

## Escalating Commitment in Individual and Group Decision Making: A Prospect Theory Approach

GLEN WHYTE

*Faculty of Management, University of Toronto, Toronto, Ontario, Canada*

An explanation for escalating commitment based on prospect theory (Kahneman & Tversky, 1979) is extended to the group level of analysis. Hypotheses concerning the likelihood and degree of escalating commitment of individuals and groups were derived from the model and tested using six investment decision scenarios. Subjects responded to decision dilemmas in which substantial funds have been invested in a failing course of action. Subsequent investment would likely exacerbate although it could potentially reverse the situation. Consistent with hypotheses derived from the model, escalating commitment occurred in both individual and group decision making. Group decision making amplified trends apparent at the individual level in terms of the frequency with which escalation occurred and its severity. Although the results are consistent with a prospect-theory-based explanation of escalating commitment at two levels of analysis, support for the self-justification approach was also found. Motives for self-justification, however, do not appear to be a necessary condition for escalation to occur. © 1993 Academic Press, Inc.

Some of the most important and difficult decisions made in organizations involve escalation situations. In these situations, costs have been incurred in the pursuit of an objective that is unlikely to be achieved, regardless of future endeavors. In many cases, the difficulty in deciding whether to invest additional resources in a losing course of action leads to a process of escalating commitment. Examples of such behavior have been observed in interpersonal relations (e.g., Rusbult, 1980), waiting situations (e.g., Rubin, 1981), gambling (e.g., McGlothlin, 1956), economic investment (e.g., Thaler, 1980), and policy making (e.g., Janis, 1982).

The phenomenon under discussion has several names. "Too much invested to quit" (Teger, 1980), the sunk cost effect (Arkes & Blumer, 1985; Thaler, 1980), the dead loss effect (Kahneman & Tversky, 1984), and entrapment (Brockner & Rubin, 1985) all refer to the tendency to continue an endeavor, regardless of its merits, once an investment in time, effort,

The author is grateful to Victor Vroom, Richard Hackman, and Robert Abelson for comments and suggestions on previous drafts. Address reprint requests to Glen Whyte, Faculty of Management, University of Toronto, 246 Bloor Street West, Toronto, Ontario, Canada M5S 1V4.

or resources has been made. The shared element across terms is the recognition that people often consider sunk costs relevant in decision making. Such reasoning, although common, violates a fundamental tenet of standard economic rationality and can lead to normatively inappropriate choices (Thaler, 1986). Sunk costs refer to irrevocable investment in a course of action, and are irrelevant according to classical economic and normative decision theory because they cannot be changed by future action.

Numerous psychological and social factors contribute to persistence in the absence of economic justification for such action. A partial list of factors includes a preference for consistency (Staw, 1981), a desire not to waste resources (Arkes & Blumer, 1985), modeling processes, the nature of one's opponent, audience effects (Brockner *et al.*, 1984), interpersonal competition (Teger, 1980), and political vulnerability (Fox & Staw, 1979). The theoretical mechanism considered most important to escalation, however, is self-justification (Bazerman, Giuliano, & Appelman, 1984; Staw & Ross, 1987). As some writers suggest, "It has become fashionable to explain such escalating commitment through mechanisms of self-justification" (Sandelands, Brockner, & Glynn, 1988, p. 208). In the self-justification paradigm, individuals have a strong need to be correct or accurate in decision making. As a result, they are likely to want to justify their actions to prove to themselves and others that they are indeed competent and rational (Staw, 1980). The need to demonstrate the rationality of previous decisions results in escalating commitment as a means to make earlier failing decisions pay off.

Several studies demonstrate that self-justification motives, induced by personal responsibility for initiating a failing course of action, contribute to escalation at the individual level of analysis (e.g., Staw, 1976; Staw & Fox, 1977; Bazerman, Beekun, & Schoorman, 1982; Caldwell & O'Reilly, 1982; Ross & Staw, 1986). Yet there are reasons to question the relevance of self-justificatory motives to group decision making in escalation situations. Group decision making, as that term is used here, refers to any decision made on the basis of consensus after thorough discussion of the alternatives.

