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ATTRIBUTING THE "CAUSES" OF PERFORMANCE:
AN ALTERNATIVE INTERPRETATION OF CROSS-
SECTIONAL RESEARCH ON ORGANIZATIONS

Barry M. Staw

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College of Commerce and Business Administration
University of Illinois at Urbana-Champaign



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Attributing the "Causes" of Performance:
An Alternative Interpretation of
Cross-sectional Research on
Organizations

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Abstract

This paper presents a general alternative interpretation of correlational findings which link perceptual or questionnaire measures to data on performance. Essentially, it is posited that organizational participants possess theories of performance just as do organizational researchers, and that respondents will use knowledge of performance as a cue by which they attribute characteristics to themselves, their work groups, and organizations. According to this attribution hypothesis, self-report data on organizational characteristics may actually represent the consequences rather than the determinants of performance. To test this alternative interpretation of correlational findings, an experiment was conducted in which knowledge of group performance (positive vs. negative) was a manipulated independent variable. The results showed that knowledge of performance affected the levels of influence, cohesion, communication, motivation, and openness to change attributed by members to their work groups. These findings were also cross-validated by an interpersonal simulation. The data of the true experiment and the interpersonal simulation, together, provided strong evidence for the attribution hypothesis.

Although much of the research in organizational behavior is devoted to understanding the causes of performance, the findings in the field are still largely based upon correlational data in which the direction of causation is unknown. At present, the research supporting most organizational theories contains hypothesized independent variables which can either be the causes of performance, the effects of performance, co-variates of third variables, or the results of a network of reciprocal causation. Therefore, it could be argued strongly that, in terms of both theory and application, resolving ambiguity in causal inference is one of the field's most pressing issues.

Previously, there have been two empirical studies specifically designed to demonstrate problems in interpreting cross-sectional (correlational) findings. In the first of these studies, Lowin and Craig (1968) experimentally manipulated the performance of subordinates and measured the leadership style of persons hired to perform a real supervisory role. The results of this study showed that closeness of supervision may be a function of subordinate performance rather than a causal determinant of performance, as previously believed. In a somewhat parallel study, Farris & Lim (1969) compared the leadership style of work group supervisors after knowledge of subordinate performance had been experimentally manipulated. This research involved a role playing exercise in which one student was designated as a foreman and three other students acted as a three-person work group in an industrial conflict situation. Each group worked with its foreman for 20 minutes toward the solution of the "Change in Work Procedure Case" (Maier, Solem, & Maier, 1957),

and then completed a post-experimental questionnaire on the foreman's behavior. Knowledge of performance was manipulated by providing information to the foreman (before the work session) that his group was one of the highest or lowest groups in terms of previous performance. The results showed that, for high performing groups, the foreman was perceived to be more supportive of the workers, higher in goal emphasis, and more facilitative of interaction than was the foreman of low performing groups.

By showing that changes in performance can cause changes in other behavioral variables, both the Lowin & Craig (1968) and Farris & Lim (1969) studies represent efforts to stimulate more causal research on organizations. The approach represented by their research is a step-by-step demonstration of the plausibility of reversals in causal order. In fact, from this approach, one might advocate measuring the effects of performance upon an array of individual, group, and organizational variables, and the construction of a thorough inventory of likely causal reversals. With this information, researchers eventually would know where to invest substantial resources on research with methods more conducive to causal inference (i.e. field experimentation, longitudinal analysis, and laboratory simulations of organizational processes).

The step-by-step demonstration of causal reversals is no doubt a worthwhile procedure to help budge the field of organizational behavior from its near total reliance on cross-sectional (correlational) data. However, it is believed that this procedure is neither sufficiently speedy nor now necessary to encourage a significant increase in causal research.

The reason for this conjecture is a new alternative interpretation of cross-sectional data which is both parsimonious and of general applicability to correlational findings linking performance data to self-report measures of individual, group, and organizational characteristics. This alternative interpretation of correlational findings is derived from previous work on attribution theory.

