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Contributions to Judgment and Decision

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Running Head: CONTRIBUTIONS

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Abstract

This paper presents an overview of the theoretical, methodological, and applied contributions that the author's research program on prediction of performance has made to the literature on judgment and decision. It is shown that the rules people employ to combine information about motivation and ability in prediction of performance depend upon nature and difficulty of task as well as age, culture, and role of the judges. Also, subjects have separate initial opinions for cognitively distinct units, and they make imputations about unavailable information. Results from studies of school teachers and managers further disclosed that decision tasks have high construct validity and so they may be useful for the selection and training purposes. New directions for further research in judgment and decision are also discussed.

One of the more difficult tasks in evaluating any research program is determining its broad implications for theory-building, for applications, and for further research. A researcher has to ask a number of questions to himself or herself. What has he or she learned? What are the theoretical, methodological, and applied contributions that the research program has made? What are the new directions in which further research can be undertaken? The central task of this paper is to evaluate the performance of my research program on prediction of performance by school and college students, parents, school teachers, and managers. I shall first briefly describe the main theoretical, methodological, and applied contributions that my research program has made to the extant literature on judgment and decision, and then suggest the new directions in which further work could be undertaken.

Contributions to Judgment and Decision

Theoretical Contributions

Models of task performance. Heider (1958), Vroom (1964), and other theorists of motivation (cf. Anderson, 1974, p. 29) suggest that people mutiply motivation and ability in prediction of performance. Anderson and Butzin (1974) and Kun, Parsons, and Ruble (1974) empirically supported such a multiplying formulation.

The present research showed that the averaging model could be a viable alternative to the multiplying model. The averaging model takes on different forms, and is more pervasive than the normative multiplying model. We have presented unambiguous evidence for the constant-weight averaging rule (Gupta & Singh, 1981; Singh & Bhargava, 1985, 1986; Singh, Gupta & Dalal, 1979; Srivastava & Singh, 1986a, 1986b), the positive differential-weight averaging

rule (Singh & Mehta, 1986, fathers' judgment in easy exam; Srivastava & Singh, 1986b, eighth graders in puzzle contest), the negative differential-weight averaging rule (Singh & Mehta, 1986, mothers' judgement; Srivastava & Singh, 1986b, kindergarten through sixth graders in singing contest), and the discounted-weight averaging rule (Singh & Shobha, 1986) and against the relative-weight averaging rule (Surber, 1981a).

All the five forms of averaging mentioned above assume that all the given pieces of information are integrated simultaneously. Singh and Bhargava (1986) suggested another possibility. They noted, "... that manipulation of information reliability engenders averaging of external information with its correspopnding initial opinion at the first stage of integration and estimated values of motivation and ability are combined by the constant-weight averaging rule at the subsequent stage" (p. 27). Singh, Bhargava, and Norman (1986) and Singh and Upadhyaya(1986) convincingly demonstrated the operation of such a two-stage strategy. They also showed that the prospective and actual industrial managers multiply estimated values of motivation and ability from the first-stage integration at the second-stage of integration.

Considered together, there are now evidence for six different models of task performance. Five of these are different forms of the averaging model. They all appeared to have been caused by the different types of changes in the weight of motivation and ability information. Thus, they are indicative of different strategies of information processing. The sixth one is a multiplying model which reflects on a different rule of information integration. It is employed by a very small group of people, that is, industrial managers in India.

Determinants of models. When Singh et al. (1979) and Gupta and Singh (1981) obtained results different from those of Anderson and Butzin (1974) and Kun et al. (1974), they proposed a hypothesis of difference in cultural outlook between American and Indian students on how motivation and ability determine performance. As Gupta and Singh (1981) note,

> Americans follow a multiplying rule. They seem to believe that effort will be more effective with persons of high than of low ability. In contrast, Indian college students believe that effort will be equally effective with persons of low and of high ability. Perhaps they feel that each person, regardless of native ability, has equal opportunity to improve her or his lot (p. 817).