For example, many groups that were without prior behavior to justify have been guilty of persistence in error; the initial decision to undertake the failing policy was made by others. Tuchman (1984) documents several instances of governments that pursued policies contrary to their own interests in the face of substantial evidence indicating the inappropriateness of such behavior. Tuchman confined her analysis to policies that were the product of group decision making and that persisted over more than one political lifetime. The latter constraint removes many of the better known historical examples of persistence in error from suscepti-

bility to the self-justification approach, since this approach is inapplicable in the absence of personal responsibility for previous incorrect choices. Consider American escalation in the Vietnam War, frequently cited as the contemporary archetype of escalating commitment to a losing course of action (Teger, 1980). This policy fiasco, committed under the Johnson administration, is an example of injudicious commitment escalation in the absence of personal responsibility for the initial failing decision. It is also an example of commitment escalation in group decision making (Janis, 1982), although the focus of most of the theoretical and empirical work has been on the individual level. This leaves a considerable gap, because only rarely are important industrial, military, and political decisions made by individuals acting alone.

Although one study found no significant difference between individuals and groups in the average amount of resources committed to a failing venture (Bazerman *et al.*, 1984), there is a need to specify the ways and the conditions under which group decisions will differ from individual decisions in escalation situations (Brockner & Rubin, 1985). A solid theoretical basis exists for the belief in such differences, including a voluminous literature on group polarization that documents the tendency of groups to make more extreme decisions than individuals (Myers & Lamm, 1976). It is also likely that self-justificatory motives are of reduced importance in group decision making. Studies of group behavior (e.g., Darley & Latane, 1968; Mynatt & Sherman, 1975; Zimbardo, 1970) demonstrate consistently that group members experience less personal responsibility for actions of the group than they experience for their own individual behavior. Hence, there is less reason to believe that self-justificatory motives will be aroused subsequent to a group decision to initiate a failing project.

To address the absence of a broadly applicable explanation for escalation at the group level of analysis, a model of escalating commitment based on prospect theory (Kahneman & Tversky, 1979) is extended to the group level. Prospect theory appears relevant across levels of analysis and can be invoked regardless of personal responsibility for the decision to commence a failing project. Tests of hypotheses derived from the model are then conducted by examining differences between individual and group responses to identical escalation situations. Predictions of the model are tested in a laboratory setting using a methodology that requires subjects to decide whether to escalate commitment to a losing course of action.

## A MODEL OF GROUP ESCALATION

### *The Framing of Decisions*

Decision frame refers to a decision maker's perception, in terms of

gains or losses, of the possible outcomes of a risky decision (Kahneman & Tversky, 1984). Whether a particular outcome is regarded as a gain or a loss, however, depends on the reference level used to evaluate potential outcomes. Framing effects occur when the same outcome can be framed either as a gain or a loss depending on which reference level is used. For example, if you received a \$5,000 raise but expected \$10,000, have you experienced a gain or a loss? Your answer depends on whether you use your former salary level or your expectations as the reference point from which to evaluate the situation.

It matters whether a decision is framed in terms of gains or in terms of losses, because people usually prefer risky options when choosing between losses but avoid risky options otherwise. A choice between losses refers to a choice between a certain loss on one hand, and potentially even greater losses combined with the chance of avoiding those losses on the other. An example of a preference for risk in a choice between losses would be the avoidance of a \$50 loss in favor of a gamble with an even chance of a \$100 loss or no loss at all. In contrast, most people would accept \$50 in lieu of a gamble with an even chance of \$100 or nothing. This characterization of risk preference is discussed in detail by Kahneman and Tversky (1979) in their explication of prospect theory.

