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Causal Attribution for Success and Failure: A Multivariate Investigation of Dimensionality, Formation, and Consequences

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The dimensions underlying causal attributions for success and failure, the influence of various informational cues on attributions along these dimensions, and the consequences of such attributions were investigated using a three-mode factor analytic technique developed by Harshman. Hypothetical cases describing high school students' performance on a university entrance exam, their performance in high school, the performance of others on the exam, and the importance of the exam were presented to 200 male university students in a within-subjects design. The students were described as male to half of the subjects and as female to the other half. Subjects judged how strongly each of nine possible causes (e.g., ability, preparation) may have influenced performance on the exam. Ratings of perceived satisfaction and expectancy of future success were also obtained. Results of the analysis revealed three factors corresponding to the stability, locus, and control dimensions proposed by Weiner. Attributions along these dimensions were influenced primarily by consistency, consensus, and incentive information, respectively. Ratings of expectancy and satisfaction were in turn related to the stability and controllability of the perceived causes. The data are discussed in terms of their support for Weiner's attributional model of motivation and the need to identify general dimensions of causal attribution.

In the original formulation of their attributional model of achievement motivation, Weiner and his associates (Weiner et al., 1971) made three important sets of assumptions. First, they argued that the causes people use to explain success and failure can be classified according to a two-dimensional taxonomy, the dimensions being *locus of control* and *stability*. Second, following the work of Kelley (1967), they suggested that attributions for success and failure are influenced by informational cues such as past performance and social norms. Finally, they proposed that the consequences of success and failure (affective reactions and expectancy of future success in particular) are influenced by the nature of the attributional explanation.

Although little attention has been given to direct investigation of the proposed taxonomy, extensive research has been carried out concerning the use of informational cues (e.g., Beckman, 1970; Cordray & Shaw, 1978; Fontaine, 1975; Frieze & Weiner, 1971; McArthur, 1972; Orvis, Cunningham, & Kelley, 1975; Read & Stephan, 1979; Weiner & Kukla, 1970) and the consequences of causal attribution (e.g., Fontaine, 1974; Lanzetta & Hanna, 1969; McMahan, 1973; Rest, Nierenberg, Weiner, & Heckhausen, 1973; Rosenbaum,

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1972; Valle & Frieze, 1976; Weiner, Heckhausen, Meyer, & Cook, 1972; Weiner & Kukla, 1970). Although the focus of this research has been on the individual causes (hereafter referred to as causal elements), the results have often been interpreted in terms of general causal dimensions. For example, information about consistency of performance has typically been assumed to influence attributions along the stability dimension. Consistent performance is attributed to stable causes (e.g., ability or task difficulty), whereas inconsistent performance is attributed to unstable causes (e.g., luck or effort). On the other hand, consensus information has been purported to influence attributions along the locus of control dimension. A common performance leads to external attributions (e.g., task difficulty), and a unique performance leads to internal attributions (e.g., ability or effort).

Recent developments (see Weiner, 1979) have led to shifts in the focus of both attribution theory and research, with greater emphasis being placed on the taxonomy of causal elements. This new emphasis is reflected in the following statement by Weiner:

> Inasmuch as the list of conceivable causes of success and failure is infinite, it is essential to create a classification scheme or taxonomy of causes. In so doing, similarities and differences are delineated and the underlying properties of the causes are identified. This is an indispensible requirement for the construction of an attributional theory of motivation. (1979, pp. 5–6)

Similar sentiments have been expressed by other authors (e.g., Passer, Kelley, & Michela, 1978).

Theories of the taxonomy of perceived causes of success and failure have undergone several revisions. Rotter (1966) originally proposed a one-dimensional locus of control classification of causality. Causes were either internal (within the person) or external (outside the person). Attributions along this dimension were typically assessed using an ability–luck scale (e.g., Feather, 1969; Feather & Simon, 1971). Weiner et al. (1971), however, recognized that ability and luck (as well as other causes) also vary along a second dimension that they labelled *stability*. That is, some causes tend to be relatively invariant over time (e.g., ability), whereas others tend to be variable (e.g., effort and luck). Thus, stability was incorporated along with locus of control to form a two-dimensional taxonomy of causality. This taxonomy was expanded by Weiner (1974) to include a third dimension, *intentionality*, that had been identified initially by Heider (1958) and incorporated into the achievement domain by Rosenbaum (1972). The most recent revision involved a reconceptualization of the intentionality dimension (Weiner, 1979). Weiner argued that a more accurate label for this dimension is *control*. In explanation, he stated:

> Rosenbaum [1972] invoked the intent dimension to describe this difference [i.e., between unstable internal causes like mood and effort] with mood classified as unintentional and effort classified as intentional. However, it seems that the dimension Rosenbaum had identified was that of "control". Failure attributed to a lack of effort does not signify that there was an intent to fail. Intent connotes a desire or want. Rather, effort differs from mood in that only effort is perceived as subject to volitional control. Hence, I propose that a third dimension of causality categorizes causes as "controllable" versus "uncontrollable". (1979, p. 6)

A corresponding change in the label of the locus of control dimension to *locus* was made to clarify the distinction between the locus (internal versus external) and control (controllable versus uncontrollable) dimensions of causality.

With this increased emphasis on taxonomy, attempts have been made to identify the nature of the dimensions underlying causal attributions for success and failure (Passer, 1977) as well as loneliness (Michela, Peplau, & Weeks, Note 1) and negative behavior within a marital context (Passer et al., 1978). Passer (1977) used multidimensional scaling procedures to determine the salient dimensions underlying subjects' judgments of the similarity of the causes of success and failure. Analysis revealed two dimensions, suggesting that subjects' judgments reflected the theoretical distinctions between internal and external causes and between intentional and unintentional (i.e., controllable and uncontrollable using Weiner's, 1979, terminology) causes. There was no evidence to suggest that subjects distinguished between causes on the basis of the stable versus unstable dimension.

