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ABSTRACT

A cognitive model of motivation is proposed which postulates four components as the determinants of the actual and anticipated outcome of an achievement-related event. The four determinants are ability, effort, task difficulty, and luck. These factors may be classified as either internal or external sources of control, and as either stable or unstable elements. Four experiments are reported which substantiate belief that individuals are able to attribute the behavior of others, as well as their personal behavior, to these four dimensions of causality. The perceptions about causality also are demonstrated to influence subjective expectancy of success, and are related to resistance to extinction. Achievement concerns, frustration and conflict, self vs. other perception, and the educational implications of this motivational approach are discussed. [Not available in hard copy due to marginal legibility of original document.] (Author/DR)

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AN ATTRIBUTIONAL (COGNITIVE) MODEL OF MOTIVATION

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An attributional (cognitive) model of motivation

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Theories of behavior generally can be categorized as either rational or mechanistic in orientation (see Bolles, 1967). Frequently, the contrasting terms central-peripheral, purposive-instinctive, and expectancy-associative also describe the distinction between conceptions which view man as self-generating and cognitive as opposed to being activated by external stimuli and passively carried along an unknown path towards the goal.

Since 1950 the trend in the study of personality and motivation has been to focus upon the cognitive aspects of organisms, particularly humans. Higher mental functions such as information processing, decision making, and judgment formation have been studied in detail. Current conceptions of action stress the organisms' propensity to increase rather than decrease incoming information, to approach rather than avoid stimulation, and to be active continuously rather than remaining at rest until a state of disequilibrium is produced or until acted upon by some external agent (see Sanford, 1963; Sells, 1969).

In this paper an attempt is made to formalize a cognitive model of motivation which incorporates these current directions in the analysis of action. The temptation to employ the currently popular phrase "towards a theory . . ." has been resisted, although it is clear that the present work represents a primitive stage of theory building, rather than a final or near-complete statement. Four previously unreported experiments also are presented to lend credulance and clarity to the conception. In addition, the relevance of the ideas to learning theory, frustration and conflict, achievement motivation, self vs. other perception and educational practices is discussed.

Terms in the model

The model receives its impetus from Heider's (1958) analysis of action, and from research and thought in the area of locus of control (Rotter, 1966). Four behavioral determinants are specified as affecting the actor's expected outcome, as well as the actual outcome (O), of an achievement-related event. (The behaviors under consideration are primarily pertinent to achievement concerns, although behaviors instigated by other sources of motivation also will be discussed). The four determinants of the actual and anticipated outcome (success or failure) of an achievement-related action are postulated to be ability (A), effort (E), task difficulty (T), and luck (L):

$$O = f(A, E, T, L)$$

The distinction between general and specific components of ability is reasonable to assume (see Mischel and Staub, 1965, and Rotter, 1954 for a similar dichotomy in the analysis of expectancies), but will be neglected in this paper.

The four components in the model can be classified into personal (internal) determinants (ability and effort), and environmental (external) causes (task difficulty and luck). Further, there may be a subdivision into stable (ability and task difficulty) and unstable (effort and luck) components. These categorizations are summarized in Table 1. The reader will note that this analysis is similar to one proposed earlier by Heider

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Insert Table 1 about here

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(1958), which distinguishes between "can" (ability in relation to task difficulty) and "try" (effort). The model also captures the distinction between internal and external causation (Rotter, 1966).

The importance of differentiating between these four determinants of behavior has been well documented in the existing research literature. The dichotomy between internal and external control has been found relevant in the analysis of resistance to extinction, social action, achievement performance, and a wide array of other behaviors (see Crandall, Katkovsky, and Crandall, 1965; Lefcourt, 1966; Rotter, 1966). The value of distinguishing between the stability versus the instability of the factors has not been directly investigated in experimental settings. However, the fixed versus variable nature of the components theoretically should affect the expectancy that behavior will remain consistent over trials. There is supporting experimental evidence, for example, that positive recency effects are displayed in games of skill and negative recency effects exhibited in games of chance. This follows from the belief that the outcome of a skill task is perceived to be, in part, a function of the ability of the player (a stable determinant), while chance outcomes are decided by an unstable (luck) component. Similarly, atypical responses (decreasing level of aspiration after success and increasing level of aspiration following failure) are more likely to be displayed when the respective outcomes are attributed to good or bad luck, rather than to high or low ability (Phares, 1957). Further, it is anticipated that atypical responses will be more likely to be exhibited if prior performance is perceived by the actor as due to heightened or depressed effort, rather than caused by the fixed factor of task difficulty.

The distinction between the two internal elements, ability and effort, also has been shown to be useful. For example, in the area of moral obligations, inactions attributed to a lack of effort (e.g., not returning a debt when the money is available) are less likely to be condoned than failures due to an inability to act (e.g., not possessing the money) (Schmitt, 1964). Similarly, Weiner and Kukla (in press) have demonstrated that in achievement-related actions both the amount of pride and shame, and the magnitude of reward and punishment dispensed to others, are related to perceptions concerning ability and effort as causal factors. The greatest reward is given to an individual of low ability who expends effort and succeeds. Maximum punishment for failure is administered in situations in which ability is not accompanied by effort, as though this causal pattern actually were "immoral." Further, in achievement-related environments effort is more likely to influence rewards and punishments than is ability (Jones and deCharms, 1957; Weiner and Kukla, in press). The evaluative inequality between ability and effort in both achievement and moral evaluative domains is understandable if one were to assume that behavioral control over effort (an unstable factor), but not ability (a fixed factor), were possible.

Inferences about the relative strength of the four determinants following any outcome may be made by the actor about himself, or by an observer. Inferences by an observer, or attributions about the causes of another behavior, may be considered an aspect of social perception, and has been subsumed within the area of social psychology (see Jones and Davis, 1965; Kelley, 1967). In addition, these perceptions can act as motivators if the inferences drawn are conveyed to the actor. For example, indicating to another that his failure was caused by a lack of ability certainly may have different psych logical (behavioral) consequences than feedback that failure was due to the difficulty of the task.

A recent investigation by Rosenthal and Jacobs (1968) is relevant to this point. These experimenters aroused false teacher expectations concerning a group of students who were presented as having special abilities. In fact, the students were randomly selected from a population of school children, and did not necessarily possess any particular talents. Subsequent testing allegedly revealed that the school children associated with the fraudulent expectations displayed greater intellectual growth than a control group of students not linked with the false characterization.

The teachers' behaviors which gave rise to these supposed intellectual gains is yet unknown. The model presented here, however, does provide some clues to this problem. The false expectancies undoubtedly lead the teachers to believe that the selected students had high ability. Hence, it is unlikely that the occasional failures which these average students undoubtedly experienced would be attributed by the teacher to a lack of ability. It is conceivable that informing children (and adults) that their failures were not due to low ability will indirectly augment later performance. This might be particularly true if the failure was communicated as caused by insufficient effort or bad luck. (This contention will be discussed again when reporting the self-attributions of individuals classified as high in achievement motivation). The main point which is being proposed at this time is that attributions by others concerning the causes of an event can have subsequent behavioral consequences.

Attributions by others are only one source of information used by an individual to reach conclusions concerning the causes of his personal behavior. As inferences about others can be subsumed within the area of social psychology, inferences about oneself fall under the general heading of self-perception, and properly can be included within the domain of personality and psychodynamics. The inferences reached by the actor about the causes of prior events influence expectations about future outcomes. Hence, behaviors such as resistance to extinction (persistence) may be affected by the perceived magnitude of the proposed attributional elements, as well as by the pattern of inferences reached concerning prior performance (see Experiments IIIa and IIIb in this paper). It is postulated that future expectations about success are a function of the subjective strength of the four causal elements already delineated.

Mathematical relationship between the terms

The mathematical relationship between the elements of the theory has been left unspecified. It is proposed that the components combine either conjunctively or disjunctively, with as yet undetermined distributive rules. Heider (1958) has contended that both "can" and "try" are necessary for an action to be successfully completed. However, it is evident that at times ability and effort are perceived as compensatory or disjunctive (e.g., "I am bright enough to receive a good grade in this course without studying."). It also is conceivable that a positive outcome might occur merely because of good luck.

An example of a more complete model might take the following form:

$$+O \rightarrow (+A \vee +E) \wedge (+L \vee +T)$$

That is, if the outcome is a success, then the individual must either possess high ability or expend effort, and he must either have good luck or the task be easy. Hence, for the result to be positive one internal and one external factor must have been advantageous toward goal attainment. In a similar manner, an anticipated success would presuppose that the individual perceived that he had ability or expected to expend effort, and that he anticipated good luck or an easy task. If the model read:

$$+O \rightarrow (+A \vee +T) \wedge (+E \vee +L)$$

then one could conclude that, regardless of the quantity of effort expended and the magnitude of luck, for success to occur one must either have high ability or the task must be relatively easy. That is, one stable component (as well as one unstable component) favorable toward goal attainment is a necessary condition for a positive outcome. The two forms of the model presented above are neither advocated nor the best possible combinations of the components in the model. They do, however, indicate how a more precise model, with the aid of symbolic logic, may be employed to predict final performance.