Attribution theory is specifically concerned with how individuals assign enduring traits or dispositions to themselves and other persons (Heider, 1957; Jones and Davis, 1965; Kelley, 1971, 1973; Nisbett and Valins, 1971). It assumes that individuals have a need to understand and explain the events around them, and that based upon this need, individuals will develop a lay or "naive" psychology of behavior (Heider, 1958). To date, most of the research in attribution theory has studied the perception of personal characteristics under varied environmental conditions (e.g., Bem, 1965; Calder and Staw, 1974a, 1974b; Deci, 1971; Jones, Davis, and Gergen, 1961; Jones and Harris, 1967; Schachter and Singer, 1962; Staw, 1974a, 1974b; Strickland, 1958). However, in its broadest context, attribution theory is concerned with the ascription of characteristics to any entity. As Kelley (1973) has noted, all of the judgments of the type, "Property X characterizes Entity Y" can be viewed as causal attributions. Thus, it seems reasonable to assume that the organizational participant, in a desire to understand and control his particular environment, may develop a lay psychology of individual, group, and organizational functioning. Just as individuals may possess an implicit personality theory to guide their impressions of others (Bruner and Tagiuri,

1954), the organizational participant may possess a theory of the relationships between organizational characteristics and subsequent performance.

The specific attribution hypothesis posited here is that individuals utilize knowledge of performance as a cue by which they ascribe characteristics to an individual, group, or organizational unit. The attribution hypothesis posits that performance is a potent independent variable, and that many of the correlations between performance and self-report data may be accounted for by the following causal sequence:

Level of Performance \longrightarrow Attribution of Characteristics \longrightarrow Self-report of Characteristics. That is, performance data may cause persons to assign an entire set of characteristics (i.e. a stereotype) to individuals, groups, and organizations, and this attributed set of characteristics may underlie many of the correlations derived from cross-sectional studies of organizational processes².

The attribution hypothesis can be illustrated by a questionnaire developed by Likert (1967) to support his System 4 theory of management. Likert asked several hundred managers to "think of the most productive department, division, or organization (they) have known well." The managers were then asked to rate this entity in terms of organizational processes such as motivation, influence, communication and cooperation. Subsequently, these same managers were also asked to rate their least productive department, division, or organization on each of these dimensions. As expected, a high degree of motivation, mutual influence,

cooperation, and communication were associated with the highest producing units. Although it is not yet clear whether the processes seen by managers as being associated with high performance actually contribute to performance, Likert's data do illustrate that, perceptually, individuals will distinguish between high and low producing units. Moreover, the existence of distinct stereotypes of successful versus unsuccessful organizations points to the very possibility that significant correlations between performance and self-report data may only be reflecting the respondents' "theories" of organizational performance rather than actual events. And as Heider (1958) has noted in his now classic analysis of interpersonal perception, a lay or "naive" psychology of behavior may or may not be correct.

Clearly, if knowledge of performance causes one to attribute particular characteristics to individuals, groups, or organizations, it may therefore be risky (and certainly unscientific) to posit that self-report data on these characteristics accurately represent the causal determinants of performance. In essence, questionnaire measures considered by organizational researchers to be indicators of the determinants of performance, may actually constitute the consequences of performance. This possibility is of substantial importance to organizational research since individual, group, and organizational characteristics are rarely observed directly, but are generally measured by respondents' perceptions within a field setting.

A laboratory experiment was conducted to test the relevance of the attribution interpretation to some important correlational findings. Specifically it seemed desirable to test whether this alternative interpretation is applicable to Tannenbaum's (1968) replicated finding that

high mutual influence is associated with high performance, Likert's (1961) finding that group cohesiveness is associated with high performance, and Evan's (1965) finding that interpersonal conflict (but not task conflict) is related to performance. In addition, the relationships of performance to motivation (Galbraith and Cummings, 1967), communication, and openness to change (Likert, 1961) were investigated by this research.

METHOD

Subjects Subjects for this experiment were undergraduate students enrolled in the College of Commerce and Business Administration at the University of Illinois, Urbana-Champaign. Sixty students were randomly assigned to three-man groups and each group was asked to participate in a "Financial Puzzle Task." Group members were given copies of the 1969 annual report of a medium-sized (but not well known) electronics company. The report contained a description of the company, a letter from the president on the firm's prospects, and five preceding years of financial data. The group members were told that their task was to estimate company sales and earnings per share for 1970, taking into consideration any knowledge they might have of the electronics industry or state of the economy at that time. Each group was given thirty minutes to discuss the issue and make any necessary calculations in formulating a group estimate of sales and earnings per share. Subjects were told that the purpose of the experiment was to evaluate the performance of groups of various sizes and that previous research had been conducted on three, four, and five-man groups.