Passer's (1977) failure to find complete support for the three-dimensional taxonomy does not necessarily indicate that Weiner's (1974, 1979) logical analysis of causality is incorrect. By using multidimensional scaling procedures as he did, Passer essentially addressed himself to the question, "Do 'naive' subjects, when asked to make a similar logical analysis of causality (through their judgments of similarity), make the same distinctions as the attribution theorist?" The findings suggest that the answer is no; they tend to make fewer distinctions. Passer's data, however, do not bear on the question (which is perhaps more relevant to the theory), "Do people's attributions for success and failure reflect the dimensions of stability, locus, and control?" This question can only be answered by using empirical techniques, such as factor analysis, that identify patterns of covariation among variables (in this case, attributions to the individual causal elements). (For a more detailed comparison of factor analytic and multidimensional scaling procedures, see MacCallum, 1974.)

The primary purpose of the present investigation was to determine, using factor analytic procedures, whether people's attributions for success and failure do reflect identifiable dimensions and whether these dimensions correspond to those proposed by Weiner (1974, 1979). In addition, the influence of informational cues on attributions along the causal dimensions and the consequences of attributions along these dimensions were investigated. Because research concerning the dimensionality of causal attributions is in its early stages, the investigation focused on attributions for the performance of others to avoid the complexities of self-serving biases (cf. Bradley, 1978; Miller & Ross, 1975).

The overall design of the study was similar to that of Frieze and Weiner's (1971). Subjects were provided with information concerning another's performance on an achievement task, along with additional relevant information, and were asked to make causal attributions to explain that performance. The selection of informational cues and attributional rating scales was guided by the findings of Frieze (1976). Finally, to investigate the consequences of attributions along the causal dimensions, subjects were asked to make ratings concerning affective reactions and expectancy of future success.

Hypotheses

Causal dimensions. Factor analyses of subjects' attributions for success and failure were expected to yield three factors corresponding to Weiner's (1974, 1979) stability, locus, and control dimensions.

Formation of causal attributions. Based on the previous research reviewed above, attributions along the stability, locus, and control dimensions were expected to be influenced primarily by consistency, consensus, and incentive information, respectively.

Consequences of causal attribution. In accord with Weiner's (1974, 1979) theoretical formulation, it was expected that attributions along the stability dimension would be related to ratings of future expectancy of success, whereas attributions along the locus and control dimensions would be related to ratings of the affective reaction to performance.

Method

Subjects

A total of 200 male college students volunteered for the study. In return for their time, they received experimental research credit for an introductory psychology course. The final sample, after exclusion of 7 subjects who failed to follow instructions, consisted of 193 subjects.

Procedure and Stimulus Materials

Subjects participated alone or in groups of up to 30. They were required to be present for two separate sessions that were initially scheduled to be one week apart. Because it was necessary to reschedule some appointments, the time period between sessions varied from 5 days to 1½ months.

In each session, subjects were given an attribution questionnaire requiring them to make causal attribution ratings under 16 different stimulus conditions. In the first session, the presentation of the 16 conditions was randomized but was the same for all subjects. In the second session, the same 16 conditions were presented in reverse order. The same attribution ratings were obtained on two separate occasions to assess the reliability of subjects' judgments.

On entering the experimental room, subjects were informed that they would be provided with information about the performance of hypothetical high school students on a university entrance exam, along with additional information relevant to the performance. They were instructed to use this information to decide how strongly each of nine possible causes might have influenced each student's performance on the exam. Approximately half of the subjects ($n = 99$) were informed that the students were male, and the remainder ($n = 93$) were told that the students were female. Assignment to the male and female stimulus person conditions was random, with the restriction that all subjects tested at the same time be in the same condition.

The 16 stimulus conditions provided to each subject comprised all possible combinations of four two-level informational cues: (a) the student's performance on the exam (pass or fail), (b) the student's standing in the final year of high school (above average or below average), (c) the percentage of the other students who passed the exam (67% pass or 33% pass), and (d) the perceived importance of the exam in influencing university admission (much importance or little importance). A fifth informational cue available to subjects was the sex of the student, but this remained constant across conditions and varied only between subjects. Finally, both male and female students in all conditions were described as being 18 years of age.

For each of the 16 conditions, subjects rated how much each of nine causal elements may have influenced students' performance on the exam. The nine causal elements were: difficulty of exam, general intelligence, luck, mood, preparation for exam, study habits, teachers' ability, teachers' effort, and test-taking ability. To ensure uniformity in subjects' perception of the various causal elements, definitions of each were provided. For example, preparation for exam was defined as follows:

> *Preparation for exam.* This factor refers to the effort the student made to prepare for the exam. This may include reviewing the year's material or doing sample problems, and so on.

The attribution ratings were made on 9-point scales ranging from −4 to +4. In making their ratings, subjects were instructed to decide first in which *direction* the causal elements influenced the student's performance. For example, they were to decide whether the exam performance was influenced by the student's test-taking ability or lack of ability, by the ease of the exam or the difficulty of the exam, by good luck or bad luck, and so on. Then, using the appropriate side of the scale (i.e., positive for a facilitative influence and negative for a detrimental influence), they were instructed to circle the number that best represented the *degree of influence*. Therefore, the sign of the number circled represented the judged direction of influence, and the absolute magnitude represented the degree of influence.

