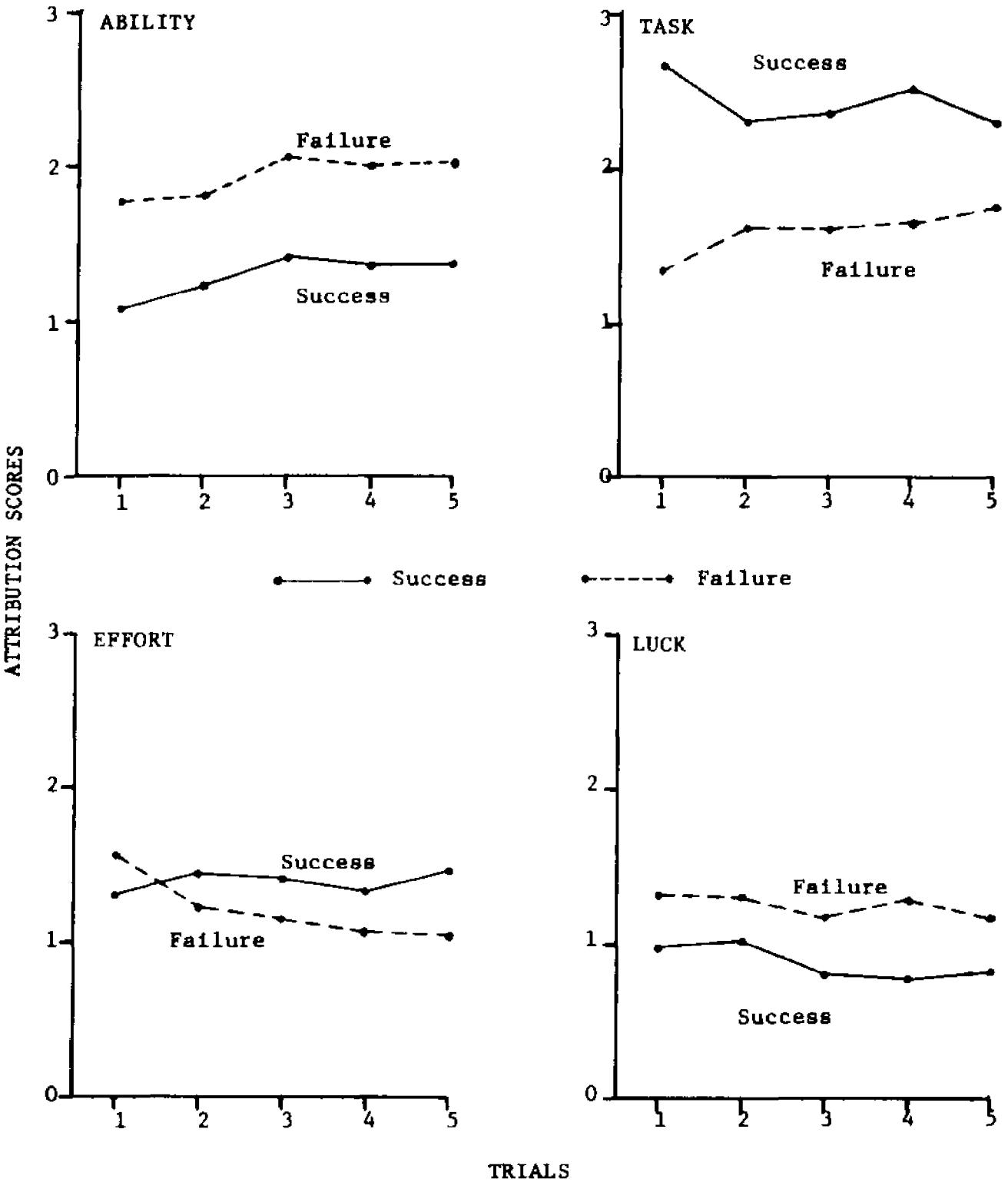


FIGURE 2. Attributions to ability, effort, task, and luck as a function of treatment group; consistent subjects.

"I'm just not good at doing this and besides, it's hard and I'm unlucky, but it's not that I didn't try."

The finding that the perceived importance of effort declines across trials in the Failure condition but not in the Success condition suggests a conceptual problem in the attributional model: asymmetry of effort and luck as variable factors. Luck is by definition variable, but effort is not. It is true that effort, as opposed to, say, ability, can be varied, and in that sense is variable, but it is not true that effort, like luck, must vary. One possible interpretation of the finding just presented is that subjects tend to treat effort as a stable or fixed factor unless they receive evidence to the contrary.

In the Success condition, in which attributions to effort change very little across trials, the subjects may not be receiving such contrary evidence. If one ascribes a success to having tried hard, and then succeeds again, the second success does not necessarily contradict the previous ascription unless the subject is aware of having tried less hard the second time. The case is different in the Failure condition. A subject who fails, says it is because he didn't try hard enough, and then fails again, may easily consider that the second outcome contradicts his attribution of the prior failure to lack of effort, especially if, as Weiner et al. (in press) suggest, attributions of failure to lack of effort tend to motivate the subject to make a greater effort. In this case, we would expect attributions of failure to low effort to decline across trials, as they do.

Effects of Grade Level on Attributions. Scores on the four attributional factors, collapsed across treatment group and sex, are shown in Figure 3. The only clear effects of grade, as the analyses just reported indicate, are on ability scores and, in interaction with trials,

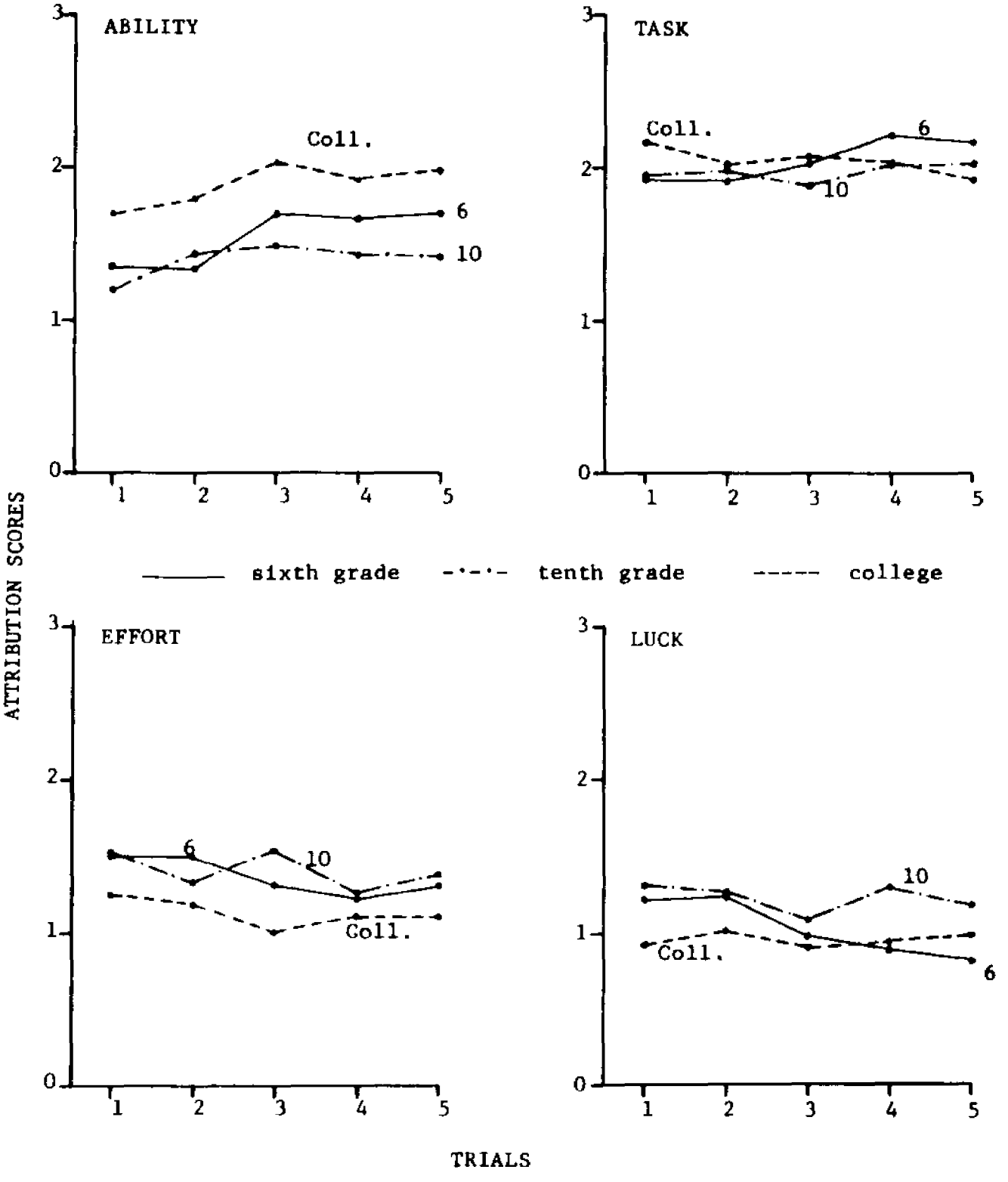


FIGURE 3. Attributions to ability, effort, task, and luck as a function of grade level; consistent subjects.

on luck scores. However, other features of Figure 3 are also of interest even though they did not reach an acceptable level of significance.

A first impression of the relationships shown in the figure is that the attributions of the sixth and tenth grade subjects on early trials are quite similar to each other and rather different from those of the college students. The sixth and tenth graders give higher mean attributions to effort on every trial than the college students; on trial one their task attributions are quite similar to each other and rather lower than those of the college subjects; and also on trial one, their attributions to luck are quite similar to each other and rather higher than those of the college subjects. As the subjects gain experience with the task, however, the range of mean scores for the three groups tends to become narrower. To borrow a term from a different body of theory, with increased experience the subjects' attributions appear to be coming under stimulus control and to show less influence of factors related to grade level.

An interesting exception is attributions to luck. In the first chapter it was suggested that younger subjects, because of a less mature grasp of probability notions, might persist longer in attributing a series of consistent outcomes to luck. Figure 3 gives no support to this suggestion. The college subjects give low attributions to luck on the first trial and continue on much the same level for the remainder of the task. The tenth grade subjects give somewhat higher attributions to luck on trial one and continue on much the same level through the rest of the task. The sixth graders, however, are on the same level as the tenth graders on trial one and decline steadily until, by trial five, they are lower than the college students. These patterns contributed to a significant grade by trials interaction.

The correct interpretation of these grade-related differences is not completely clear. The relative lack of change across trials in the tenth grade and college samples seems to indicate a fairly stable a priori conception of the importance of luck in determining achievement outcomes. The difference in level between the two samples may, in that case, reflect the greater maturity of the college students or their presumably greater intelligence, or both. What, then, do the findings for the sixth grade sample mean?

First, if the steady responding of the older subjects indicates a stable conception of the role of luck, then clearly the sixth grade subjects do not have such a stable conception. Their curve for luck attributions suggests rather that they are testing hypotheses about the contribution of luck, with the result that they increasingly reject the hypothesis that it is an important determinant of the outcomes. Paradoxically, such behavior could be interpreted simultaneously as less mature and more intelligent than that displayed by the older subjects: less mature, because while luck is generally not an important determinant of achievement outcomes, the sixth graders are willing to entertain the hypothesis that it is; more intelligent, because unlike the older subjects, they are responsive to cues in the task that indicate that such a hypothesis is untenable. Perhaps, in fairness to the tenth grade and college subjects, it should be noted however that in both groups luck was considered the least important factor, that is, received the lowest mean score, on almost every trial.

Effects of Sex on Attributions. Unweighted mean scores on the four factors by sex, collapsed across grade and treatment, are shown in Figure 4. As was already reported, the main effect of sex

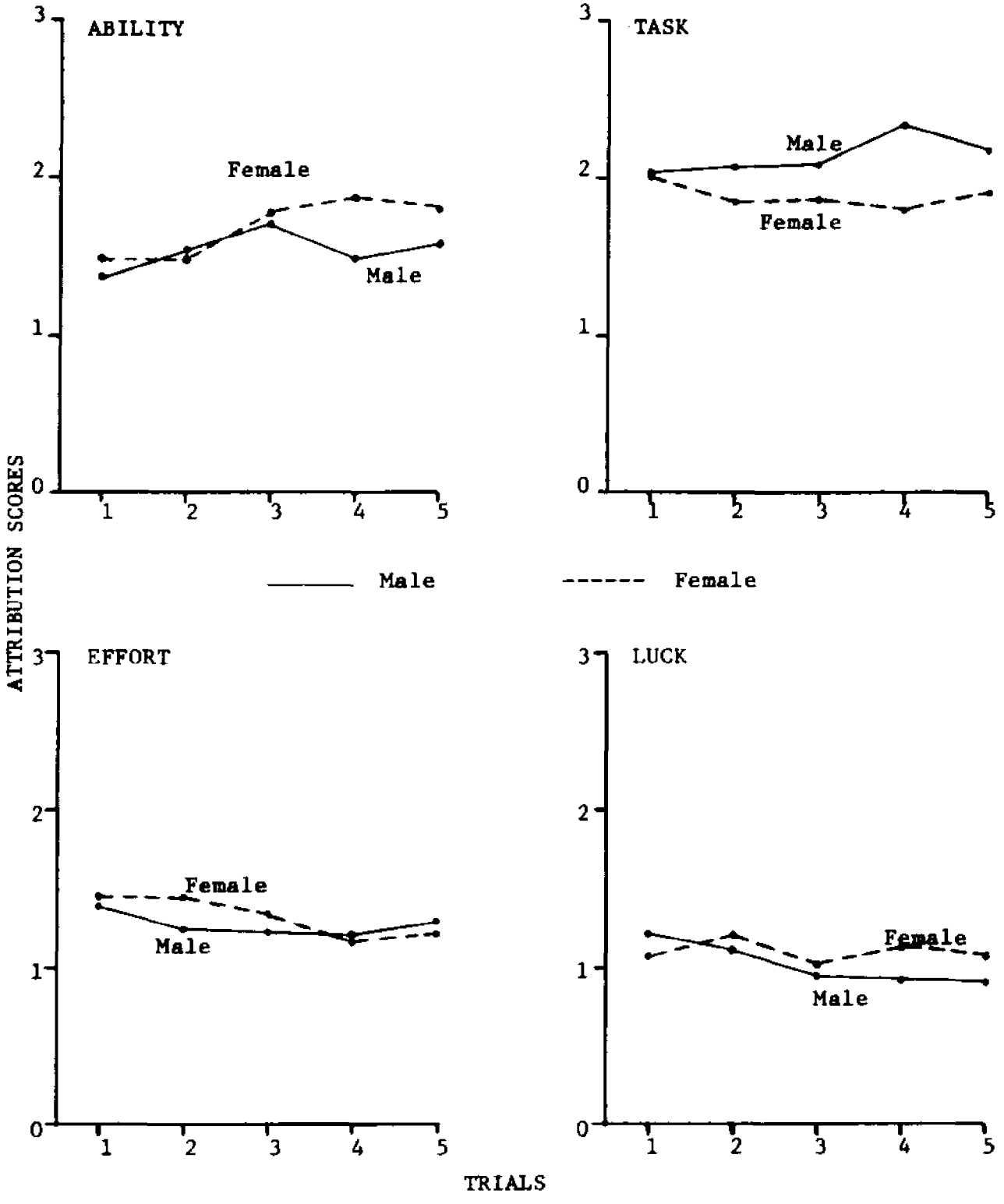


FIGURE 4. Attributions to ability, effort, task, and luck as a function of sex; consistent subjects.

on task attributions was significant, as were the interaction effects of sex and trials on ability, task, and luck attributions.

The most interesting of these effects concern attributions to ability and task. Inspection of Figure 4 indicates that if these two scores were combined into a single fixed-factor score, the sex difference would essentially disappear. Males and females do not, then, differ in their tendency to detect regularities in a series of outcomes and to draw appropriate conclusions from them; nor, according to the attributional model, should they differ markedly in their expectancy of success as a result. However, the females are clearly more willing to attribute their outcomes to an internal factor, ability, than are the males. This corroborates several previous findings discussed in the first chapter and, as was pointed out, implies that the females should experience more outcome-related affect, positive or negative depending on the outcome, than the males. This point is taken up again in a later section of this chapter, as well as in the next chapter.

As Figure 4 indicates, male attributions to luck declined across trials, while female attributions to luck stayed at the same relatively low level throughout the task; these differences contributed to a significant sex by trials interaction. As was pointed out, however, the largest contribution by far to this interaction came from the tenth grade subjects; consequently, interpretation of it is left to later in this section, in the discussion of the joint effects of grade and sex.

Effects of Grade and Treatment on Attributions. Figure 5 shows the unweighted mean attributions to each factor for the two treatment groups at each grade level, collapsed across sex. The grade by treatment interaction significantly affected task and luck scores, while the interaction of grade by treatment by trials was significant for effort and task.

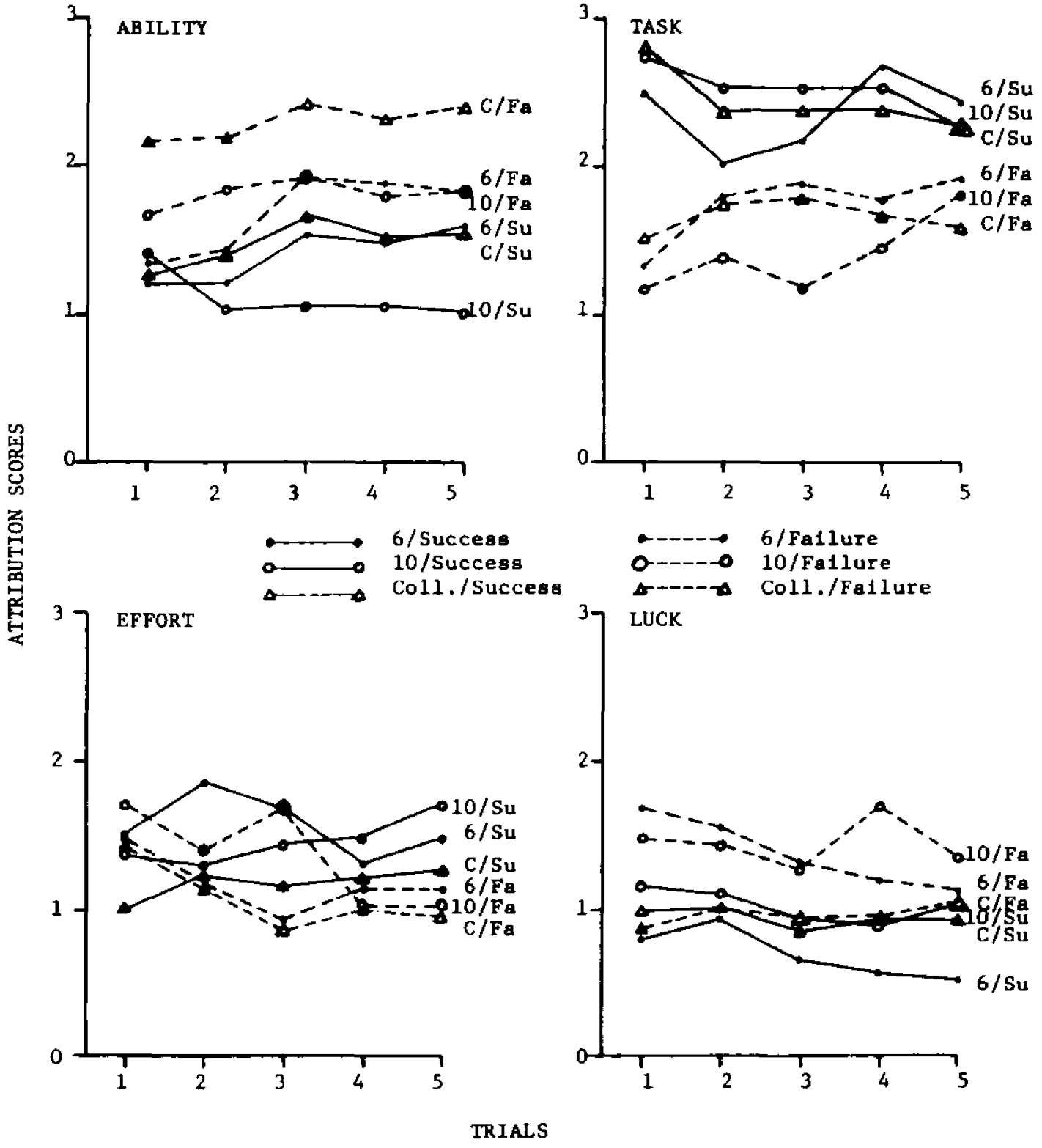


FIGURE 5. Attributions to ability, effort, task, and luck as a function of grade level and treatment group; consistent subjects.

Neither interaction reached significance in the analysis of ability attributions.