Manipulation of Performance After each group presented its estimates of sales and earnings per share, the experimenter stated that "it would be interesting to see how well this group had performed relative to previous three-man groups." The experimenter then took the group's estimates of sales and earnings per share and searched through several file cabinets in the next room. On returning to the (randomly assigned) High Performance groups, the experimenter announced that the group had "done quite well," that their sales figure was off by only \$10,000, earnings per share was accurate within \$.05 a share, and that the group's overall performance was clearly in the top 20% of three-man groups. On returning to the (randomly assigned) Low Performance groups, the experimenter announced that they had "not done too well," that, their estimate for sales was off by \$10,000,000, their estimate for earnings per share was off by \$1.00, and that the group's overall performance was in the lowest 20% of previous three-man groups. No subjects expressed strong doubts about their group's performance. However, it should be noted that the annual report used in this experiment was selected specifically on the basis of its ambiguity and could be interpreted in either a positive or negative manner.

Dependent Variables After being told of their group's performance, subjects were led to separate rooms and asked to complete a short questionnaire about, "what went on in the group." On the questionnaire were items to measure group cohesiveness, influence, communication, task conflict, openness to change, motivation, ability, and clarity of instructions. Although the questions were randomly ordered on the questionnaire, they are listed below under the appropriate variable headings.

I. Cohesiveness

- a. To what extent did you enjoy working with your teammates?
(11 point scale from "not at all" to "to a great extent")
- b. In working on the financial puzzle task, what were your personal feelings toward your teammates?
(11 point scale from "I disliked them" to "I liked them")
- c. How would you rate the cohesiveness or group spirit of your team?
(11 point scale from "extremely low" to "extremely high")

II. Influence

- a. How much influence did you have on final solution of the task?
(11 point scale from "very little" to "a great amount")
- b. How much influence did your teammates have on the final solution of the task?
(11 point scale from "very little" to "a great amount")

III. Communication

- a. How would you rate the quantity of communication between you and your teammates?
(11 point scale from "very low" to "very high")
- b. How would you rate the quality of communication between you and your teammates?
(11 point scale from "very low" to "very high")

IV. Task Conflict

- a. To what extent did you and your teammates each have different ideas about methods to solve the financial puzzle task?
(11 point scale from "not at all" to "to a great extent")
- b. If you and your teammates had different ideas about solving the task, to what extent did you have an open confrontation of ideas?
(11 point scale from "not at all" to "to a great extent")

V. Openness to Change

- a. How open were your teammates to your ideas and suggestions about solving the financial puzzle task?
(11 point scale from "not open at all" to "extremely open")
- b. In solving the task, to what extent did your teammates ever attempt to impose or force their position(s) on you?
(11 point scale from "not at all" to "to a great extent")

VI. Satisfaction

- a. To what extent did you enjoy working on the Financial Puzzle Task?
(11 point scale from "not at all" to "to a great extent")

VII. Motivation

- a. To what extent were you interested in performing well on the financial puzzle task?
(11 point scale from "not at all" to "to a great extent")
- b. To what extent were your teammates interested in performing well on the financial puzzle task?
(11 point scale from "not at all" to "to a great extent")

VIII. Ability

- a. In general, how would you rate your ability in solving financial puzzles?
(11 point scale from "very low" to "very high")
- b. In general, how would you rate your teammates' ability in solving financial puzzles?
(11 point scale from "very low" to "very high")

IX. Role Clarity

- a. Were the instructions for solving the financial puzzle made clear to you?
(11 point scale from "not at all" to "very clear")

RESULTS

Check on the performance manipulation

Subjects randomly assigned to High Performance groups rated their ability in solving financial puzzles as higher than did subjects in Low Performance groups ($t = 5.64$, $d.f. = 58$, $p < .001$). Subjects in the High Performance groups also rated their teammates' ability as higher than did those in Low Performance groups ($t = 2.60$, $d.f. = 58$, $p < .01$). These data support the hypothesis that subjects believed the information provided by the experimenter on their group's performance.