Since Surber (1981a) also obtained evidence for the averaging rule with American college students, she questioned the adequacy of the cultural difference hypothesis. She suggested that a hypothesis of task difficulty may perhaps be a better alternative. In a subsequent work, Surber (1981b) demonstrated that exams described as easy, moderately difficult, and very difficult in fact yield patterns of convergence, parallelism, and divergence, respectively. However, similar manipulations with Indian subjects (Singh & Bhargava, 1985, 1986) ruled out the plausibility of the hyothesis of task difficulty as well as of the relative-weight averaging found by Surber (1981a).

When we consider all the available data on prediction of performance, it appears now that age, culture, and role of subjects as well as nature and difficulty of task determine the rule people follow in combining information about motivation and ability. The same task invokes multiplying rule in managers but constant-weight

averaging rule in professors (Singh & Upadhyaya, 1986). Similarly, the same task which is handled according to the constant-weight averaging by students (Singh & Bhargava, 1986; Srivastava & Singh, 1986a, 1986b) is handled according to the discounted-weight averaging by school teachers (Singh & Shobha, 1986). These results argue for role differences in cognitive algebra.

Importance of cultural variables is indicated by two lines of evidence. First, manipulations of task difficulty (Surber, 1981b) and information reliability (Surber, 1981a) with college students in the United States yielded results quite different from those with Indian college students (Singh & Bhargava, 1985, 1986). Second, the multiplying-type rule evolves from adding-type rule in the United States (Kun et al., 1974; Surber, 1980). But the reverse is found in India (Srivastava & Singh, 1986b). While culture by itself can not account for all the results, it remains one of the determinants of cognitive algebra.

Culture and role of subjects also interact with difficulty of exam in prediction of performance. Exam difficulty affected pattern in the Motivation x Ability effect of American students (Surber, 1981b) but only the origin of the response scale in Indian students (Singh & Bhargava, 1985). This emphasizes importance of cultural variables in social cognition. But Indian mothers differed from not only Indian fathers but also college students in their response to the manipulations of exam difficulty (Singh & Mehta, 1986). While mothers had a uniform pattern of linear fan, fathers had different patterns at different levels of exam difficulty. This shows an interaction between culture and role of subjects and difficulty of task. The interpretation of Singh and Mehta that effectiveness of

motivation decreases with persons of low ability but increases with persons of high ability as difficulty of task increases is a new contribution to the literature.

The nature of task also determines the cognitive algebra. Younger children followed one type of rule in prediction of performance in signging contest but different rule in prediction of performance in puzzle-solving contest (Srivastava & Singh, 1986b). The same students of management employed the two-stage averaging-averaging model in prediction of exam performance (Singh & Bhargava, 1986b) but the two-stage averaging-multiplying model in prediction of life performance (Singh et al., 1986). One interesting finding of the present research program is that nature of task interacts with age of judges either at very young age (Srivastava & Singh, 1986b) or at late adolescence (Singh & Bhargava, 1986; Singh et al., 1986). High school and undergraduate college students uniformly follow the constant-weight averaging rule in all kinds of tasks.

Taken collectively, these results show that the multiplying rule suggested by Heider (1958) and Vroom (1964) is rather severely restricted. Furthermore, the rule one follows depends upon his or her age, culture, and role as well as upon the nature and difficulty of the task.

Separate initial opinions. Much of the research performed within the information integration paradigm has centered around the assumption that there is only one initial opnion,in the judges which they average with given information. This position has been extremely useful in accounting for the effects of set size of information (Anderson, 1981a, 2.4; Singh, 1977), source credibility (Anderson, 1981a, 4.4.3), and individual differences between judges

(Anderson, 1981a, 4.3). But the judgmental tasks have mainly been forming impressions of personality from qualitatively similar pieces of information. It is not surprising then that Anderson (1981a, p. 315) found no evidence for separate initial opinion for each distinct informational unit, though he suggested that separate initial opinions have great theoretical interest for studying flow of information processing.