The most readily interpretable of these interactions is that of grade and treatment on luck scores. As the figure shows, the two treatment groups in the college sample are virtually indistinguishable from each other in their attributions to luck. In both the sixth and tenth grades, however, the Failure subjects gave greater attributions to luck than the Success subjects. This both supports and deepens the interpretation given earlier to grade differences in attribution to luck. The college subjects are more mature in that they tend to exclude luck as a causal factor, whether they succeed or fail, while both the sixth and tenth graders are more ready to ascribe a failure to bad luck than to ascribe a success to good luck. However, the sixth grade subjects also display what appears to be more intelligent behavior than the tenth grade subjects, in that their attributions to luck decline across trials in both conditions, while those of the tenth graders do not. It is possible, then, that the obtained differences in luck attributions reflect both a developmental difference and a difference in samples, a point that is elaborated upon in the next chapter.

The meaning of the interaction effects on effort and task attributions may be somewhat clearer if the two factors are considered together. Figure 5 suggests that, among Success groups, the tenth grade and college subjects are quite similar to each other and rather different from the sixth grade subjects in attributions to effort and task, while among Failure groups it is the sixth grade and college subjects who are similar and the tenth graders who are somewhat different. Specifically, on trial two, the sixth grade/Success subjects, in comparison to the other two groups, attribute their success more to high effort and less

to an easy task, while on trial three, the tenth grade/Failure subjects, in comparison to the other two groups, attribute their failure more to a lack of effort and less to a difficult task. It would be unwise to place too much stress on differences that, like these, appear mainly on a single trial, even though the effects reach statistical significance; however, it is interesting to note that, for both the sixth and tenth grades, the curves for effort and task attributions appear to be quite close inverses of each other in both treatment groups. To illustrate this, Figure 6 shows the task and effort curves of the sixth grade/Success group, with effort inverted. The shift, across trials, from attributions to variable factors to attributions to fixed factors was predicted from hypothesis III, but the suggestion contained in these findings, that subjects who shift from attributions to effort may tend to shift to task attributions rather than ability attributions, was not anticipated. The possible significance of this suggestion is discussed in the next chapter.

Effects of Grade and Sex on Attributions. Mean attributions by grade and sex, collapsed across treatment group, are shown in Figure 7. The interactions of grade and sex and of grade, sex, and trials did not significantly affect any of the four attributional factors. As was noted earlier, however, the interaction of sex with trials on luck scores was significant and appeared to stem mostly from the tenth grade, a suggestion that Figure 7 illustrates. On trials four and five, in particular, the mean luck score for the tenth grade females is notably higher than the means for the other five groups, which tend to cluster together on these trials. It is not clear why the tenth grade females should depart from the other groups in this way, although it is of interest to note that they also tend to give the lowest attributions to ability and task and the highest to effort of the six groups. This leads to the speculation that

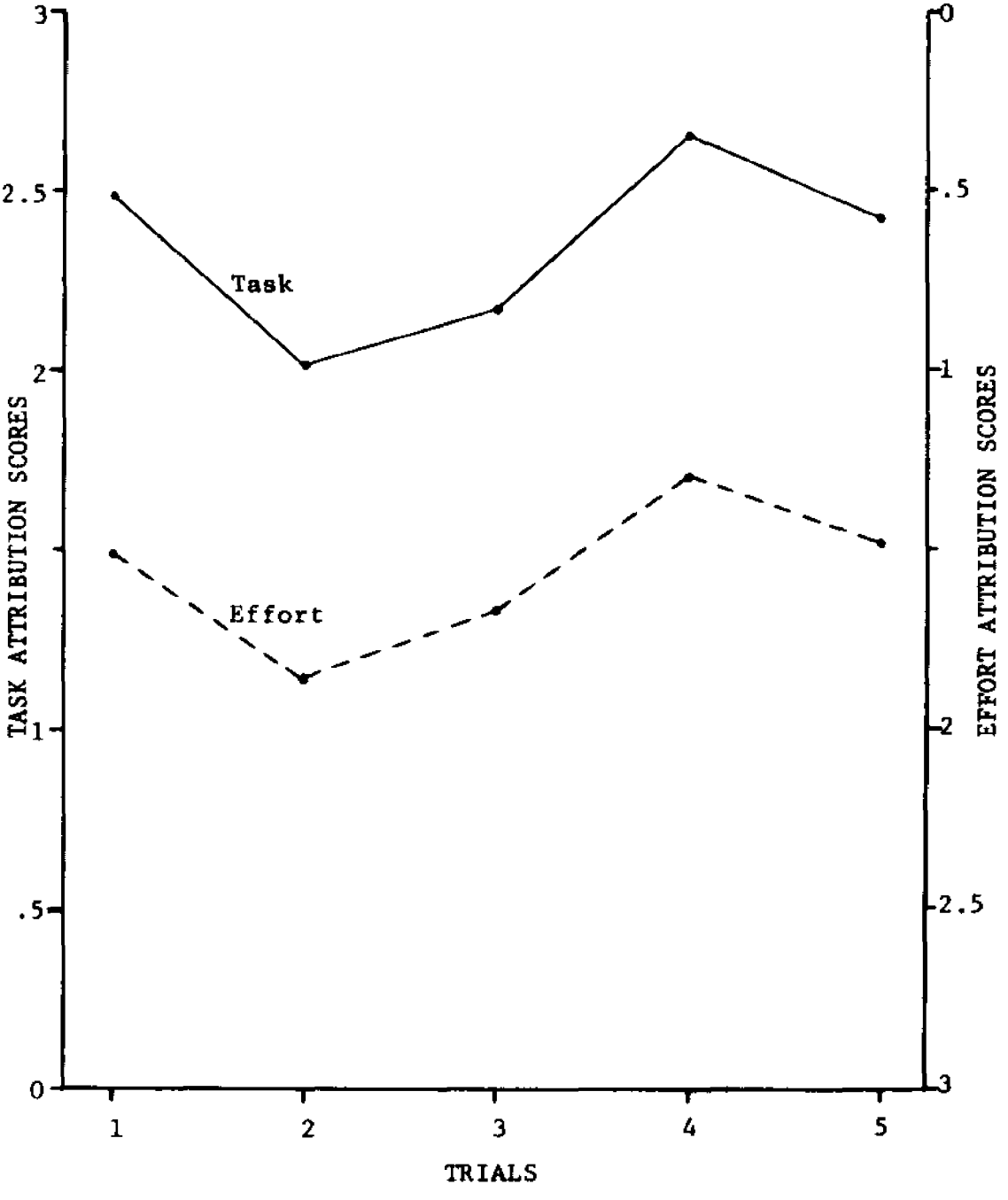


FIGURE 6. Attributions to task and effort of the sixth grade/ Success group, with effort inverted.

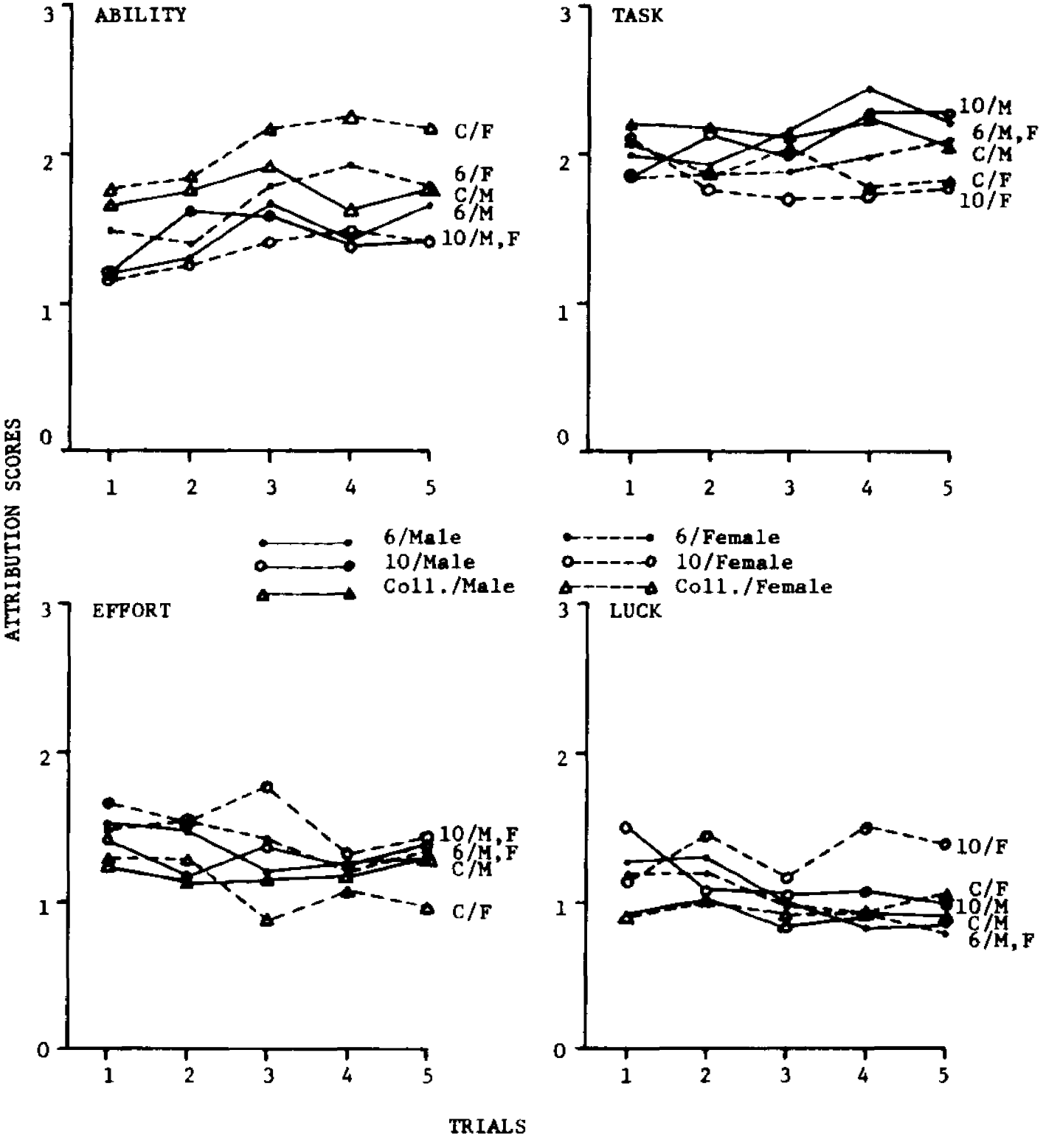


FIGURE 7. Attributions to ability, effort, task, and luck as a function of grade and sex; consistent subjects.

these subjects find failure so threatening that they reject causal explanations, that is, attributions to fixed factors, that would imply a high probability of further failures.

Effects of Treatment and Sex on Attributions. Figure 8 shows mean attributions on each trial by treatment group and sex, collapsed across grade. The interaction of treatment with sex did not significantly affect any of the four factors, but the treatment by sex by trials interaction did reach significance in the analysis of attributions to effort. As was indicated by the comparisons reported earlier, the subjects in the Failure condition were primarily responsible for this interaction. Both males and females in the Failure condition gave fairly high attributions to effort (that is, said that their failure was due to low effort) on trial one, although, as the figure shows, the females were higher than the males. After trial one, however, effort scores of males in the Failure condition dropped sharply, then remained on much the same low level for the remainder of the task, while the female/Failure mean declined steadily but more slowly, until by trial five it was slightly lower than the male/Failure mean. It is tempting to see this result as evidence of greater female internality for failure, especially since, as was mentioned earlier, the females also give higher attributions to ability than the males following failure (as well as following success). However, since effort scores were also significantly affected by the interactions of treatment with trials and of grade by treatment by trials, it is not clear that such an interpretation can be justified, especially since reference back to the means reported in Table 21 suggests that the female/Failure groups at the three grade levels were not uniformly higher in attributions to effort than the male/Failure groups. In fact, the means for the college female/Failure group were slightly lower than

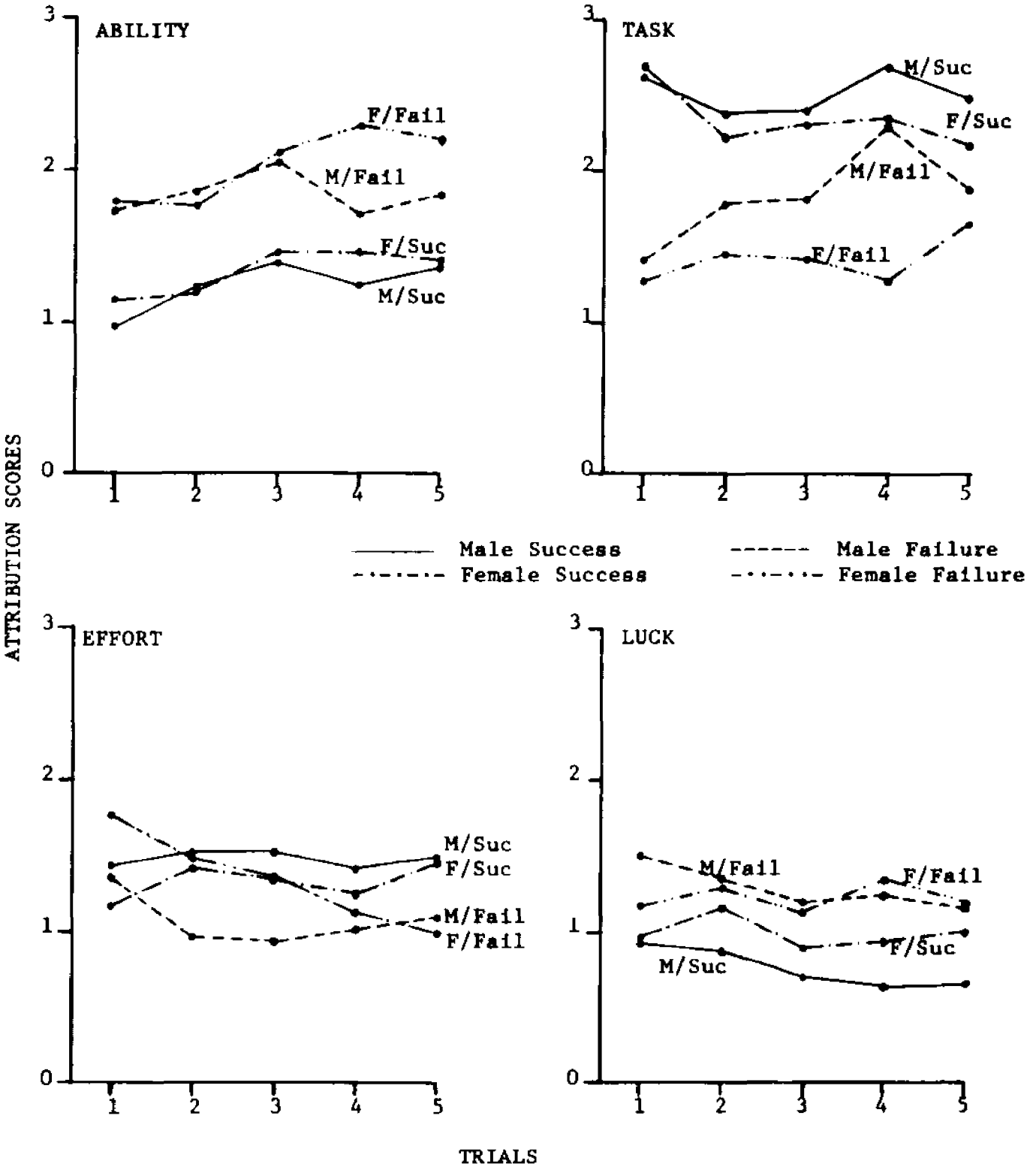


FIGURE 8. Attributions to ability, effort, task, and luck as a function of treatment group and sex; consistent subjects.

those of the college male/Failure group on the last three trials. A more thorough discussion of the question of sex differences in internality appears in the next chapter.

Changes in Expectancy Across Trials

Mean expectancies prior to each trial, together with an analysis of variance, are reported in Table 24. As might be expected, there are very strong effects of treatment and of the interaction of treatment with trials. These reflect the fact that subjects who experience a series of successes state higher expectancies of success than subjects who experience a series of failures, and that this difference increases with the length of the series.

Two other first-order interactions reached significance: grade by trials and grade by treatment. Comparisons among the means indicated that prior to trial one, the sixth grade subjects stated higher expectancies than either the tenth grade ($F = 11.50$, $p < .01$) or college subjects ($F = 5.09$, $p < .05$). On no later trial did any comparisons between means for the grades as a whole reach significance. As for the interaction of grade with treatment, Figure 9 shows that, after the first trial, the tenth grade/Success subjects gave lower expectancies on every trial than either the sixth grade/Success or college/Success subjects, while the tenth grade/Failure subjects gave higher expectancies on every trial than either the sixth grade/Failure or college/Failure subjects. On trial four the tenth grade/Success group mean was significantly lower than the college/Success mean ($F = 5.12$, $p < .05$), while the tenth grade/Failure mean was significantly higher than either the sixth grade/Failure mean ($F = 5.43$, $p < .01$) or the college/Failure mean ($F = 6.02$, $p < .01$). The difference between the tenth grade/Failure

TABLE 24

MEAN EXPECTANCY ACROSS TRIALS
(CONSISTENT SUBJECTS)

Grade	Treatment	Sex	N	Preceding: Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
6	Suc	M	18	6.17	6.33	6.33	7.17	8.11
		F	20	6.65	7.45	7.45	8.15	8.60
	Fail	M	15	5.47	2.73	2.60	2.07	1.47
		F	15	5.47	3.87	3.67	2.47	2.00
10	Suc	M	13	6.23	6.54	7.38	7.62	7.92
		F	14	4.64	6.29	6.29	6.21	6.86
	Fail	M	13	4.23	4.38	3.69	3.15	2.85
		F	12	3.33	3.83	3.67	3.83	3.25
Coll.	Suc	M	32	6.28	7.00	7.41	7.97	7.97
		F	40	7.00	7.08	7.20	7.85	8.13
	Fail	M	16	4.13	3.63	3.25	2.69	2.31
		F	14	3.21	2.43	1.86	1.71	1.79

Analysis of Variance

Source of Variance	df	MS	F
Between Ss			
Grade (A)	2	2.29	< 1.0
Treatment (B)	1	3726.62	260.67**
Sex (C)	1	2.20	< 1.0
A x B	2	61.04	4.27*
B x C	1	0.75	< 1.0
A x C	2	42.16	2.95
A x B x C	2	23.18	1.62
Error (between)	210	14.30	
Within Ss			
Trials (D)	4	0.90	< 1.0
A x D	8	7.78	5.36**
B x D	4	103.67	71.46**
C x D	4	1.28	< 1.0
A x B x D	8	6.80	4.69**
A x C x D	8	2.40	1.65
B x C x D	4	1.70	1.17
A x B x C x D	8	1.22	< 1.0
Error (within)	840	1.45	

* $p < .05$
** $p < .01$

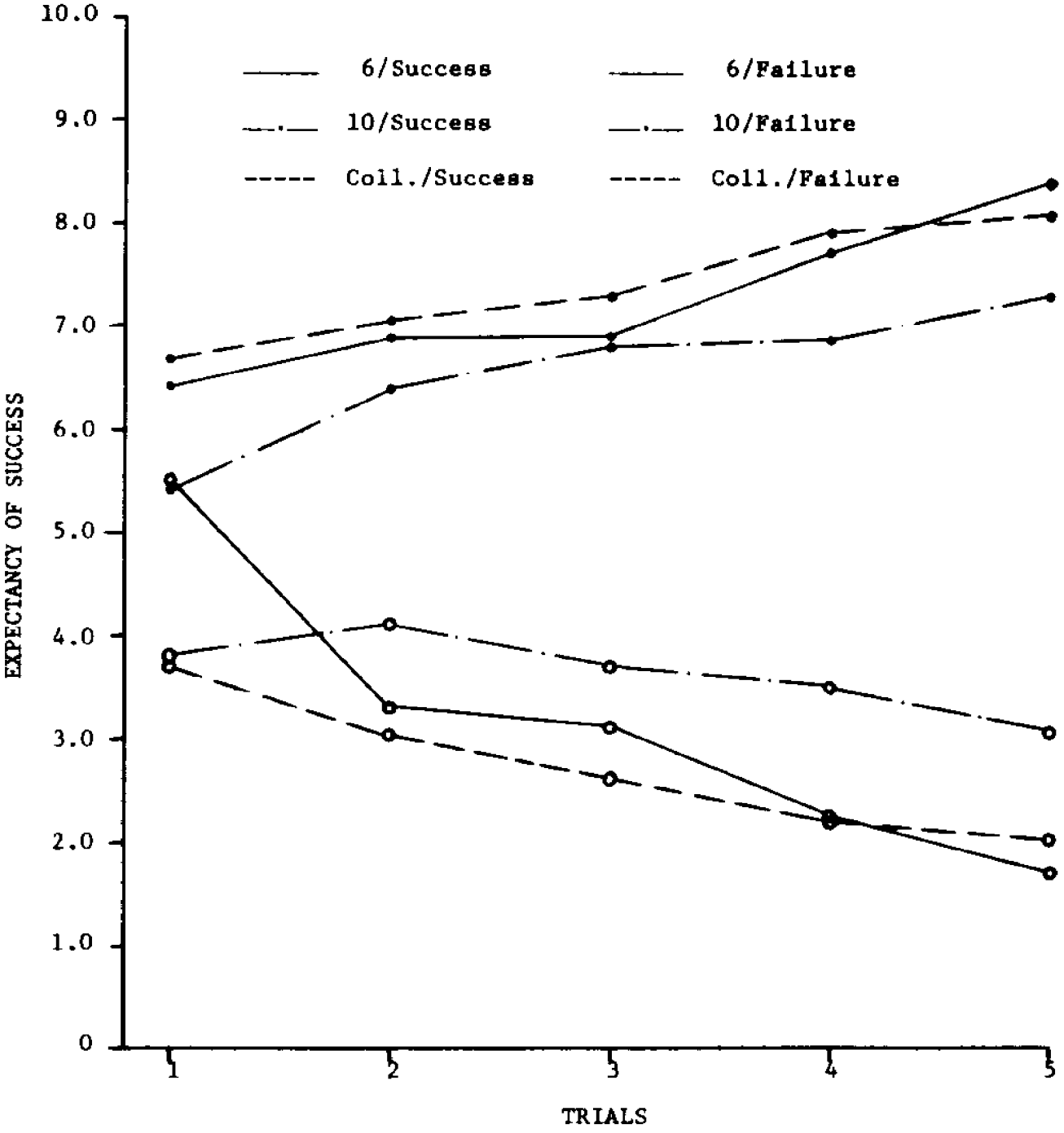


FIGURE 9. Expectancy of success as a function of grade and treatment (consistent subjects).

and sixth grade/Failure means also reached significance on the last trial ($F = 5.71$, $p < .01$). These differences also contributed to a significant grade by treatment by trials interaction.