It should be noted that, in actuality, the groups assigned to the High Performance condition performed no better than those assigned to the low Performance Condition. In fact, in terms of predicting corporate sales and earnings, groups told that they had performed well actually performed slightly worse than those told they had performed poorly (For sales: $t = -.48$, N.S.; for earnings: $t = -.23$, N.S.). Thus, any reported differences in the perception of group characteristics are likely to be due to manipulated knowledge of performance rather than to any actual differences in the behavior of the groups. Again, it should be stressed that the financial data comprising the group task was specifically selected (in terms of ambiguity) so as to allow a credible manipulation of knowledge of performance.

Effect of knowledge of performance on perceptions of interpersonal behavior

The perceptions of several dimensions of interpersonal behavior for subjects in both High and Low Performance groups are shown in Table 1. Where more than one item was used to measure a particular variable, and where these items were significantly intercorrelated, a combined score and resulting p value is also reported.

Insert Table 1 about here

As shown in Table 1, individuals who were randomly assigned to High Performance groups rated their groups as more cohesive ($t = 1.68$, d.f. = 53, $p < .05$) and enjoyed working with their teammates to a greater extent ($t = 1.81$, d.f. = 58, $p < .05$) than did individuals assigned to Low Performance groups. Persons in High Performance groups also rated their groups higher in quality and quantity of communication ($t = 1.77$,

d.f. = 58, $p < .05$), higher in total influence ($t = 1.86$, d.f. = 58, $p < .05$), and marginally higher in openness to change ($t = 1.49$, d.f. = 58, $p < .10$). It is interesting to note that the effect of performance on total influence was due primarily to the large effect of performance on the perception of one's own influence ($t = 2.47$, d.f. = 58, $p < .01$), and that there was no effect of performance on the perception of teammates' influence on the group task. No clear relationship to performance was shown by the two indicators of task conflict and these two scales were not significantly intercorrelated.

Effects of knowledge of performance on satisfaction, motivation, ability and role clarity

Table 2 shows that subjects assigned to High Performance groups enjoyed working on the experimental task to a greater extent than did subjects assigned to Low Performance groups ($t = 5.54$, d.f. = 58, $p < .001$). In addition, subjects in High Performance groups rated their own interest in performing well on the task as greater than subjects assigned to Low Performance groups ($t = 5.33$, d.f. = 58, $p < .001$). Similarly, these same subjects rated their teammates' interest in performing well on the task higher than did subjects in Low Performance groups. Finally as previously reported, feedback on performance affected the subjects rated ability ($t = 5.64$, d.f. = 58, $p < .001$), his perception of his teammates' ability ($t = 2.60$, d.f. = 58, $p < .01$), and also the rated clarity of instructions for the task ($t = 2.20$, d.f. = 58, $p < .05$).

Insert Table 2 about here

DISCUSSION

As illustrated by the data of Tables 1 and 2, knowledge of performance had a marked effect on the self-report measures of intragroup processes. As expected, individuals who were told that they had participated in a high-performing group rated their group higher in cohesiveness, influence, communication, openness to change (marginally significant) and motivation as compared to individuals who were told that they had participated in a low performing group. As a whole, these data provide support for the notion that individuals attribute one set of characteristics to a work group they believe is effective and another, different, set of characteristics to an ineffective work group. As a whole, these data also offer support for an attributional interpretation of correlations between self-report data and measures of group performance.

The data on cohesiveness and task conflict provide a particularly interesting test of the attribution hypothesis. Previously, Evan (1965) had hypothesized that the impact of intragroup conflict upon performance may not necessarily be negative, and that the effects of conflict might depend on the type of conflict involved. Specifically, Evan postulated that interpersonal conflict should have a negative effect on work group performance, while task conflict might prove beneficial. By correlating self-report measures of conflict to the performance of R & D groups, Evan's data showed a significant negative relationship between interpersonal conflict and performance but no clear relationship between task conflict and performance. As shown in Table 1, quite similar results were obtained in this study when knowledge

of performance was the manipulated independent variable. Knowledge of high performance caused subjects to perceive less interpersonal conflict (greater group cohesiveness), while there was a tendency (but not totally consistent) to rate a high performing group as being higher in task conflict. Evan's relatively complex relationship between conflict and performance was thus replicated when knowledge of performance was the manipulated independent variable.