In addition to making attribution ratings in each of the 16 conditions, subjects used 9-point scales to indicate how satisfied they believed the student would be with his or her performance on the exam, from extremely dissatisfied (−4) to extremely satisfied (+4), and how well they expected the student to do in college, from extremely poorly (−4) to extremely well (+4).

Results

Inspection of subjects' attribution ratings revealed that, as expected, the negative side of the rating scales (indicating detrimental effects) tended to be used in the failure conditions, and the positive side of the scales (indicating facilitative effects) tended to be used in the success conditions. Because of this pattern of responding, performance outcome accounted for an artificially large portion of the variation in subjects' responses. To avoid the possibility that this large effect would obscure more subtle, yet meaningful, patterns of covariation among the causal elements, data analyses were performed on the absolute values of subjects' responses, which reflect judgments of degree of influence but not direction. Collapsing the scales in this way (by ignoring sign) is comparable to using separate scales for the success and failure conditions and combining the data for analysis, as has been done in previous investigations (e.g., Frieze & Weiner, 1971).

Assessment of Reliability

The first stage in the data analysis was to assess the reliability of subjects' attribution ratings to eliminate unreliable data from further consideration. Reliability was determined by correlating subjects' responses to the 144 attribution rating scales (16 Conditions × 9 Ratings) obtained in the two sessions. Because judgments of degree rather than direction of influence were to be used in subsequent analyses, elimination of data was based on the reliability of subjects' responses with sign ignored. A correlation of .40 was selected as the minimum level of acceptable reliability.[1] The data from subjects with reliabilities less than .40 were therefore eliminated from further analysis. This resulted in the elimina-

[1] To achieve the best estimate of the "true" dimensional structure underlying causal attributions for success and failure, it was necessary to eliminate the data from subjects who responded carelessly or who had difficulty following the instructions. However, this elimination had to be done without biasing the data by including only subjects with highly consistent patterns of responding. On the basis of pilot research, it was felt that using the .40 reliability level as a cutoff provided a reasonable balance between these two objectives.

tion of 19 sets of data in the female stimulus person condition and 15 sets of data in the male stimulus person condition. The mean reliability scores for the remaining 75 subjects in the female group and 84 subjects in the male group were .59 and .60, respectively.[2] It is interesting to note that when reliabilities were computed with sign included, the corresponding mean reliabilities were .79 and .78, reflecting, in part, the fact that judgments of the direction of influence were made quite reliably.

Taxonomy of Causes and Use of Informational Cues

To identify the dimensions underlying subjects' causal attributions and to determine how attributions along these dimensions were influenced by the informational cues, the data were subjected to a three-mode factor analysis. The three-mode model employed, called PARAFAC (for parallel factors), was developed by Harshman (1970, 1976).

PARAFAC, like traditional factor and components analyses, takes a set of complex interrelations among variables and decomposes them into simpler, more meaningful dimensions. Traditional analyses, however, are restricted to use with data varying on two modes of measurement (Tucker, 1964), such as rating scales and subjects. The present data vary on three modes: rating scales, conditions, and subjects. That is, 159 subjects made 9 attribution ratings in each of 16 stimulus conditions. To use traditional factor analysis in this case would require that the data be collapsed over one mode by computing means across that mode (e.g., computing the mean for each attribution rating for each subject across conditions). This would result in the loss of potentially valuable information. PARAFAC, however, is not subject to this restriction and can be used to analyze data varying on three or more modes at once.

A second advantage of the PARAFAC model is that it provides an empirical criterion, based on Cattell's (1944) principle of proportional profiles, for determining the orientation of axes in the factor space.[3] (The procedure is similar to that developed by Carroll and Chang, 1970, for multidimensional scaling.) As a result, PARAFAC does not rely on analytic procedures such as Varimax (Kaiser, 1958) to achieve a simple structure (Thurstone, 1954) that may not always correspond to the "psychologically real" dimensions inherent in the data. Finally, PARAFAC does not require that the factors be orthogonal. (For more details about PARAFAC, see Harshman, 1970, 1976, and Harshman, Ladefoged, and Goldstein, 1977).

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[2] These reliabilities are comparable to item reliabilities (i.e., reliability of single test items) and as such reflect a reasonably strong degree of consistency in responding. If an appropriate method of correction for attenuation were available, these reliability coefficients could be expected to approximate those reported for published scales.

[3] Cattell (1944) reasoned that if a "true" underlying factor structure exists, it should emerge in several studies employing the same variables. Further, he reasoned that if these variables are measured on two or more occasions designed to produce variation in the degree to which the underlying psychological factors are salient, the result should be a similar factor structure over conditions, but with proportional shifts evident in the scatter of "points" along the true underlying factors. The shift should be toward the extremes when the factor is salient and toward the origin when it is not. A unique rotational solution could then be obtained by orienting the axes in the direction along which the proportional shifts occur over occasions of measurement in the factor space.

Harshman (1970, 1976) incorporated this idea into a straightforward generalization of the basic factor analytic equation. The revised PARAFAC equation includes a third coefficient (symbolized o_{km}) that modifies the factor score and factor loading for a given "occasion". Thus, using Harshman's notation, the revised model may be written as:

$$x_{kji} = o_{k1}a_{j1}F_{1i} + o_{k2}a_{j2}F_{2i} + \ldots + o_{km}a_{jm}F_{mi} + U_{kji},$$

where x_{kji} is the raw score for Person i on Measure j on Occasion k, a_{jm} is the loading of Measure j on Factor m, F_{mi} is the factor score for Person i on Factor m, o_{km} indicates the relative weight of Factor m on Occasion k, and U_{kji} represents the unique component of the raw score contribution by the "specific factor" for that person–measure–occasion combination, plus random error.