From the point of view of theory, it is important to note the extent to which these age differences in expectancy are parallelled by age differences in attribution. In the Success condition, the tenth grade subjects did not differ appreciably from the sixth grade and college subjects in attributions to task or luck, but they did tend, especially on later trials, to be somewhat higher in attributions to effort and to be lower in attributions to ability. In the Failure condition, the tenth grade on trial three gave significantly higher attributions to effort and significantly lower attributions to task than either the sixth grade or college groups, while on trial four the tenth grade group gave significantly higher attributions to luck than the college group and was higher than the sixth grade as well, although the difference did not reach significance. These grade differences in attribution would, according to the hypotheses, be accompanied by precisely the grade differences in expectancy of success that were in fact found.

This inferential support for the theoretical model is of particular interest because it is provided by the tenth grade subjects. As was noted in the earlier sections of this chapter which considered evidence bearing on the hypotheses, the sixth grade and college data supplied stronger evidence for the hypotheses than did the tenth grade. Nevertheless, if the behavior of the tenth grade subjects did not provide a great deal of support for the hypotheses, we see that it was quite in accord with the cognitive operations being hypothesized.

One other aspect of the results presented in Table 24 should be pointed out. Sex, either as a main effect or in interaction with trials,

had essentially no effect on expectancy of success; both F ratios were less than unity. However, the interaction of sex with grade did have an effect that approached significance ($F = 2.95$, $df = 2/210$, $p < .10$). Moreover, in individual analyses of variance of the data from trials two and three, this interaction was significant (trial two, $F = 3.66$, $df = 2/210$; trial three, $F = 4.46$, $df = 2/210$; both $p < .05$). Comparisons among the means on these trials revealed that the sixth grade females stated significantly higher expectancies of success than the sixth grade males (trial two, $F = 5.51$, $p < .01$; trial three, $F = 5.16$, $p < .05$), even though, as was pointed out in Chapter II, their verbal aptitude scores were significantly lower than those of the sixth grade males. Just as the initial questionnaire responses gave no evidence of generalized lower expectancies of success among females, so the repeated measurement of expectancy across a series of consistent outcomes on this task gives no support to the notion that the expectancies of females are lower than those of males; in fact, the only noticeable sex difference in expectancy is in the opposite direction. It should also be noted that, in this study, there are no sex differences in causal attribution that would, from the theory, lead us to expect sex differences in expectancy. Some implications of these findings are discussed in the next chapter.

Post-Task Questionnaire Responses

After the last trial and its paired comparisons, subjects were asked to rate their outcome (degree of success or failure), their satisfaction with the outcome, their ability to solve anagrams, the amount of effort they had expended on the task, the difficulty of the task, the amount of luck they had had, and their willingness to undertake another similar task. These responses, on ten-interval graphic scales, were scored from

one to ten, with scores of ten corresponding to extreme success, extreme satisfaction, very high ability, very high effort, very difficult task, very lucky, and very willing to try a similar task. Subjects were also asked to suppose that they were about to try to solve another set of five anagrams and to state how many of the five they would expect to be able to solve.

Two sets of analyses of variance were performed on the scores from this questionnaire. The first set used data from the subsample of consistent subjects, while the second used the data from all subjects, dividing them at the midpoint on rating of perceived outcome to create success and failure groups. With a few minor exceptions, which are noted, the two sets of analyses yielded essentially the same results. Consequently, only the analyses for the entire sample are reported here.

Outcome and satisfaction. The results for outcome rating and satisfaction appear in Table 25. Since the outcome factor in the analysis was created by dividing subjects according to their scores on rated outcome, the very strong main effect of this factor on rated outcome is not surprising. However, the analysis of the scores of consistent subjects showed an even stronger main effect of assigned treatment group ($F = 1380.93$, $df = 1/210$, $p < .01$), so it seems safe to assume that the effect does not rest solely on the way in which the cells in the analysis were created.

The only other effect to reach significance in the analysis of outcome ratings was the interaction of outcome and sex. Comparisons among the means revealed that females in the success category rated their performance as more successful than did the males in that

TABLE 25

POST-TASK RATINGS OF PERCEIVED OUTCOME AND SATISFACTION

Grade	Perceived Outcome[1]	Sex	N	Outcome Rating Mean	Satisfaction Mean
6	Success	M	30	8.63	6.50
		F	32	8.94	7.09
	Failure	M	23	2.22	3.74
		F	24	2.21	2.88
10	Success	M	20	8.10	5.15
		F	21	8.71	4.86
	Failure	M	24	3.00	5.38
		F	16	2.38	4.38
Coll.	Success	M	47	8.66	6.15
		F	55	9.31	6.33
	Failure	M	19	2.79	5.16
		F	25	2.68	4.20

Analyses of Variance

Source of Variance	Outcome Rating df	MS	F	Satisfaction df	MS	F
Grade (A)	2	3.80	1.69	2	7.40	1.17
Outcome (B)	1	2843.63	1263.07**	1	221.73	35.04**
Sex (C)	1	1.41	< 1.0	1	11.35	1.79
A x B	2	4.60	2.04	1	70.60	11.16**
A x C	2	0.47	< 1.0	2	1.62	< 1.0
B x C	1	11.05	4.91*	1	22.54	3.56
A x B x C	2	1.33	< 1.0	2	0.88	< 1.0
Within	324	2.25		324	6.33	

* $p < .05$
** $p < .01$

[1]"Success" = outcome rating of six or higher; "failure" = outcome rating of five or lower.

category ($F = 5.41$, $p < .01$), while females in the failure category rated their outcome as slightly, nonsignificantly, less successful than did males in that category ($F < 1.0$, n.s.).

The analysis of data from only the consistent subjects showed a significant interaction of grade with treatment group ($F = 3.78$, $df = 2/210$, $p < .05$). Comparisons among means indicated that sixth grade Success subjects tended to rate their performance as more successful than tenth grade Success or college Success subjects, while sixth grade Failure subjects tended to rate their performance as less successful than tenth grade Failure or college Failure groups. However, the only comparison to reach significance was between sixth grade and college Failure groups ($F = 8.42$, $p < .01$).

The analysis of satisfaction scores showed a significant main effect of outcome and a significant interaction of grade and outcome. The main effect indicated simply that subjects who perceived their outcome as successful were more satisfied with the outcome than were those who rated their outcome as unsuccessful. These comparisons were significant for the sixth grade ($F = 51.41$, $p < .01$) and college ($F = 11.63$, $p < .01$) subjects, but not for the tenth grade subjects. Among successful subjects, mean satisfaction was lower in the tenth grade subjects than in the sixth grade ($F = 12.53$, $p < .01$) or college ($F = 7.03$, $p < .01$) subjects. Among unsuccessful subjects, the sixth graders had lower scores, that is, expressed more dissatisfaction with their performance, than either the tenth grade ($F = 8.21$, $p < .01$) or college ($F = 6.69$, $p < .01$) subjects.

It is of interest to note that the age differences in perceived

outcome are closely paralleled by age differences in expressed satisfaction, while the sex differences in perceived outcome are accompanied by weaker sex differences in expressed satisfaction that were of borderline significance ($F = 3.56$, $df = 1/324$, $p < .10$). This suggests that achievement-related affect varies directly with perceived outcome, a suggestion that is given some support by the correlation of 0.39 ($N = 334$, $p < .01$) between the two variables. The question of whether, and to what extent, other factors influence satisfaction and dissatisfaction with achievement outcomes is considered later in this chapter.

Ability, effort, task, and luck estimates. Mean post-task estimates of ability, effort, task difficulty, and luck are reported in Table 26. It should be recalled that, unlike the paired comparison attributions, these estimates were measured independently of each other, on ten-point graphic scales.

Ability. The only significant effects revealed by the analysis of post-task ability estimates were the main effect of outcome and the interaction of outcome with grade. The former confirms what even a casual inspection of the means indicates, that subjects who had succeeded on the task estimated their ability to be a great deal higher than did subjects who had failed on the task. Inspection of the means also suggests that the significant interaction reflects the higher sixth grade ability estimates following success and the lower sixth grade ability estimates following failure; however, only the comparison between the sixth grade success mean and the college success mean reached significance ($F = 5.32$, $p < .01$).

TABLE 26

POST-TASK RATINGS OF ABILITY, EFFORT, TASK DIFFICULTY, AND LUCK

Grade	Perceived Outcome[1]	Sex	N	Ability Mean	Effort Mean	Task Mean	Luck Mean
6	Success	M	30	8.50	6.77	2.67	6.77
		F	32	8.34	6.38	2.44	8.25
	Failure	M	23	4.43	7.13	7.09	3.26
		F	24	3.96	6.58	7.29	3.04
10	Success	M	20	7.30	5.45	3.85	6.60
		F	21	7.86	6.05	2.67	7.52
	Failure	M	24	4.50	6.13	6.25	4.04
		F	16	5.69	5.81	6.50	4.75
Coll.	Success	M	47	7.38	4.96	3.53	6.02
		F	55	7.91	5.27	3.13	7.69
	Failure	M	19	4.53	6.05	5.32	4.32
		F	25	4.32	6.40	5.80	4.28

Analyses of Variance

Source	df	Ability MS	Ability F	Effort MS	Effort F	Task MS	Task F	Luck MS	Luck F
Grade (A)	2	2.76	< 1.0	30.68	3.70*	5.36	1.31	4.03	< 1.0
Outc. (B)	1	816.08	187.61**	21.63	2.61	824.18	201.54**	759.32	165.27**
Sex (C)	1	4.24	< 1.0	0.00	< 1.0	1.59	< 1.0	42.44	9.24**
A x B	2	18.94	4.35*	6.12	< 1.0	36.82	9.00**	25.26	5.50**
A x C	2	8.88	2.04	4.35	< 1.0	1.93	< 1.0	0.28	< 1.0
B x C	1	0.37	< 1.0	2.21	< 1.0	15.71	3.84	27.15	5.91**
A x B x C	2	3.03	< 1.0	1.54	< 1.0	1.55	< 1.0	4.58	< 1.0
Within	324	4.35		8.30		4.09		4.59	

* $p < .05$
** $p < .01$

[1] "Success" = outcome rating of six or higher; "failure" = outcome rating of five or lower.

In order to compare these results with responses to the identically-worded question asked prior to the task (which appear in Table 17), change scores were calculated and analyzed by means of a three-way (grade x perceived outcome x sex) analysis of variance. The results appear in Table 27. As the analysis indicates, the main effects of grade, outcome and sex were all significant. Comparisons among means revealed that the tenth grade as a whole changed more in the positive direction than the sixth grade as a whole ($F = 5.01$, $p < .05$), leading to a significant grade effect. The effect of perceived outcome reflects the fact that successful subjects tended to alter their ability estimates upward following the task, while unsuccessful subjects tended to alter them downward. This finding, that one's perceived outcome on a task affects one's perceived ability to perform the task, lends support to a suggestion advanced in Chapter I as a basis for the hypotheses relating attributions to subsequent expectancy.

No effect of sex was significant in the analyses of initial or post-task ability estimates; consequently, the significant main effect of sex on the change scores is at first rather puzzling. Inspection of the means in Table 27 suggests that this effect is, as it were, an interaction with outcome: that is, females raised their ability estimates more than males following success and lowered them less than males following failure. Reference back to Table 17 recalls the fact that the interaction of sex with treatment on initial ability estimates approached significance ($F = 2.77$, $df = 1/323$, $p < .10$), reflecting a tendency for females in the Failure condition to state lower ability estimates than males in that condition. Consequently, in order

TABLE 27

CHANGE IN ESTIMATED ABILITY AS A FUNCTION OF PERCEIVED OUTCOME

Grade	Outcome[1]	Male N	Male Mean	Female N	Female Mean
6	Success	30	2.30	32	2.44
	Failure	23	-1.78	24	-1.71
10	Success	20	1.40	21	2.14
	Failure	23	-0.48	15	0.67
Coll.	Success	47	0.94	55	1.36
	Failure	19	-0.42	25	-0.16

Analysis of Variance

Source	df	MS	F
Grade (A)	2	10.67	3.10*
Outcome[1] (B)	1	427.30	124.07**
Sex (C)	1	15.88	4.61*
A x B	2	53.70	15.59**
A x C	2	4.57	1.33
B x C	1	0.06	< 1.0
A x B x C	2	0.56	< 1.0
Within	322	3.44	

* $p < .05$
** $p < .01$

[1] "Success" = outcome rating of six or higher; "failure" = outcome rating of five or lower.

to make similar post-task ability estimates to those of the males, the females did not have to lower their estimates as much, since they already had a head start.

The proper interpretation of this finding is not clear. It may be that a "floor" effect acts to limit the effective range of the change

scores, in which case the females in the Failure condition, having started somewhat nearer the "floor," would be expected to show smaller (negative) change scores. This does not, however, account for the somewhat larger positive change scores of the successful females, as compared to the successful males.

The analysis of change in estimated ability also revealed a highly significant interaction of grade with outcome. Comparisons indicated that, among successful subjects the sixth graders showed greater positive change than the college subjects ($F = 16.58$, $p < .01$), while among unsuccessful subjects the sixth graders showed greater negative changes than either the tenth grade ($F = 20.13$, $p < .01$) or college ($F = 13.83$, $p < .01$) subjects. These may simply indicate a tendency for the sixth grade group to respond more extremely. On the other hand, it was suggested in Chapter I that the younger subjects, due to a relatively greater lack of experience on which to base an ability estimate, might be more readily influenced by their immediate experience with the task. The significantly larger change scores of the sixth grade subjects can be seen as support for this suggestion.

Effort. The analysis of perceived effort scores, in Table 26, revealed only one significant effect, that of grade level. Comparisons indicated that the sixth grade subjects rated their effort as higher than either the tenth grade ($F = 4.01$, n.s.) or college ($F = 7.45$, $p < .01$) subjects. This may reflect a greater involvement in the task on the part of the sixth graders, or even the tendency to make extreme responses referred to earlier. Alternatively, it may represent a veridical statement; because of their youth, the sixth grade subjects

may have been obliged to make a greater effort on the task.

In two prior studies of college students in which a very similar questionnaire was administered following a number-guessing task (Weiner, et al., 1971; McMahan, 1971), the main effect of outcome on perceived effort scores was significant: subjects who rated their outcome as successful said they tried harder than did subjects who rated their outcome as unsuccessful. It is therefore interesting to observe that, in the present study, the effect of outcome on effort estimates did not reach significance and that, as inspection of the means in Table 26 indicates, subjects who judged their outcome to be successful tended to give lower effort estimates than those who felt they had been unsuccessful. This latter is interesting also because the analysis of attribution scores during the task indicated that subjects in the Failure condition tended to give lower attributions to effort than subjects in the Success condition.

These apparent contradictions seem to stem, first, from differing task characteristics, and second, from a bit of conceptual confusion. The task in the Weiner and McMahan studies was ambiguous not only with regard to the "real" causes of success and failure but also with regard to whether the outcome was a success or failure. Because of this ambiguity, the outcome gave the subject no clear evidence that effort was or was not a determinant. Consequently, subjects who felt that they had succeeded might well conclude that they must have tried hard, while subjects who felt that they had failed might conclude that they had not tried hard enough, and rate their effort correspondingly lower.

In the present study, however, the subject's outcome on each trial was unambiguously a success or failure. Consequently, subjects were able to test hypotheses about the causes of their outcomes and, as was discussed earlier in this chapter, to reject some of the hypotheses. As a result, attributions to effort declined in the Failure condition, where the hypothesis that low effort was a cause of failure could be rejected, but did not decline in the Success condition, where the hypothesis that high effort was a cause of success was not contradicted. Accordingly, subjects in the Success condition, who felt that effort had helped determine their success, might be expected to rate the amount of effort expended as moderately high, while subjects in the Failure condition, who rejected the hypothesis of low effort as a determinant of their failures because they had tried harder and still failed, could be expected to rate their expended effort as quite high, higher than subjects in the Success condition.

The conceptual confusion referred to earlier is between attributions to a factor and estimates of the factor. This distinction was discussed in Chapter I and is referred to again in the next chapter. It should be noted, however, that in the example just cited, low attributions to a factor, effort, occurred simultaneously with high estimates of the factor, without any contradiction. Consequently, to consider an estimate of a factor as an indication of the strength of attribution to that factor is unlikely to lead to very great clarity.

Task. The analysis of estimated task difficulty, in Table 26, revealed a highly significant main effect of outcome and a highly significant interaction of grade with outcome. The main effect indicates

that subjects who succeeded on the task (almost all of whom were in the Success condition) considered the task much easier than subjects who failed on the task (almost all of whom were in the Failure condition). Since the level of difficulty of the task was in fact manipulated, this finding would be unremarkable were it not that Weiner, in the study just cited, did not find an effect of perceived outcome on ratings of task difficulty (Weiner, et al., 1971). Again the seeming contradiction appears to be the result of differences between the tasks. Since success or failure on the number-guessing task is in fact a matter of chance, it seems probable that the task contains few cues by which subjects can assess its level of difficulty. Thus even if success tends to bias perceived difficulty downward and failure bias it upward, the distributions for the two outcome groups would tend to be closer together than would be the case when the task, as in the present study, contains differential cues to level of difficulty.

Another factor may also have contributed. Frieze and Weiner (in press) show that the most salient datum used in assessing the difficulty of a task is the proportion of others in a reference group who succeed on the task. The number-guessing task insures that about half of the subjects in a group will succeed and half fail, which should lead subjects to infer that the task is of intermediate difficulty. In the present study, however, almost all of the subjects in the Success groups succeeded and almost all in the Failure groups failed. This should have led to the inference that the task was, in the former case, extremely easy, and in the later case, extremely difficult. From this point of view, it is interesting that the difference between

the means for the two outcome groups is not even larger.

The interaction of grade with outcome also had a significant effect on ratings of task difficulty. Comparisons among means indicated that, in the failure group, the sixth grade subjects rated the task as most difficult (that is, gave it the highest score), and the college subjects as least difficult; the difference between the two was significant ($F = 14.64$, $p < .01$). The tenth grade mean was between the other two and not significantly different from either. A similar pattern appeared among successful subjects: the sixth grade subjects rated the task as significantly easier than did the college subjects ($F = 5.68$, $p < .01$), while the tenth grade mean was between the other two and not significantly different from either. Since this finding appers to be closely related to similar findings on other variables, interpretation of it is left to the next chapter. It should be noted, however, that the grade differences in perceived task difficulty cannot be explained solely by the proportion of subjects in each group who succeeded or failed. If that were the explanation, we would expect the college Success group, in which almost everyone succeeded on every trial, should have rated the task as easiest instead of rating it significantly more difficult than did the sixth grade Success group.

Luck. The grade by outcome interaction was significant in the analysis of estimated luck as well, as shown in Table 26. Sixth grade luck estimates tended to be higher following success and lower following failure than the tenth grade or college estimates, although the comparisons were significant only following failure (between sixth grade and tenth grade, $F = 7.12$, $p < .01$; between sixth grade and

college, $F = 6.44$, $p < .01$).

Other significant effects in the analysis of luck scores included the main effects of outcome and sex and the interaction of outcome with sex. The main effect of outcome reflects the fact that subjects who had succeeded tended to say they had better luck than did subjects who had failed. Comparisons between the male and female means showed that, while females estimated their luck as higher following both success and failure, the comparison was significant only following success ($F = 23.09$, $p < .01$). Inspection of the means in Table 26 suggests that the sixth grade and college females tended to give lower luck estimates than the males following failure, but that this was overshadowed by a larger tendency for the tenth grade females to give higher estimates than the males following failure.