Results reported by Singh et al. (1986) and by Singh and Upadhyaya (1986) clearly indicate that there are two different initial opinions, one about motivation and another about ability, in the judges. Without accepting presence of separate initial opinions for motivation and ability, it would not be possible to explain the two-stage strategy followed by subjects of Singh (in press), Singh and Bhargava (1986), Singh et al. (1986), and Singh and Upadhyaya (1986) as well as the difference in the locations of crossover interactions between reliability and value of motivation information and between reliability and value of ability information. This finding of presence of two separate initial opinions and its implications for tests of various models of information integration discussed by Singh et al. (1986) are important additions to the existing literature.

Effects of a third multiplying variable. The literature is full of studies showing that addition of a third supposedly multiplying factor engenders a task-simplification strategy. Subjects simplify complex tasks by using an adding rule in combining stimuli which should, on objective grounds, be multiplied (Slovic & Lichtenstein, 1968).

Singh (1986a) examined the effect of information about external opportunity, a third supposedly multiplying variable, on the rule

people follow in combining information about motivation and ability in prediction of life performance. He found inadequacy of the task-simplification explanation just as in past research (Singh, 1985) but wide individual differences in predictive models. The 11 models used by the 72 subjects who were studied for two days seemed to be attributable to their personal theories about life performance and/or to presence of separate initial opinions about opportunity, motivation, and ability (Singh et al., 1986).

Do judges remain passive? One of the criticisms of experimental social psychology made by Sinha (1981a) is that experimentalists force "... the subject to act as a passive information-processing machine rather than as an active agent who is information-seeking and information-generating. It amounts to a gross distortion of reality" (p. 220). Findings presented in the 12 preceding papers refute Sinha's notion that judges remain passive information-processor in experimental settings. Let me present three of the results to counter his point.

First, the finding that judges first average the given external information with their corresponding initial opinion to derive effective values and then combine them in prediction of performance (Singh & Bhargava, 1986; Singh et al., 1986; Singh & Upadhyaya, 1986) reflects on judges' active role in the classification of the given stimuli into relevant categories. Second, the same set of stimuli are handled differently by children, teachers, parents, and managers. Had judges remained a passive machine, they might not have utilized their own subjective experiences in interpreting and combining the given information. Finally, the result that judges impute value to unavailable information while making their

judgments (Gupta & Singh, 1981; Singh, in press; Singh et al., 1979; Singh & Upadhyaya, 1986) shows that judges indeed generate the information they need. Their judgments are not necessarily controlled by just the information supplied by the experimenters.

The three results mentioned above question Sinha's (1981a) assumption that the subjects in sociopsychological experiments remain a passive information-processor. No less important, the differences obtained across different subject populations, tasks, and types of unavailable information argue that judgments and decisions by experimental subjects are not as "a gross distortion of reality" as Sinha (1981a, p. 220) contends.

Cognitive development. In Piagetian theory, children up to the age of 7 years are assumed to have a general tendency to "center" on some particular aspect of the stimulus field. Their perception and judgment are supposed to be "caught and held by one or another dominant aspect of the perceptual field" (Elkind, 1975, p. 553). Anderson and Butzin (1978) suggested, therefore, that the number of statistically significant main effects in analysis of variance of the individual child could be indicative of his cognitive capacity. Although Gupta and Singh (1981) noted an age-trend in utilization of number of cues by children, they raised the possibility that statistically significant main effects may also reflect on relevance of the cues.

Srivastava and Singh (1986a) showed that kindergarten through fourth graders in India are capable of integrating upto four pieces of information efficiently. One notable aspect of this study was that each child was studied for three consecutive days, and he or she was given enough incentives on each day. The authors noted,

therefore, "... that presence of main effects of all the pieces of information given for judgment beyond doubt illustrates integrational capacity of children. But absence of such effects [in past research] does not necessarily show lack of integrational capacity" (p. 18).