The factors produced by PARAFAC are determined by identifying the direction of proportional shifts in the scatter of points in the factor space accompanying variations in the third mode and orienting the axes in these directions. Under ideal conditions, the angle between the axes (i.e., the degree of obliqueness) should reflect the angle between the directions of proportional shifts along the "true psychological dimensions".

When applied to the three-mode data, the PARAFAC analysis produces three Mode-Level × Factor matrices, one for each mode. Each factor obtained is reflected in all three modes so that the number of factors is the same in each mode. The loadings in the three modes can be combined multiplicatively according to the PARAFAC equation (see Footnote 3) to produce raw data estimates. In the present study, the loadings in the rating scale mode indicate the relationships among the causal elements and therefore have direct implications for Weiner's (1974, 1979) taxonomy. The loadings in the condition mode indicate the degree to which the various informational cue combinations influence attributions. The loadings in the subject mode indicate the degree to which the dimensions were reflected in each subject's causal attributions.

Before being subjected to analysis, the data were "double centered" by subtracting out the means for rating scales and conditions (see Gollob, 1968a, 1968b). Separate analyses were then performed on the centered data for the male stimulus person, female stimulus person, and combined groups. Because there were no substantial differences in the results, only the analyses of the combined data are reported here.

The PARAFAC analysis was performed to produce one-, two-, three-, four-, and five-factor solutions. Selection of the optimal solution was aided by the use of three criteria: (a) the mean squared error of the data estimates, (b) the uniqueness of the solution, and (c) the replicability of the solution with split halves of the data set. Uniqueness refers to the presence of the same factor structure over different starting positions (i.e., sets of initial random loadings used to begin the analytic procedure). Ideally, uniqueness will not occur when the optimal number of factors is exceeded (see Harshman, 1970, 1976).

The mean squared error values for the five solutions are plotted in Figure 1. The curve indicates that although fit continues to improve as dimensionality increases, there is a sharp decline in the per factor increment in fit as the dimensionality of the solution increases from three to four factors. This, and the fact that uniqueness was not obtained beyond the three-factor solution, suggests that the three-factor solution is optimal for the present data.

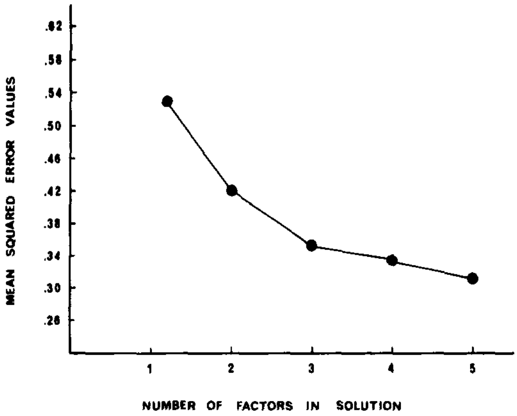

Figure 1. Mean squared error values for the one- to five-factor solutions.

The rating scale and condition modes for the three-factor solution are presented in Table 1. The loadings for the subject mode have been omitted to save space and because they are sample-specific (i.e., the values reflect the importance of the dimensions for the specific subjects in this study). It should be noted, however, that there was variation in subjects' loadings within factors, indicating that there were individual differences in the use of the three dimensions (see Meyer, 1978).

As can be seen from Table 1, Factor 1 is characterized in the rating scale mode by large positive loadings for general intelligence, study habits, and test-taking ability and by negative loadings for the remaining elements, the largest negative loadings being for luck and mood. This pattern of loadings, except for the difficulty of exam and teachers' ability loadings, seems to reflect a stability dimension. The loadings for difficulty of exam and teachers' ability are in the negative (unstable) rather than in the expected positive (stable) direction.

The most obvious pattern of loadings in the condition mode of Factor 1 reflects consistency of performance. Conditions in which exam performance and performance in high school are consistent (i.e., pass/above average and fail/below average) load positively, whereas conditions in which there is inconsistency (i.e., pass/below average and fail/above average) load negatively on Factor 1. When com-

Table 1
Rating Scale and Condition Mode Weights from Three-Mode Factor Analyses of Replication Means for Total Sample

Mode	Factor 1	2	3
Rating scale mode			
Difficulty of exam	−.64	−2.52	−.37
General intelligence	1.62	.70	−.56
Luck	−1.36	.05	−.73
Mood	−.96	.29	.25
Preparation for exam	−.40	.83	2.65
Study habits	1.32	.73	.22
Teachers' ability	−.22	−.40	−.40
Teachers' effort	−.38	−.41	−.25
Test-taking ability	1.04	.73	−.83
Condition mode			
P/A/67%/V	1.03	−.66	.65
P/A/67%/L	.97	−.97	−.79
P/A/33%/V	1.18	.91	.66
P/A/33%/L	1.08	.78	−1.26
P/B/67%/V	−.62	−.89	1.08
P/B/67%/L	−.69	−.99	−.87
P/B/33%/V	−1.06	1.02	.96
P/B/33%/L	−1.33	1.21	−1.53
F/A/67%/V	−1.62	1.41	−1.05
F/A/67%/L	−1.11	.83	1.17
F/A/33%/V	−.81	−.96	−.46
F/A/33%/L	−.46	−.97	1.32
F/B/67%/V	.81	.93	−1.14
F/B/67%/L	.80	.76	.81
F/B/33%/V	.88	−1.24	−.57
F/B/33%/L	.95	−1.19	1.03

Note. The order of presentation of variables in the Condition mode is: exam performance (P = pass, F = fail), 12th grade standing (A = above average, B = below average), percentage of others who passed the exam, and importance (V = very important, L = little importance).

bined according to the PARAFAC equation, the loadings in the rating scale and condition modes suggest that stable elements, such as intelligence, study habits, and test-taking ability, were perceived as having greater influence than unstable elements, particularily luck and mood, when exam performance was consistent with general performance in high school. The reverse was true when exam performance was inconsistent with high school performance. This finding is consistent with prediction.