The interpretation of these findings is not clear. However, it is interesting to recall that, in the analysis of the effects of sex on attributions, it was noted that on later trials the tenth grade females, particularly those in the Failure condition, tended to give higher attributions to luck than any other group. Since these subjects were more ready to say that they had failed because of bad luck, one might expect them to give correspondingly lower luck estimates, that is, to check the end of the scale anchored with "very unlucky." As we have just seen, however, they do just the opposite. They tend to check nearer the midpoint than the other failure subjects. This is another example of the difficulty of translating between attributions to a factor and estimates of the same factor.

The higher luck estimates of the females in all grades following

success suggest that the female subjects were more willing than the males to entertain the notion that luck had contributed to their success. Some minor anecdotal evidence supports this suggestion; a number of male subjects, but no females, wrote in their task booklets to the effect that "luck had nothing to do with it" and checked the midpoint of the scale. This question is discussed further in the next section of this chapter.

Post-task ratings of approach tendency. The responses of subjects to the item which asked how willing they would be to undertake another set of anagrams were considered to be a measure of the tendency to approach the task. The results are reported in Table 28. Only the effect of perceived outcome reached significance, and in the analysis of data from the subsample of consistent subjects, not even this effect reached significance ($F = 1.77$, $df = 1/210$, n.s.). Inspection of the means indicates that subjects who felt that they had succeeded on the task were more willing to approach a similar task than subjects who felt they had failed. However, while this difference was significant, it was not very large. The means in the failure group were all on the "willing" side of the midpoint. Considering that many of these subjects had just failed five anagrams in a row, their willingness to try another set is somewhat surprising.

One possible explanation is that the failure subjects expected that the next set of anagrams would be easier, while the success subjects expected that the next set would be somewhat harder. This would have the effect of narrowing the difference between the two groups without necessarily eliminating it.

TABLE 28

POST-TASK RATINGS OF APPROACH TENDENCY

	Success[1]				Failure[1]			
	Male		Female		Male		Female	
Grade	N	Mean	N	Mean	N	Mean	N	Mean
6	30	6.90	32	7.25	23	6.35	24	5.67
10	20	5.90	21	5.81	24	6.00	16	5.81
Coll.	47	6.49	55	6.29	19	5.58	25	5.56

Analysis of Variance

Source of Variance	df	MS	F
Grade (A)	2	12.59	1.92
Outcome[1] (B)	1	27.91	4.25*
Sex (C)	1	1.41	< 1.0
A x B	2	8.58	1.31
A x C	2	0.02	< 1.0
B x C	1	1.86	< 1.0
A x B x C	2	2.50	< 1.0
Within	324	6.57	

* $p < .05$

[1] "Success" = outcome rating of six or higher; "failure" = outcome rating of five or lower.

In addition to the analysis of variance just reported, a multiple regression analysis of approach scores was computed with the following independent variables: grade; sex; treatment group; task performance; perceived outcome; satisfaction; estimated ability; effort; task difficulty; luck; and post-task expectancy. While the regression was significant ($F = 5.54$, $df = 11/322$, $p < .001$), the proportion of variance explained was small ($R^2 = 0.16$). Only two of the standardized weights were significant, that of treatment group (beta = 0.22, t = 2.09) and that of satisfaction (beta = 0.34, t = 6.01). The standard-

ized weight of grade level approached significance (beta = -0.10, t = 1.87).

These results add some interesting information to that derived from the analysis of variance. First, the significance of the treatment effect is confirmed. Second, the marginally significant grade effect appears again. Third, the best single predictor of approach was neither treatment, nor actual performance, nor the subject's rating of his outcome, but the amount of satisfaction or dissatisfaction he expressed with his outcome. It is also notable that it was assigned treatment group, rather than actual performance or perceived outcome, that had a significant weight in the regression.

Post-task expectancy. The last item in the questionnaire asked the subject to suppose that he was going to try another five anagrams and to state how many of the five he would expect to solve. The results are presented in Table 29. Only the main effect of outcome was significant, indicating that subjects who had succeeded on the task stated higher expectancies than subjects who had failed.

In order to examine the results more closely, a multiple regression on post-task expectancy was computed, using the following independent variables: grade; sex; treatment group; task performance; perceived outcome; satisfaction; ability, effort, task difficulty, and luck estimates; and approach scores. The regression was significant ($F = 93.90$, $df = 11/322$, $p < .001$) and accounted for a large proportion of the variance ($R^2 = 0.76$). Only three of the regressed variables had significant standardized weights: task performance (beta = 0.38, t = 4.32), perceived outcome (beta = 0.32, t = 4.20), and estimated

TABLE 29

POST-TASK EXPECTANCY OF SUCCESS

	Success[1]				Failure[1]			
	Male		Female		Male		Female	
Grade	N	Mean	N	Mean	N	Mean	N	Mean
6	30	4.10	32	4.19	23	1.52	24	1.13
10	20	3.70	21	4.05	24	1.88	16	1.38
Coll.	47	3.96	55	4.20	19	1.53	25	1.76

Analysis of Variance

Source of Variance	df	MS	F
Grade (A)	2	0.48	<1.0
Outcome[1] (B)	1	465.85	429.43**
Sex (C)	1	0.00	<1.0
A x B	2	2.11	1.94
A x C	2	1.07	<1.0
B x C	1	3.72	3.43
A x B x C	2	1.10	1.01
Within	324	1.08	

** $p < .01$

[1] "Success" = outcome rating of six or higher; "failure" = outcome rating of five or lower.

ability (beta = 0.23, t = 5.85).

Two points about these results are notable. The first is that both actual performance on the task and the subject's rating of perceived outcome contribute significantly to the formation of expectancy of success on a similar task. Since these two variables are highly correlated ($r = 0.92$, $N = 333$, $p < .01$), this apparently indicates that the regression weight of performance represents the influence on expectancy of "reality," while the weight of perceived outcome represents the influence of personal and situational factors that affect

the perception of an achievement outcome independent of performance. Put another way, performance is an objective determinant of expectancy while perceived outcome is a subjective determinant. It is therefore all the more interesting to observe that estimated ability also significantly affected expectancy, independent of both performance and perceived outcome. This appears to support one of the premises of the attributional model set forth in Chapter I, that initial expectancy of success on a task is primarily a function of perceived ability for the task, which can be considered a sort of distillation of the subject's prior encounters with similar tasks.

It should also be noted that neither the variance analysis nor the regression analysis indicated a significant effect of sex on expectancy of success. However, the interaction of sex and treatment did approach significance. Inspection of the means in Table 29 suggests that females tended to state higher expectancies than males following success and lower expectancies than males following failure. Some possible implications of this tendency are discussed in the next chapter.

Results From the Speed Addition Task

Following the completion of the anagrams task, subjects were given a booklet containing 20 simple addition problems and told that they would have four minutes (in the college groups, three and a half minutes) to work on them. They were asked how many of the problems they expected to solve correctly in the allotted time, then were told to work on the problems. In reality the time allowed was between four and five minutes, sufficient to permit almost all subjects to solve

most of the problems. Then, after checking their answers, the subjects responded to a questionnaire exactly parallel to that given following the anagrams task. They rated their outcome (degree of success or failure) their satisfaction with the outcome, their ability to do speed addition, the amount of effort they had expended on the task, its difficulty, the amount of luck they had experienced, and their willingness to undertake another set of similar problems. They were also asked to suppose that they had another set of problems to solve and to state how many of them they would expect to solve correctly. It should be noted that the paired comparison measure of causal attributions was not included in this task.

The data from these measures were analyzed by means of three-way (grade x prior treatment x sex) unweighted-means analyses of variance. The prior treatment factor in the analyses refers to the subject's assigned treatment group (Success or Failure) on the anagrams task. This factor was included in order to assess the effects that a previous success or failure experience on an unrelated task might have on expectancy of success and attributional estimates.

Initial expectancy. Mean initial expectancies of success on the addition task are reported in Table 30. As the analysis indicates, the main effects of grade, previous treatment, and sex were highly significant, while none of the interactions even approached significance. Comparisons among the means indicated that the college subjects stated higher expectancies than either the sixth grade ($F = 27.39$, $p < .01$) or tenth grade ($F = 10.34$, $p < .01$) subjects; while the tenth grade expectancies were somewhat higher than the sixth grade expectancies,

TABLE 30

INITIAL EXPECTANCY ON ADDITION TASK

	Success[1]				Failure[1]			
	Male		Female		Male		Female	
Grade	N	Mean	N	Mean	N	Mean	N	Mean
6	25	12.32	27	11.56	27	12.04	28	9.32
10	23	14.39	21	12.19	21	11.67	16	10.81
Coll.	35	16.49	44	14.23	27	15.19	35	10.97

Analysis of Variance

Source of Variance	df	MS	F
Grade (A)	2	225.48	12.17**
Treatment[1] (B)	1	266.94	14.40**
Sex (C)	1	361.58	19.51**
A x B	2	7.35	< 1.0
A x C	2	22.24	1.20
B x C	1	14.00	< 1.0
A x B x C	2	23.27	1.26
Within	317	18.53	

** $p < .01$

[1] Refers to subject's assigned treatment group on the previous anagrams task.

the difference did not reach significance ($F = 2.25$, n.s.). It seems likely that these differences reflect different degrees of overlearning of simple arithmetic, although they may also be influenced by a better sense of time in the older subjects. The experimenter noted that many sixth grade subjects expressed dismay when they found out that the four-minute time limit applied to all the problems and not to each separately; a few tenth grade subjects showed the same reaction. Among the college subjects, however, most subjects appeared to feel that three and a half minutes was excessive for the entire task.

As the treatment main effect indicates, subjects who had been in the Failure groups during the anagrams task stated significantly lower expectancies on the addition task than did subjects who had been in the Success treatment groups. This finding is somewhat ambiguous. It may reflect a direct effect of a previous achievement experience on expectancy of success, even though the tasks are dissimilar. On the other hand, it may indicate that subjects who had been given quite difficult anagrams to solve expected that this new task would also be quite difficult, while those who had been given easy anagrams expected the new task to be equally easy.

The highly significant main effect of sex reflects the fact that, as inspection of the means indicates, females stated lower expectancies of success than males. In fact, male expectancies were higher than female expectancies at every grade level and in both prior treatment groups. In view of the previously-noted absence of sex differences in expectancy on the anagrams task, this is a crucial finding. These are the same subjects, on the same day, being asked by the same experimenter an almost-identically worded question. The only difference is the task. On the verbal task, no sex difference appeared; on the numerical task, the females expected to do much less well than did the males. This becomes even more revealing when it is recalled that, in the sixth grade sample, the measured verbal aptitude of the females was, somewhat surprisingly, significantly lower than that of the males. Without mathematical aptitude scores as well, one can only speculate, but these differences in the sixth grade suggest that sex differences in expectancy, or their absence, are related more to social stereotypes than to

actual abilities. Females, especially in elementary school, commonly are better on verbal tasks than males; the sixth grade females in this study, even though their mean verbal aptitude is lower than that of the males, do not state lower expectancies of success on a verbal task. Females are widely supposed to "have no head for numbers;" in this study they state lower expectancies of success on a numerical task than do the males. This suggests that future research should address the question, not of whether there are sex differences in expectancy of success, but of the conditions under which such sex differences are found. This point is considered at greater length in the next chapter.

Task performance, perceived outcome, and satisfaction. The mean number of problems correctly solved and mean ratings of outcome and satisfaction are reported in Table 31. As the analysis of variance indicates, there were significant grade differences in performance. Comparisons revealed that the college subjects solved significantly more problems correctly than the tenth graders ($F = 24.52$, $p < .01$), who in turn had more correct solutions than the sixth graders ($F = 12.50$, $p < .01$). It should be noted that no sex difference was found in the number of problems solved; this adds support to the interpretation that the sex difference in expectancy reflected internalized social norms rather than actual differences in performance or aptitude.

In the analysis of perceived outcome ratings, the main effects of both grade and sex were significant. Comparisons indicated that the college subjects rated their outcome as more successful than either the sixth grade ($F = 6.70$, $p < .01$) or tenth grade ($F = 9.43$, $p < .01$) subjects. Since the performance of the college subjects was

TABLE 31

TASK PERFORMANCE, PERCEIVED OUTCOME AND SATISFACTION ON ADDITION TASK

Grade	Treatment[1]	Sex	N	Performance	Outcome	Satis-faction
6	Success	M	25	15.16	7.96	5.96
		F	27	16.81	8.48	7.44
	Failure	M	27	16.22	8.07	5.81
		F	28	16.07	8.07	6.68
10	Success	M	23	18.00	7.52	4.87
		F	21	18.00	8.52	4.76
	Failure	M	21	16.67	8.05	4.67
		F	16	17.00	7.81	5.81
Coll.	Success	M	35	19.20	8.23	5.77
		F	44	19.18	9.02	6.16
	Failure	M	27	19,11	8.44	5.74
		F	35	19.37	9.20	6.14

Analyses of Variance

		Performance		Outcome		Satisfaction	
Source	df	MS	F	MS	F	MS	F
Grade (A)	2	256.04	38.55**	15.75	5.28**	55.08	6.07**
Treatment[1] (B)	1	7.83	1.18	0.02	< 1.0	0.03	<1.0
Sex (C)	1	9.24	1.39	17.18	5.76*	37.27	4.11*
A x B	2	13.90	2.09	0.88	< 1.0	4.96	<1.0
A x C	2	3.17	< 1.0	1.86	< 1.0	4.50	<1.0
B x C	1	3.05	< 1.0	6.92	2.32	0.90	<1.0
A x B x C	2	9.53	1.44	2.33	< 1.0	5.83	<1.0
Within	317	6.64		2.98		9.08	

* $p < .05$
** $p < .01$

[1] Refers to subject's assigned treatment group on the previous anagrams task.

actually superior to that of either school-age group, this is not surprising; it does, however, raise the question of why the tenth grade subjects, whose performance was significantly better than that of the sixth grade subjects, rated their outcome somewhat lower than the sixth graders.

The higher outcome ratings of the female subjects, given the absence of a sex difference in performance, suggest that perceived outcome may be a function not of performance per se but of performance in relation to expectancy. Since the females stated lower expectancies but performed equally well, it follows that the positive discrepency between expectancy and performance must have been greater for the females than for the males, which may explain their more positive appraisal of their outcome.

The same explanation may be advanced for the significantly higher satisfaction ratings of the females, although two related possibilities cannot be excluded. It was suggested earlier that satisfaction with one's outcome is a function of one's perception of that outcome; if so, the higher outcome ratings of the females, whatever their cause, would suffice to explain their higher satisfaction ratings. It has also been suggested that internality for success is positively related to satisfaction with or pride in success. There are indications, both in prior research and in the results of the anagrams task in the present study, that females tend to be more internal for success and failure than males. If so, this too would lead to higher female satisfaction ratings following success.

The main effect of grade level on satisfaction ratings was also

significant. Comparisons revealed that the tenth grade subjects were less satisfied (that is, had lower scores) than either the sixth grade ($F = 10.51$, $p < .01$) or college ($F = 4.75$, $p < .05$) subjects. In fact, the mean satisfaction ratings of three of the four tenth grade groups are distinctly on the "unhappy" side of the midpoint. One possible interpretation of this finding is that the tenth graders are both unhappy at being asked to undertake a task which they find uninteresting and unhappy at having performed less than perfectly on what they might perceive as "kid stuff." From this notion we would expect them, first, to perceive their outcome as less successful in relation to actual performance than the sixth graders, and second, to rate their satisfaction with the outcome a good deal lower.

Ability, effort, task, and luck estimates. Mean ratings of ability, effort, task difficulty, and luck, obtained on graphic scales following the speed addition task, are reported in Table 32.

Ability estimates showed significant main effects of grade and of prior treatment group (that is, Success or Failure on the anagrams task). Comparisons across grades indicated that the tenth grade subjects rated their ability lower than did the sixth grade or college subjects. Taken in conjunction with the other grade differences just reported, this suggests that we may be dealing with a level of aspiration effect: while the tenth grade subjects, like the subjects in the other two age groups, solved many more problems than their stated expectancies, it may be that, having encountered the task, they aspired to perform perfectly and, failing to do so, rated their perceived outcome, satisfaction, and ability to do the task somewhat lower than did

TABLE 32

ESTIMATES OF ABILITY, EFFORT, TASK DIFFICULTY, AND LUCK FOLLOWING ADDITION TASK

Grade	Treatment[1]	Sex	N	Ability	Effort	Task	Luck
6	Success	M	25	7.92	8.96	4.52	7.28
		F	27	8.00	7.44	3.52	8.15
	Failure	M	27	8.81	8.15	3.81	7.19
		F	28	8.14	8.57	3.43	8.57
10	Success	M	23	6.91	7.09	3.87	5.61
		F	21	7.67	7.95	3.00	7.38
	Failure	M	21	8.43	8.19	3.90	5.71
		F	16	7.63	7.38	4.06	7.25
Coll.	Success	M	35	8.17	7.03	3.91	5.40
		F	44	8.05	7.32	3.66	7.02
	Failure	M	27	8.22	7.59	3.59	6.15
		F	35	8.49	7.91	3.60	6.43

Analyses of Variance

		Ability		Effort		Task		Luck	
Source	df	MS	F	MS	F	MS	F	MS	F
Grade (A)	2	11.00	3.12*	18.81	3.35*	0.50	<1.0	71.09	17.41**
Treatment[1] (B)	1	19.27	5.47*	8.56	1.52	0.01	<1.0	0.45	<1.0
Sex (C)	1	0.54	<1.0	0.40	< 1.0	11.78	2.58	119.11	29.17**
A x B	2	1.55	<1.0	1.24	< 1.0	6.35	1.39	0.20	<1.0
A x C	2	0.92	<1.0	4.83	< 1.0	2.11	<1.0	3.43	<1.0
B x C	1	7.88	2.24	0.18	< 1.0	7.76	1.70	2.40	<1.0
A x B x C	2	6.13	1.74	21.02	3.74*	0.94	<1.0	5.61	1.37
Within	317	3.52		5.62		4.56		4.08	

* $p < .05$
** $p < .01$

[1] Refers to the subject's assigned treatment group on the previous anagrams task.

the sixth grade subjects, whose expectancies (and possibly levels of aspiration) were lower, or the college subjects, many of whom did in fact solve all the problems correctly.

The main effect of prior treatment group reflects the fact that subjects who had been in the Failure treatment on the anagrams task rated their ability to do the addition problems higher than did those who had been in the Success treatment. This may be a simple contrast effect: a subject who had previously failed and rated his ability correspondingly low would tend to make stronger inferences about his level of ability following a success experience. It is noteworthy that prior treatment did not affect ratings of perceived outcome or satisfaction. It may also be that subjects who had had a success experience on the anagrams task and inferred high ability from it are less impressed by this second success experience and consequently infer less ability from it than do subjects who had had a previous failure experience.

Effort estimates following the addition task showed a significant main effect for grade; comparisons indicated that the sixth grade subjects said they had tried harder than did the tenth grade ($F = 3.62$, n.s.) or college ($F = 6.10$, $p < .01$) subjects. Given both the age differences and the differences in performance on the task, it seems likely that this is a veridical report; that is, the sixth graders did try harder or experienced the task as one that required high effort.

The effort scores also showed a significant grade by treatment by sex interaction. Inspection of the means suggests that, in the sixth grade, males give higher estimates than females in the former Success

group and lower estimates than the females in the former Failure group; that this pattern is reversed in the tenth grade; and that among college subjects the females give higher effort estimates than the males regardless of previous treatment group. No interpretation is offered for this interaction.

In the analysis of ratings of task difficulty, only one effect even approached significance. The females showed a slight tendency to rate the task as less difficult than the males ($F = 2.58$, $df = 1/317$, $p < .20$). This suggests that their higher performance relative to initial expectancy is being attributed in part to the easiness of the task, although the danger of inferring attributions from estimates has been pointed out previously. The absence of other effects is also of interest, since it accords with the suggestion advanced earlier that estimates of task difficulty are more "objective," or less influenced by subject or group characteristics, than the other attributional estimates.

Both grade level and sex had highly significant effects on luck estimates. Sixth grade subjects said they had more luck than did either the tenth grade ($F = 19.09$, $p < .01$) or college ($F = 35.13$, $p < .01$) subjects, while the females in every group rated themselves as luckier than did the males. The sex difference in estimated luck was found following the anagrams task too; its possible implications are explored in the next chapter. It should be noted at this point, however, that both the sixth graders, in relation to other grades, and the females, in relation to the males, had expected to do less well on the addition task. It may be, then, that they regarded the extent to which their

performance exceeded their expectations as evidence that they were lucky. Again, this does not necessarily imply that they regarded luck as a (or the) major cause of their success, although they may have; it simply means that they felt they had had good luck on the task.