Several social scientists agree that prospect theory provides the theoretical devices to explain commitment escalation at the individual level of analysis (for a more detailed treatment of these issues, see Arkes & Blumer, 1985; Bazerman, 1983; Laughhunn & Payne, 1984; Levi, 1981; Thaler, 1980; Whyte, 1986). In brief, prospect theory implies that when sunk costs are incurred in a losing course of action, and these costs still possess economic value in their original use or have yet to be fully depreciated, subsequent decisions concerning whether to continue the initially chosen course of action are likely to be framed as a choice between losses. Project abandonment is perceived as accepting a certain loss, whereas escalation is perceived as possibly increasing losses combined with a chance that losses may be avoided. The belief that sunk costs are relevant in decision making, an error to which even practicing managers are susceptible (Thaler, 1986), creates the perception of a choice between losses. Individuals, when faced with such a choice, risk further losses to prevent otherwise certain losses because of a general aversion to wasting resources (Arkes & Blumer, 1985). Escalating commitment is the natural consequence of negatively framing a decision about the fate of an entire course of action, and will occur regardless whether motives for self-justification have been aroused by personal responsibility for previous failing choices. Prospect theory determinants are of potential importance to a large category of escalation situations, even when these determinants

operate simultaneously with others, including motives for self-justification.

### *Group Decisions in Escalation Situations*

If framing effects and the aversiveness of certain losses generate escalating commitment in individual decision making, are the same factors operative at the group level? Since the dynamic of commitment escalation can lead to decisions that violate the rationality of standard economic models, perhaps a group is more likely than an individual to recognize the pathology of such behavior. Groups, for example, may have the capacity to employ multiple frames, thereby diluting the impact of one specific frame (Neale, Bazerman, Northcraft, & Alpers, 1986). If that is the case, then escalating commitment should occur less frequently in group than in individual decision making.

In contrast, a review of the literature on group performance does not support the view that groups are inherently more capable than individuals (Hackman & Morris, 1975). Several recent studies report the phenomenon of groups exacerbating individual level biases (e.g., Argote, Seabright, & Dyer, 1986; Nagao, Tindale, Hinsz, & Davis, 1985). If groups generally exacerbate trends at the individual level, then escalating commitment may occur more frequently in group than in individual decision making. This proposition is supported by studies showing that prospect theory accurately describes the behavior of organizations, not just individuals (e.g., see Fiegenbaum & Thomas, 1988, for a review of this literature), suggesting that the behavioral propositions on which prospect theory is founded may not be moderated in a social context.

Although prospect theory is concerned strictly with individual choice behavior, it is possible to elevate prospect theory to the group level of analysis. The processes to be discussed imply that group decision making should have two major effects: (1) the escalation tendency will occur more often than in individual decision making, and (2) the escalation tendency will be more severe than in individual decision making. That is, in a social and organizational context, an escalation dilemma will be more likely to elicit escalation and will induce greater commitment to the failing project than would otherwise be the case. Two well-established products of group interaction are suggested to undermine the ability of groups relative to individuals to cope effectively with commitment dilemmas. Further discussion will focus on pressures for uniformity and group polarization, both of which are produced by social interaction.

*Uniformity pressures.* The task of a decision making group is to produce a group position from the initial preferences of its members. Although unanimity is unlikely at first, the sharing of opinions, information,

and arguments provides the means by which mutual influence can lead ultimately to consensus. This mutual influence results in a tendency for group members to move toward the majority position in the group, even when there is no requirement for uniformity and even when the position taken by the majority is wrong (Janis, 1982).

The tendency for a member's responses to conform more closely to that of the group after exposure to group discussion has been demonstrated in a variety of contexts. Although minority viewpoints can be influential under certain conditions, conformity to the majority view is the dominant form of behavior (Moscovici, 1984). Hence, if a majority of group members initially advocate increasing commitment in an escalation situation as prospect theory implies, uniformity pressures will facilitate conformity to the majority view and ensure that the majority preference is reflected in the group decision. If, as suggested, an initial majority is sufficient to dictate the decision taken in an escalation situation, then reliance on a group rather than an individual to resolve an escalation dilemma will increase the frequency with which escalation occurs.

In support of the view that a proescalation majority will rule in escalation situations, evidence indicates that the strength of the tendency for group members to conform to the majority view is most powerful under two conditions (Ferrell, 1985). The first condition is uncertainty about the appropriate response; with increasing uncertainty the majority effect increases (Asch, 1951). Rarely in escalation situations is there an obvious correct choice. Group members as a result will be compelled to seek information from others in making their decision (Festinger, 1954). The second condition that encourages individual conformity to the view of the group is the need to maintain a good relationship with other group members. The organizational context in which the most important escalation situations arise will ensure that this condition is also operative. An organizational setting should induce concerns about social desirability, continued membership in the group, and a desire to maintain the group as a functioning entity (Janis, 1982).