Methodological contributions

Imputation problems. It has commonly been assumed in judgment research that the psychological processes invoked by two stimuli presented together can also be invoked by just one of those stimuli. This has led to the critical tests between adding and averaging models as well as between averaging and multiplying models in which judgments are also obtained from each of the various kinds of information presented alone. When the slope of the single-cue curves is steeper than that of one of the multiple-cue curves, the underlying rule of information integration is believed to be averaging (Anderson, 1981a, 2.3).

Results from the present research program show that such tests can not always be expected to be unambiguous. As Singh and Bhargava (1986) note,

... the slope of the single-cue curve may always be subject to alternative interpretations such as different integration models, low or high weight of initial opinion, and nature of imputations about missing information. Accordingly, it may be suggested that integration rule should preferably be determined from descriptions which avoid the problem of missing information. The two-cue and four-cue descriptions employed in the present experiment illustrate one such method of model diagnosis (p. 24).

One of the main methodological contributions of the present research program lies in showing that judges sometimes make imputations about missing information (Gupta & Singh, 1981; Singh et al., 1979; Singh & Upadhyaya, 1986) and hence the so-called critical tests between rules are not always unambiguous. Even when data from single-cue descriptions conform to the model detected from judgments of the two-cue and four-cue descriptions (Singh, in press; Singh & Bhargava, 1986; Singh et al., 1986), the possibility of imputation can not be ruled out definitely. So single-cue judgments are more suitable for studying imputation than integration rules (Singh, in press).

Multiple tests. One general tendency among judgment researchers has been to employ one or two tests of the model within the experimental design. In the present research, multiple tests of the same model were always made (cf. Singh & Bhargava, 1986; Singh et al., 1986; Singh & Shobha, 1986; Singh & Upadhyaya, 1986). This enhanced confidence in the generality and pervasiveness of the model. In addition, it helped to explain one failure, such as of Test 1 in Experiment 2 of Singh and Shobha (1986), by insensitivity of school teachers to the number of pieces of similar motivation information and not by the inadequacy of the discounted-weight averaging rule. Accordingly, it may be recommended that judgment researchers should include multiple tests of the model within the same experiment.

Do response reproduction processes change?. Surber (1981b, 1984a, 1984b) has argued that converging, parallel, and diverging patterns in the Cue 1 x Cue 2 effect on judgment can be produced by manipulating factors which affect the response reproduction

processes. Thus, the effect of task difficulty on prediction of exam performance (Surber, 1981b) and the age differences in prediction of performance on puzzles (Kun et al., 1974) could be accounted for by the changing response reproduction processes instead of by rule changes. Surber's (1984a, 1984b) argument is that the same rule can engender convergent, parallel, and divergent interactions if responses are reproduced by logarithmic, interval, and exponential judgment functions, respectively (cf. Mellers & Birnbaum, 1983).

Three results of the present research program illustrate the weakness of such an explanation of the changes in the pattern in the Cue 1 x Cue 2 effect. First, exam difficulty did not alter the pattern in the Motivation x Ability effect (Singh & Bhargava, 1985; Singh & Mehta, 1986, mothers' judgment). Although fathers' judgments were moderated by exam difficulty, the patterns did not conform to the requirements of Surber's (1981b) hypothesis of changes in response reproduction processes. Second, divergent interaction was replaced by parallelism over increasing age of children (Srivastava & Singh, 1986b). Assuming exponential judgment function at younger age would be counter-intuitive. Finally, the same experiment which obtained linear fan pattern in one two-way interaction obtained parallelism pattern in other two-way interactions (Singh et al., 1986; Singh & Mehta, 1986; Singh & Upadhyaya, 1986). Parallelism in even one two-way interaction is enough to establish linearity of the response scale (Anderson, 1981a, 1986; Singh, in press).