Antecedent conditions (operational definitions)

What information does the individual possess, or what knowledge must he have available, to attribute the causes of an achievement-related event differentially across the four specified dimensions, and to form expectations about future events? At present only an incomplete account of the data which an individual utilizes can be offered. It is postulated that perceived ability (skill) at a given task is a function of the percentage of success at that task, and the percentage of success experienced at similar tasks. Further, the temporal pattern of past outcomes also can influence attributions about ability. For example, maximum performance exhibited on a prior trial, and performance on early trials, are taken as indicators of a person's general skill at the task (Feigenbaum, Johnson, and Weiby, 1964; Jones, Rock, Shaver, Goethals, and Ward, 1968). Knowledge concerning prior success, however, must be considered in conjunction with information about task difficulty to reach conclusions about one's own, or someone else's, relative ability. It is postulated that task difficulty is a function of social norms concerning prior outcomes. The greater the percentage of others who are believed to have successfully completed an activity, the less subjectively difficult the task. Self-evaluation then involves a comparison between task ability and task difficulty. If performance is consistent with social norms, i.e., success when others succeed and failure when others fail, then the outcome will be attributed to the properties of the task, and insufficient information is provided to reach any self-evaluative deductions. On the other hand, success given that others fail, or failure when others succeed, should produce clear self-evaluative conclusions, and result in relatively intense positive or negative affect.

In the prior paragraphs information necessary for the formation of judgments about the two stable behavioral determinants was outlined. Concerning the unstable elements, it is postulated that luck is inferred from the pattern of prior reinforcements; the more random the pattern of outcomes, the higher the probability that luck will be perceived as a causal influence (Bennion, 1961). Instructions indicating that the task is determined by chance also affect luck attributions. It is believed that such instructions, if accepted, will initially result in the perception of outcomes as predominantly externally determined. However, subsequent information conveyed by the pattern of reinforcements may alter this judgment (see Experiment IIIb reported here).

Formalization of the conditions necessary to attribute an outcome to effort are somewhat more difficult to determine. Covariation of performance with incentive value, or covariation with effort cues such as perceived muscular tension or task persistence, conceivably will lead to inferences that effort was a dominant behavioral determinant. Such covariations also are expected to minimize attributions of the outcome to luck. Further, it appears that self-attributions to effort are a function of the degree of success at an activity (Jenkins and Ward, 1965; Weiner and Kukla, in press). This is evident even though the performance at the task employed in the Jenkins and Ward (1965) and Weiner and Kukla (in press) investigations was determined by chance alone (although this was unknown to the Ss). It is probable that in one's life history performance correlates with effort; hence, success or failure may result in effort attributions in situations in which effort was not a behavioral determinant. It is difficult to specify, however, how much effort an individual expects or plans to expend on subsequent occasions.

Summary

It has been contended that individuals are able to process a wealth and diversity of information to reach inferences about the causes of their own and others' behaviors, that the causal categories in achievement settings include ability, effort, task difficulty, and luck, and that the attributions made have motivational significance. Four experiments will now be reported which are pertinent to these convictions. Experiment I examines attributions made by an observer following the success or failure of a hypothetical performer. Experiment II then investigates a participant's attributions about his personal performance. Finally, Experiments IIIa and IIIb relate the pattern of self- and other-attributions to subjective expectancy of success and resistance to extinction. As indicated previously, the experiments are not reported in detail. Rather, a sketch is provided to convey an overview of the nature of the research, some of the main empirical findings, and their relevance to the proposed theoretical orientation. It will be evident to the reader that the experiments provide some answers, but bring into focus an even greater number of unresolved issues for future investigation.

Experiment I

Procedure

The Ss were 30 male and female students enrolled at UCLA. They were told that they were participating in a "decision-making" experiment, and given information which specified the percentage of success which a hypothetical person had experienced ~~at this point of~~ at a task (100%, 50%, or 0%), the percentage success which that person had encountered at similar tasks (100%, 50%, or 0%), and the percentage of other individuals successful at the particular task (100%, 50%, or 0%). The nature of the task was left ambiguous. Further, the Ss were told that the individual attempted the task again, and had either succeeded or failed. Thus, there were 54 combinations of information (3 X 3 X 3 levels of description X 2 levels of immediate outcome). The Ss then rated the degree to which the immediate success or failure was attributable to ability, effort, task difficulty, or luck. Ratings were constrained from 0 (not a cause) to 3 (very much a cause). (Note that the judgments are independent of direction, such as good or bad luck.) Each of the four causal elements was rated for every informational combination. Because of the apparent difficulty of the task, each S rated only one-half (27) of the combinations. These items were randomly determined, although every informational grouping was judged by 15 of the Ss.

Results

Only a small selected sample of the many results will be presented. Figure 1 shows the magnitude of the attributions made to the four dimensions as a function of immediate performance outcome and the percentage of prior success. The figure indicates that attributions

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to luck and effort, the unstable variables, increase as a function of the discrepancy between the outcome and prior performance. That is, greatest attributions to luck and effort are reported when an individual succeeds after never succeeding in the past, or fails after having a history of repeated success. The reverse pattern characterizes task difficulty and ability attributions. Greatest attributions to these stable components in the model occur when past behavior is consistent with current outcome. (All interactions are significant beyond the $p < .001$ level). A parallel pattern of results is observed when information is provided about performance on similar tasks, although the effects are somewhat modulated (interactions range between $p < .01$ and $p < .05$).

Figure 2 illustrates the interaction between the percentage of prior success and the percentage of others designated as having succeeded at the task. Figure 2 illustrates only a portion of the data given a

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Insert Figure 2 about here

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success outcome; the left half of the figure portrays ability attributions, while the luck attributions are shown on the right. The figure indicates that the causal significance of ability varies as a function of the percentage of prior success, as was shown in Figure 1. Further, ability attributions also are related to the percentage of others who are successful, $F(1,28) = 5.93$, $p < .01$). Greatest judgment of ability as a causal factor occurs when the individual always has succeeded while others consistently have failed. Ability is least likely to be inferred as the cause of a success when the individual has never succeeded in the past, while others always have been able to perform the task. Attributions concerning luck are somewhat more complex, and less readily interpretable. In the right half of Figure 2 it can be seen that given no previous success, luck attributions for the immediate success experience do not covary with performance of others. On the other hand, given consistent prior positive outcomes, attributions to luck vary monotonically with the performance of others. Analysis of variance indicate that this interaction is significant, $F(4,112) = 6.12$, $p < .001$.

One additional result is shown in Figure 3. Figure 3 portrays the degree to which causal attributions to the four elements are a function of task outcome. Figure 3 indicates that greater absolute attribu-

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Insert Figure 3 about here

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tions to ability, effort, and luck are made following a success than after a failure ($p < .005$). It appears that it is easier to allocate causation after a success than after a failure experience. However, inferences about the difficulty of the task are not significantly related to task outcome ($F < 1$). This overall pattern of results ~~also~~ suggests that attributions tend to be more internal for success than for failure (i.e., high ability and high effort absolutely greater than low ability and low effort).

Discussion

No attempt will be made here to fully discuss the data generated by this experiment. The most evident conclusion is that individuals are able to form systematic causal judgments in complex situations.

Further, inferences about the attributional elements are dependent upon the outcome of the event, prior performance, and the behavior of others. It is again contended that the attributional analyses which each individual performs to make sense out of his world (see Heider, 1958) has meaningful implications for future behavior. That is, they have motivational consequences.

Experiment II

In Experiment II the Ss actually attempt an achievement-related mathematical task which is ambiguous with respect to the factors which contribute to success or failure. Upon completion of the task, the Ss evaluate their performance, and judge their ability, effort expenditure, and luck, as well as the difficulty of the task.

Procedure

138 paid males participated in the experiment. They were tested in groups ranging in size from 8 to 16. The Ss were first given a measure of resultant achievement motivation (Mehrabian, 1968), and subsequently classified into disparate motive groups. After the individual difference assessment, the following instructions were read:

> "I have in front of me a list of 50 numbers, either 0 or 1, in an order which is unknown to you. Your task is to guess whether the next number on my list is either 0 or 1. You will write down your guess on the answer sheet which I have passed out, and then I will tell you what the number actually was. If your guess is correct, place a check on the line next to it. You will then be asked to make your next guess, and so on until all 50 guesses have been completed.

Now this is a test of your <u>synthetic</u> as opposed to your <u>analytic</u> ability. By this we mean that there is no one definite pattern, like 010101, that you could easily detect and get all the answers correct from then on. But the list also is not random. Instead there are certain general trends and tendencies in the list--perhaps a greater frequency of one kind of pattern over another. To the extent that you can become sensitive to those tendencies, you can make your score come out consistently above chance. Of course, your score also will be heavily influenced by luck. Even if you learn just exactly as much about the patterns as we expect, you could get a much higher total score just by being lucky in your guessing. Similarly, your score could be much lower just because of bad luck. To get a really accurate idea of just where you stood, you would have to take the test a number of times so that the good and bad luck would average out."

The list of 0's and 1's read to the <u>S</u>s was randomly constructed, so that the outcome was determined solely by chance. However, the instructions created an ambiguous situation which allowed performance to be perceived as either attributable to skill ~~and~~, effort ~~or~~, chance, luck + task difficulty. (also see Jenkins and Ward, 1965; Weiner and Kukla, in press). Subjects were allowed 15 seconds to make each guess, with the correct answer read after each trial.