A second test of the attribution hypothesis is provided by the data on intragroup influence. Within several organizational settings, Tannenbaum (1968) has found that the amount of total control or influence was significantly related to organizational effectiveness. In each of these studies (Smith and Tannenbaum, 1963; Tannenbaum, 1962, Tannenbaum, 1968), self-report measures of influence are correlated with objective measures of organizational performance. Although Tannenbaum has interpreted these findings as indicating that greater total influence causes improved performance, an attribution interpretation is also plausible. In fact, the hypothesis that individuals attribute greater influence to high rather than low producing groups is generally supported by the data of this experiment.

The data on quality and quantity of communication also provide support for the attribution hypothesis. Although communication has previously been found to correlate with organizational effectiveness (see Price, 1967), the direction of causation has not been clear. In this experiment, however, members of high producing groups inferred higher quality communication to their groups and tended also to infer a greater

quantity of communication. In addition, persons with knowledge of high performance tended to rate their teammates as being more open to change (see Likert, 1961, 1967, for concomitant correlation), and perceived both themselves and their teammates as being higher in motivation (see Galbraith and Cummings, 1967, for concomitant correlation).

Although the data of this experiment are generally supportive of the attribution hypothesis, it should be noted that some of the data can be explained by alternative processes. For example, one indicator of group cohesiveness (enjoyed working with teammates) may have been higher among persons assigned to High Performance groups due to the reinforcement associated with task success. Although this explanation would also clearly apply to the measure of task satisfaction, it would not, however, be as applicable to other intragroup processes measured on the questionnaire (e.g. influence, conflict, communication, motivation, and openness to change).

A second alternative interpretation is suggested by the data on intragroup influence and motivation. Because persons assigned to Low Performance groups attributed less influence to themselves and rated themselves as lower in task motivation than persons in High Performance groups, an ego-defensive process is suggested (Weiner, 1971). One problem with the ego-defensive explanation, however, is that subjects also rated their teammates' motivation as lower under the Low Performance condition, and this result would not be predicted by an ego-defensive process. A second problem with the ego-defensive explanation

is that subjects rated their own ability under Low Performance conditions as significantly lower than that of their teammates. Clearly, if an ego-defensive process were operating, one would expect subjects to depreciate their teammate's ability under low group performance, while keeping their own rated ability intact.

In sum, the results of this experiment support the contention that knowledge of performance is a relatively potent independent variable. Moreover, the overall pattern of results can be more parsimoniously explained by an attribution theory than by either a reinforcement or ego-defensive process. The attribution process posited here is that individuals hold distinct stereotypes of high versus low performing groups, and that persons will attribute these characteristics to a group based upon mere knowledge of its performance. So as to provide cross-validation of this attribution process, an "interpersonal simulation" (Bem, 1965) was also performed.

A Cross-validating Interpersonal Simulation

In order to provide specific data on the stereotypes individuals hold and the attachment of these stereotypes to high and low performing groups, an "interpersonal simulation" (Bem, 1965) was conducted. As described below, the study provided direct data on the attribution process in addition to important cross-validation of the experimental findings.

For the interpersonal simulation, sixty students were asked to participate in a study on perceptual accuracy. They were told that a large number of undergraduate business students had previously participated

in a group problem-solving study in which measurements were taken of intragroup processes and performance. Subjects were told that the researchers were interested in seeing how accurately individuals could assess intragroup processes based upon a minimal amount of information, and that their assessments would be compared to "true" observational measures of group processes collected over the past year. The "Financial Puzzle Task" (as used in the above experiment) was then thoroughly described to the subjects in both written and oral form. Subsequently, subjects were asked to rate a typical group of business undergraduates who had performed in the lowest (or highest) 20% of all three-man groups. Via random assignment, thirty subjects were asked to rate a high performing group and thirty a low performing group. Efforts were made to keep the rating scales as similar as possible to those used in the previous experiment.