Post-task ratings of approach. Subject ratings of willingness to undertake a similar task, which were considered to be measures of approach tendency, appear in Table 33. The main effect of grade was significant, while the main effects of prior treatment group and sex approached significance. Comparisons indicated that the sixth grade subjects expressed more willingness to approach a similar task than the tenth grade subjects ($F = 7.59$, $p < .01$); the college means were also higher than the tenth grade means, but the comparison did not reach significance. Inspection of the means suggests that females tended to give higher approach scores than males and that those who had been in the Failure treatment on the anagrams task tended to give higher approach scores than those who had been in the Success treatment.

These differences are the inverse of those found in initial expectancy. Females stated lower expectancies than males, those who had been in the Failure condition stated lower expectancies than those who had been in the Success condition, and sixth graders stated lower expectancies than tenth graders. These relationships suggest that a person may be more attracted to a task on which he has had an unexpected success than to one on which he has had an expected success. This is reminiscent of Feather's (1969) finding that, following success, subjects reported greater satisfaction the less confident they had been initially.

TABLE 33

RATINGS OF APPROACH TENDENCY FOLLOWING THE ADDITION TASK

	Success[1]				Failure[1]			
	Male		Female		Male		Female	
Grade	N	Mean	N	Mean	N	Mean	N	Mean
6	25	4.92	27	6.63	27	6.74	28	6.96
10	23	4.74	21	5.86	21	5.00	16	5.63
Coll.	35	5.69	44	5.66	27	6.37	35	6.14

Analysis of Variance

Source of Variance	df	MS	F
Grade (A)	2	26.90	3.91*
Treatment[1] (B)	1	24.02	3.49
Sex (C)	1	25.03	3.64
A x B	2	7.26	1.06
A x C	2	9.41	1.37
B x C	1	10.16	1.48
A x B x C	2	2.91	< 1.0
Within	317	6.87	

* $p < .05$

[1] Refers to the subject's assigned treatment group on the anagrams task.

Post-task expectancy of success. At the conclusion of the task, subjects were asked to suppose that they were to be given another set of twenty similar addition problems and to state how many they would expect to solve correctly. The results are presented in Table 34. The analysis revealed a highly significant effect of grade and an effect of former treatment group that approached significance. Comparisons among the means indicated that the college subjects stated higher expectancies than either the sixth grade ($F = 15.58$, $p < .01$) or

TABLE 34

EXPECTANCY OF SUCCESS FOLLOWING THE ADDITION TASK

	Success[1]				Failure[1]			
	Male		Female		Male		Female	
Grade	N	Mean	N	Mean	N	Mean	N	Mean
6	25	15.44	27	16.78	27	17.48	28	16.21
10	23	16.61	21	15.76	21	17.10	16	17.00
Coll.	35	18.06	44	17.80	27	18.44	35	17.97

Analysis of Variance

Source of Variance	df	MS	F
Grade (A)	2	79.46	9.56**
Treatment[1] (B)	1	30.31	3.65
Sex (C)	1	5.51	1.0
A x B	2	2.40	1.0
A x C	2	1.83	1.0
B x C	1	9.11	1.10
A x B x C	2	19.15	2.30
Within	317	8.31	

** $p < .01$

[1] Refers to the subject's assigned treatment group on the previous anagrams task.

tenth grade ($F = 12.99$, $p < .01$) subjects. Inspection of the means suggests that subjects who had received the Failure treatment on the anagrams task tended to state higher expectancies than those who had received the Success treatment.

Several possible interpretations can be suggested for these findings. First, the college subjects had significantly higher scores on the task than the sixth grade or tenth grade subjects; this may suffice to explain their higher expectancies. However, this explanation

does not account for the fact that, while the tenth grade subjects had significantly higher performance on the task than the sixth grade subjects, their post-task expectancies were not significantly higher. Second, former treatment group did not affect performance, but it did tend to affect post-task, as well as pre-task, expectancy. This suggests that post-task expectancy, like approach tendency, may be a function both of performance and of the discrepency between expectancy and performance; that is, given the same successful level of performance, the subject whose initial expectancy was lower will tend to state a higher post-task expectancy.

Such an interpretation would also account for the absence of a significant sex difference in post-task expectancy. Since the females had a larger positive discrepency between expectancy and performance than the males, the change in their expectancy as a result of experience with the task would also be larger, tending to eliminate the original disparity in expectancy. However, the fact that the females performed on the task at about the same level as the males may be sufficient to explain the fact that their post-task expectancies were at about the same level as those of the males.

Relationship of Test Anxiety to Attributions

A week prior to the experimental seesion, subjects were given measures of test anxiety; the sixth and tenth grades received a modified version of the Test Anxiety Scale for Children, and the college subjects received the first third of the Test Anxiety Questionnaire. Mean scores of the sixth and tenth grade subjects are reported in Table 35; college scores are reported in Table 36. Among sixth and tenth grade

TABLE 35

SIXTH AND TENTH GRADE SCORES ON TEST ANXIETY SCALE FOR CHILDREN

	Success[1]				Failure[1]			
	Male		Female		Male		Female	
Grade	N	Mean	N	Mean	N	Mean	N	Mean
6	22	9.41	25	13.80	22	11.09	27	13.37
10	15	9.47	10	12.80	16	10.75	9	10.11

Analysis of Variance

Source of Variance	df	MS	F
Grade (A)	1	40.60	1.33
Treatment[1] (B)	1	0.05	< 1.0
Sex (C)	1	172.56	5.67*
A x B	1	13.90	< 1.0
A x C	1	31.10	1.02
B x C	1	72.82	2.39
A x B x C	1	6.81	< 1.0
Within	138	30.44	

* $p < .05$

[1] Refers to subject's assigned treatment group.

TABLE 36

COLLEGE SCORES ON TEST ANXIETY QUESTIONNAIRE

	Male		Female	
Treatment Group	N	Mean	N	Mean
Success	33	33.36	35	33.17
Failure	21	33.62	24	34.67

Analysis of Variance

Source of Variance	df	MS	F
Treatment (A)	1	20.69	< 1.0
Sex (B)	1	4.94	< 1.0
A x B	1	10.38	< 1.0
Within	109	76.85	

subjects, sex significantly affected scores: females reported higher test anxiety than males. There were no significant effects on college scores.

As was noted in Chapter I, several investigators have suggested possible relationships between test anxiety and locus of control for achievement outcomes. Katz (1967) suggested that high test anxiety is associated with internality for failure. Rotter (1966) and Feather (1967) advanced the hypothesis that high test anxiety is related to external control. Weiner and Kukla (1970) suggested that low test anxious subjects attribute failure to low effort while high test anxious subjects attribute failure to low ability. Recalling that high test anxiety scores indicate high test anxiety while high attribution scores indicate high attribution to that factor, these suggestions can be reformulated as predictions of the directionality of correlations between test anxiety and attributions, as shown in Table 37.

TABLE 37

PREDICTED DIRECTIONS OF CORRELATIONS BETWEEN TEST ANXIETY AND ATTRIBUTIONS

Author	Outcome	Direction of r between test anxiety and Ability	Effort	Task	Luck
Katz (1967)	Failure	+	+	-	-
Weiner & Kukla (1970)	Failure	+	-	---	---
Rotter (1966), Feather (1967)	Success & Failure	-	-	+	+

Correlations between test anxiety and attribution scores were com-

puted on each trial for those subjects in each grade who had succeeded on that trial and those who had failed on that trial. These appear in Table 38. Two aspects of these results are immediately apparent: the first is that the correlations tend to be quite low, and the second is that the pattern of correlations in the tenth grade subjects tends to be quite different from that of the sixth grade and college subjects. Some possible reasons for this grade difference are suggested later in this section; for the moment, only the results of the sixth grade and college subjects will be considered.

Following success, test anxiety tends to be negatively related to ability and task attributions and positively related to effort and luck attributions. This contradicts the prediction derived from Rotter (1966) and Feather (1967) and suggests that results that were interpreted as indicating a difference in locus of control may have indicated a difference in the tendency to attribute success to fixed versus variable factors. By this latter interpretation, low test anxious subjects tend to attribute success to fixed factors (ability and task) while high test anxious subjects tend to attribute success to variable factors (effort and luck). This has some interesting implications, which are considered later in this section.

Following failure, few of the correlations were significantly different from zero, which renders any interpretation of them extremely tentative. It can, however, be stated that the majority of the correlations between test anxiety and task attributions following failure were positive, while the majority of correlations between test anxiety and attributions to ability, effort, and luck were negative. These

TABLE 38

CORRELATIONS BETWEEN TEST ANXIETY AND ATTRIBUTIONS BY GRADE, OUTCOME, AND TRIAL

Grade	Outcome[1]	Trial	N	r between test anxiety and attributions to: Ability	Effort	Task	Luck
6	Success	1	51	-0.27*	0.26	-0.13	0.14
		2	47	-0.27*	0.29*	0.01	0.06
		3	51	-0.18	0.11	-0.05	0.16
		4	54	-0.09	0.07	-0.11	0.15
		5	51	-0.21	0.01	0.03	0.22
	Failure	1	45	-0.09	0.18	0.18	-0.22
		2	49	-0.11	0.24	-0.05	-0.07
		3	45	0.21	-0.08	0.05	-0.19
		4	42	-0.15	-0.09	0.19	0.04
		5	45	0.11	-0.09	-0.03	-0.00
10	Success	1	26	0.15	-0.15	0.07	-0.04
		2	23	0.07	-0.25	0.09	0.11
		3	25	0.24	0.03	-0.12	-0.17
		4	28	0.25	0.01	-0.26	-0.07
		5	19	0.51*	-0.27	-0.17	-0.08
	Failure	1	22	-0.08	-0.43*	0.26	0.31
		2	25	-0.16	-0.06	0.09	0.18
		3	23	-0.11	-0.18	0.15	0.18
		4	20	0.05	-0.29	0.09	0.17
		5	29	0.10	-0.30	0.15	0.11
Coll.	Success	1	77	-0.31**	0.21	-0.14	0.24*
		2	75	-0.32**	0.28*	-0.18	0.24*
		3	81	-0.19	0.11	-0.12	0.24*
		4	78	-0.27*	0.26*	-0.14	0.18
		5	81	-0.23*	0.22*	-0.10	0.16
	Failure	1	36	-0.13	0.12	0.12	-0.08
		2	38	-0.13	-0.06	0.37*	-0.11
		3	32	-0.24	-0.06	0.46*	-0.21
		4	35	-0.04	0.01	0.14	-0.12
		5	32	0.15	-0.05	0.14	-0.24

* $p < .05$, two-tailed
** $p < .01$, two-tailed

[1] Refers to the subject's obtained outcome on that trial and not to his assigned treatment group.

results do not accord well with any of the predictions in Table 37. They suggest that the high test anxious subject who fails tends to place the blame on a difficult task, while the low test anxious subject may attribute failure to any of the factors.

These patterns of attributions imply that, following success, the high test anxious subject, who tends to attribute his success to variable factors, will tend to state lower subsequent expectancies than the low test anxious subject, who tends to attribute his success to fixed factors. Following failure, the tendency of the high test anxious subject to attribute the outcome to task difficulty may also lead to lower expectancies.

Correlations between test anxiety and expectancy of success following each trial are reported in Table 39. On the whole they support the suggestions just advanced, although again the tenth grade results tend to be different from those of the sixth grade and college subjects. Of the 16 sixth grade and college correlations, 15 are negative, as are four of the eight tenth grade correlations. These results suggest that the high test anxious subject tends to state lower expectancies of success than the low test anxious subject following both success and failure. This suggestion is discussed more fully in the next chapter.

As the results in Table 40 indicate, test anxiety tended to show negative relationships to the initial measures from the anagrams task also, at least in the sixth grade and college samples. The high test anxious subject, then, apparently enters the task situation with a low opinion of his ability, which can be seen as leading in turn to a low

TABLE 39

CORRELATIONS BETWEEN TEST ANXIETY AND EXPECTANCY BY GRADE, OUTCOME, AND TRIAL

Grade	Outcome	Trial 1 N	Trial 1 r	Trial 2 N	Trial 2 r	Trial 3 N	Trial 3 r	Trial 4 N	Trial 4 r
6	Success	51	-0.12	47	-0.04	51	-0.13	54	-0.05
	Failure	45	0.11	49	-0.10	45	-0.02	42	-0.14
10	Success	26	0.13	23	0.25	25	0.30	28	0.27
	Failure	22	-0.13	25	-0.18	23	-0.06	20	-0.44*
Coll.	Success	77	-0.37**	75	-0.37**	81	-0.26*	78	-0.27*
	Failure	36	-0.10	38	-0.08	32	-0.31	35	-0.05

* $p < .05$, two-tailed
** $p < .01$, two-tailed

initial expectancy that interacts with his obtained outcome to produce the attributional patterns described earlier in this section. These in turn would tend to lead to lower expectancies of success compared to those of the low test anxious subject, whether the outcome was a success or a failure.

So far the results relating test anxiety to attributions have been discussed only for the sixth grade and college samples, because the results from the tenth grade subjects are at such variance with those from the other two grade levels. One reason for this disparity may be that the Test Anxiety Scale for Children was designed and validated for subjects in the elementary grades; its validity for tenth grade subjects is not known. Another factor may also have contributed: defensiveness tends to increase across the elementary years and is negatively related to test anxiety (Hill and Sarason, 1966). This has been interpreted as indicating that highly defensive subjects tend not

TABLE 40

CORRELATIONS BETWEEN TEST ANXIETY AND INITIAL ABILITY ESTIMATE, OVERALL EXPECTANCY, AND TRIAL ONE EXPECTANCY

Grade	Treatment	Sex	N	Ability	Overall Expectancy	Trial 1 Expectancy
6	Success	M	22	-0.25	-0.58**	-0.39
		F	25	0.16	0.24	-0.18
	Failure	M	22	-0.23	-0.22	0.09
		F	27	0.25	-0.12	0.20
10	Success	M	15	0.24	0.29	0.45
		F	10	0.03	-0.19	-0.08
	Failure	M	16	-0.18	-0.04	-0.49*
		F	9	0.25	0.60	0.06
Coll.	Success	M	33	-0.51**	-0.31	-0.22
		F	35	-0.49**	-0.32	-0.23
	Failure	M	21	-0.09	-0.12	-0.21
		F	24	0.14	0.06	-0.11

* $p < .05$, two-tailed
** $p < .01$, two-tailed

to admit anxiety. If so, and if we can extrapolate elementary school age trends to the tenth grade, it may be that the principal difference between those tenth grade subjects who scored high on the Test Anxiety Scale for Children and those who scored low is that the low scorers are more defensive and hence less ready to admit to anxiety. If so, it is not surprising that these scores relate to attributions and expectancy rather differently than the presumably more valid scores of the sixth grade and college subjects.

Recapitulation and Summary of Results

1. An outcome that confirms the subject's prior expectancy of success tends to be attributed to ability, while an outcome that dis-

confirms his prior expectancy of success tends to be attributed to effort and luck. Attributions to task are relatively independent of the subject's prior expectancy of success. These results are seen as confirming hypothesis II and disconfirming hypotheses Ia and IIa, while partially confirming hypothesis I.

2. Among subjects who received a consistent series of successes or failures, attributions to fixed factors tended to increase across trials while attributions to variable factors tended to decrease. This confirms hypothesis III and disconfirms hypothesis IIIa.

3. Following success, attributions to ability and task (fixed factors) tend to be positively related to subsequent expectancy of success, while attributions to effort and luck (variable factors) tend to be negatively related to subsequent expectancy. Following failure, subsequent expectancy tends to be related negatively to attributions to fixed factors and positively to attributions to variable factors. These relationships are seen as confirming hypotheses IV and V and disconfirming hypotheses IVa and Va.

4. Those groups which were high in attribution to internal factors tended also to give more extreme affective responses following the task. This finding lends some support to hypotheses VI and VII; however, it is considered that the data do not permit an adequate test of these hypotheses.

5. Subjects who succeeded on the anagrams task gave higher attributions to task and effort, and lower attributions to ability and luck, than subjects who failed. In the Success group, task ease was seen as the most important cause, followed by high effort, high ability, and good luck. In the Failure group, on early trials low ability

was ranked as most important, followed by low effort, task difficulty, and bad luck; on later trials the order was low ability most important, followed by task difficulty, bad luck, and low effort.

6. On early trials sixth and tenth grade attributions tended to resemble each other and differ from those of the college group. Across trials these differences tended to disappear, with the exception of attributions to luck, on which the scores of college subjects were low and consistent across trials, those of the tenth grade subjects were somewhat higher and consistent across trials, and those of the sixth grade subjects started at the same level as the tenth graders and declined across trials to below the level of the college subjects.

7. Although there was no overall sex difference in attribution to fixed factors, females gave significantly higher attributions to ability than males, while males gave significantly higher attributions to task than females.

8. In the college sample, the luck attributions of subjects in the Success and Failure groups were practically identical. In the sixth and tenth grade groups, however, Failure subjects gave significantly higher attributions to luck than Success subjects.

9. After the first trial, tenth grade subjects in the Success condition stated lower expectancies of success than sixth grade and college subjects in that condition, while tenth grade subjects in the Failure condition stated higher expectancies of success than sixth grade and college subjects in that condition.

10. No significant sex difference in expectancy of success was found prior to, during, or following the anagrams task. Prior to the addition task, however, females stated significantly lower expectancies

than males, although their performance on the task was not inferior. This sex difference did not appear on the expectancy measure taken following the addition task.

11. On the questionnaire which followed the anagrams task, successful subjects rated their outcome as more successful, their satisfaction, ability, and luck as greater, and the difficulty of the task as less, than did unsuccessful subjects. Successful subjects also were more willing to undertake a similar task and stated higher expectancies for such a similar task. Successful females tended to rate their outcome and satisfaction as greater than successful males, while unsuccessful females tended to rate their outcome and satisfaction as lower than unsuccessful males. Whether successful or unsuccessful, females rated their luck as greater than did males. Successful sixth grade subjects tended to rate their outcome as more successful, their satisfaction, ability, and luck as greater, and the task as easier, than did successful tenth grade and college subjects, while unsuccessful sixth grade subjects tended to rate their outcome as more unsuccessful, their satisfaction, ability, and luck as less, and the task as more difficult than did unsuccessful tenth grade and college subjects. Whether successful or unsuccessful, sixth grade subjects rated their effort as greater than did tenth grade and college subjects.

12. In a regression analysis of post-anagrams task expectancy, actual task performance, perceived outcome, and estimated ability all had significant beta weights. The regression as a whole accounted for 76 percent of the variance in post-task expectancy.

13. College subjects stated higher initial expectancies of success on the addition task than did tenth or sixth grade subjects.

Subjects who had received the Success treatment on the anagrams task stated higher initial expectancies on the addition task than subjects who had received the Failure treatment. As was mentioned, males stated higher initial expectancies on the addition task than females.

14. College subjects solved significantly more problems correctly than tenth grade subjects, who in turn solved significantly more correctly than sixth grade subjects. There were no other significant differences in performance on the addition task.

15. On the questionnaire following the addition task, females rated their outcome as more successful and their satisfaction and luck as greater than did males, and tended to rate the task as easier and their willingness to undertake a similar task as greater than did the males. As compared with subjects who had received the Success treatment on the anagrams task, subjects who had received the Failure treatment rated their ability for speed addition as higher, and tended to state both a greater willingness to undertake another addition task and higher expectancies of success on such a task. College subjects rated their outcome as more successful and stated higher post-task expectancies than sixth or tenth grade subjects. Tenth grade subjects rated their satisfaction and ability as lower, and tended to be less willing to undertake a similar task, than sixth grade or college subjects. Sixth grade subjects rated their effort and luck as greater than tenth grade or college subjects.

16. Among sixth grade and college subjects, test anxiety tended to be negatively related to initial ability estimates and initial expectancy of success on the anagrams task. Following success, test anxiety tended to be related positively to effort and luck attribu-

tions and negatively to ability and task attributions. Following failure, test anxiety tended to be related positively to task attributions and negatively to ability, effort, and luck attributions. The relationships between test anxiety and expectancy of success across trials tended to be negative following both success and failure. The relationships among these variables in the tenth grade subjects were less consistent.

CHAPTER IV

DISCUSSION

Introduction

It often happens that, in the course of reading (or presenting) the results of a moderately complex study such as the present one, some of the implications of the findings, or of relationships among the findings, are not fully appreciated. One objective of this chapter is to lighten this difficulty by drawing together results from various parts of the study that bear on similar questions and examining their consistencies and inconsistencies. The areas of age and sex differences in achievement behavior are of particular concern, but the possible role of individual differences is also assessed.

A second aim is to present a theoretical model of behavior in an achievement situation, based on the hypotheses advanced in Chapter I and modified by the results of the study. Other theoretical issues raised by the findings are also discussed.

Finally, some implications of the study for the methodology and future course of research in attribution theory and achievement behavior, as well as for educational practices, are presented and discussed.