Upon completion of the task the Ss added their correct anticipations. They then evaluated their performance (extreme success to extreme failure), and estimated their ability (how good are you at this kind of task?), effort (how hard did you try to succeed?), and luck (how lucky were your pure guesses?). They also indicated the difficulty of the task (independent of your own ability, does this task require a high degree of ability to do well?). Responses for the evaluative and causal questions were recorded on Likert-type scales anchored at the extremes and midpoints, and divided into ten equal intervals.

Result

Subjects rating their performance as six or higher were classified in a Success condition, while those with ratings of five or lower were categorized within a Failure condition. (The correlation between objective and subjective success was $r = .44$. The pattern of attributions was very similar within outcome conditions whether Ss were subdivided according to perceived or actual performance. Subdivision at six corresponded to the median of the distribution of evaluative scores.) Subjects were further classified as high (above the median) or low (below the median) in resultant achievement motivation. Table 2 gives the mean ratings for the four groups (2 experimental conditions X 2 motive classi-

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Insert Table 2 about here

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fications) across the four causal dimensions. The table indicates that ability and luck, as well as effort, are perceived as greater after success than following failure, respectively, $F(1, 134) = 30.19$, $p < .001$;

$F(1, 134) = 9.20$, $p < .01$; $F(1, 134) = 3.36$, $p < .10$. However, the main effect of task difficulty does not approach statistical significance between the Success and Failure conditions ($F < 1$). (These findings are suggestive of the pattern of results reported in Figure III.) Further, Ss classified as high in achievement motivation believe that they have greater ability than Ss low in this motivational classification, $F(1, 134) = 7.64$, $p < .01$. Perhaps of greater interest than the individual comparisons within the dimensions are the general patterns of attributions and the interactions exhibited in the Success and Failure conditions by the disparate motive groups. Table 2 shows that given success, Ss high in achievement motivation are more likely to attribute the outcome to internal factors (ability and effort) than Ss in the low achievement grouping (respectively, $t = 1.33$, $df = 70$, $p < .20$; $t = 1.89$, $df = 70$, $p < .10$), while Ss in the low motive group are more prone to attribute success to the external factor of task ease ($t = 1.33$, $df = 70$, $p < .20$). Further, the Ss high in achievement motivation vary their effort attributions as a function of task outcome ($r = .44$, $p < .01$), while this perceived effort-outcome covariation is not exhibited by Ss in the low motive group ($r = .08$). Hence, the Ss high in achievement motivation relatively attribute personal failure to a perceived absence of effort. On the other hand, the Ss low in achievement motivation, relative to the high group, attribute failure to the absence of ability ($t = 2.14$, $df = 64$, $p < .05$). One other aspect of the data, the significant interaction exhibited on the task difficulty factor, $F(1, 134) = 4.42$, $p < .05$, is not immediately interpretable.

Discussion

Again the most evident conclusions are that Ss can judge performance on the four causal dimensions, and that systematic empirical relationships emerge from an examination of their judgments. The data presented here suggest that individuals high in resultant achievement motivation tend to attribute success to themselves more than Ss in the low motive group. Further, given failure, the Ss in the low group perceive themselves as lacking in ability, while the high group believes that they did not try hard enough. (Recall that in the discussion of the Rosenthal and Jacobs (1968) investigation it was suggested that communication of failure as due to a lack of effort rather than a deficiency in ability might enhance subsequent performance. This does appear to be the pattern of inferences maintained by high achievement-oriented individuals).

The role of individual differences in attributional dispositions had not been discussed prior to this point. The analysis presented thus far has implicitly assumed that the behavioral model which has been outlined will be applicable or generalizable across all individuals, although the particular pattern or form which any final attribution assumes is expected to vary between individuals (e.g., the weights given to the components may differ). Perhaps the differences between the motive groups displayed in this study can be accounted for by examining the reinforcement histories of the two groups. For example, if individuals high in achievement motivation have had more past success than Ss low in achievement motivation, then they should be more likely to attribute success, and less likely to attribute failure, to ability (see Experiment I). In addition, it has been well documented that Ss in the high motive group prefer tasks of intermediate difficulty, while Ss in the low motive group are attracted to relatively easy or difficult tasks (Atkinson, 1964). It is conceivable that for the high achievement group past performance at intermediate difficulty tasks actually has varied with effort, while within the low motivational grouping task outcome at the very easy or very difficult activities, which they presumably select, has been relatively independent of effort expenditure. Hence, differential task selection could mediate the effort X motive interaction indicated in Table 2.

General summary

Experiments I and II examined some of the antecedent conditions which systematically affect self- and other-causal attributions. Yet the studies focused upon somewhat different issues. Experiment I primarily investigated the linkage between the stated antecedents and the formation of attributions, with particular attention paid to questions concerning the assembly and combination of information. Experiment II, on the other hand, was more implicitly concerned with the linkage between the mediating cognitions and behavior. (see Diagram below)

Antecedents | Mediating cognitions | Consequents

Exp. 1

Past success → Attributions of causality

Social norms

Exp. 2

Indiv. diff. in achievement needs ⇢ Persistence, risk-preference, approach behavior

Prior data in the research literature has demonstrated clear relationships between achievement-related needs and behavior. It has been shown, for example, that individuals high in achievement needs persist in the face of failure, prefer tasks of intermediate difficulty, and voluntarily approach achievement-related activities (see Weiner, in press). Experiment II intimates that these relationships are mediated by attributions to the four causal elements outlined in Table 1. For example, if individuals high in achievement needs attribute failure to a lack of effort (an unstable element), then they should persist at the activity. Conversely, individuals low in need for achievement should readily quit failed activities, for failure is attributed by them to the stable element of low ability. These points will be elaborated later in the paper.

In Experiments IIIa and IIIb the relationship between reinforcement schedules and mediating attributions are examined. Thus, the class of antecedent conditions is broadened to include one of the most investigated parameters in experimental psychology. In addition, these experiments more directly examine the association between causal attribution and behavior.

Experiment IIIa

It has been stated that the stability or instability of the factors affect the expectancy that the behavioral outcome will remain unchanged on subsequent occasions. An attribution by the actor to ability or task difficulty implies that outcomes exhibited on previous attempts will again be manifested, while attributions to luck or effort intimate that on later occasions the outcome might be different from that previously exhibited. It is therefore hypothesized that greater resistance to extinction will be displayed in situations which can be interpreted as controlled by chance (e.g., random partial reinforcement schedule, luck instructions), or which require a great deal of effort (see Lawrence and Festinger, 1962), than given circumstances in which nonreinforcement is perceived as due to high task difficulty or a lack of ability. That is, attributing failure to unstable factors should result in slower extinction than attributing failure to stable factors. It also follows that attributions during nonreinforcement to low ability and high task difficulty should result in faster extinction than will the maintenance of a high ability-easy task pattern of inferences.

In Experiment IIIa resistance to extinction (inferred from subjective expectancies of success) is examined in an achievement-related situation. Prior to the extinction procedure three groups were created which varied in their percentage of positive reinforcement (100%, 50%, 0%). These schedules were expected to result in disparate attributions during extinction, and hence differential persistence of behavior. In general, this experiment attempts to demonstrate that the observed relationship between reinforcement schedules and resistance to extinction is mediated by perceptions about causality, which, in turn, affect subjective expectancies of success:

$$\begin{tikzcd}
\text{Reinforcement Schedules} \arrow[r] \arrow[d] & \text{resistance to extinction} \\
\text{perceptions about causality} \arrow[r] & \text{subjective expectancy of success} \arrow[u]
\end{tikzcd}$$

Procedure

Sixty-two male and female Ss participated in the experiment, although only 35 Ss qualified for inclusion in the final data analysis. Each S received a booklet containing a series of closed line drawings. The task was to trace over all the lines of the figure without lifting the pencil from the paper or retracing a line (see Birch, 1964; Feather, 1961; Weiner, in press). Insoluble figures can be constructed which naive Ss cannot discriminate from soluble figures, thus making it possible for the experimenter to exercise some degree of control over task outcome.

Three experimental conditions were created by varying the percentage of soluble puzzles prior to the initiation of the extinction procedure. For one group of Ss included in the final analysis all puzzles were soluble (S condition; N = 9); for a second group half the tasks were soluble and half insoluble (R condition; N = 15). Two different random puzzle orders were created, with the constraint that success or failure did not occur on three consecutive trials. A third group received all insoluble puzzles (F condition; N = 11). After eight trials extinction procedures were initiated, with all puzzles being insoluble. Seven extinction trials followed; each S, therefore, attempted a total of 15 puzzles.

Prior to every trial the Ss estimated their probability of success (Ps) on a scale ranging from 0-10. The next puzzle was not visible when making this estimate. Then, following that trial, for which 30 seconds was allowed, perceived task outcome was indicated, and the perception of the causes of the outcome were reported. The four dimensions of ability, effort, task difficulty, and luck were rated on each trial. Ratings ranged from 0-7 in both the success (e.g., high ability-ability not a factor) and failure (e.g., ability not a factor-low ability) outcomes. The scales were anchored at the extremes and subdivided into seven intervals.