On the basis of these results, it may be said that Indian subjects always use the judgmental scale as an equal interval scale

(cf. Singh & Bhargava, 1985, p. 478). This is of great use to the study of attitudes and values which have so far been surveyed by Indian researchers using "ill-conceived, badly planned, and conducted without proper scientific procedure" (Sinha, 1981b, p. 14).

Realistic subject populations. According to Aronson and Carlsmith (1968/1975), "... an experiment is realistic if the situation is realistic to the subject, if it involves him, if he is forced to take it seriously, if it has impact on him" (p. 22). I have always been impressed by such an assertion of experimentalists. I also believed that a powerful manipulation would always engender the same reaction in all subjects. Thus, college students remained my favorite and convenient subjects in most experiments.

Results from the present research program have shaken my faith in the "external validity" or "outcome generality" (Anderson, 1981b) of the results obtained from college students. The main reason for such a change in my confidence has been discrepant results from student and nonstudent populations in the same task. Predictions by school teachers (Singh & Shobha, 1986) differed markedly from those by students (Singh & Bhargava, 1985, 1986; Srivastava & Singh, 1986b). Similarly, parents (Singh & Mehta, 1986) handled the same task in a much different manner than did college students (Singh & Bhargava, 1985). Imputation rules were also different for managers and students. Whereas the former used different imputation rules for different kinds of unavailable information (Singh & Upadhyaya, 1986), the latter followed the same imputation rule for both unavailable motiviation and unavailable ability information (Singh et al., 1986).

What do these discrepant results from student and nonstudent populations imply? One implication is that the processes used by students are not readily generalizable to nonstudent populations. This means that the generality of other results from samples of college students (e.g., Greenberg & Leventhal, 1976; Lanzetta & Hannah, 1969; Weiner & Kukla, 1970) to the populations of real interest needs to be checked. Generality of results obtained from college students has to be demonstrated. It can not be simply assumed.

Another implication is for sociopsychological theorizing itself. Most theories, including information integration theory (Anderson, 1981a; 1986), have a very narrow data base of college sophomores. As a result, our portrait of human nature and judgment processes is much more tentative than what we have generally believed. It is high time for us to move to more realistic and broader populations of subjects in order to have a general or group-specific theory of social processes (Sears, 1986; Singh, 1985).

Does error variance in individual child analysis decrease over increasing age?. As already mentioned in the subsection on cognitive development, the number of statistically significant main effects in individual child analysis are used as indices of cognitive capacity of the child. There is an obvious bias in such an interpretation, for response variability may decrease over increasing age of children. If it in fact happens, then the main effect of the same magnitude would be statistically significant for an older but not for a younger child.

Anderson and Butzin (1978, p. 602) found that error variance indeed steadily decreases from 4- to 8-year of age in equity judgments. Surber (1984b) has called this single demonstration of the decrease in error term over increasing age as a "well-known problem in developmental research" (p. 242).

Singh (1986b) analyzed error term from individual child analyses of the experiments by Gupta and Singh (1981) and by Srivastava and Singh (1986a, 1986b). He found that the mean error term sometimes decreases (Gupta & Singh, 1981; Srivastava & Singh, 1986b, puzzle contest), sometimes increases (Srivastava & Singh, 1986a), and sometimes remains constant (Srivastava & Singh, 1986b, singing contest) over increasing age of children. He suggested, therefore, that Surber's (1984b) description of decrease in error term with increase in age of children as a "well-known problem in developmental research" be corrected. Furthermore, he showed that error variance in individual child analyses can be better predicted from the nature of cues in the judgmental task (Srivastava & Singh, 1986a) as well as nature of judgment (Srivastava & Singh, 1986b) than from the age of subjects alone.

One methodological implication of the foregoing finding for developmental research is obvious. As Singh (1986b) puts it,

In research on integrational capacity of children, response variability along with the number of significant main effects over ages must as a rule be checked. Simply assuming that error variance remains constant or steadily decreases over increasing age may at times lead to erroneous conclusions about cognitive capacity of children (p. 13).