In addition to the obvious pattern of loadings in the condition mode involving sign, there are more subtle patterns involving the magnitude of the loadings. For example, among the conditions in which performance is inconsistent with previous performance (i.e., those conditions with negative loadings), the loadings are smaller when performance has high consensus (i.e., pass/67% pass and fail/33% pass) than when it has low consensus (i.e., pass/33% pass and fail/67% pass). Thus, although inconsistent performance was attributed more to unstable than to stable causal elements overall, attributions to stable elements were greater, and attributions to unstable elements were less, when the inconsistent performance had high consensus. The presence of these subtle patterns suggests that subjects used informational cues other than consistency in making judgments about the stability of causality. In comparison with consistency, however, the other cues had a relatively minor influence.

The largest positive loadings in the rating scale mode of Factor 2 are for the internal causes: preparation for exam, study habits, test-taking ability, and general intelligence. The negative pole of this factor is defined principally by the external cause difficulty of exam. Teachers' ability and teachers' effort also have negative loadings. This factor, then, reflects the predicted locus dimension. Note, however, that luck, rather than loading in the expected negative, external direction, has a near zero loading, suggesting that it was perceived as neither internal nor external.

In the condition mode of Factor 2, positive loadings mark the low consensus conditions, and high consensus conditions have negative loadings. Together, the rating scale and condition mode loadings indicate that high consensus performance resulted in greater attributions to external elements, especially difficulty of exam, whereas low consensus performance produced greater attributions to internal elements. This finding is also consistent with prediction.

Again, in addition to the obvious pattern of loadings in the condition mode involving sign, more subtle patterns involving the magnitude of the loadings are evident, indicating that cues other than consensus influenced judgments of locus. For example, for six of the eight pairs of conditions that differ only on the importance variable, the loadings tend to be greater (i.e., more positive or less negative) for the important than for the unimportant condition. This suggests that attributions to internal causes tended to be greater and attributions to external causes tended to be less when the exam was important than when it was unimportant.

The pattern of loadings in the rating scale mode of Factor 3 reflects the control dimension. The positive pole of the factor is defined principally by preparation for exam. Positive loadings were also obtained for study habits and, unexpectedly, for mood. The remaining elements load in the negative direction. Thus, this factor contrasts the controllable causal element, preparation for exam, with the less controllable elements such as test-taking ability, luck, and intelligence.

The loadings in the condition mode of Factor 3 reflect an interaction of exam performance and importance of exam. The loadings are positive for conditions in which the student passed an important exam or failed an unimportant exam. Conditions in which the student passed an unimportant exam or failed an important exam have negative loadings. The rating scale and condition mode loadings together, therefore, suggest that success on an important exam and failure on an unimportant exam were attributed to controllable causes, especially preparation or lack of preparation, whereas success on an unimportant exam and failure on an important exam were attributed to uncontrollable causes.

Although importance and outcome information had the greatest effect on judgments of controllability, the presence of subtle patterns in the magnitude of the condition mode loadings suggests that other informational cues also had an influence. For example, when pairs of conditions differing only in consensus (i.e., Conditions 1 and 3, 2 and 4, and so on) are compared, the loadings tend to be greater in the high consensus (pass/67% pass or fail/33% pass) than in the low consensus (pass/33% pass or fail/67% pass) condition. Thus, attributions to controllable causes tended to be slightly greater for normative as opposed to non-normative performance.

Test for obliqueness. To assess the degree of association between factors produced by the PARAFAC analysis, correlations were computed between the factors. Because the relationship between the same factors may be different in the three modes (see Harshman, 1970, 1976), correlations were computed separately for the loadings in the rating scale, condition, and subject modes. The correlations between Factors 1 and 2, 1 and 3, and 2 and 3 were .45, −.15, and .29, respectively, in the rating scale mode; −.25, .04, and −.21 in the condition mode; and .69, .42, and .47 in the subject mode. In the present context, the correlations in the three modes reflect covariation in the properties of causality, in the influence of informational cues on judgments concerning these properties, and in the extent to which these properties were reflected in subjects' attributions, respectively. Thus, for example, the correlations between Factors 1 and 2 indicate that (a) there was a tendency, within the present sample of causal elements, for stable causes to be internal and for unstable causes to be external, (b) there was a slight tendency for the informational cues to influence subjects' judgments of the stability and locus of causality in opposite directions, and (c) subjects who weighted the stability dimension heavily in making their attributions also placed heavy emphasis on the locus dimension.

Assessment of generalizability. To assess the generalizability of the factor structure, two additional analyses were performed. First, to test for generalizability across samples of subjects, the total sample was divided into two groups, and the data from both groups were analyzed separately. Group 1 was composed of 42 subjects from the male stimulus person condition and 38 from the female stimulus person condition. Group 2 consisted of 42 and 37 subjects in the male and female conditions, respectively. Using the procedures described earlier, the PARAFAC analysis was performed to obtain one- to five-factor solutions for the data from both groups. As was the case with the total data set, the PARAFAC analysis did not yield a unique solution when more than three factors were extracted, suggesting that the three-factor solution was optimal for both subsamples. The rating scale and condition modes for the two three-factor solutions are presented in Table 2.