Results

27 of the initial Ss could not be used in the final data analysis because of subjective or objective failure on a soluble puzzle, or subjective success on an insoluble puzzle. There generally is misperception on approximately 10% of the insoluble puzzles (also see Weiner, in press); 24 of the 27 Ss had to be eliminated because of "success" on one or more trials during the extinction series. Sixteen of these Ss also made "errors" during the initial eight trials.

Figure 4 shows the probability estimates for the 35 usable Ss in the three reinforcement conditions. It can be seen that the experimental manipulation systematically affected the Ps ratings. Subjective expec-

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tancy of success increases in the S condition, remains relatively constant and near .50 in the R condition, and steadily declines in the F condition. Further, during extinction the Ps in all conditions decreases.

Table 3 gives the mean attribution ratings for the four dimensions during extinction. (Attribution data during the establishment of the experimental conditions will not be reported here. There also was little variability within the dimensions during the seven extinction trials,

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and only the overall means are reported). A Kruskal-Wallace analysis of variance (which has a X^2 distribution) between the three reinforcement conditions yields significant main effects of task difficulty and luck (respectively, $H = 6.20$, $p < .05$; $H = 7.86$, $p < .02$), while the ability and effort main effects only approach statistical significance (respectively, $H = 2.58$, $p < .30$; $H = 4.96$, $p < .10$).

Inspection of the total pattern of results reveals that the F group is most likely to infer that the stable factors (low ability and high task difficulty) were the causes of their failure. Further, they were least likely to infer that the outcome was attributable to a composite of the unstable factors of low effort and poor luck. The Ss in the S condition were least likely to infer that failure was due to the stable attributional elements. That is, they relatively maintain a high ability-easy task inferential pattern. (In general, Ss in this condition are relatively unable to attribute their failures to the specific dimensions. Apparently it is difficult for Ss in the 100% reinforcement condition to "explain" the repeated sequence of failures). Finally, the

Ss in the R condition most believe that bad luck and lack of effort, the unstable factors, were responsible for their failures during the extinction trials.

Discussion

The causal data can be related to resistance to extinction if one assumes that the probability of not-responding increases as Ps decreases (see James and Rotter, 1958). The data suggest that Ss in the F condition would be the first to stop responding. These Ss attribute failure to stable factors, and, relative to Ss in the other conditions, do not contend that bad luck or lack of effort produced the poor outcomes. Therefore, they should not expect the outcome to improve on subsequent occasions, and, if given the opportunity, should have quit the task.

Differential resistance to extinction for Ss in the S and R conditions, however, is indeterminant given the present attribution data. In the S condition the Ss display least attributions to poor ability or high task difficulty. As suggested earlier, they should therefore persist at the activity. Yet Ss in the R condition make the highest attributions to bad luck and insufficient effort; this would theoretically also lead them to persist at the task, for they should expect change on subsequent attempts. Thus, it is not possible to predict differential speed of extinction between the S and R conditions, inasmuch as Ss in each condition are associated with two factors which theoretically retard extinction. The data indicate that the post-hoc null hypothesis (no difference in trials to extinction between the S and R conditions) is supported by the Ps estimate. Subjective expectancies in the S and R conditions are virtually identical following Trial 10, ($t < 1$).

The lack of difference in inferred resistance to extinction between the R and S conditions is not inconsistent with other experimental evidence. It has been demonstrated that 100% reinforcement results in greatest resistance to extinction for tasks perceived as skill-determined, while a 50% reinforcement schedule gives rise to greatest persistence at chance tasks (James and Rotter, 1958). But the puzzle task employed in the present investigation was neither perceived as determined uniquely by skill nor by chance. The ability and luck ratings indicate that both factors were believed to be somewhat responsible for final outcome. (Perhaps including rating scales for both luck and skill implies that the task includes both as determinants.) Hence, prior experimental results might lead to the prediction of no difference in resistance to extinction between 100% and 50% reinforcement conditions, given a task ambiguous with respect to its chance vs. skill nature. Although there were no phenotypic differences in the Ps estimates between the S and R conditions during the final extinction trials, the attributional data indicate that there were genotypic disparities between the two conditions. Further, these genotypic differences should be manifest given different instructions. That is, skill directions would be expected to result in greater weighting of the ability-task factors, and result in slower extinction for the 100% (S) group, while chance instructions should result in greater salience of the luck dimension, and cause slower extinction for the 50% (R) group.

Experiment IIIb

Thus far self- and other-perceptions of the four attributional dimensions have been treated as if they were identical. However, it is evident that perceptions concerning oneself and inferences about others may have different characteristics and determinants (see Heider, 1958). For example, an individual has access to additional information (e.g., conscious intentions) and may employ certain psychological mechanisms (e.g., ego-defensiveness) when formulating self- as opposed to other-judgments. Experiment IIIb, considered in conjunction with Experiment IIIa, explores some of the similarities and differences between self- vs. interperson-perception of causal attributes.

Procedure

Subjects were 49 paid male and female students. The procedure used in Experiment IIIa was essentially repeated, save for one crucial factor: the Ss in the present investigation did not actually perform the activity. Rather, they were presented one of the patterns of outcome which the Ss in Experiment IIIa experienced (i.e., S, R, or F condition). They were asked to infer the causal elements responsible for the "observed" behavior. Subjects in the present experiment rated Ps only after Trials 4 and 8 prior to the extinction series, while Ps and the four causal elements were judged following every trial during extinction. During these judgments the Ss were not aware of the outcome on trials subsequent to the one which they were rating. Prior to the initiation of the Ps ratings the Ss were shown an example of the line-drawing task. However, they were not permitted to see the particular puzzles attempted, inasmuch as their own performance would provide additional cues with which to determine task difficulty.

Results and discussion

Figure 5 shows the Ps ratings for the Ss in the three experimental conditions. Again Ps rises in the S condition (N = 18), approximates

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Insert Figure 5 about here

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.50 in the R condition ($N = 16$), and drops in the F condition ($N = 15$). Further, during extinction the Ps continually decreases in all the conditions. As in Experiment IIIa, Ps is lowest during extinction in the F condition. However, unlike the prior experiment, the Ps in the 100% condition remains substantially above the Ps in the 50% condition. The expectancy of success on the last trial is significantly different between these two conditions ($p < .02$, Fisher Exact Test).

In Figure 6 the attributions to the four causal categories over trials are portrayed, while the bottom portion of Table 3 contains the mean attributions in the three experimental conditions. The pattern of inferences for the ability and luck dimensions (Quadrants I and IV) are

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Insert Figure 6 about here

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virtually identical to those displayed in Experiment IIIa. Again low ability is least inferred in the S condition, and this attribution varies monotonically with the percentage of prior success, $F(1,47) = 4.16$, $p < .05$). Further, attributions to bad luck are greatest in the R condition and perceived as minimal in the F condition, $F(1,47) = 2.92$, $p < 10$, thus replicating the order of the findings of the previous experiment. In sum, Ss in the F condition are perceived as failing because of low ability and not because of bad luck. However, Ss in the S condition relatively maintain a high ability attribution, while Ss in the R condition make greatest attributions to the unstable element of bad luck.

The results and discussion thus far have been relatively consistent between Experiments I, IIIa, and IIIb (see Table 3). Perceived ability is a function of the percentage of prior success when rating either oneself or others. Further, random schedules and performance at variance with prior outcomes result in attributions to luck. It is of interest to note that in Experiment IIIb attributions to bad luck in the R condition decrease during the extinction series. That is, as new information is assimilated (consistent failure), there are decrements in the perceived causal significance of luck. This intuitively reasonable shift was not displayed in the self-ratings in Experiment IIIa.

Quadrants II and III respectively portray the attributions to task difficulty and effort during the extinction trials. The task was (unexpectedly) perceived as easiest in the F condition, although the difference in perceived difficulty between conditions did not approach significance, $F < 1$. The lack of a significant main effect of task difficulty is at variance with the results reported in the upper portion of Table 3 for Experiment IIIa. There are numerous interpretations of this disparity. It may be that the judges in the present experiment cannot conceive of the variety and range of difficulty of the line-drawing puzzles which can be constructed. In addition, the very dominant attributions to internal factors for Ss in the F group may preclude strong attributions to the external, task difficulty dimension. Further, the judgments in Experiment IIIa veridically reflect differences in the "difficulty" of the activity prior to extinction; observers did not have commerce with the tasks, and therefore lack information which aids in the formulation of judgments about the task.

The discussion of effort attributions (Quadrant III) has been postponed until last because it is the most post-hoc (although the data are the most titillating). Recall that in Experiments I and IIIa it was demonstrated that performance either inconsistent with prior outcomes or having a variable outcome resulted in attributions to effort. It was postulated that effort and luck attributions had similar characteristics, inasmuch as both represented unstable components. However, in the present experiment the most consistent outcome during extinction, vis-a-vis early performance, occurs in the F condition. Yet in that condition there is a relatively high attribution to a lack of effort, overall, $F(1,47) = 7.37$, $p < .01$. Further, in the S condition attributions to a lack of effort increase as repeated failures are observed (see Figure 6). Our prior thoughts would have led to the opposite prediction; decrements in the perception of effort as a causal determinant should be exhibited as the stable pattern of failures is displayed.