*Group polarization.* Several hundred studies demonstrate that when group members have, on average, a moderate preference for a particular point of view, group discussion will increase the strength of this preference (Isenberg, 1986; Myers & Lamm, 1976). For example, as Fraser, Gouge, and Billig (1971) illustrate, a three-person group with individual rankings of +3, +1, and -2 on an attitude scale might all put down +1 after discussion. Polarization has occurred in the shift in the mean from +.67 to +1. Group member responses have also converged, as pressures for conformity would predict. Although this pattern is typical, polarization has been demonstrated without group convergence, indicating that

convergence is a concomitant rather than an essential feature of polarization (Myers & Lamm, 1976).

Group decisions usually manifest polarization but are not necessary for this effect to occur: a short period of discussion followed by individual decision making also leads to an enhancement of the tendency dominant among group members prior to discussion (Myers & Lamm, 1977). This effect is reliable, although usually not large, and is the product mainly of informational influence and social comparison processes (see Myers & Lamm, 1976, and Isenberg, 1986, for reviews of studies investigating the causes of polarization). Informational influence refers largely to exposure to a preponderance of persuasive arguments in favor of the majority view. Social comparison processes refer to the desire to perceive and present oneself in a socially favorable light. To do this, we determine how others present themselves and then adjust our self-presentations accordingly.

The occurrence of polarization during discussion of escalation dilemmas is consistent with an impressive array of findings in social psychology. Several studies employing diverse methodologies confirm that a group will be inclined to be more risky than its average member was before participation in group discussion, when that average member had an initial preference for risk (e.g., Doise, 1969; Runyan, 1974; Zaleska, 1976). Observations in the field are also consistent with the changes implied by the polarization effect (Myers, 1982).

These studies relate to group behavior in escalation situations in the following way. Escalation dilemmas appear to consist of a choice between a sure loss and the possibility of an even larger loss combined with a chance to avoid otherwise certain losses. Given such a frame, most group members will initially prefer the risky option over the certain loss, even when the former option possesses a lower expected value than the latter. Polarization is then hypothesized to occur. Social interaction will amplify the dominant initial preference for risk that characterizes group members. Hence, group decisions should, on average, manifest a stronger preference for risk in escalation situations than will individual decisions made prior to discussion in response to the same escalation dilemma. This increased preference for risk should lead groups to take greater chances and to invest more resources than will individuals to rescue a failing course of action.

## HYPOTHESES

The following testable hypothesis derives from a prospect-theory-based approach to commitment escalation in individual and group decision making.

H1: Escalating commitment to a failing project will occur in individual and group decision making regardless of personal responsibility for past related sunk investments.

Additional testable hypotheses are required to specify the ways in which individual and group decisions will differ in the domain of escalating commitment.

H2: Escalating commitment will occur more often in group decisions than in individual decisions taken in response to the same commitment dilemma.

H3: Group decisions will manifest a higher degree of escalation than individual decisions taken in response to the same commitment dilemma.

## METHOD

*Sample.* A total of 325 subjects, 133 women and 192 men, participated in the study; 200 subjects were graduate students, and 125 subjects were senior undergraduate students of business administration enrolled in a course on organizational behavior. Subjects had an average of approximately 2 years full-time work experience. Average age of subjects was 25 years.

*Study design.* A  $6 \times 3 \times 2$  (scenario  $\times$  decision frame  $\times$  performing unit) mixed factorial design was used to examine individual and group decision making in escalation situations. To investigate the hypotheses, six hypothetical investment decision scenarios were written and pretested in a pilot study with 80 subjects. The scenarios required subjects to make decisions under risk in the role of an investment administrator. In the experimental conditions, subjects were asked to imagine themselves as administrators in charge of allocating resources to a failing project, with the option of withdrawing from or increasing the commitment of funds to the original course of action. The experimental conditions of all scenarios describe escalation situations, defined as "predicaments where costs are suffered in a course of action and subsequent activities have the potential either to reverse or compound one's initial losses" (Staw & Ross, 1987, p. 39). Subsequent investment might ultimately save the failing project, but is highly likely to be in vain and possesses an expected value of \$0.