Table 2
Rating Scale and Condition Mode Loadings From the Three-Mode Factor Analysis of Replication Means for Two Subgroups of the Total Sample

	Factor					
	Group 1 (n = 80)			Group 2 (n = 79)		
Mode	1	2	3	1	2	3
Rating scale mode						
Difficulty of exam	−.51	−2.28	−.36	−.73	−2.57	−.40
General intelligence	1.66	1.07	−.54	1.54	.59	−.55
Luck	−1.32	−.27	−.76	−1.43	.11	−.68
Mood	−.92	.06	.26	−1.02	.29	.23
Preparation for exam	−.40	.61	2.61	−.38	.90	2.69
Study habits	1.36	.99	.30	1.29	.65	.14
Teachers' ability	−.37	−.48	−.37	−.07	−.35	−.46
Teachers' effort	−.50	−.53	−.21	−.26	−.34	−.32
Test-taking ability	.99	.85	−.93	1.06	.72	−.65
Condition mode						
P/A/67%/V	1.07	−.65	.59	1.04	−.65	.69
P/A/67%/L	1.21	−.99	−.79	.84	−.90	−.79
P/A/33%/V	.76	1.02	.60	1.30	.81	.70
P/A/33%/L	.81	.87	−1.23	1.09	.73	−1.35
P/B/67%/V	−.39	−.87	1.06	−.65	−.93	1.11
P/B/67%/L	−.47	−.89	−1.04	−.69	−1.10	−.61
P/B/44%/V	−1.30	1.05	.95	−.94	.94	.98
P/B/33%/L	−1.56	1.22	−1.59	−1.19	1.19	−1.40
F/A/67%/V	−1.62	1.23	−.90	−1.76	1.56	−1.18
F/A/67%/L	−1.24	.79	1.20	−1.03	.82	1.17
F/A/33%/V	−.45	−1.07	−.42	−.89	−.87	−.49
F/A/33%/L	−.18	−1.00	1.30	−.53	−.96	1.36
F/B/67%/V	.49	.93	−1.14	.89	.97	−1.17
F/B/67%/L	.52	.78	.85	.87	.78	.70
F/B/33%/V	1.22	−1.29	−.51	.73	−1.15	−.67
F/B/33%/L	1.13	−1.13	1.06	.92	−1.24	.95

Note. The order of presentation of variables in the Condition mode is: exam performance (P = pass, F = fail), 12th grade standing (A = above average, B = below average), percentage of others who passed the exam, and importance (V = very important, L = little importance).

Inspection of Table 2 reveals that the two structures are strikingly similar to one another and to the structure for the total sample presented in Table 1. As a measure of the similarity among the three structures (i.e., Total, Group 1, Group 2), coefficients of congruence (Harman, 1976) were computed for the loadings in the rating scale and condition modes. The coefficients comparing corresponding factors in the three solutions ranged from .94 to .99 (M = .98), attesting to the generalizability of the factor structure across independent samples. The magnitude of the coefficients (ignoring sign) comparing noncorresponding factors ranged from .01 to .64 (M = .24) and mirrored the pattern of obliqueness observed among the factors within solutions. The largest coefficients occurred in the comparison of Factors 1 and 2 in the rating scale mode.[4]

[4] As a further demonstration that the three-factor solution was optimal for the present data, the four-factor solutions for Groups 1 and 2 were compared in a manner similar to that for the three-factor solutions. Because the four-factor solution was not unique (i.e., was not consistent over starting positions), the solutions that emerged most frequently in the two subsamples were compared. Coefficients of congruence revealed only one common factor, a factor resembling the control dimension. The remaining factors were different for the two groups (see Meyer, 1978). Thus, the failure of the four-

Table 3
Principal-Components Analysis With Varimax Rotation for Mean Attribution Ratings

Rating scale	Factor 1	2	3
Difficulty of exam	.15	−.91	.03
General intelligence	.67	.52	−.49
Luck	−.98	−.15	−.04
Mood	−.91	.04	.38
Preparation for exam	−.13	.23	.92
Study habits	.74	.64	−.15
Teachers' ability	−.25	−.80	−.35
Teachers' effort	−.45	−.81	.06
Test-taking ability	.44	.64	−.63
Eigenvalue	5.13	2.18	1.05

Note. The principal-components analysis was performed on the mean attribution rating (across 159 subjects) for each condition.

A second generalizability analysis was performed to determine whether the factor structure would generalize over analytic techniques. The data were collapsed across subjects by computing the means of subjects' ratings on the nine attribution rating scales for the 16 conditions. The 16 × 9 matrix of means was then subjected to a principal components analysis. Only factors (i.e., components) with eigenvalues greater than 1.00 were extracted and rotated to a varimax criterion. The result was a three-factor solution that is presented in Table 3.

Comparison of the loadings in the rating scale mode of the PARAFAC solution (Table 1) with the loadings produced by the principal components analysis reveals that the magnitude and direction of the loadings for the causal elements that principally define the poles of the three dimensions (taking into account the different standardization procedures used in the two models) are extremely close. The only reversals in sign occur for those elements that load close to zero on a particular dimension (i.e., difficulty of exam on Factor 1 and study habits on Factor 3). Thus, the interpretation of the factors obtained in the two solutions is essentially the same.