The pattern of attributions concerning effort, considered in conjunction with the Ps data, suggests the following interpretation. Effort is perceived as a stable component when making judgments about others, but an unstable element in self-judgments. That is, when others succeed they are perceived as "people who try at this task," and when failing they are perceived as "having the disposition not to expend effort at this task" (the task specificity of this inference is neglected here). Judgments concerning the lack of effort of others then imply that performance will remain unchanged on future occasions. Thus, on the basis of their early performance, Ss in the S condition are judged as trying hardest to succeed. However, with the new information of repeated failures, the attributions to lack of effort increase. On the other hand, it is inferred that Ss in the F condition do not try, and that expectation is maintained during extinction. It is not entirely clear why the inferences about effort in the R condition so closely approximate the judgments made in the F condition. However, it was previously contended that failure gives rise to effort attributions when behavior is variable. Further, effort may be a salient performance dimension at tasks of intermediate difficulty (see Experiment II). (It also is not clear why effort attributions do not drop more dramatically in the later trials in the R condition.)

If the above analysis is accepted, then greater resistance to extinction would be expected in the S than R condition. Subjects in the S condition are believed to have the most ability and the disposition to try hard. (Note again that observers have difficulty assigning causation for the behavior in the S condition.) On the other hand, persistence is maintained in the R condition primarily because of the bad luck attribution. Finally, Ss in the F condition are perceived as deficient in ability and effort, and do not have bad luck. Hence, they should persist least at the activity.

In sum, Experiments IIIa and IIIb reveal similarities between self- and other-perceptions concerning the determinants of ability and luck (see Table 3), and the inferred effects of these attributions on future expectancies. On the other hand, inferences concerning task difficulty are not consistent (presumably because of the information gained when actually confronting the activity), and conceptions of effort are quite disparate. Self-perception of failure as due to a lack of effort intimate that success is believed to be possible on later occasions, for it is contended that each individual believes that he is able to control (increase) his effort expenditure. Yet other-judgments of effort suggest that energy expenditure is perceived as a relatively stable attribute in a given situation. It is believed that one who has succeeded in the past tries hard, and relatively maintains this characteristic, while one who has failed in the past has not expended effort, and is not expected to change in the future. Thus, it is contended that one perceives his own effort expenditure as under volitional control (free will), while others perceive behavior as "determined." (The reader should note that this interpretation is not entirely consistent with the results of Experiment I. It is evident that effort is the most complex of the behavioral determinants, and judgments may greatly differ as a function of the amount of information given, the type of experimental paridigm, etc.)

Further thoughts about extinction

An oft-cited theory of extinction proposed by Amsel (1958) postulates that non-reward following a series of rewarded trials elicits frustration. Amsel argues that frustration has drive properties, and has demonstrated that response strength initially increases following a nonrewarded response (Amsel and Rousell, 1952). Further, Amsel (1958) postulates that extinction occurs because the anticipation of frustration eventually results in the withholding of the instrumental approach response.

The conception which has been advocated in this paper provides an alternative, cognitive interpretation of experiments which demonstrate increments in response strength during extinction procedures. In the study cited above conducted by Amsel and Rousell (1952), a 100% reward schedule was instituted during initial learning. This schedule would be most likely to result in the subsequent failure to obtain the goal to be attributed by the actor to bad luck and/or a lack of effort (Experiments I and IIIa). The enhanced response strength following nonreward intimates that the animal has made an attribution to insufficient effort, and this inference has produced increments in subsequent performance.

With continued nonreward this attribution should be altered, and it is contended that stable factors (low ability, high task difficulty) will then be perceived as causing the final outcome. Hence, extinction will be observed. Amsel and his colleagues have also shown that the magnitude of response strength during initial extinction performance is positively related to the number of rewarded trials and the length of the runway (see Amsel, 1958). It is postulated that both these manipulations increase the tendency to attribute failure to a lack of effort, rather than to the other causal elements. The related finding that the more effort which the task requires, the greater the resistance to extinction (Lawrence and Festinger, 1962), also can be interpreted as being mediated by an effort attribution. In general, it is suggested that any manipulation which results in the perception of failure as caused by a lack of effort (or bad luck) will produce greater resistance to extinction.

<u>Attributional errors and animal psychology</u>

Suggesting that animals (rats) attribute nonreinforcement to a lack of effort indeed might be attributing greater cognitive complexity and thought processes to these rodents than they actually possess. However, there is evidence that organisms other than humans are capable of differentiating between the causal dimensions outlined in Table 1. For example, Maier, Seligman, and Solomon (1968) gave dogs classical aversive conditioning training in which shock unavoidably followed a conditional stimulus. Following training these animals exhibited relatively slow learning of an instrumental escape response. These data can be interpreted as indicating that a procedure which imposes an "external causation" set retards subsequent learning when the animals are placed in a situation in which they are responsible for event outcome. That is, attributional errors are being made because the dogs have been taught the aversive outcomes are externally controlled.

Perhaps animals can differentiate between unstable-stable conditions as well as internal-external situations. The former cognitive discrimination may be inferred from the greater resistance to extinction which is displayed under 50% than 100% reinforcement schedules. (Needless to say, inferring cognitions of animals is a vulnerable practice which badly needs "verification.")

Achievement predispositions and reinforcement schedules

It has been contended that achievement motives and reinforcement schedules both affect mediating cognitions concerning the causes of behavioral outcomes. These mediational processes then influence subsequent behavior. More specifically, our prior discussion indicated that individuals high in need for achievement tend to persist given failure. Similarly, animal experimentation had demonstrated that resistance to extinction is greater given 50% than 100% reinforcement prior to the onset of the extinction procedure. These antecedent-consequent relationships are believed to be mediated by attributions to unstable elements (effort and luck) which then give rise to persistent behavior:

Antecedent conditions		Mediating cognitions		Consequents
Individual differences in achievement needs	→	Perceptions of causality (Ability, effort, task difficulty, luck)	→	Persistence (resistance to extinction)
Reinforcement schedules	↗			

General Discussion

Attributional conflict

There are many sources of information pertinent to attributional decision making. The experiments reported here have shown that the percentage and pattern of prior outcomes, social norms, immediate performance, and individual differences are among the factors which determine inferences about causation. It is likely that the knowledge utilized for attributional judgments often will be conflicting. For example, in Experiment I some items indicated that the individual always succeeded at the task, while always failing similar activities. Further, a person high in achievement motivation (disposition to attribute success internally) might succeed at a task which others also solve (external attribution situation). Still another conflict arises when actual performance is at variance with expected performance. This signifies that one or more of the cognitive determinants of action was misjudged. To resolve such conflicts the decision maker might seek out further information, alter his cognitions, weigh some information more than others, or ignore some of the available facts. These methods of reducing cognitive conflict resemble those suggested by Festinger (1957) for the resolution of cognitive dissonance.

Educational implications

Achievement motivation. A great deal is known about the actions of individuals classified as high or low in resultant achievement motivation. It has been demonstrated that individuals high in resultant achievement motivation approach achievement-related activities, prefer tasks of intermediate difficulty, and exhibit positive or adaptive reactions to failure. On the other hand, individuals believed to be low in resultant achievement motivation avoid achievement-related activities, prefer tasks which are relatively easy or difficult, and display decrements in performance after failure (see Weiner, in press).

While much information is available concerning the behaviors of the disparate achievement motive groups, very little is known about the thoughts or belief systems which mediate their actions. The data reported in Experiment II, as well as evidence found by Weiner and Kukla (in press), reveal that individuals high in resultant achievement motivation have a greater tendency to attribute success to themselves than individuals in the low motive group. The incentive or reward for an achievement action has been presumed to be an affect labeled as "pride in accomplishment" (Atkinson, 1964). However, the reinforcement value of a goal is a function of the degree to which the attribution is made to the self (Heckhausen, 1967; Rotter, 1966). Therefore, it is postulated that individuals high in achievement motivation experience greater reward for success and, hence, are more likely to undertake achievement actions, than individuals low in achievement motivation:[2]

$$\begin{tikzcd}
\text{achievement motivation} \arrow[r] \arrow[d] & \text{approach behavior} \\
\text{self-attribution for success} \arrow[r] & \text{reward for goal} \arrow[u]
\end{tikzcd}$$

Experiment II also indicated that $\underline{S}$s in the high motive group attribute failure to a lack of effort. This could account for the fact that they tend to persist when experiencing repeated failures (see Weiner, in press). In a prior paper, Weiner and Kukla (in press) suggested that the high achievement-oriented person would attribute failure to bad luck, and therefore externalize responsibility for failure. While this attribution to an unstable element also would result in persistence in the face of failure, it does not capture the data demonstrating response increments after failure, and is not supported by the results in Experiment II

Weiner and Kukla also have suggested that individuals low in resultant achievement motivation avoid achievement-related tasks because they are prone to attribute failure to internal sources, and hence suffer more shame in achievement-oriented situations. This supposition also may be in need of modification. Subjects low in achievement motivation do tend to attribute failure to the internal stable component (lack of ability). This should result in less persistence given unsuccessful accomplishment. However, subjects high in achievement motivation also apparently attribute failure internally, but to a lack of effort rather than a lack of ability. Attribution to effort may be a form of behavioral control which produces enhanced performance, rather than avoidance of the activity.

Summarizing the relevant data gathered thus far, it is suggested that high achievement behavior is produced by developing self-attributions for success, and imputing failure to either low effort or external factors. Conversely, low achievement-oriented behavior is associated with relative external attributions for success, and a belief that low ability was responsible for failure outcomes (see Katz, 1968).