All participants made decisions about either scenarios 1–3 or scenarios 4–6, making scenario a nested-within-group, six-level between-subjects factor. The order of presentation of scenarios was not varied.

Three versions of each scenario were written, corresponding with the no sunk costs (control), sunk cost (SC), and personal responsibility for sunk costs (SC + PR) decision frame conditions. Decision frame was manipulated by the presence or absence of sunk costs incurred on the course of action described in the scenario and through the assignment of



personal responsibility for these costs. The addition of personal responsibility for sunk costs was expected to induce self-justificatory motives and to increase the likelihood that subjects would negatively frame decision outcomes in escalation situations, thereby further increasing the tendency to escalate commitment. All study participants were exposed to all decision frame conditions, making the decision frame variable a three-level within-subjects factor. The study employed a Latin-square design in which each decision frame condition appeared in each of the three order positions. Consequently, decision frame was balanced with respect to order of presentation, making order a three-level between-subjects factor.

In the control decision frame condition, a high risk, high return investment opportunity is described. The SC decision frame condition describes an investment identical to the control condition in terms of the rational economic criteria of future costs and benefits. The difference is that sunk costs have been incurred on the project as the result of an earlier risky decision made by someone else. The SC + PR decision frame condition is identical to SC with the exception that the sunk costs incurred on the project were described as the result of an earlier risky decision made by the decision maker now contemplating additional investment.

Performing unit refers to the entity faced with the decision making task, and includes individuals and groups consisting of five members. The order of presentation of the performing unit manipulation was the same for each subject: individual and then group. Consequently, performing unit is a two-level within-subjects factor. It is appropriate in laboratory studies comparing individual and group decision making to first request individuals to make a decision, and then assemble them into groups to make the identical decision (Myers & Lamm, 1976, 1977; Myers, 1982).

A schematic representation of the design is shown in Table 1. The term "booklet" was used to denote each of the six unique sets of stimulus materials used in this study. All booklets contain either scenarios 1-3 or scenarios 4-6, and all decision frame conditions, but each booklet pairs different scenarios with different decision frames and the decision frame

TABLE 1  
COMBINATION AND ORDERINGS OF SCENARIOS AND DECISION FRAME CONDITIONS FOR EACH BOOKLET

	Booklet version					
	a	b	c	d	e	f
Order of presentation within booklet <sup>a</sup>	1C 2SC 3SC + PR	1SC + PR 2C 3SC	1SC 2SC + PR 3C	4C 5SC 6SC + PR	4SC + PR 5C 6SC	4SC 5SC + PR 6C

<sup>a</sup> Number refers to scenario, capital letters to decision frame condition. C, control; SC, sunk costs; SC + PR, personal responsibility for sunk costs.

manipulations appear in different positions. Each participant received one booklet.

*Stimulus materials.* To facilitate generalizability of the conclusions drawn from the study, the decision frame manipulations were embedded within descriptions of six hypothetical investment decision scenarios. Six scenarios were used to provide multiple operationalizations of the independent variable decision frame. Multiple operationalizations help avoid "monooperation bias" (Cook & Campbell, 1979), a common threat to construct validity in experimental research.

Each scenario was several hundred words in length and provided a realistic context within which to situate the escalation dilemma. Experimental conditions of scenarios 1-6 described the choices facing (1) a bank vice-president who must decide whether to make a high risk loan to protect an earlier investment; (2) a director of new product development who must decide whether to invest funds in a last-ditch effort to develop a new product ahead of the competition; (3) an investor in the stock market who must decide whether to sell shares that have declined in value and likely will decline some more; (4) the head of the financial planning committee for a major utility who must decide whether to complete a project in light of a recent technological breakthrough made by a competitor; (5) a senior public official who must decide whether to close an expensive but superfluous airport; and (6) a company president who must decide whether to purchase one of the firm's suppliers to manufacture a product in which the firm has heavily invested. Control and experimental conditions of a representative decision scenario are found in Appendix 1. Personal responsibility manipulations for all scenarios are found in Appendix 2.