Applied Contributions

Since judgments and decisions by managers (Singh, 1985; Singh & Upadhyaya, 1986) and by mothers (Singh & Mehta, 1986) were closer to the prescritpions of equity theory (Adams & Freedman, 1976; Anderson, 1981a, pp. 77-80) and expectancy theory (Vroom, 1964) than those by students, the present integration tasks may be regarded as having high construct validity (cf. Singh, 1983, 1985). This has two important applied implications.

One implication is for the identification and measurement of managerial attitudes and values. Instead of the paper-and-pencil tests which have been customary in applied psychology, decision tasks may now be used to measure managerial attitudes and values.

Another implication is for training of young graduates as managers. The idealistic, egalitarian values fostered in them by their fathers (Singh & Mehta, 1986) and college professors (Singh & Upadhyaya, 1986) may not be very useful in their managerial career. They need to be exposed to managerial attitudes and values before they are actually placed on the job. Singh and Upadhyaya suggest, therefore, that a battery of decision tasks designed to measure managerial attitudes and values may be quite useful in identifying potential managers, training them in decision-making, and assessing effectiveness of their training programs.

The same approach may also be followed in training of school teachers who seem to suffer from ability and negativity biases. Singh and Shobha (1986) recommend that the teacher training programs should include materials on various determinants of student performance (Weiner, 1979) and also on fallibility of data in

student folders to remove these biases. Because teachers are more skeptical of positive than negative information about a student, the training materials must emphasize that negative information could be as fallible as positive information.

The applied contributions of the present research program thus lie in showing that decision tasks are of high construct validity, and that they may be useful in selection and training of managers as well as teachers. Also, judgmental tasks could be useful in identifying what should go as contents of the training program as discussed in case of school teachers (Singh & Shobha, 1986).

Implications for Future Research

There are four topics on which further research can be undertaken. They are briefly mentioned below.

Initial Opinions

Singh and Bhargava (1986), Singh et al. (1986), and Singh and Upadhyaya (1986) presented evidence for separate initial opinions, one about motivation and another about ability, in their subjects. Singh (1986a) and Singh and Mehta (1986) also discussed implications of such opinions for their three-factor tasks. Interestingly, Surber (1981a), who found evidence for the one-stage model, had evidence for just one generalized initial opinion (cf. Singh et al., 1986)

Future research on presence of separate initial opinions is needed. It is now necessary to collect enough data from each judge by manipulating information reliability to establish individual differences in weighting of their initial opinions and to find out the conditions under which the various implications of the presence

of separate initial opinions discussed by Singh et al. (1986) apply. Such analyses are important for determining organizing principles in information processing.

Imputations about Missing Information

There are two reports currently available in the literature on asymmetry in imputations about missing information. Singh (in press) found that missing generosity information was imputed a constant, average value; missing income information, however, was imputed a value equal to that of the given information about generosity. Exactly the same result was obtained by Singh and Upadhyaya (1986): Unavailable motivation information was imputed a constant, fixed value, whereas unavailable ability was imputed a value as a direct function of given motivation information. What do these results imply? Two speculations can be made.

First, since one, two, and three cues of generosity/motivation were paired with one cue about income/ability in both studies, it is possible that the steeper slope of generosity-only/motivation-only curve actually arose due to averaging of similar cues at the first-stage of integration. This means that there is no asymmetry in imputation rule: The generosity-only/motivation-only and income-only/ability-only curves reflect on altogether different strategies in judgment. Whereas the steeper slope of generosity-only/motivation-only curve shows averaging of similar cues at the first-stage of integration, assimilation of the slope of income-only/ability-only curve in the linear fan pattern formed by the four-cue and two-cue curves illustrate imputation of a fixed, constant value to the unavailable generosity/motivation information. Although result found by Singh

et al. (1986) does not exactly fit within this interpretation, there are obvious methodological differences. It would be proper, therefore, to further study this problem by pairing several cues of motivation with one ability cue as well as by pairing several cues of ability with one motivation cue with the same group of subjects.