Attributional errors and conflict in educational settings. The attributions which students, teachers, and parents input about performance have immediate implications in school settings. For example, in a recent study Beckman (in press) manipulated the temporal pattern of performance feedback given to teachers who were led to believe that they were communicating mathematical skills to two students. False feedback concerning the performance of one of the students indicated that his test outcomes were consistently high. Performance of the second student was conveyed as either changing from high to low (H-L), low to high (L-H), or remained constantly low. Subsequent questionnaire data revealed that the teachers believed that they were more responsible for the behavior of the L-H than the H-L children. On the other hand, a group of "observers" stated that the teachers were more responsible for the H-L than the L-H performance! The reader is invited to imagine a teacher-observer (perhaps a mother) conference in which opposing attributions are made concerning the good or poor performance of a pupil.

Experiments IIIa and IIIb indicate that there also are potential conflicts between self- and other-attributions of effort. The reader undoubtedly will be able to recall a conversation with a student who professed that he would study harder in the future and do well (self-perception of effort as a unstable variable), while he (the reader) was anticipating that the student would merely perform in his usual unsatisfactory manner (other-perception of effort as a stable variable).

In still another "attributional-error" study relevant to educational procedures, Strickland (1958) demonstrated that power over another, even if not used, results in attributions for successful outcomes to that power source. Attributions of confidence and trust to another person apparently are not made unless that person has had an opportunity to exhibit positive performance under nonpower conditions. Yet in school settings the power to reward and punish via grading is always in the teacher's possession. No wonder, then, that students are often considered untrustworthy or undependable. The power situation inherent in the student-teacher relationship fosters this attributional error.

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Footnotes

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2. Some of the arrows in the diagram may be reverse in direction, or actually be bi-directional. That is, self-attributions for success may give rise to achievement motivation, rather than vice-versa.

Table 1

Classification scheme for the determinants of behavior

Stability	Locus of Control	
	Internal	External
Stable	Ability	Task difficulty
Unstable	Effort	Luck

Table 2

Mean attribution ratings in the Success and Failure conditions for Ss classified as high (above the median) or low (below the median) in resultant achievement motivation

Condition	Ability				Effort		Task difficulty		Luck	
	N	High	N	Low	High	Low	High	Low	High	Low
Success	37	7.0	35	6.6	7.1	6.3	5.4	4.8	5.2	5.2
Failure	33	5.9	33	4.9	5.6	6.4	5.0	5.8	4.4	4.4

Table 3

Mean attributional ratings during extinction

as a function of reinforcement schedule

Attribution dimension	Reinforcement schedule		
Self ratings (Exp. IIIa)	100% (S)	50% (R)	0% (F)
Ability	2.3[1]	3.0	3.4
Task difficulty	5.6	6.2	6.8
Luck	2.1	2.9	1.3
Effort	1.7	2.8	2.1
Other ratings (Exp. IIIb)			
Ability	4.0	5.3	5.7
Task difficulty	5.5	5.5	4.7
Luck	2.1	3.0	1.7
Effort	3.0	4.6	4.6

[1] High means indicate failure is perceived as due to low ability, hard task, bad luck, or lack of effort.

Figure Captions

Fig. 1. Attributions to ability, effort, task difficulty, and luck as a function of the percentage of prior success and the immediate task outcome (success or failure).

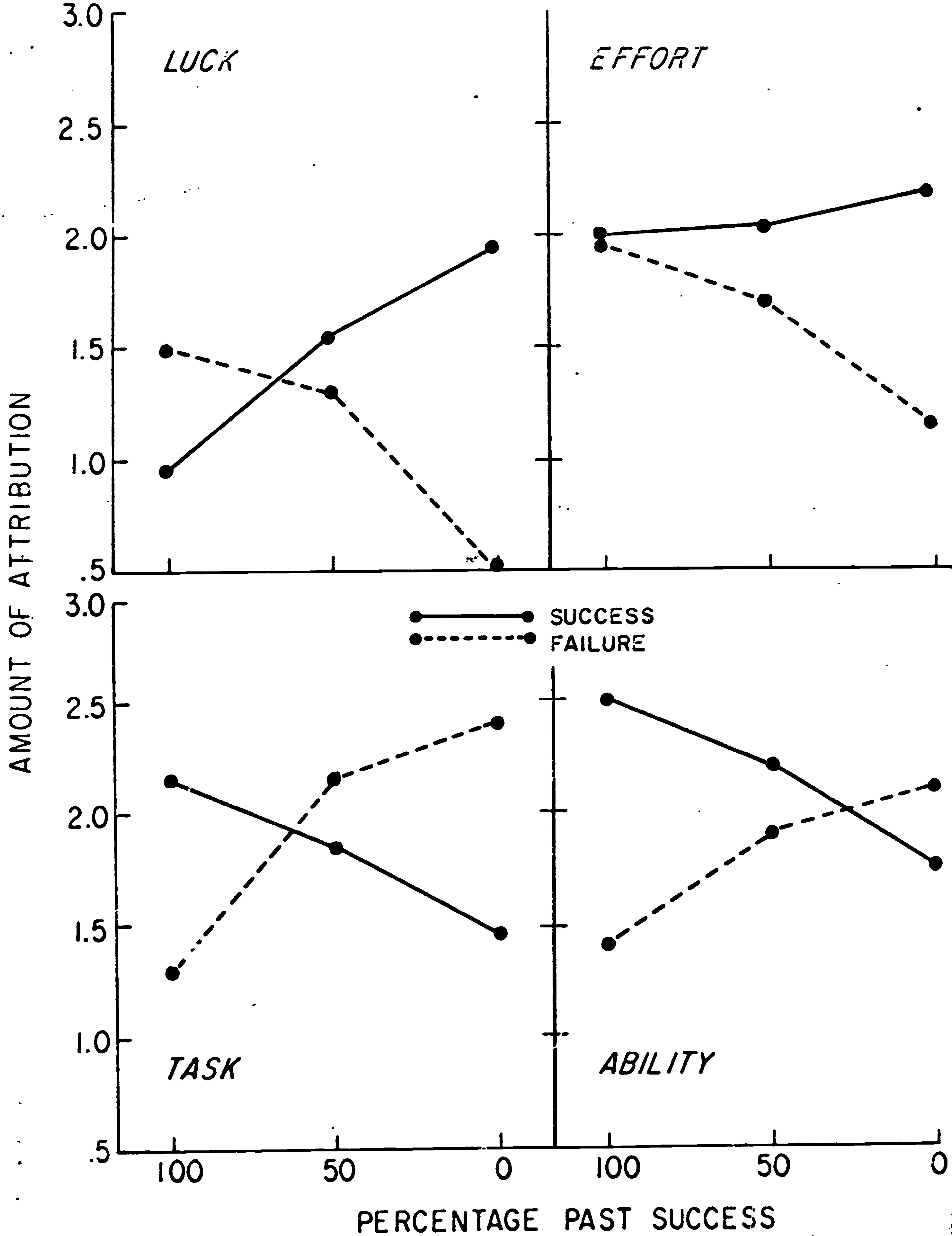
Fig. 2. Attributions to ability (left) and luck (right) given a successful outcome as a function of the percentage of prior success and the percentage of others successful at the task.

Fig. 3. Attributions to ability, effort, task difficulty, and luck as a function of the immediate outcome (success or failure).

Fig. 4. Subjective expectancy of success as a function of the percentage of reinforced trials (experimental conditions). The vertical line indicates the onset of extinction. Trial Block 7 represents three rather than two trials.

Fig. 5. Subjective expectancy of success as judged by "observers" as a function of the percentage of reinforced trials (experimental conditions). The vertical line indicates the onset of extinction.