Age-Related Differences

In the previous chapter, analyses of variance were reported for some twenty-four task-related variables. Of these, only four--ratings of outcome, approach, and post-task expectancy following the anagrams task, and ratings of task difficulty following the speed addition

task--did not show a significant effect of grade level, either as a main effect or in interaction. Clearly there were differences between the sixth grade, tenth grade, and college groups. As has been pointed out, however, not all of these differences are necessarily age-related; some of them are likely to reflect differences among the samples that are not functions of the age differences among them. One aim of this section is to try to separate what seem to be genuine age-related differences from those that seem to be sample differences. To an extent this has been done, variable by variable, in the previous chapter; another aim of this section is to pull these scattered interpretations together and see if they form a coherent picture.

The most obvious regularity among the grade differences is what for the moment will be referred to as the extremism of the sixth grade subjects. On the post-task questions, those sixth grade subjects who had succeeded gave responses in the same direction as successful tenth grade and college subjects, but more toward the extreme, while sixth grade subjects who had failed gave responses in the same direction as, but more extreme than, the tenth grade and college subjects who had failed. There were seven questions asked after each task, to be answered on graphic scales; this effect appeared on five of them following the anagrams task and on four following the addition task. Furthermore, when the anagrams questionnaire data of just the consistent subjects was analyzed, the effect appeared on another of the questions as well. Since the other major variables, the attribution scores, were measured in such a way that this effect could not appear, it is safe to conclude that this "extremism" of the sixth grade subjects was quite pervasive.

If we accept these responses at face value, successful sixth graders, in comparison with successful tenth graders and college students, say that their outcome on the anagrams task was more successful, that they are happier with the outcome, that they have higher ability, that they tried harder, that the task was easier, and that they were luckier. Unsuccessful sixth graders say that their outcome was less successful, that they are unhappier with it, that they have lower ability, that they tried harder, that the task was harder, and that they were more unlucky. Following the addition task (on which all subjects were more or less successful), the sixth graders say that they have higher ability, that they tried harder, that they were luckier, and that they are more willing to try another set of problems.

Three possible interpretations of these differences present themselves. The first is that, because the sixth grade subjects are younger, the tasks are more novel to them. Consequently they must rely more heavily on information derived from the task itself in making their estimates of outcome, ability, and so forth. This relative naivete would show up as a greater differential effect of treatment in the sixth grade subjects; since their ability estimates, for example, would rest more heavily on their obtained outcome, success and failure should affect this estimate to a greater extent than they would among older subjects, whose estimates would be influenced to a greater degree by experiences prior to the task and hence less susceptible to the effects of immediate task outcomes.

A second possible interpretation points to the role of motivation or involvement. The relative novelty of the task and of participating

in an experiment may have induced a greater degree of involvement in the younger subjects. It is certainly the impression of the experimenter that the sixth grade subjects were more engaged by the situation and took the tasks more seriously than either the tenth grade or college subjects. If so, it is plausible to suppose that they would also take the results of the task more seriously and make stronger inferences from them. This greater motivation might also have led the sixth grade subjects, on the one hand, to make the greater effort during the task which they reported, and on the other hand, to experience the greater outcome-related affect which they reported.

A third possible interpretation is that the sixth grade subjects are displaying less differentiated cognitions; that they are, in effect, responding to a ten-point scale as if it were a three-point scale--high, medium, and low. If so, it would not be surprising to find that their scores tended to be more extreme than those of older, presumably more differentiated, subjects.

It should be noted that these interpretations are by no means mutually exclusive. It seems likely that all three played some role, and in any case the first two are related, since they both rest on the assumption that the tasks were more novel to the younger subjects because they were younger and less experienced. The obtained age differences, then, can be seen as reflecting two age-related differences, although only the differentiation interpretation can properly be called developmental: presumably a group of sixth grade students in, say, a university-run experimental school could be as blase and uninvolved as the most test-wise college student.

Grade level also affected causal attributions and expectancy of success during the anagrams task. In this case, however, it tended to be the tenth grade group that differed from the sixth grade and college groups. Compared to the other two grades, the tenth grade subjects in the Success condition tended to ascribe their successes more to high effort and less to high ability, while those in the Failure condition tended to attribute their unsuccessful outcomes more to bad luck and low effort and less to the difficulty of the task. These differences were accompanied by differences in expectancy of success: in the Success condition, tenth grade expectancies tended to be lower than those of sixth grade and college subjects, while in the Failure condition, the tenth grade tended to state higher expectancies than the sixth grade or college groups.

While U-shaped curves are not unknown in developmental psychology, these differences appear to reflect, not age-related factors, but differences among the samples. The tenth grade sample had lower verbal aptitude than the sixth grade sample, and it is probably safe to assume that their verbal aptitude was lower than that of the college sample as well. In addition, the tenth grade subjects were all in middle-track classes in English, while the sixth grade subjects, and of course the college subjects, were in untracked classes.

The differences found in attribution suggest that, compared to the other age groups, the tenth grade subjects were either less able or less willing to process the information they received from the task situation and to draw appropriate conclusions. On balance it seems unlikely that they were incapable of seeing the inappropriateness of

the statement that their fourth failure in succession was the result of bad luck, which suggests that they were unwilling to see it. If so, this unwillingness may be related to the achievement environment: namely, the tracked classroom.

It is possible that factors in the tracked situation itself give rise to the observed differences in attribution. For example, it may be that, in a relatively homogeneous ability grouping, effort and luck are comparatively more important determinants of success, than would be the case in a non-homogeneous group. If so, a given achievement outcome would carry less information on which to base an expectancy estimate, with the result that expectancies would tend to remain in an intermediate range in spite of consistent successes or failures. However, it should be noted that, as Table 3 (page 31) indicates, there was considerable variability in verbal aptitude scores among the tenth grade subjects, which renders this suggestion less cogent.

Another possibility is that both the observed differences and the assignment of these subjects to the middle track are related to other subject variables. For example, their tendency to give greater attribution to variable factors may reflect a defensive tendency to regard each achievement task as an isolated event, barren of implications about future achievement tasks. Such a tendency would protect the subject's self-esteem from the consequences of failure, at the cost of insulating his self-esteem from the implications of success as well. In this connection it is suggestive that, following the anagrams task, the satisfaction ratings of those tenth grade subjects who had succeeded did not differ significantly from those of

the tenth grade subjects who had failed. Both groups had mean scores slightly on the "unhappy" side of the "indifferent" midpoint. Following the addition task, the tenth grade subjects expressed significantly less satisfaction with their success than either the sixth grade or college subjects. One likely result of such a tendency would be a lack of involvement in achievement activities that, given a normal level of aptitude, would probably lead to placement in a middle-level academic track.

One other grade difference should be discussed briefly since, as was suggested in the previous chapter, it appears to reflect both a sample difference and a developmental difference. This is the interaction of grade and treatment on attributions to luck. It will be recalled that the sixth and tenth grade subjects gave greater attribution to luck following failure than following success; that is, they were more prepared to say that they had failed because of bad luck than to say that they had succeeded because of good luck. The means of the college Success and Failure groups, however, were virtually indistinguishable from each other. This was interpreted as evidence of a more mature concept of the role of chance in achievement activities on the part of the college subjects. However, the sixth and tenth graders also differed from each other: sixth grade attributions to luck tended to decline across trials in both conditions, while those of the tenth grade subjects did not. This was interpreted to reflect a greater alertness to cues in the task situation on the part of the sixth grade subjects, or alternatively, an unwillingness on the part of the tenth grade subjects to respond to those cues.

Sex Differences

The most significant aspect of this study that bears on the role of sex in achievement behavior is that very few sex differences were evident on the anagrams task and many were evident on the addition task. In a general way this finding was anticipated; the choice of tasks was motivated in part by the consideration that solving anagrams would probably not be seen as a "male" skill while arithmetic probably would. It must be admitted, however, that the clarity with which the effect of task choice displayed itself was unexpected.

On the anagrams task, the most important sex difference was that successful females rated their luck on the task higher than did successful males. On the addition task, females stated lower initial expectancies, gave higher ratings of outcome and of satisfaction with the outcome, rated their luck higher, and tended to express more willingness to undertake a similar task.

As has already been pointed out, the absence of sex differences in expectancy of success prior to, during, or following the anagrams task, combined with the significantly lower female expectancy of success prior to the speed addition task, suggests very strongly that the often-reported sex difference in expectancy (e.g. Crandall, 1969) is at least in large part a function of the nature of the task, or perhaps of the sex-role stereotypes associated with the nature of the task. A recent study by Stein (1971), which found a significant sex difference in expectancy only in the skill area of mechanical skills, reinforces this point.

Other sex differences that appeared on the questionnaire responses

following the addition task appear to be related to the females' lower initial expectancies and their equal performance on the task. It has been suggested that the higher positive discrepency between expectancy and performance that resulted was in turn responsible for the fact that the females rated their outcome and satisfaction more positively than the males and tended to be more willing to undertake a similar task. A plausible sequence of relationships is that perceived outcome is a function of both performance and the expectancy-performance discrepency, that satisfaction is a function of perceived outcome, and that willingness to undertake a similar task is a function of satisfaction with one's previous encounter with the task.

Higher ratings of luck were obtained from successful females following both tasks. The interpretation of this sex difference is in some doubt. In particular, it cannot be concluded from higher post-task estimates of luck that the females perceived luck as a more important determinant of their success than did the males, although it should be noted that female attributions to luck during the anagrams task did tend to be somewhat higher than male attributions to luck. Another possibility is that the males tended to exclude luck from any role in influencing their outcomes. It may be observed that the male mean estimations of luck, following both success and failure, tended to be close to the midpoint, which was interpreted as disavowing the influence of luck. Some anecdotal evidence, reported in the previous chapter, also supports this interpretation.

Prior research, reported in Chapter I, suggests that females tend to be more internal for both success and failure than males, although

this sex difference is somewhat stronger in the case of failure than in the case of success. The results of the present study are not clearcut on this point. On later trials of the anagrams task, female attributions to ability were significantly higher than male attributions to ability, while female task attributions were significantly lower than male task attributions. These differences support the notion that females are more internal than males. However, females gave higher attributions to effort than males only following failure, and only on trial two; in addition, they tended to give greater attributions to luck than males. The rank order of the attributional factors following success is essentially the same for both sexes: **task ease** is by far the most important determinant, and good luck by far the least important, with high ability and high effort of approximately the same intermediate importance. In the Failure group, however, the rank orders for the sexes were somewhat different: the males tended to rank task difficulty as most important, followed by low ability, bad luck, and low effort, in that order. The females, however, saw low ability as most important, followed by low effort (on early trials) or task difficulty (on later trials), with bad luck least important on early trials and low effort least important on later trials. Initially, at least, the females were clearly more internal for failure than the males; although experience with the task tended to narrow this difference, the fact that the males continued to place primary responsibility on an external factor, task difficulty, while females placed it on an internal factor, low ability, indicates that this sex difference is relatively stable.

It should be noted that previous reports of a sex difference in locus of responsibility for achievement outcomes have been based largely on responses to questionnaires such as the Intellectual Achievement Responsibility scale (e.g. Crandall, Katkovsky and Crandall, 1965). In the present study, subjects were asked to specify the locus of responsibility for successes or failures that they had themselves just experienced. Given these contrasting situations, it is not surprising that the findings are not perfectly congruent. It is possible, for example, that the Success form of the anagrams task demanded an external attribution (to task ease) to such an extent that differing tendencies to make internal attributions were overpowered, especially if, as prior research suggests, the sex difference in internality for success is weaker than the sex difference in internality for failure.

Individual Differences

Although the effects of grade level, sex, and treatment accounted for some proportion of the variance on all the variables assessed in this study, they also left a large proportion of the variance unaccounted for. It can be assumed that some of this unexplained variance was contributed by individual differences among subjects assigned to the same cells in the experiment.

Unfortunately, it was not feasible to include more than one measure of individual differences--the test anxiety measure--in the study. However, the results from this one measure are of interest, both for what they reveal about behavior in an achievement situation and for what they suggest about the potential value of further

research on the relationship between individual differences and attributional processes.

Although test anxiety did not correlate highly with attributions following success or failure, the obtained correlations did suggest that high test anxiety is associated with ascription of success to variable factors and ascription of failure to task difficulty. As might be anticipated from these attributions, test anxiety also tends to be associated with lower expectancies following both success and failure. There is also a tendency for test anxiety to be associated with lower initial estimates of ability.

These findings, tentative as they must be, raise some interesting possibilities. Test anxiety is often considered an indicator of the strength of the motive to avoid failure (cf. Atkinson and Feather, 1966). Perhaps high test anxious subjects, in whom this motive is presumably strong, are more sensitive to the implications of failure than to the implications of success. If so, we might expect them to attribute a success to unstable causes while perceiving a failure as the result of unchanging factors in the environment.

Since test anxiety tends to be associated with lower initial ability estimates and lower initial expectancies, the other relation can be interpreted as consequences of these relationships. A low expectancy of success is less discrepent from a failure than from a success. According to the model, a person with a low initial expectancy will consequently tend to attribute a success to variable factors and a failure to fixed factors, and as a result will tend to state lower expectancies following either a success or failure than

would a person who approached the task with a high expectancy of success.

It can also be argued that test anxiety results from these patterns of attributions. A person who tends to see his successes as the result of high effort or good luck and his failures as the result of difficult tasks has good reason to be anxious about tests: he has nothing to gain and everything to lose. A successful outcome does not induce the belief that he is likely to succeed in the future, while a failure reinforces the conviction that he is destined to fail in the future. The most desirable solution from his point of view would be to avoid tests and achievement situations altogether; lacking this option, he may display the behaviors, such as avoidance of intermediate risk, that have been described as characteristic of a "fear of failure" orientation (Atkinson and Feather, 1966). By this line of argument, a better term for such an orientation might be "anticipation of failure."

The fact that the relationships between test anxiety and attributions of causality are interpretable and lead to some interesting hypotheses, in spite of a relatively small number of subjects and rather low correlations, suggests that the investigation of relationships between attributions and other individual difference variables is potentially of great value. Such investigation might shed further light not only on the intrapersonal sources of variation in the attributional process in achievement situations, but also on the possible roots in cognition of stable personality orientations.

A Model of Achievement Task Behavior

A major purpose of this study was to test the validity of a model of behavior in an achievement task situation. This model specifies a sequential series of relationships among expectancy of success, causal attributions, and other achievement-related variables. In this section, the results of the study are considered as they validate or alter these hypothesized relationships. In the interest of clarity, the relationships are stated both verbally and as quasi-mathematical functions; it should be noted that the mathematical expressions are not intended to denote the specific form of the functions, but only to illustrate their gross characteristics.

A person enters a task situation with some subjective expectancy of success (Exp) which is a function of "the assumed level of ability in relation to perceived task difficulty... as well as an estimation of intended effort and anticipated luck" (Weiner, et al., 1971). That is,

$$Exp = f(A/T,E,L) \qquad (IV.1)$$

where A, T, E, and L represent the person's estimates of his ability, the difficulty of the task, his intended effort, and anticipated luck.

If the person intends to make a moderate effort and assumes, first, that the task will be neither extraordinarily difficult nor extraordinarily easy, and second, that the effects of good and bad luck will counterbalance each other, expression IV.1 tends to reduce to $Exp = f(A)$; that is, initial expectancy is primarily a function of perceived ability. It was noted that, prior to the anagrams task, ability estimates and overall expectancy were moderately highly cor-

related. Following the anagrams task, only three variables had significant weight in the prediction of post-task expectancy: task performance, perceived outcome, and perceived ability. These findings support the hypothesized relationship.

It is of interest to observe that the simplifying assumptions which permit expression IV.1 to be reduced tend to parallel the everyday classroom situation, in which tasks are seldom very easy or very difficult, in which the effects of luck tend to balance out, and in which we may assume that few students make either a great effort or no effort at all.

Having formed an expectancy, the person undertakes the task and obtains an outcome (Out) which in some degree confirms or disconfirms his expectancy. The discrepency between expectancy and outcome may be symbolized as Dis = f(Exp - Out); the larger the absolute value of this function, the greater the degree of expectancy disconfirmation. The results of this study have been interpreted as indicating that attributions to variable factors, effort (att(E)) and luck (att(L)), are positively related to expectancy disconfirmation:

$$att(E,L) = f(Dis) \qquad (IV.2)$$

while attributions to ability (att(A)) are negatively related to expectancy disconfirmation:

$$att(A) = f(1 - Dis) \qquad (IV.3)$$

In other words, the greater the disparity between the person's expectancy and his outcome, the greater weight he gives to effort and luck as causal factors and the less weight he gives to ability. Attributions to task appear to be relatively independent of expectancy disconfirmation.

If the person is now obliged to undertake a similar task, he must formulate a new expectancy of success. He may continue to hold his previous expectancy, or he may chanfe it. In this study it was shown that, with prior expectancy held constant, attributions to ability and task are positively related to subsequent expectancy following success and negatively related to subsequent expectancy following failure, while attributions to effort and luck are negatively related to expectancy following success and positively related to expectancy following failure. This suggests that the person's new expectancy is a function of his prior expectancy, his obtained outcome, and the attributions he makes for the outcome:

$$Exp_{n+1} = Exp_n + ((Out_n) \times f(att(A,T) - att(E,L))) \qquad (IV.4)$$

where Out is assumed to vary between +1 and -1. In the simplest case, in which the outcome is a discrete success or failure, the value of the outcome term would be either +1 or -1; where the outcome is continuous, it could presumably take on any value in the range, including zero, which would represent the case in which the outcome was so ambiguous that the person would tend to avoid altering his expectancy.

It may be observed that, with a single exception, all the terms on the right side of expression IV.4 have been previously defined as functions of prior expectancy, outcome, or both. The exception is attributions to task. Weiner states that task attributions are primarily determined by social norms. A task on which many people succeed is perceived as easy, while a task on which many people fail is perceived as difficult. An outcome in accord with the norm--succeeding when most others succeed or failing when most others fail--is

attributed to the task, while an outcome not in accord with the norm is attributed to other factors (Weiner, et al., 1971).

The results of the present study appear to support this formulation. Since subjects were tested in groups in which most people obtained the same outcome, we would expect task attributions to be high, as they were. Also, the proportion of subjects experiencing consistent outcomes was somewhat higher in the Success treatment than in the Failure treatment; the relatively greater homogeneity of outcome in the Success groups may have contributed to the significantly higher task attributions in those groups as compared to the Failure groups.

The dependency of task attributions on performance norms may be responsible for a seeming contradiction between the results of this study and some previous findings. Both Weiner (Weiner, et al., 1971) and McMahan (1971) report that success and failure tend not to affect post-task ratings of task difficulty. In the present study, subjects who failed rated the task as a great deal more difficult than subjects who succeeded. Although the objective differences in the level of difficulty of the tasks in the two treatments probably contributed to this difference, it is suggested that the testing situation also contributed. The task developed by Weiner and Kukla (1970) and used in the two later investigations (Weiner et al., 1971; McMahan, 1971) was designed to insure that about half the subjects in a group would succeed and half fail. If perceived difficulty is a function of social norms, we would not expect any difference between successful and unsuccessful subjects in such groups. In the present study, however, social norms would oblige subjects in the Failure condition, in which

most subjects failed, to rate the task as difficult and subjects in the Success condition, in which most subjects succeeded, to rate the task as easy. Furthermore, we should expect this difference to appear even if there were no difference in the objective difficulty of the tasks.

The relative independence of task attributions from prior expectancy has another unanticipated implication: it tends to confirm the value of the attributional model for understanding the dynamics of achievement behavior. If all four attributional factors were functions of outcome and prior expectancy, they would be in a sense unnecessary. Subsequent expectancy could be understood solely as a function of outcome and prior expectancy, without mediating attributions. In this case it could be argued that attributions were not mediating cognitions but merely rationalizations constructed after the fact.

However, if we make the assumption that task attributions, like ability attributions, are negative functions of expectancy disconfirmation (expression IV.3) and make the appropriate substitutions in expression IV.4, we arrive at an expression of the general form:

$$Exp_{n+1} = Exp_n + ((Out_n) \times f(1 - (Exp_n - Out_n))) \quad (IV.5)$$

that is, change in expectancy is negatively related to the absolute value of the discrepency between expectancy and outcome. Thus a person who was confident of succeeding and failed, or who was sure of failing and succeeded, would change his expectancy very little as a result of the discrepent outcome. If he obtained the same outcome again, the discrepency would again be high and the change in expectancy correspondingly low. In short, the assumption that task attributions are functions of prior expectancy leads directly to a relationship between expectancy and outcome that guarentees a sort of stasis.

The attributional model offers a way out of this dilemma. Even if the discrepency between a person's expectancy and his outcome is maximal, his expectancy will move toward greater conformity with the obtained outcome if there are cues, either in the task itself or in the apparent performance of others, that would lead to a task attribution.

Other Theoretical Issues

As well as providing evidence to support (and in part develop) the model of achievement task behavior just presented, this study contained several findings relevant to other aspects of an attribution theory approach to achievement behavior. One such is the finding that attributions to effort, as predicted, tend to decline across a series of consistent failures, but that, contrary to expectation, they do not decline across a series of successes.