Coefficients of congruence were again computed to compare the two sets of factors. The values comparing Factors 1, 2, and 3 from the PARAFAC solution with the corresponding factors from the principal components solution were .91, .82, and .86, respectively. The magnitude of the coefficients comparing noncorresponding factors ranged from .01 to .64 (M = .26), again mirroring the obliqueness of the PARAFAC factors.

Consequences of Causal Attribution

For each of the 16 cases, subjects were asked to rate how satisfied they thought the students would be with their exam performances and how well they expected the student to do in college. To determine how these ratings were related to subjects' attributions along the three causal dimensions, the following correlational analysis was performed.

First, ratings of satisfaction and expectancy were collapsed across subjects by computing subjects' mean judgments for each of the 16 conditions. The mean ratings were then correlated with the condition mode loadings from the PARAFAC analysis (presented in Table 1). Recall that the condition mode loadings reflect the direction (sign of loading) and degree (magnitude of loading) of the contribution of the properties of causality to attribution ratings in a given condition. Thus, the correlations produced in this analysis reflect the extent to which subjects' ratings of satisfaction and expectancy covary over conditions with their judgments of the stability, locus, and controllability of causality. Because of the obvious effect that outcome might be expected to have on both the satisfaction and expectancy ratings, the analysis was performed separately for the pass and fail conditions. The results are presented in Table 4.

Inspection of Table 4 reveals two significant relationships. First, satisfaction ratings correlated significantly with the condition mode loadings for Factor 3 (control). Subjects judged that students would be more satisfied with success, and less dissatisfied with failure, when attributions were made to controllable as opposed to uncontrollable causes.

factor solution to replicate provides strong evidence that the three-factor solution best accounts for the present data.

Table 4
Correlations of Satisfaction With Performance and Expectancy of Future Success With the Pass (n = *8*) *and Fail* (n = *8*) *Condition Mode Loadings From the Three-Mode Factor Analysis*

Condition mode loading	Satisfaction rating: Condition: Pass	Satisfaction rating: Condition: Fail	Expectancy rating: Condition: Pass	Expectancy rating: Condition: Fail
Factor 1	−.22	.52	.89**	−.90**
Factor 2	−.53	.25	−.30	.06
Factor 3	.75*	.87**	.10	.15

Note. The consequence ratings in this analysis were always scored in the positive *satisfied* and *expect to do well* direction. To interpret the relations in terms of *dissatisfaction* or *expect to do poorly*, the correlations must be reflected.
* $p < .05$. ** $p < .01$.

Note that the expected relationship between judgments of the locus of causality and ratings of satisfaction did not appear.

Finally, consistent with prediction, the correlations produced in this analysis reveal a strong relationship between expectancy ratings and attributions along the stability dimension (Factor 1). In the pass conditions, expectancy of future success was greater when attributions were made to stable as opposed to unstable elements. Conversely, expectancy of future success in the failure conditions was greater when attributions were made to unstable as opposed to stable causal elements.

Discussion

The results of the three-mode factor analysis of subjects' attribution ratings provide answers to several questions posed at the outset of this investigation. First, they reveal that there is an identifiable three-factor structure underlying people's causal attributions for success and failure. The generalizability analyses reveal that this structure is remarkably stable across independent samples and across methods of analysis. (Further evidence for the generalizability of the structure is provided by the fact that similar results were obtained with two additional samples of subjects [Meyer, 1978, Note 2]).

Moreover, the pattern of loadings in the rating scale mode for all three factors, with few exceptions, corresponds closely to Weiner's (1974, 1979) stability, locus, and control dimensions. In general, the data provide strong support for Weiner's taxonomy. The few loadings that deviate from expectation, however, have interesting and important implications and therefore deserve further attention.

First, difficulty of exam loaded in the unstable rather than the stable direction on Factor 1 (stability). This may have been due partly to the nature of the achievement task. The university entrance exam, although related to past and future academic performance, could be seen as a relatively unique event in the student's life, and not one that he or she would be likely to experience again. Thus, difficulty of exam could not be considered stable in the same sense that the term applies to intelligence, study habits, and test-taking ability. Task difficulty might be expected to load in the stable direction in future investigations in which the task is described as one that has been, and will continue to be, experienced repeatedly (see Valle & Frieze, 1976).

Second, the loading for luck on Factor 2 (locus), rather than being in the negative, external direction, was near zero. This finding may reflect confusion or disagreement among subjects concerning the locus of luck. Luck can be perceived as internal, in that it influences individuals differently within a group, or as external, because—by definition—it cannot be controlled. It may be useful in future studies to divide luck into internal and external components just as effort is divided into stable and unstable components.

Finally, mood loaded in the controllable rather than uncontrollable direction on Factor 3. One possible explanation is that subjects interpreted mood to mean "frame of mind" or "attitude". That is, subjects may have felt that the students had some control over whether their attitude (mood) going into the exam was positive (e.g., "I know I can do well if I try") or negative (e.g., "I won't pass no matter how hard I try"). Whether mood is a controllable or uncontrollable element, then, may depend on how it is interpreted in the context.

These unexpected findings do not contradict or negate the existence of stable underlying dimensions. Rather, they emphasize the importance of trying to discover such a stable dimensional structure. They are consistent with the suggestion (e.g., Weiner, 1979; Weiner, Russell, & Lerman, 1978) that the nature of the individual causal elements is open to subjective interpretation and may vary from person to person and situation to situation. This propensity to fluctuate in meaning limits the information value of the individual causal elements. For example, knowing that a student attributes failure on an exam to the difficulty of that exam may not be helpful in predicting the student's consequent behavior unless one knows what the student means by difficulty. If difficulty is seen as stable (e.g., a hard course), failure may lead to submission, whereas if it is seen as unstable (e.g., an unusually hard exam), it may lead to persistence. Thus, knowing the properties of a causal explanation may be more important than knowing the causal explanation itself. It would seem to be important, therefore, to identify stable underlying dimensions of causality that can be theoretically and empirically linked to antecedent conditions and behavioral consequences.