Second, imputation rules actually reflect on implicit theories of personality. When there is no direct relationship between given and missing information, the value of the missing information is likely to be a fixed constant. On the contrary, when the given and missing information have a definite relationship, value of missing information is likely to be inferred as a function of the given information. This interpretation raises the possibility that single-cue curves could also have shallower slope than two-cue ones (cf. Levin, Johnson, & Faraone, 1984; Yamagishi & Hill, 1981). Further work on such a possibility in prediction of performance is worth exploring.

It should also be added that imputations have generally been found at the level of adults only (Gupta & Singh, 1981; Singh, in press; Singh et al., 1979; Singh & Upadhyaya, 1986). When do children begin imputing values to unavailable information is also an important topic for developmental research.

It must be emphasized that concern for imputations is theoretically important for cognitive analyses. It does not, however, mean that all people will make imputations about missing information all the time. What is needed is an analysis of whether subjects actually make imputations (Singh & Shobha, 1986), and how imputations whenever they are made complicate model diagnosis. When judgments are obtained from information about just one of the cues,

it is necessary that imputation possibility be also examined in order to have clarity in model diagnosis as discussed under the section of methodological contributions.

Predictive Validity of Decision Tasks

In the section of applied contributions, it has been argued that decision tasks have high construct validity for the selection and training purposes. Those interested in applied research may consider using some of the decision tasks in selection and training of managers and school teachers and checking on their predictive validity. A research of this kind would certainly be a step in the right direction, for applied researchers are interested in external and predictive validity.

Appraisal of Performance with Its Causes

Many situations provide us with information about not only the performance but also the various causes that might have contributed to the performance. Examples of such situations are parents' reactions to exam performance of their children, teachers' reactions to performance of their students, and managers' reactions to performance of their subordinates. Under these circumstances, types of attributions made about the performance generally determine the way in which judges behave with the target person (cf. Kanekar, 1981). It is theoretically important to know how attributions of causality are made in relation to some of the known causes.

Consider one example. We all preach that one should do his duty without his concern for the outcome. This idea is analogous to the parallelism pattern in the Effort x Outcome effect on judgment of overall achievement. Parallelism would show that effort, the cause, is indeed judged independent of one's outcome,

the effect. Any deviation from parallelism will indicate differential weighting of effort at the different levels of outcome. This example is just to show the analytic power of integration-theoretical approach. Much more complex situations can also be handled using the same approach.

With enough work on prediction of performance, we now clearly need to move to analyses of appraisal of performance along with its various facilitative and inhibitory causes. How is reward allocated? How is feedback given? What are the differences between children, school teachers, parents, and managers in such a evaluations? The methods developed in the present work could readily be applied to appraisal of performance as well.

Concluding Comments

Success of a research program should be judged not by how voluminous is the report but by what knowledge it has generated, where the findings have been published, and how much research it has generated in the field. If we apply these criteria, the present program appears to have met with some success.

The findings have not only been published in (and are under reviews of) major journals of the field but have also generated some new issues (Anderson, 1986, in press; Levin & Johnson, 1984; Norman & Singh, 1986; Surber, 1981a, 1981b, 1984a, 1984b, 1985a, 1985b; Yamagishi & Hill, 1981). However, this initial success is not as much a matter of pride as it is a matter of curiosity to me. I personally am eager to learn about the replicability, applications, and extensions of the findings of the present research program by colleagues working in other institutions in India as well as abroad.

Confirmation of results in similar settings, that is, with similar tasks, subjects, and methods, is theoretically and methodologically as important as disconfirmation in different settings. Both reflect on scientific progress of the field, and this is what I have always been interested in and arguing for. The present research program has further confirmed my earlier "expectation that social psychology will grow even more scientific in the years to come" (Singh, 1981, p. 237).

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