Insert Table 3 about here

As shown in table 3 the results of the "interpersonal simulation" followed closely those of the previous study. High performing groups were perceived to be higher in cohesiveness, total influence, quality and quantity of communication, motivation, and openness to change than low performing groups. As in the previous experiment, interpersonal conflict (i.e. low group cohesiveness) was negatively related to performance, while task conflict tended to be positively associated with performance. Likewise, total influence was perceived to be greater in high rather than low performing groups. However, because persons in the interpersonal simulation did not actually participate in

a problem-solving group, total influence was not measured by a combination of the rated influence of self and one's teammates. Instead, total influence was measured by, 1) combining the perceived influence scores for the "most influential" and "least influential" persons in the group, and, 2) by simply asking subjects to rate the influence of each group member. By either of these methods, total influence appeared to be positively associated with group performance.

Conclusions

The data of the true experiment and the interpersonal simulation, together, provide strong evidence for the attribution effect. The similarity of results from these two studies demonstrate that mere knowledge of performance may cause an individual to attribute one set of characteristics to a high performing group and a different set of characteristics to a low performing group. Supported by these data, the attribution effect thus constitutes a very plausible interpretation of correlations linking perceived group characteristics to work group performance. Moreover, though not yet specifically tested, this same attribution process may underlie many correlations between self-report data on individual characteristics (e.g. attitudes, perceived role conflict and ambiguity, perceived effort) and individual performance data, as well as many correlations between self-report data on organizational variables (e.g. openness, conflict, goal orientation, climate) and organizational performance data. In sum, the process by which individuals attribute the "causes" of performance may have important implications for the conduct of organizational research.

From the data presented here the attribution effect can be viewed as potentially more threatening to the interpretation of correlational findings than the simple reversal of causal sequences. As noted by Lowin and Craig (1968) and Farris and Lim (1969), an assumed direction of causation may be incorrect since performance can affect actual interpersonal behavior. However, actual reversals in causation do not always occur and often it is possible for the researcher to discount the probability of their occurrence on logical and theoretical grounds. In essence, the more intuitively obvious or plausible is a particular causal sequence, the safer it is for researchers to discount its actual reversal. In direct contrast, the attribution interpretation posits that organizational participants possess theories of performance just as do organizational researchers. Thus, the more intuitively obvious or plausible is a theory of organizational behavior, the more likely is a correlation between self-report data and performance to be threatened by an attribution interpretation. Since there are no doubt a greater number of obvious than non-obvious findings in organizational research, the attribution effect may therefore be a greater threat to cross-sectional findings than actual reversals in causal order.

Clearly, a major problem still facing the field of organizational behavior is a dearth of firm causal findings. The results of this study, together with previous experiments on the effects of performance, underscore the need for organizational research with methods more conducive to causal inference. Three primary solutions to this dilemma

have already been posited, but not yet widely adopted. First, by conducting longitudinal studies using cross-lag correlation procedures (Pelz and Andrews, 1964; Vroom, 1967) there can be an improvement in our knowledge of causal order. (It should be noted, however, that the use of cross-lag correlational techniques implies equal time lag in the causal links $X_{t1} \longrightarrow Y_{t2}$ and $Y_{t1} \longrightarrow X_{t2}$). Second, by conducting true and (strong) quasi-experiments within organizations, we may be able to increase the internal validity of our findings without unduly sacrificing external validity (Campbell and Stanley, 1963; Cook and Campbell, 1974). Both as consultants to planned organizational changes and as documenters of naturally occurring organizational changes (Staw, 1974), there are many opportunities to obtain data from which causal inferences may be drawn. Third, it may be possible to constructively combine the advantages of laboratory and field methods in the investigation of organizational processes (McGrath, 1964; Evan, 1971). By coordinating laboratory and field studies (e.g. in terms of chosen variables and measurement instruments) the resultant findings could be high in both internal and external validity.

Footnotes

1 The author is indebted to Greg R. Oldham for his comments on an earlier version of this paper, and to Ramamoorthi Narayan for serving as an experimenter in this research.

2 Farris & Lim (1969) interpreted their data as knowledge of performance affecting actual supervisory behavior. However, these data can also be alternatively interpreted by an attribution effect. Persons playing subordinate roles in the study may have learned from their leaders that they were members of a high or low performing work group, attributed this past performance to the foreman's leadership capabilities, and then reported these characteristics on the post-experimental measures of perceived leadership behavior. It is therefore possible that knowledge of performance did not affect actual supervisory behavior but only subordinates' perceptions of it.