In addition to the contextual factors, scenarios contained financial information about the choice to be made, including the amount of sunk costs incurred to date on the project, the amount of potential additional investment available, the probability of total loss of the additional investment, the probability of receiving a return on the additional investment, and the potential net return on additional investment. A summary of this information is found in Table 2.

*Measures.* The primary dependent variable is the choice whether to make the investment described. The choices were "Yes," "No," and "Can't Decide." In the experimental conditions, a "Yes" response is tantamount to a decision to escalate commitment to a losing course of action. This variable measures the frequency with which the escalation option is preferred over the project abandonment option.

Secondary dependent variables measure more precisely the degree to which subjects were committed to the escalation option. Subjects were asked to quantify how much risk they would expose themselves to in an

TABLE 2  
SUMMARY OF FINANCIAL INFORMATION

Scenario	Sunk costs (experimental conditions only)	Amount of potential (additional) investment	Probability of total loss of (additional) investment	Probability of receiving a return on the (additional) investment	Potential net return on (additional) investment
1	\$ 400,000,000	\$ 100,000,000	.80	.20	\$ 400,000,000
2	3,500,000	500,000	.90	.10	4,500,000
3	30,000	10,000	.75	.25	30,000
4	3,000,000,000	1,000,000,000	.75	.25	\$3,000,000,000
5	180,000,000	20,000,000	.90	.10	180,000,000
6	8,000,000	2,000,000	.80	.20	8,000,000

effort to rescue the failing projects described in the scenarios. Subjects indicated the highest chance of losing additional investment they would take to try to turn the losing course of action around. Subjects also indicated the maximum amount of money, if any, they would invest under the conditions described. These measures can be used to determine if, and under what conditions, group discussion produces group polarization in escalation situations. Sample items to measure chance of failure and maximum amount are also found in Appendix 1.

The statistical analyses will examine the effects of the decision frame and performing unit manipulations on frequency and degree of escalation. First, the overall effects of the decision frame and performing unit conditions will be tested. Planned comparisons between the specific means of interest, as determined by the hypotheses, will then be conducted to test whether the hypotheses were supported.

*Procedure.* The study was conducted during class time in eight different classes at two Canadian business schools. A brief standardized introduction to the study was given. Subjects were asked to imagine they were faced with the choice described in each scenario, to consider the choice carefully, and to indicate in the space provided the decision they would make. Versions of the six booklets were randomly distributed to participants, subject to the constraint that each of the booklet conditions contained approximately the same number of subjects. Results of the study were used as the basis for later class discussion.

Subjects initially made individual decisions in response to the scenarios. Subjects were then formed into groups of five with others who had completed the identical booklet of scenarios, and were required to discuss the scenarios until every member of the group could agree on the appropriate response. If all group members were unable to agree after the alternatives had been thoroughly discussed, the groups were allowed to make a decision using any method they deemed appropriate.

After participating in group decision making, subjects responded a third time to the scenarios. These responses will not be used to assess the effects of decision frame and performing unit on escalation, but will be used to determine the extent to which group discussion produced preference shifts in individual group members.

## RESULTS

*Manipulation checks.* After turning in all materials, subjects completed a questionnaire containing several manipulation check items. Two checks were conducted on the decision frame manipulation. The items, tailored to fit each scenario, were as follows:

1. Was the notion that the previous related investment would become a waste of funds, unless additional investment was made, an important factor in your decision?
2. I felt that a decision not to make the additional investment would result in the suffering of a loss on the initial investment.

The first question required a response on a 5-point scale anchored by "not at all important" (1), and "very important" (5). Subjects responded to the second question on a 7-point scale anchored by "strongly disagree" (1) and "strongly agree" (7). Mean responses to the first question in the SC and SC + PR conditions were 3.3 ( $SD = 1.3$ ) and 3.5 ( $SD = 1.2$ ), respectively. Mean responses to the second question were 5.5 ( $SD = 1.6$ ) and 5.6 ( $SD = 1.5$ ). Responses to the questions indicate that, in general, subjects in the experimental conditions considered sunk costs important in decision making and framed choices about future courses of action as choices in the domain of losses.