Fig. 6. Attributions to ability, effort, task difficulty, and luck as a function of the percentage of reinforced trials (experimental conditions). High attribution indicates low ability, hard task, low effort, and bad luck.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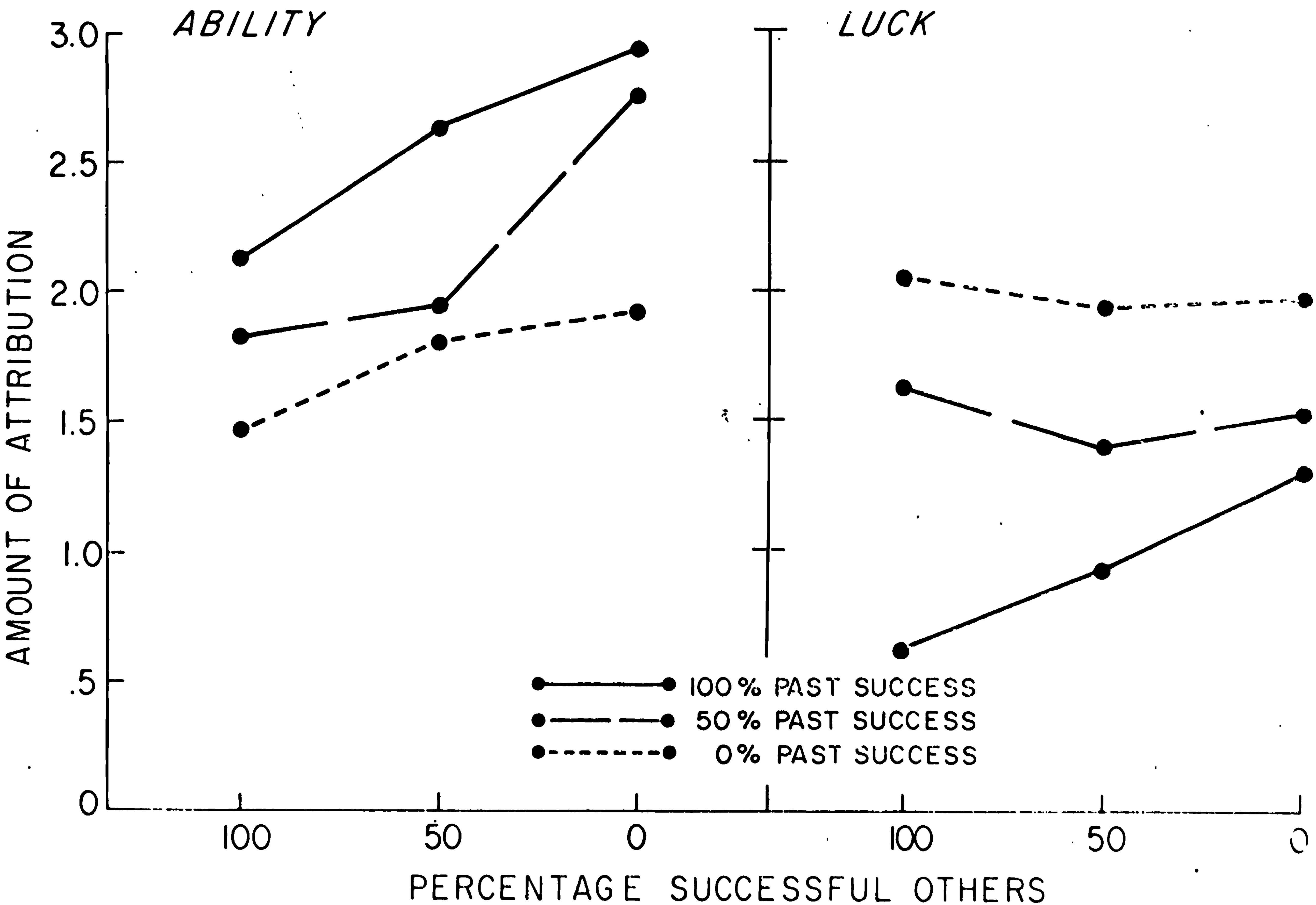
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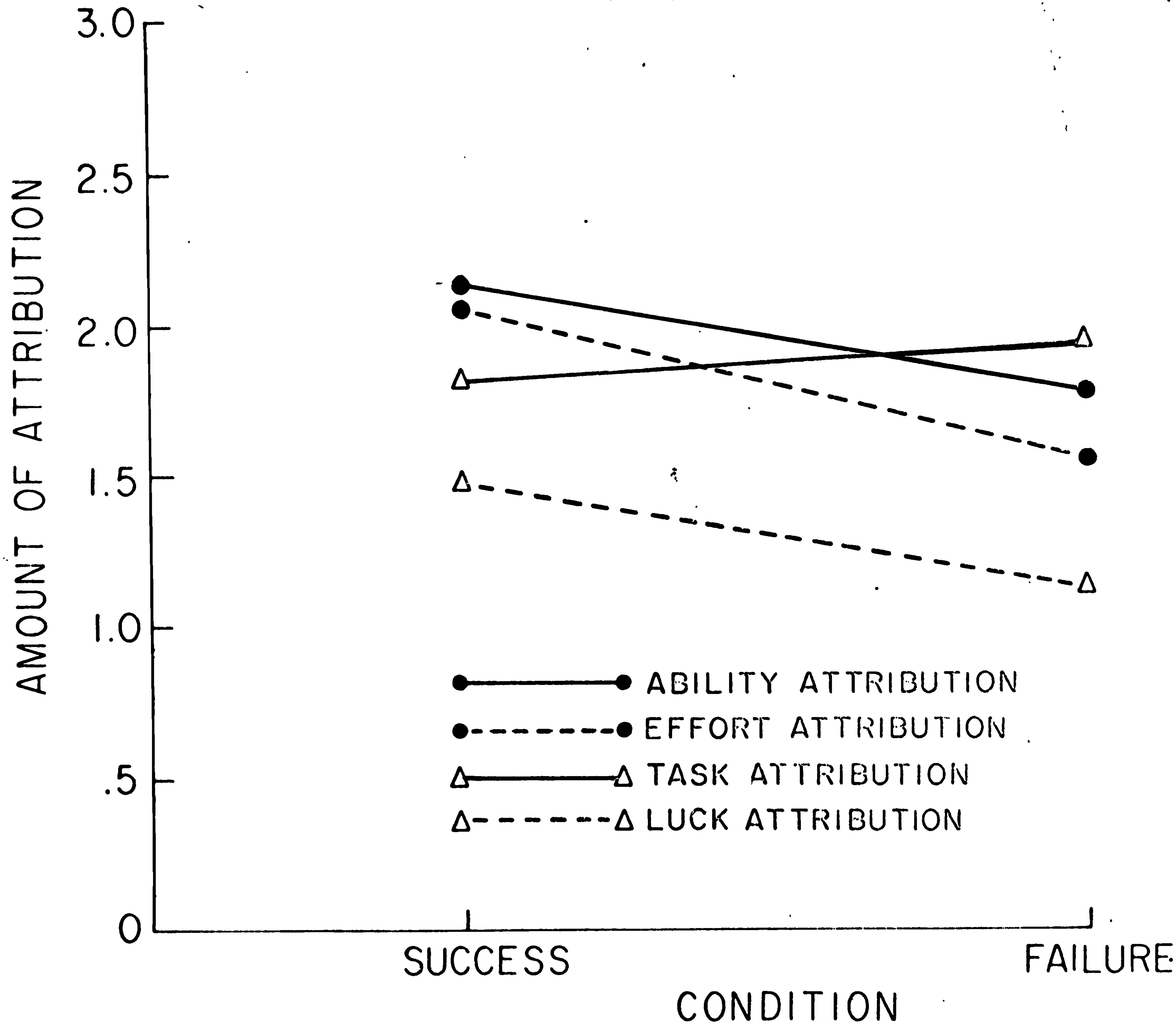
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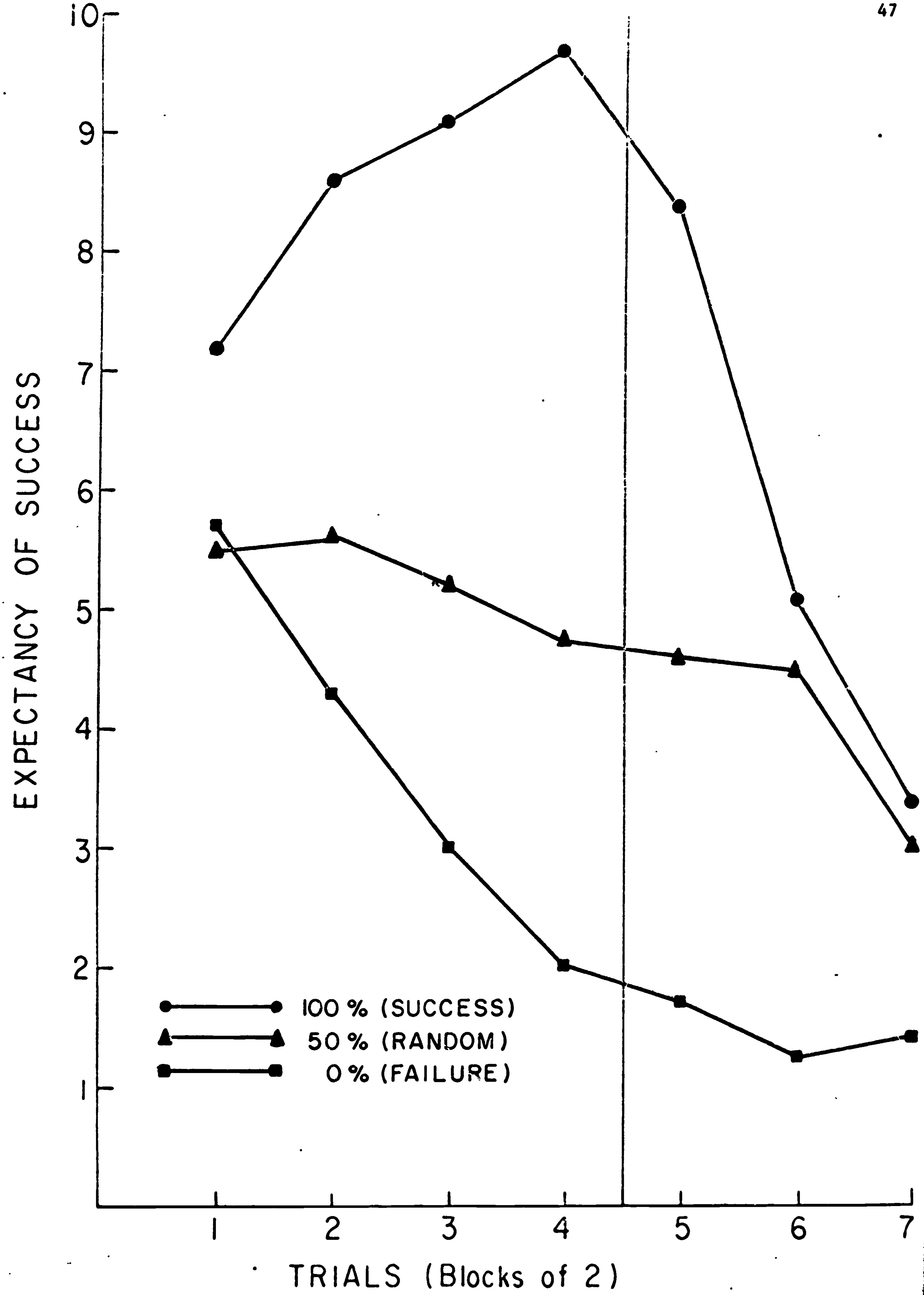