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Table 1

Effect of Knowledge of Performance
on Individual Perceptions of Intragroup Processes

	<u>Low</u> Performance	<u>High</u> Performance	<u>t</u> Value
<u>Cohesiveness</u>			
Cohesiveness of group	6.70	7.83	1.68**
Enjoy working with teammates	7.23	8.25	1.81**
Liking for teammates	8.77	9.23	1.04
Combined cohesiveness score	7.57	8.43	1.72**
<u>Influence</u>			
Teammates influence on task solution	7.57	7.43	-.24
Own influence on task solution	6.00	7.73	2.47***
Combined influence score	6.78	7.58	1.86**
<u>Communication</u>			
Quality of communication	6.77	7.93	1.75**
Quantity of communication	6.47	7.30	1.33
Combined communication score	6.62	7.61	1.77**
<u>Task Conflict</u>			
Differences in ideas about methods to solve problem	4.83	4.93	.17
Confrontation of ideas with teammates	5.34	7.03	1.97**
<u>Openness to Change</u>			
Openness of teammate to ideas and suggestions about solving problem	7.73	8.55	1.52*
Extent teammate attempted to force his position on you (scale reversed)	8.53	9.21	1.02
Combined openness score	8.14	8.88	1.49*

* $p < .10$, one-tailed test

** $p < .05$, one-tailed test

*** $p < .01$, one-tailed test

Table 2

Effect of Knowledge of Performance on
Satisfaction, Motivation, Ability, & Role Clarity

	<u>Low</u> <u>Performance</u>	<u>High</u> <u>Performance</u>	<u>t</u> <u>Value</u>
<u>Motivation</u>			
Teammates' interest in performing well	4.67	7.90	3.87***
Own interest in per- forming well	4.73	7.47	5.33***
Combined motivation score	4.70	7.68	5.24***
<u>Ability</u>			
Teammates' ability	5.50	7.13	2.60***
Own ability	3.57	6.80	5.64***
Combined ability score	4.54	6.96	5.00***
<u>Satisfaction</u>			
Enjoyed working on financial task	3.47	7.20	5.93***
<u>Role Clarity</u>			
Clarity of instructions for the task	7.23	8.70	2.20**

* $p < .10$, one-tailed test

** $p < .05$, one-tailed test

*** $p < .01$, one-tailed test

Table 3

Effects of Knowledge of
Performance for Int rpersonal Simulation

	<u>Low</u> <u>Performance</u>	<u>High</u> <u>Performance</u>	<u>t</u> <u>Value</u>
<u>Cohesiveness</u>			
Cohesiveness of group	3.00	8.67	17.18***
Enjoyed working with teammates	4.10	8.10	10.62***
Liking for teammates	4.93	7.50	7.17***
Combines cohesiveness score	4.01	8.09	15.46***
<u>Influence</u>			
Influence of each member	5.17	6.97	3.49***
Influence of "most influential" member	8.90	8.90	.00
Influence of "least influential" member	2.60	4.03	2.74**
Combined influence score	5.75	6.47	2.21*
<u>Communication</u>			
Quality of communication	2.93	8.80	17.08***
Quantity of communication	4.50	8.37	8.22***
Combined communication score	3.72	8.58	14.47***
<u>Task Conflict</u>			
Difference in ideas about methods to solve problem	6.80	6.50	-.53
Confrontation of ideas with teammates	5.30	7.03	2.98**
Combined task conflict score	6.05	6.77	1.53 ⁺

Table 3
(Continued)

	<u>Low</u> <u>Performance</u>	<u>High</u> <u>Performance</u>	<u>t</u> <u>Value</u>
<u>Openness to Change</u>			
Openness to ideas & suggestions about solving problem	4.27	8.07	7.27***
Extent group members ever attempted to force their positions (scale reversed)	4.03	4.30	.40
Combined openness score	4.65	6.68	5.04***
<u>Motivation</u>			
Group members' interest in performing well	3.33	8.30	11.84***
<u>Ability</u>			
Rated ability of group on task	2.90	8.93	19.13***
<u>Role Clarity</u>			
Clarity of instructions for the task	6.50	3.37	4.27***

+ p<.10, one-tailed test
 *p<.05, one-tailed test
 **p<.01, one-tailed test
 ***p<.001, one-tailed test



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