Subjects were asked the following question, tailored to fit each scenario, pertaining to the scenario in which personal responsibility was assigned.

1. Who made the initial decision to undertake this line of investment? Potential response were: (1) I made it; (2) Somebody else made it; (3) I don't remember who made it; (4) It is unclear who made it; and (5) I don't know who made it.

Seventy percent or 229 of 325 subjects responded, "I made it" to this question. This percentage likely would have been higher but for the fact that this question was asked after the entire study was completed; only one of the three scenarios completed by each subject involved personal responsibility, and this scenario might have been in the first, second, or third position. These results indicate that the assignment of personal responsibility was moderately successful.

Average length of time required to complete the study was 70 min, with group decisions typically requiring 35–45 min. The deliberations of over half the groups were audio-taped and confirm in general that groups con-

sidered sunk costs important, adopted the decision frame implied by the problem, and engaged in thorough discussion before making a decision.

*Dependent measures.* To test for overall effects, univariate analyses of variance on group level data were conducted for a repeated measures design with one three-level within-subjects factor (decision frame), one three-level between-subjects factor (decision frame order), one two-level within-subjects factor (performing unit), and one six-level between-subjects factor (booklet with the combined scenario and order effects). The results of the univariate analysis for each dependent variable were examined to determine whether decision frame and performing unit had significant effects, testing for each effect separately.

*Decision to invest.* The proportions of individuals responding "Yes" to the scenarios in the control, SC, and SC + PR conditions are .29, .66, and .72, respectively. The corresponding proportions of groups responding "Yes" are .26, .77, and .94. The proportions of subjects responding "Yes," "No," and "Can't Decide" in all conditions to all decision scenarios are summarized in Table 3.

An arcsin transformation was performed on the proportion of "Yes" responses prior to analysis to stabilize variances, which tend not to be homogeneous in the case of proportions (Kirk, 1982; Winer, 1971). The analysis indicates that decision frame had a significant effect on frequency of escalation ( $F(2,59) = 122.6; p < .0001$ ). Performing unit also had a significant effect on frequency of escalation ( $F(1,59) = 83.5; p < .0001$ ). A significant interaction between decision frame and performing unit indicates that decision frame had a more pronounced effect on frequency of escalation in group decision making than in individual decision making ( $F(2,59) = 11.8; p < .0001$ ).

*Chance taken of losing additional investment.* Subjects were asked to state the maximum percentage chance of losing additional investment they would take to try to rescue the failing projects. The mean maximum percentage chances taken by individuals in the control, SC, and SC + PR conditions are 57.1, 73.8, and 77.6, respectively. The corresponding percentages for groups are 59.7, 80.7, and 84.2. The mean percentages for all conditions and scenarios are summarized in Table 4.

Decision frame and performing unit both had a significant effect on chance taken of losing additional investment ( $F(2,59) = 97.7; p < .0001$ ;  $F(1,59) = 22.7; p < .0001$ , respectively). No interaction effect was apparent in this case ( $F(2,59) = 0.7; p < .51$ ).

*Amount invested.* Subjects were also asked to state for each scenario the maximum amount of money they would invest under the conditions described. These amounts are summarized for all conditions and scenarios in Table 5. To combine amounts across scenarios, and to allow for meaningful comparisons across scenarios to be made, it is necessary to

TABLE 3  
SUMMARY OF RESULTS FOR DECISION TO INVEST: PROPORTION OF SUBJECTS  
RESPONDING "YES," "NO," AND "CAN'T DECIDE"