When this result was reported, it was suggested that inferences about the causes of success and failure are asymmetrical with respect to effort. A series of failures carries the strong implication that lack of effort is not a determining cause, especially since an initial attribution of failure to low effort has motivating properties that tend to induce a greater degree of effort (Weiner, et al., in press). Thus effort clearly has the conceptual status of a variable factor in the case of failure. Given a series of successes, however, a subject who attributes one success to high effort and then succeeds again may quite logically and consistently attribute the second success to high effort as well. As long as the subject is motivated to succeed on the task, effort will not be a variable factor because the subject will

choose not to vary it; he will continue to make a high effort and continue to ascribe his success to his high effort.

Other findings in this study can be interpreted as supporting the classification of effort as a variable factor, following success as well as failure. The correlations between effort and both prior and subsequent expectancy are in the same direction as the correlations between those variables and luck attributions following both success and failure, while the correlations between the expectancy variables and attributions to ability and task are in the opposite direction. Moreover, attributions to effort and luck show the smallest negative intercorrelations of the four factors; since the paired comparison attribution measure forces scores on the factors to be negatively related to each other, this is interpreted, paradoxically, to indicate a positive relationship between effort and luck attributions. Thus even if, in the case of success, effort is not conceptually a variable factor, it is nonetheless more akin to luck than to ability and task.

Another finding of some theoretical interest is that task characteristics and the task situation, as well as the subject's performance, can affect post-task estimates of ability, expended effort, task difficulty, and experienced luck. Previous studies (Weiner, et al., 1971; McMahan, 1971) have stressed the finding that successful subjects rated their expended effort as greater than did unsuccessful subjects; this was interpreted as evidence that performance served as a basis for making attributions of causality for the performance. In the present study, however, subjects who perceived their anagrams performance as successful did not rate their effort as higher and even tended to rate it as lower than did those who considered their per-

formance to be unsuccessful. The explanation advanced for this apparent contradiction is that, in the earlier studies, there was some ambiguity about the nature of the subject's outcome as well as about the causes of it. As a result, the subject could not directly observe the covariance, or lack of covariance, between effort and outcome. He could only infer that they did covary, that is, that high effort was associated with success. In the present study, because the outcome on each trial was unambiguously a success or a failure, the subject who failed on one trial could directly observe whether making a greater effort on the next trial would result in success. A similar effect on post-task ratings of task difficulty was noted and explored earlier in this chapter, in the presentation of a theoretical model of achievement task behavior.

During the presentation of results bearing on the effects of grade level and treatment on attributions, the observation was made that attributions to effort and task appeared to be related in a reciprocal fashion. On trials when task attributions increased, effort attributions decreased, and vice versa. A shift, across consistent trials, from variable factors to fixed factors had been predicted by the hypotheses, but this particular shift had not been anticipated. Indeed, if perceived locus of control is a fairly stable personality trait, we would expect that shifts between variable and fixed factors would tend to remain either internal or external, that is, between ability and effort or between task and luck.

As has already been pointed out, the results of this study indicate that the stability dimension, rather than the locus of control

dimension, shows the predicted relationships to expectancy of success. In addition, insofar as test anxiety is related to attributions, it appears to relate to the dimension of stability rather than of locus of control. Moreover, when attribution scores were intercorrelated, the negative relationships between ability and effort and between task and luck were approximately as large as the negative relationships between ability and luck and between effort and task, which cross the two dimensions. Taken together, these findings suggest that in an achievement context, when the differentiated four-factor attributional model is applied, the dimension of locus of control is far less salient than the dimension of stability. If so, it is not surprising that previous attempts to relate locus of control to achievement behavior (e.g. Crandall, Katkovsky and Preston, 1962) have yielded rather inconsistent results.

In the attributional model put forth by Weiner (Weiner, et al., 1971), the dimension of locus of control is seen as mediating affective responses to achievement outcomes: internal attributions result in greater positive affect following success and greater negative affect following failure. It will be recalled that these relationships were stated as hypotheses in this study. Unfortunately, the method in the present study does not permit an adequate test of them. It is suggestive to note that the tenth grade subjects tended to be more external than either the sixth grade or college subjects and that they also expressed less satisfaction than the other age groups following success and more following failure, as the hypotheses would predict. However, it would be incautious to consider these results as confirm-

ing the hypotheses, especially since the attributions were measured trial by trial and the satisfaction rating explicitly asked for an affective response to the subject's performance on the task as a whole. The hypothesized relationship between locus of control and achievement-related affect, then, must remain tentative until such time as it receives a more adequate test.

Methodological Implications

The most notable methodological innovation of this study was the paired comparison measure of causal attributions. While a new measure cannot be thoroughly evaluated on the basis of a single study, it can be said that scores on the measure were related, both among themselves and to other variables, in readily interpretable and theoretically relevant ways. Further evidence for the validity of the measure can be inferred from the fact that the relationship between attributions and subsequent expectancy demonstrated in this study was previously reported, following failure only, in a study of German male high school students which used a different task and a different measure of attributions (Weiner et al., in press).

One advantage of the paired comparison measure over other attribution measures that have been used is its relative simplicity. Although the procedure to be used in completing the questionnaire had to be explained at some length, the questions themselves apparently posed no difficulty for even the youngest subjects. It was suggested in Chapter II that the cognitive processes involved in comparing two possible causal factors and deciding which was more important are less demanding than those involved in assessing the importance of each fac-

tor independently. No specific evidence can be cited in support of this suggestion, but the results give no reason to withdraw it.

With this comparative simplicity, however, goes a feature that may be a serious drawback, depending on the objectives of the study. This is the complete dependence of the four attribution scores. In addition to posing some difficulties for the interpretation of mean differences, this dependence makes it impossible to apply such analytic techniques as multiple regression and factor analysis.

As was noted in Chapter II, the anagrams task was selected for this study because it appeared to meet several criteria, among them that each trial be a clear and discrete success or failure, that it be possible for the subject to interpret his outcome as the result of any of the attributional factors, and that it be possible to manipulate the outcome. The results of the study suggest several additional criteria for tasks used in future research. First, the task should be sufficiently novel that most subjects approach it with approximately equal, moderate, expectancies of success. Second, the task should contain few intrinsic cues to its difficulty; failure tasks should not be discriminably different from success tasks except, of course, for the outcome. Third, it would be advantageous for the subject's outcome on each trial to be completely controlled by the experimenter. Fourth, if the task is undertaken in a group setting, it would be preferable for about half the subjects to succeed and half fail on each trial, in order to reduce cues to task difficulty from group performance. A task with these characteristics would tend to reduce the extent to which attributions are influenced by factors other than the subject's idiosyncratic mode of processing achievement information,

and thus would make such idiosyncratic modes more readily visible.

Given such an objective, the results of this study also suggest that it would be prudent to give subjects less than one hundred percent consistent outcomes. As we have seen, a consistent series of outcomes demands attribution to fixed factors and tends, especially in the case of a series of failures, to demand an external (task) attribution. A controlled mixture of successes and failures, while it might make data analysis more complicated, would not have these implicit demand characteristics and would also bear a closer resemblance to everyday achievement situations.

Implications for Future Research

The results of this study suggest several possible avenues for future research. To some extent these overlap and complement each other, but for greater clarity they are discussed under separate headings.

Sex differences. If, as the results of this study suggest, sex differences in expectancy of success are linked to internalized sex role stereotypes, it is important to determine the content of these stereotypes. It seems plausible to suppose that there is a hierarchy of achievement skills, from those perceived as strongly male skills, through those considered neutral, to those perceived as strongly female skills. If so, the specification of this scale would be of considerable interest, as would the possible effects on scale values of such factors as age, sex, social class, and education. The degree of congruence of the scale with actual sex differences on aptitude tests would shed some light on the processes of social perception, although

it might be quite difficult to specify the direction of causality in any relationship between the two. Another question of some interest would be whether participation in a women's liberation group has any effect on such sex role stereotypes, and if so, what. If, for example, a woman in such a group disavows the female stereotype on a questionnaire measure, does this disavowal also extend to behavioral measures such as expectancy of success?

Development of achievement behavior. The relative paucity of developmental differences in the present study has several implications for future research. Although some age-related differences were found, on the whole the responses of the sixth grade subjects accorded as well with the theoretical model as those of the college subjects. This fact suggests that the cognitive strategies postulated by the model develop earlier than the age of twelve; it would be of great interest to know when and to examine the relationship between these strategies and concurrent events in cognitive development.

While this study did not specifically address the question of the stability of a person's attributions, it should be noted that the model allows considerable room for individual differences. For example, expectancy disconfirmation leads to attribution to variable factors, but whether it be effort or luck is not specified. The two are considered equivalent in their effects on subsequent expectancy, but they are presumed to have quite different effects on satisfaction and motivation.

If there are stable individual differences in attribution, are they specific to particular achievement areas or do they appear on achievement tasks generally? Is it possible to induce such response

tendencies experimentally, say, by supplying a subject with causal statements across a series of tasks? What relationship is there between the attributions a parent makes for his child's successes and failures and the attributions the child himself makes? To what extent do these attributional preferences change with age. Another problem for future research is the relationship between these attributional preferences and individual differences on other cognitive and personality variables.

Theory-oriented research. Broadly speaking, the model of achievement behavior presented and tested in this study is an information-processing model. In the ideal case, the only necessary inputs are an ability estimate and a series of outcomes, and possibly some information about the outcomes of a reference group. From these inputs the hypothesized processes generate an initial expectancy of success, a series of causal attributions for the outcomes, and a sequence of new expectancies of success, as well as a new ability estimate.

One obvious line of research would involve testing the limits of this model, which, like all such models, is almost certainly a gross oversimplification. It appears feasible to determine empirically the shapes of the various functions relating expectancy, outcome, and attributions to each other; it may also be feasible to determine the parameters in these functions and to move in the direction of a mathematical model of achievement behavior. Among the questions that such a model might suggest answers to is what series of outcomes would induce the greatest positive change in perceived ability, given a range of initial ability estimates. The answer in this case is by no means

obvious or trivial, since a uniform string of successes would tend to lead to task attributions; these would result in higher expectancies of success in the specific task situation, but would leave perceived ability more or less unchanged. It seems likely that such a model would have other interesting and non-obvious implications as well.

Educational Implications

One implication of this study for educational practices has already been touched on in this chapter. The suggestion was advanced that the differences found between the tenth grade subjects and the sixth grade and college subjects reflected the internalization by the tenth grade subjects of the "official" definition of their ability as implied by their placement in a middle-level tracked class. The effects of such an internalization are not clear in the case of a student whose actual aptitude is lower than this official definition. A student who had higher aptitude than his placement would indicate, however, would probably succeed fairly frequently and, because of his unrealistically low perception of his ability, would tend to attribute his successes to variable factors or, if they were sufficiently frequent, to task ease. The effect of this would be to insulate him from positive affect related to his successes, while leaving him open to negative affect related to his failures. This in turn would depress his tendency to approach achievement tasks. If the student was placed in a lower track than his aptitude would warrant because of poor motivation, it would appear from this line of argument that the remedy may well accentuate the disease.

Assuming that self-attributions are to any degree influenced by

the attributions made for one's outcomes by significant others, the present study has some interesting implications about the probably effects of teacher behavior. Weiner (Weiner, et al., 1971) has noted that the teacher expectation effect (Rosenthal and Jacobson, 1968) can be explained in attributional terms. The relationships between attributions and expectancy of success demonstrated in this study suggest some ways in which a teacher might deliberately set out to create such an effect. The ethical questions posed by this possibility, however, are difficult to answer. Given the necessary knowledge to do so, would a teacher be justified in misleading a student about the causes of his successes and failures in order to minimize negative affect and downward expectancy shifts or to maximize positive affect and upward expectancy shifts? The author is inclined to say no, on the ground that the possible negative consequences of deliberate deception, however benevolent its aim, are likely to outweight the possible benefits.

However, the results of the study yield some suggestions of possible ways to accomplish the same goals without deception. If a task is of intermediate difficulty relative to a student's <u>own</u> level of ability, rather than relative to his reference group, both ability and task attributions tend to be excluded, while the covariation of effort and outcome gains greater salience. As has been pointed out, attributions of success to high effort lead to a high level of satisfaction as well as greater rewards from others, while attributions of failure to low effort are associated with low satisfaction but also tend to induce a greater effort. It is also conceivable that, in a situation in which the relationship of ability to task difficulty is relatively constant, effort attributions do not relate to subsequent

expectancy in the usual way. In effect, such a situation validates the attitude, "I can do it if I try." This suggests that expectancy of success may tend to rise following a success, but will not necessarily fall following a failure; if so, this situation has obvious implications for educational practices. However, the exploration of this possibility must be left to future research.

APPENDIX A

SPECIMEN PAGES FROM THE ANAGRAMS TASK BOOKLET

SCRAMBLED WORDS

PLEASE FILL IN THE BLANKS ON THIS PAGE. DO NOT OPEN YOUR BOOKLET UNTIL THE TASK HAS BEEN EXPLAINED TO YOU.

NAME _____ SEX: MALE FEMALE
First Middle Initial Last (circle one)

BIRTHDATE _____ CLASS/SECTION _____
Month Day Year

PLEASE ANSWER THE QUESTIONS ON THIS PAGE AFTER THE TASK HAS BEEN EXPLAINED.

1. How much ability do you have for doing scrambled words? How good are you at solving them, if you try as hard as you can? Put an X mark on the line below to show where you think you stand.

very low ability ——————————————— very high ability

2. This booklet contains five scrambled words for you to try to solve. Of these five, how many do you expect to be able to solve correctly? Circle the number of scrambled words that you expect to get right.

0 1 2 3 4 5

3. The first scrambled word is on the next page. What do you think your chances are of getting it right in the time allowed? How sure are you that you will be able to unscramble it correctly? Put an X on the line below to show how sure you are.

I'm sure I won't get it right ——————————————— I'm sure I will get it right

PLEASE DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO.

IUMSC

IF YOU GOT THE LAST SCRAMBLED WORD RIGHT, please complete the following six sentences by checking one of the two choices. Be sure to complete all six, and to check only one choice in each.

1. I got the last word right mainly because:

   _____ I'm good at doing scrambled words OR _____ it was easy

2. I got the last word right mainly because:

   _____ I tried hard OR _____ I was lucky

3. I got the last word right mainly because:

   _____ I was lucky OR _____ I'm good at scrambled words

4. I got the last word right mainly because:

   _____ it was easy OR _____ I tried hard

5. I got the last word right mainly because:

   _____ I was lucky OR _____ it was easy

6. I got the last word right mainly because:

   _____ I'm good at doing scrambled words OR _____ I tried hard

* * * * * * *

IF YOU DID NOT GET THE LAST SCRAMBLED WORD RIGHT, please complete the following six sentences, by checking one of the two choices. Be sure to complete all six, and to check only one choice in each.

1. I didn't get the last word right mainly because:

   _____ it was hard OR _____ I was unlucky

2. I didn't get the last word right mainly because:

   _____ I didn't try hard enough OR _____ I'm not very good at scrambled words

3. I didn't get the last word right mainly because:

   _____ I was unlucky OR _____ I didn't try hard enough

4. I didn't get the last word right mainly because:

   _____ it was hard OR _____ I'm not very good at scrambled words

5. I didn't get the last word right mainly because:

   _____ I didn't try hard enough OR _____ it was hard

6. I didn't get the last word right mainly because:

   _____ I'm not very good at scrambled words OR _____ I was unlucky

What do you think your chances are of getting the next scrambled word right in the time allowed? How sure are you that you will be able to unscramble it correctly? Put an X on the line below.

/___.______.______.______.______.______.______.______.______.______.___/

sure I won't get it right	50/50	sure I will get it right

PLEASE ANSWER ALL THE QUESTIONS ON THIS PAGE BY PUUTING AN X AT THE PLACE ALONG THE LINE THAT MOST CLOSELY CORRESPONDS TO YOUR ANSWER.

1. How do you think you did on the scrambled words task? Do you think your performance was a success or a failure?

/_____._____._____._____._____._____._____._____._____._____/

extreme failure — so-so — extreme success

2. How do you feel about how you did on the scrambled words task? Did your performance make you feel very happy, or very unhappy, or indifferent?

/_____._____._____._____._____._____._____._____._____._____/

very happy — indifferent — very unhappy

3. How hard did you try to solve the scrambled words? Did you give them all the care and attention you could, or did you work at them without much effort?

/_____._____._____._____._____._____._____._____._____._____/

very low effort — very high effort

4. How hard do you think this task is? Independent of your own level of ability, could very many people do very well on this task, or does it require a high level of ability to do well?

/_____._____._____._____._____._____._____._____._____._____/

very difficult — very easy

5. How lucky were you in working on the scrambled words? To what extent did you do better or worse than you expected because of good or bad luck?

/_____._____._____._____._____._____._____._____._____._____/

very unlucky — very lucky

6. How much ability do you have for scrambled words? How good are you at solving them, if you try as hard as you can?

/_____._____._____._____._____._____._____._____._____._____/

very low ability — very high ability

7. How willing would you be to try to solve another set of scrambled words? Would you be very happy or very unhappy, or indifferent?

/_____._____._____._____._____._____._____._____._____._____/

very happy — indifferent — very unhappy

8. If you were given another set of five scrambled words to try to solve, how many would you expect to be able to solve correctly? Circle the number of words you would expect to get right.

0 1 2 3 4 5

APPENDIX B

ADDITION TASK BOOKLET

NAME _____

GRADE _____ TEACHER _____

SPEED ADDITION

This booklet contains twenty simple addition problems. Each problem has four two-digit numbers to be added. Here is an example:

Example:
64
18
93
37

You will have only a limited amount of time to work on the problems.

In the amount of time allowed, how many of the addition problems do you expect to be able to solve correctly? Circle the number, from zero to twenty, that you expect to get right.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

1. 23 15 70 55	2. 45 14 87 13	3. 89 76 97 31	4. 21 17 42 43
5. 36 19 38 64	6. 95 40 36 76	7. 76 80 70 92	8. 43 31 61 57
9. 31 35 25 70	10. 48 92 43 97	11. 95 79 37 32	12. 72 62 16 10
13. 20 97 83 98	14. 91 60 25 96	15. 68 14 43 11	16. 32 25 48 59
17. 55 43 60 35	18. 74 95 16 17	19. 18 69 38 12	20. 88 59 20 47

PLEASE ANSWER ALL THE QUESTIONS ON THESE PAGES BY PUTTING AN X AT THE PLACE ALONG THE LINE THAT MOST CLOSELY CORRESPONDS TO YOUR ANSWER.

1. How do you think you did on the speed addition task? Do you think your performance was a success or a failure?

extreme failure — so-so — extreme success

2. How do you feel about how you did on the speed addition task? Did your performance make you feel very happy, or very unhappy, or indifferent?

very happy — indifferent — very unhappy

3. How hard did you try to solve the problems? Did you give them all the care and attention you could, or did you work at them without much effort?

very low effort — very high effort

4. How hard do you think this task is? Independent of your own level of ability, could very many people do very well on this task, or does it require a high level of ability to do well?

very difficult — very easy

5. How lucky were you in working on the problems. To what extent did you do better or worse than you expected because of good or bad luck?

very unlucky — very lucky

6. How much ability do you have for speed addition problems? How good are you at solving them, if you try as hard as you can?

very low ability — very high ability

7. How willing would you be to try to solve another set of problems? Would you be very happy or very unhappy, or indifferent?

very happy — indifferent — very unhappy

8. If you were given another set of twenty speed addition problems to try to solve, how many would you expect to be able to solve correctly? Circle the number of problems that you would expect to get right.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

APPENDIX C

INSTRUCTIONS TO SUBJECTS ON ANAGRAMS TASK

My name is Ian McMahan, and I'm here today doing some research. To start off, please fill in the blanks on the front page of the booklet, and don't look through the booklet until I say to. Give your name, sex, teacher's name, and birthdate. Where it says "grade," just put down period.

I should tell you first that this is not a test of any kind. No one here at Fox Lane will know how you did on it, and there will not be any record of your performance as an individual.

Now most of you probably know what scrambled words are. You may have seen them in newspapers and magazines. In case you haven't, a scrambled word is just a regular English word with the letters mixed up. For example, this (writing on blackboard Y-A-D) is a scrambled word. In this case the answer is DAY. Of course the words we'll be working on today are harder than that, but that gives you the idea.

Your booklet contains five scrambled words. Each one has five letters that can be rearranged to spell one--and only one-- common English word. You will have fifteen seconds to try to unscramble each word.

Before we start, though, I'd like you to turn to page one and answer the three questions there. First, how much ability do you have for doing scrambled words? How good are you at solving them if you try as hard as you can? Just put an X on the line at the place that corresponds to how much ability you feel you have. Number two, how many of the five scrambled words in this booklet do you expect to be

able to unscramble correctly in the time allowed? Just circle the number, from zero to five, that you expect to get right. Number three, what do you think your chances are of getting the first word right? How sure are you that you will be able to unscramble it correctly? Put an X on the line to show how sure you are. Before we go on, are there any questions about what I have said so far?

When I say "Start," turn to the next page and try to unscramble the word. When I say "Stop," please stop working at once and turn the page. Ready? Start.