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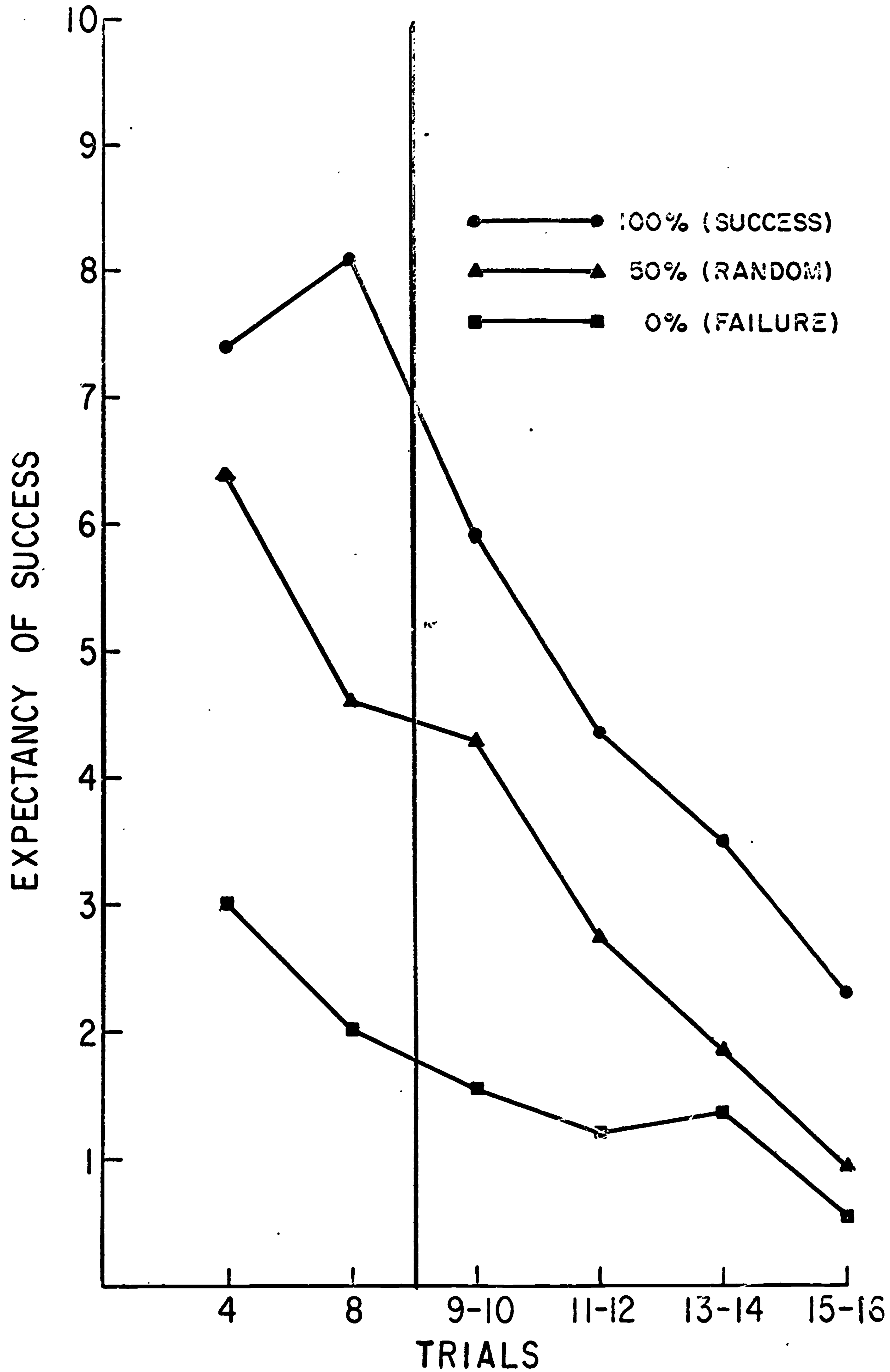
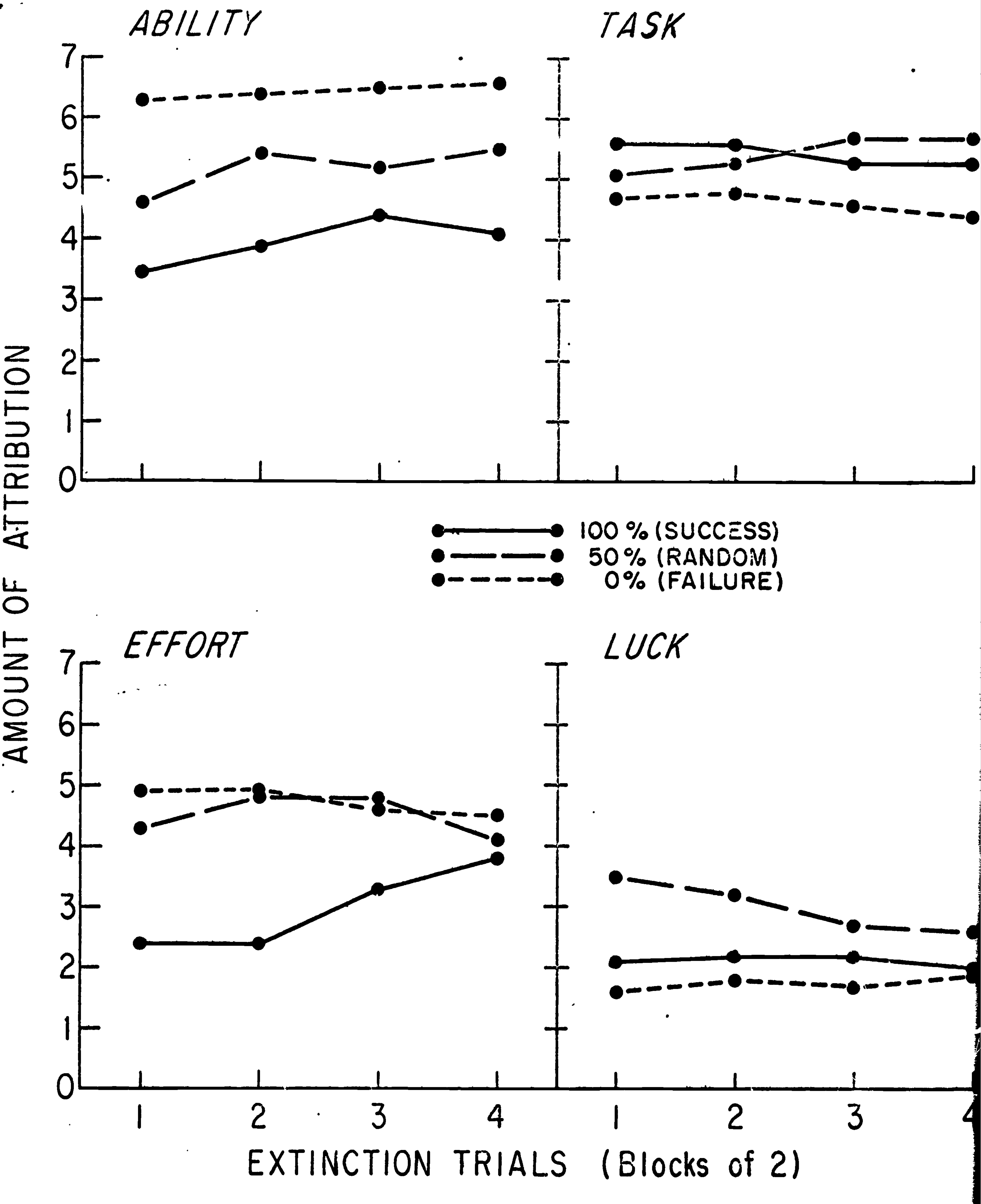
7
TRIALS (Blocks of 2)


100% (SUCCESS)
50% (RANDOM)
0% (FAILURE)
EXPECTANCY OF SUCCESS
10
9
8
7
6
5
4
3
2
1
4
8
9-10
11-12
13-14
15-16
TRIALS


ABILITY
TASK
EFFORT
LUCK
AMOUNT OF ATTRIBUTION
7
6
5
4
3
2
1
0
100 % (SUCCESS)
50 % (RANDOM)
0% (FAILURE)
1
2
3
4
EXTINCTION TRIALS (Blocks of 2)