The fact that factors corresponding to all three of Weiner's (1974, 1979) theoretical dimensions emerged in this study supports the earlier argument that Passer's (1977) failure to find a stability dimension may have been due, in part, to his use of multidimensional scaling procedures. Although people may not use stability as a criterion for judging the similarity of causes, it appears that their actual attributions for success and failure do reflect the stability dimension as well as the locus and control dimensions.

A second question addressed by the three-mode factor analysis concerned the influence of informational cues on attributions along the three causal dimensions. As predicted, attributions along the stability, locus, and control dimensions were influenced primarily by information about consistency of performance, consensus with the performance of others, and incentive (mediated by outcome), respectively. More specifically, immediate success or failure that was consistent with the student's previous performance was attributed to stable causes (e.g., intelligence, study habits, test-taking ability), whereas inconsistent performance was attributed to unstable causes (e.g., luck, mood). Success or failure with high consensus was attributed to external causes, especially difficulty of exam, and low consensus performance was attributed to internal causes (e.g., preparation for exam, study habits). Finally, success on an important exam and failure on an unimportant exam were attributed to controllable causes, particularly preparation for exam, and success on an unimportant exam and failure on an important exam were attributed to uncontrollable causes (e.g., luck, test-taking ability).

The fact that subjects used consistency and consensus information in making causal attributions is consistent with the findings of previous studies (e.g., Frieze & Weiner, 1971) and provides additional support for Kelley's (1967) general model of information synthesis. Subjects' use of information about incentive, or importance of the task, however, is a relatively novel finding. The influence of the task importance cue on causal attribution has received little attention to date, either theoretically or empirically (with the exception of Frieze, 1976). The present findings suggest that although information about importance was used to the greatest extent in making attributions along the control dimension, it was also used to moderate the influence of consistency and consensus information in making attributions along the stability and locus dimensions. Thus, it would appear that the influence of task importance information deserves further investigation.

The data concerning the consequences of causal attribution provide partial support for the hypothesized relationships. Ratings of expectancy of future success were related to attributions along the stability dimension, whereas ratings of the students' satisfaction with performance were related to attributions along the control dimension. Expectancy of success in college was greatest when success on the entrance exam was attributed to stable causes, such as intelligence and study habits, and least when failure on the exam was attributed to the lack of these stable qualities. Students' satisfaction with success was perceived to be greatest when it was attributed to controllable causes, especially preparation, and dissatisfaction with failure was expected to be greatest when it was due to causes beyond the students' control (e.g., test-taking ability, luck).

Although the findings concerning expectancy and affect are consistent with Weiner's (1974) belief that causal attributions mediate between immediate performance and its consequences, two qualifications should be noted. First, because the data are correlational, they do not provide evidence for a cause–effect relationship. Previous research (e.g., Dweck, 1975; Fontaine, 1974; Klein, Fencil-Morse, & Seligman, 1976; Weiner & Seirad, 1975) has demonstrated a cause–effect relationship between attributions to specific causal elements and the consequences of performance. However, further investigation of the mediational hypothesis focusing on the general dimensions of causality is required. Recent research of this type in the domain of helping behavior has demonstrated that manipulating the properties of causality (especially controllability) influences subjects' affective reactions to the situation and their willingness to help (Meyer & Mulherin, in press; Weiner, in press). Second, although a relationship between attribution and affect was observed, only one of the many possible affective reactions was investigated. In light of recent suggestions (e.g., Weiner, 1977) and findings (Weiner, Russell, & Lerman, 1978, 1979) that causal attributions are related to a much wider range of affective responses than had been previously believed, a more extensive investigation of the relationship between the causal dimensions and affect would appear to be necessary.

Analyses performed to determine the relationships among the causal dimensions revealed that the three factors obtained in the PARAFAC analysis are correlated to varying degrees in the three modes. The correlations among the factors in the rating scale mode are of greatest relevance in the present investigation and may reflect incomplete sampling of causal elements or true nonorthogonality of the causal dimensions. It is possible that had a more complete sample of causal elements been included, orthogonality (or a closer approximation to orthogonality) would have been achieved. Alternatively, the correlations may reflect recent suggestions by Weiner (1977; Weiner et al., 1978) that the three dimensions are not theoretically independent. The fact that the positive (controllable) pole of Factor 3 does not share any elements in common with either the positive (stable) pole of Factor 1 or the negative (external) pole of Factor 2 is consistent with Weiner's belief that stable causes (e.g., ability) and external causes (e.g., task difficulty) tend to be uncontrollable. Whatever the explanation for nonorthogonality, however, it is interesting to note that when the orthogonality constraint was placed on the factor structure in the principal components analysis, the interpretation of the structure did not change.

In summary, the present findings provide strong support for Weiner's three-dimensional taxonomy and for the hypotheses concerning the formation and consequences of attributions along these dimensions. The identification of basic properties or dimensions of causality is an important finding, for as Weiner (1979) suggests, it is an "indispensible requirement for the construction of an attributional theory of motivation" (p. 6). Although there is some evidence to suggest that these same dimensions underlie attributions in other nonachievement contexts (e.g., Michela et al., Note 1), further research is required to assess the generalizability of the present findings and to identify other properties of causality if a comprehensive attributional model of motivation is to be developed.

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