.....

Please stop working and turn to the next page. The last word was

(Following Trial One:)

Now we're not just interested in whether you unscrambled the word correctly or not. We're also interested in the reasons you succeeded or failed. For example, if you got the word right, it may have been because you're good at doing scrambled words, or you may have tried hard, or you may have just been lucky enough to spot the answer quickly, or the word may have been so easy that most people would get it right, or it may have been some combination of those reasons.

In the same way, if you didn't get the word right, it may have been because you didn't try hard enough, or because you're not very good at doing scrambled words, or because you weren't lucky enough to spot the answer in time, or it may be that the word was so hard that few people could get it right, or some combination of those reasons.

There are two sets of questions on this page. If you got the last word right, please look at the set at the top of the page. If you did

not get it right, look at the set at the bottom. The six questions in each set are in the form of sentences for you to complete. In each sentence there are two choices, two ways to complete it. I'd like you to check the choice in each sentence that you think is more nearly true for you. For example, if you got the last word right and you think it's more because of your ability than because it was easy, you'd check the left-hand choice in the first sentence. If it's the other way around, you'd check the right-hand choice. There are no right or wrong answers on this; just answer the way you feel is more nearly true for you. When you finish, you should have checked one of the two choices in each of the six sentences in your set. If there are any questions, please raise your hand and I'll try to answer them.

.....

If you have finished completing your set of sentences, please turn to the next page and put an X on the line to show what you think your chances are of getting the next word right.

.....

Is everyone ready to go on to the next word? Okay, start.

.....

Please stop working and turn the page. The last word was

Again I'd like you to answer the questions about the reasons you got the last word right or not. Remember, if you got it right, complete the set of sentences at the top of the page; if you didn't, do the set at the bottom of the page. Be sure to check one, and only one, choice in each of the six sentences. When you finish, go on to the next page and put an X on the line to show how sure you are that you will get the next word right.

(After Trial Five and the paired-comparisons:)

On this page there are a few more questions I'd like you to answer about how you did on the five scrambled words in the booklet. To answer the questions, just put an X anywhere along the line under the question, at the place that most closely corresponds to your answer.

.....

If you've finished the questions on this page, turn to the last page. Suppose I said I have another booklet with five scrambled words for you to try. How many would you expect to be able to solve correctly? Just circle the number, from zero to five, that you would expect to get right, then pass your booklets up to the front.

APPENDIX D

INSTRUCTIONS TO SUBJECTS ON SPEED ADDITION TASK

Now there's one more part of this, then I'll be glad to answer all of your questions. This booklet contains twenty simple addition problems, just like the one on the cover, adding up four two-digit numbers. After you fill in the blanks at the top of the page, you will have a chance to try doing them. The catch is that you will only have four minutes (college: three and a half minutes) to work on the problems; four minutes for all twenty of them. Now, in that amount of time, how many of the twenty problems do you expect to be able to solve correctly? Just circle the number, from zero to twenty, that you expect to get right.

Okay? Start working.

.....

Okay, time's up. I'll read you the correct answers. You can mark them if you like, but please don't change or add any answers on your page. No one here at school will see this, and it won't be graded. Here are the answers:

.....

Now please turn to page three and answer the questions there, in the same fashion as after the scrambled words, by putting an X on the line under the question.

.....

If you've finished the questions on this page, turn to page four. If I were to give you another booklet of twenty similar problems, how many would you expect to be able to solve in the time allowed? Just

circle the number, from zero to twenty, that you would expect to get right, then pass your booklets up to me.

APPENDIX E

MODIFIED TEST ANXIETY SCALE FOR CHILDREN[1]

2. Do you worry about being promoted (that is, passing from the _____ to the _____ grade) at the end of the year?

4. When the teacher says that she is going to call upon some students (boys and girls) in the class to do math (arithmetic) problems, do you hope that she will call on someone else and not on you?

7. When the teacher is teaching you about math (arithmetic) do you feel that other students in the class understand her better than you?

10. When the teacher is teaching you English (about reading) do you feel that other students understand her better than you?

12. When you are at home and you are thinking about math (arithmetic) homework for the next day, do you become afraid that you will get the answers wrong if the teacher calls on you?

15. When you are home and you are thinking about your English homework (reading lesson) for the next day, do you worry that you will do poorly on the homework (lesson) ?

[1] Only those questions that were modified are reproduced. The material that was excerpted or modified appears in parentheses. The other questions were administered in exactly the form given in Sarason, et al. (1960, pp. 307-309).

APPENDIX F

TABLE 1

ATTRIBUTIONS ON TRIALS TWO THROUGH FIVE AS A FUNCTION OF OUTCOME AND PRIOR EXPECTANCY

Grade	Out-come	Expec-tancy	Trial	N	Abil-ity	Ef-fort	Task	Luck
6	Success	2	High	31	1.74	1.68	1.77	0.81
			Low	21	0.62	2.19	1.86	1.33
		3	High	32	1.81	1.50	2.19	0.50
			Low	28	0.54	2.21	1.79	1.46
		4	High	38	1.74	1.29	2.53	0.45
			Low	24	0.67	1.83	2.25	1.25
		5	High	42	1.74	1.36	2.33	0.57
			Low	16	0.50	2.00	2.06	1.44
	Failure	2	High	8	0.63	1.38	2.00	2.00
			Low	49	1.45	1.16	1.78	1.59
		3	High	8	0.63	1.88	1.25	2.25
			Low	41	1.76	1.05	1.73	1.46
		4	High	5	0.60	1.60	2.00	1.80
			Low	42	1.81	1.07	1.81	1.29
		5	High	7	1.29	1.29	1.57	1.86
			Low	44	1.75	1.16	2.02	1.07
10	Success	2	High	20	1.30	1.50	2.40	0.80
			Low	23	0.61	1.48	2.48	1.43
		3	High	25	1.44	1.48	2.52	0.56
			Low	20	0.60	1.50	2.50	1.40
		4	High	25	1.44	1.40	2.52	0.64
			Low	19	0.32	1.89	2.26	1.53
		5	High	19	1.32	1.84	2.21	0.63
			Low	14	0.29	1.79	2.14	1.79
	Failure	2	High	7	0.71	2.00	1.57	1.71
			Low	31	1.81	1.35	1.55	1.29
		3	High	4	1.75	1.75	0.75	1.75
			Low	32	1.69	1.72	1.31	1.28
		4	High	6	0.50	1.67	2.17	1.67
			Low	31	1.74	1.10	1.39	1.77
		5	High	12	0.83	1.75	1.67	1.75
			Low	35	1.63	1.06	1.97	1.34

TABLE 1 (continued)

Grade	Out-come	Trial	Expec-tancy	N	Abil-ity	Ef-fort	Task	Luck
Coll.	Success	2	High	56	1.84	1.13	2.29	0.75
			Low	38	0.66	1.55	2.21	1.58
		3	High	64	1.91	1.23	2.08	0.78
			Low	37	0.84	1.54	2.30	1.32
		4	High	69	1.77	1.16	2.30	0.77
			Low	26	0.65	1.54	2.42	1.38
		5	High	71	1.82	1.35	2.11	0.72
			Low	34	0.56	1.47	2.24	1.74
	Failure	2	High	7	0.71	2.00	2.00	1.29
			Low	45	2.04	1.36	1.62	0.98
		3	High	4	0.00	2.00	2.25	1.75
			Low	41	2.37	0.95	1.76	0.93
		4	High	10	1.00	1.20	2.30	1.50
			Low	41	2.07	1.07	1.80	1.05
		5	High	6	0.67	2.00	1.17	2.17
			Low	35	2.34	1.06	1.60	1.00

Analyses of Variance

Source	df	Ability MS	Ability F	Effort MS	Effort F	Task MS	Task F	Luck MS	Luck F
Trial 2									
Grade (A)	2	0.97	< 1.0	0.17	< 1.0	0.62	< 1.0	1.39	1.45
Outcome (B)	1	0.49	< 1.0	0.11	< 1.0	8.81	9.36**	6.61	6.86**
Expectancy (C)	1	0.09	< 1.0	0.48	< 1.0	0.41	< 1.0	1.03	1.07
A x B	2	0.88	< 1.0	5.00	5.03**	3.87	4.11*	2.46	2.56
A x C	2	0.54	< 1.0	1.00	1.01	0.28	< 1.0	0.19	< 1.0
B x C	1	55.41	50.68**	8.33	8.38**	0.72	< 1.0	13.94	14.47**
A x B x C	2	0.62	< 1.0	0.24	< 1.0	0.06	< 1.0	0.04	< 1.0
Within	324	1.09		0.99		0.94		0.96	
Trial 3									
Grade (A)	2	0.46	< 1.0	0.77	< 1.0	2.07	2.32	0.73	< 1.0
Outcome (B)	1	1.22	1.19	0.02	< 1.0	20.61	23.14	12.72	16.13
Expectancy (C)	1	0.07	< 1.0	0.83	< 1.0	0.13	< 1.0	0.08	< 1.0
A x B	2	2.87	2.80	1.48	1.53	6.05	6.79**	1.16	1.47
A x C	2	4.14	4.04	0.52	< 1.0	0.56	< 1.0	0.37	< 1.0
B x C	1	48.44	47.29**	9.60	9.95**	0.63	< 1.0	21.65	27.47**
A x B x C	2	5.95	5.83**	2.18	2.26	2.39	2.68	0.19	< 1.0
Within	324	1.02		0.96		0.89		0.79	

TABLE 1 (continued)

Source	df	Ability MS	Ability F	Effort MS	Effort F	Task MS	Task F	Luck MS	Luck F
Trial 4									
Grade (A)	2	2.22	2.07	1.27	1.43	0.24	<1.0	0.99	1.31
Outcome (B)	1	1.72	1.60	2.60	2.94	10.44	12.35**	12.30	16.24**
Expectancy (C)	1	0.06	<1.0	0.05	<1.0	4.64	5.49*	2.75	3.64
A x B	2	0.44	<1.0	0.01	<1.0	0.37	<1.0	1.16	1.54
A x C	2	0.04	<1.0	0.11	<1.0	0.50	<1.0	0.79	1.04
B x C	1	61.38	57.31**	9.18	10.36**	1.45	1.72	13.16	17.37**
A x B x C	2	0.03	<1.0	0.42	<1.0	0.57	<1.0	0.29	<1.0
Within	324	1.07		0.89		0.85		0.76	
Trial 5									
Grade (A)	2	2.22	1.99	0.49	<1.0	1.06	1.24	0.56	<1.0
Outcome (B)	1	7.23	6.47*	3.09	3.11	13.21	15.47**	7.31	9.50**
Expectancy (C)	1	0.48	<1.0	1.54	1.55	1.30	1.53	0.63	<1.0
A x B	2	0.06	<1.0	1.68	1.69	0.94	1.10	0.07	<1.0
A x C	2	1.47	1.32	2.34	2.36	0.17	<1.0	0.91	1.17
B x C	1	57.47	51.45**	8.38	8.44**	2.72	3.18	40.13	52.14**
A x B x C	2	1.90	1.70	0.20	<1.0	0.20	<1.0	0.46	<1.0
Within	324	1.12		0.99		0.85		0.77	

* $p < .05$
** $p < .01$

REFERENCES

Alpert, R., and Haber, R. N. Anxiety in academic achievement situations. Journal of Abnormal and Social Psychology, 1960, 61, 207-215.

Atkinson, J. W., and Feather, N. T. (Eds.) A Theory of Achievement Motivation. New York: Wiley, 1966.

Bialer, I. Conceptualization of success and failure in mentally retarded and normal children. Journal of Personality, 1961, 29, 303-320.

Brim, O. G., Jr. College grades and self-estimates of intelligence. Journal of Educational Psychology, 1954, 45, 477-484.

Brim, O. G., Jr., Glass, D. C., Neulinger, J., and Firestone, I. J. The Use of Standardized Ability Tests in American Secondary Schools and Their Impact on Students, Teachers, and Administrators. Technical Report #3. New York: Russell Sage Foundation, 1965.

Brookover, W. B., LePere, J. M., Hamachek, S. T., and Erikson, E. L. Self-Concept of Ability and School Achievement, II. U.S. Office of Education Cooperative Research Project No. 1636. Educational Publication Services, East Lansing, Mich., October 1965.

Bruner, J. S., Olver, R. R., and Greenfield, P. M. Studies in Cognitive Growth. New York: Wiley, 1966.

Coleman, J. S., Campbell, E. Q., Hobson, C. J., McPartland, J., Mood, A. M., Weinfeld, F. D., and York, R. L. Equality of Educational Opportunity. Washington: Government Printing Office, 1966.

Crandall, V. C. Reinforcement effects of adult reactions and nonreactions on children's achievement expectations. Child Development, 1963, 34, 335-354.

Crandall, V. C. Sex differences in expectancy of intellectual and academic reinforcement. In C. P. Smith (Ed.), Achievement-Related Motives in Children. New York: Russell Sage Foundation, 1969.

Crandall, V. C., Katkovsky, W., and Crandall, V. J. Children's beliefs in their own control of reinforcements in intellectual-academic achievement situations. Child Development, 1965, 36, 91-109.

Crandall, V. J., Katkovsky, W., and Preston, A. Motivational and ability determinants of young children's intellectual achievement behaviors. Child Development, 1962, 33, 643-661.

Feather, N. T. The relationship of expectation of success to need achievement and test anxiety. Journal of Personality and Social Psychology, 1965, 1, 118-126.

Feather, N. T. Effects of prior success and failure on expectations of success and subsequent performance. Journal of Personality and Social Psychology, 1966, 3, 287-298.

Feather, N. T. Valence of outcome and expectation of success in relation to task difficulty and perceived locus of control. Journal of Personality and Social Psychology, 1967, 7, 372-386.

Feather, N. T. Attribution of responsibility and valence of success and failure in relation to initial confidence and task performance. Journal of Personality and Social Psychology, 1969, 13, 129-144.

Feather, N. T., and Simon, J. G. Attribution of responsibility and valence of outcome in relation to initial confidence and success and failure of self and other. Journal of Personality and Social Psychology, 1971, 18, 173-188.

Feld, S. C., and Lewis, J. The assessment of achievement anxieties in young children. In C. P. Smith (Ed.), Achievement-Related Motives in Children. New York: Russell Sage Foundation, 1969.

French, E. G., and Lesser, G. S. Some characteristics of the achievement motive in women. Journal of Abnormal and Social Psychology, 1964, 68, 119-128.

Frieze, I., and Weiner, B. Cue utilization and attributional judgments for success and failure. Journal of Personality, in press.

Guilford, J. P. The Nature of Human Intelligence. New York: McGraw-Hill, 1969.

Heider, F. The Psychology of Interpersonal Relations. New York: Wiley, 1958.

Hill, K. T., and Sarason, S. B. The relationship of test anxiety and defensiveness to test and school performance over the elementary-school years: a further longitudinal study. Monographs of the Society for Research in Child Development, 1966, 31(2), Serial No. 104.

Hobson, J. R. Sex differences in primary mental abilities. Journal of Educational Psychology, 1947, 41, 126-132.

Hoffman, L. W. Early childhood experiences and women's achievement motives. Journal of Social Issues, in press.

Horner, M. S. Sex differences in achievement motivation and performance in competitive and noncompetitive situations. Unpublished doctoral dissertation, University of Michigan, 1968.

James, W. H., and Rotter, J. B. Partial and 100% reinforcement under chance and skill conditions. Journal of Experimental Psychology, 1958, 55, 397-403.

Kagan, J., and Moss, H. A. Stability and validity of achievement fantasy. Journal of Abnormal and Social Psychology, 1959, 58, 357-364.

Katz, I. The socialization of academic motivation in minority group children. In D. Levine (Ed.), Nebraska Symposium on Motivation. Lincoln: University of Nebraska Press, 1967.

Kelley, H. H. Attribution theory in social psychology. In D. Levine (Ed.), Nebraska Symposium on Motivation. Lincoln: University of Nebraska Press, 1967.

Kukla, A. The cognitive determinants of achieving behavior. Unpublished doctoral dissertation, University of California, 1970

Lefcourt, H. M. Internal versus external control of reinforcement: a review. Psychological Bulletin, 1966, 65, 206-220.

McGhee, P. E., and Crandall, V. C. Beliefs in internal-external control of reinforcements and academic performance. Child Development, 1968, 39, 91-102.

McMahan, I. D. Sex differences in causal attribution for success and failure. Paper presented at the meeting of the Eastern Psychological Association, New York, April 1971.

McNemar, Q. Psychological Statistics (3rd Ed.). New York: Wiley, 1962.

Mehrabian, A. Male and female scales of the tendency to achieve. Educational and Psychological Measurement, 1968, 28, 493-502.

Penk, W. E. Developing patterns of conceptual area analysis of children's object sorting responses. Proceedings of the 77th Annual Convention of the American Psychological Association, 1969, 4, 255-256.

Phares, E. J. Expectancy changes in skill and chance situations. Journal of Abnormal and Social Psychology, 1957, 54, 339-342.

Piaget, J. Piaget's theory. In P. H. Mussen (Ed.), Carmichael's Manual of Child Psychology (3rd Ed.). New York: Wiley, 1970.

Piaget, J., and Inhelder, B. La genese de l'idee de hasard chez l'enfant. Paris: Presses Universitaires de France, 1951.

Rosenthal, R., and Jacobson, L. F. Teacher expectations for the disadvantaged. Scientific American, 1968, 218, 19-23.

Rotter, J. B. Social Learning and Clinical Psychology. New York: Prentice-Hall, 1954.

Rotter, J. B. Generalized expectancies for internal versus external control of reinforcement. Psychological Monographs, 1966, 80(1), Whole No. 609.

Rotter, J. B., Liverant, S., and Crown, D. P. The growth and extinction of expectancies in chance controlled and skill tests. Journal of Psychology, 1961, 52, 161-177.

Sarason, S. B., Lighthall, F. F., Davidson, K. S. Waite, R. R., and Ruebush, B. K. Anxiety in Elementary School Children. New York: Wiley, 1960.

Scheffe, H. The Analysis of Variance. New York: Wiley, 1959.

Smith, C. P. The influence on test anxiety scores of stressful versus neutral conditions of test administration. Educational and Psychological Measurement, 1965, 25, 135-141.

Smith, C. P. Conclusion. In C. P. Smith (Ed.), Achievement-Related Motives in Children. New York: Russell Sage Foundation, 1969.

Smith, C. P., Ryan, E., and Diggins, D. Moral decision making: cheating on examinations. Journal of Personality, in press.

Stein, A. H. The effects of sex-role standards for achievement and sex-role preference on three determinants of achievement motivation. Developmental Psychology, 1971, 4, 219-231.

Veroff, J. Social comparison and the development of achievement motivation. In C. P. Smith (Ed.), Achievement-Related Motives in Children. New York: Russell Sage Foundation, 1969.

Veroff, J., Wilcox, S., and Atkinson, J. W. The achievement motive in high school and college age women. Journal of Abnormal and Social Psychology, 1953, 48, 108-119.

Walls, R. T., and Cox, J. Disadvantaged and nondisadvantaged children's expectancy in skill and chance outcomes. Developmental Psychology, 1971, 4, 299.

Weiner, B., Frieze, I., Kukla, A., Reed, L., Rest, S., and Rosenbaum, R. M. Perceiving the Causes of Success and Failure. New York: General Learning Press, 1971.

Weiner, B., Heckhausen, H., Meyer, W.-U., and Cook, R. E. Causal ascriptions and achievement behavior: the conceptual analysis of effort. Journal of Personality and Social Psychology, in press.

Weiner, B., and Kukla, A. An attributional analysis of achievement motivation. Journal of Personality and Social Psychology, 1970, 15, 1-20.

Weiner, B., and Potepan, P. A. Personality characteristics and affective reactions toward exams of superior and failing college students. Journal of Educational Psychology, 1970, 61, 144-151.

Winer, B. J. Statistical Principles in Experimental Design. New York: McGraw-Hill, 1962.

AUTOBIOGRAPHICAL STATEMENT

IAN DOUGLASS McMAHAN was born in Houston, Texas on April 6, 1940. After secondary education at St. John's School in Houston, he was awarded a National Merit Scholarship to Princeton University. At Princeton he majored in romance languages and was chairman of the editorial board of the Nassau Lit. His A.B. degree was granted in 1962.

The next several years were spent as a free-lance writer, specializing in popular and juvenile treatments of physiology and medicine, as well as advice to parents. His book for young readers, Highlights of American History, appeared in 1968.

In 1967 Mr. McMahan entered the Doctoral Program in Developmental Psychology of the City University of New York, supported by an NDEA Title IV Fellowship. Particular interests included personality development, achievement motivation, and cognitive development. In 1970 he was awarded one of the first Russell Sage Foundation Graduate Student Fellowships for the dissertation year 1970-1971. In addition to his residency at the Foundation, during that year he was a consultant to Forum 15 of the White House Conference on Children and to the Wingspread Conference on Parent-Child Relationships.

On completion of the doctorate, Mr. McMahan accepted an appointment as Assistant Professor of Psychology at Brooklyn College of the City University of New York.