Scenario	Individual			Group consensus		
	Y	N	CD	Y	N	CD
Neutral decision frame—Control <sup>a</sup>						
1	.16	.84	0	0	.91	.09
2	.33	.58	.09	.27	.73	0
3	.16	.84	0	.09	.91	0
4	.24	.73	.04	.18	.82	0
5	.47	.45	.07	.64	.36	0
6	.38	.52	.10	.40	.50	.10
$\bar{x}$	.29	.66	.05	.26	.71	.03
Negative decision frame—Sunk costs <sup>b</sup>						
1	.65	.29	.05	.73	.18	.09
2	.58	.40	.02	.82	.18	0
3	.51	.44	.05	.64	.18	.18
4	.69	.27	.04	.82	.18	0
5	.76	.22	.02	.80	.10	.10
6	.76	.22	.02	.82	.09	.09
$\bar{x}$	.66	.31	.03	.77	.15	.08
Negative decision frame—Personal responsibility for sunk costs <sup>c</sup>						
1	.71	.20	.09	.91	.09	0
2	.65	.33	.02	.91	.09	0
3	.69	.31	0	.91	.09	0
4	.68	.30	.02	.90	.10	0
5	.78	.15	.07	1.00	0	0
6	.76	.15	.09	1.00	0	0
$\bar{x}$	.72	.23	.05	.94	.06	0

<sup>a</sup> n = 55 in each scenario except for scenario 6, where n = 50.

<sup>b</sup> n = 55 in each scenario except for scenario 5, where n = 50.

<sup>c</sup> n = 55 in each scenario except for scenario 4, where n = 50.

standardize amounts invested. Recall that additional amounts described as available to be invested in each scenario, if invested, possessed an expected value of \$0. Subjects were then given an option to invest more, or less, than this amount. Amounts invested by subjects were standardized by conversion to a percentage of the amount originally described as available for investment in each scenario. For example, if the project required an additional \$100 million, and subjects were willing to invest as much as \$125 million, this amount would be converted to 125. Standardized amounts are also summarized for all scenarios in Table 5.

The mean standardized amounts that individuals were willing to invest in the control, SC, and SC + PR conditions are 69.5, 104.9, and 107.2, respectively. The corresponding amounts for groups are 57.3, 100.9, and

TABLE 4  
SUMMARY OF RESULTS FOR CHANCE TAKEN OF LOSING ADDITIONAL INVESTMENT:  
MEAN MAXIMUM PERCENTAGE CHANGE

Scenario	Individual	Group consensus
Neutral decision frame—Control		
1	44.3	39.5
2	68.3	71.5
3	45.8	47.7
4	52.5	64.1
5	70.0	72.3
6	61.6	62.8
$\bar{x}$	57.1	59.7
Negative decision frame—Sunk costs		
1	73.3	74.5
2	80.7	91.0
3	61.3	71.1
4	70.8	70.9
5	79.5	95.8
6	77.0	80.5
$\bar{x}$	73.8	80.7
Negative decision frame—Personal responsibility for sunk costs		
1	75.7	80.9
2	83.9	90.0
3	70.2	76.4
4	71.4	77.5
5	82.3	93.5
6	82.1	86.8
$\bar{x}$	77.6	84.2

115.2. Decision frame had a significant effect on amount invested ( $F(2,59) = 51.0$ ;  $p < .0001$ ). No effect of performing unit on amount invested, however, is discernible ( $F(1,59) = 0.1$ ;  $p < .80$ ), and no interaction effects are apparent ( $F(2,59) = 1.7$ ;  $p > .18$ ).

*Planned comparisons.* Multiple planned comparisons (Keppel, 1982) were conducted between the control and SC conditions, and between the SC and SC + PR conditions. Decision to invest, chance taken of losing additional investment, and amount invested were all significantly higher in the SC condition than in the control condition ( $F = 144.1$ ,  $p < .0001$ ;  $F = 117.0$ ,  $p < .0001$ ; and  $F = 58.5$ ,  $p < .0001$ , respectively). Results for decision, chance taken, and amount were also significantly higher in the SC + PR condition than in the SC condition ( $F = 6.7$ ,  $p < .01$ ;  $F = 4.6$ ,  $p < .03$ ; and  $F = 3.2$ ,  $p < .07$ , respectively).

Contrasts were also performed between individual and group responses in each decision frame condition. These analyses reveal that group deci-

TABLE 5  
SUMMARY OF RESULTS FOR AMOUNT INVESTED: MEAN MAXIMUM DOLLAR AMOUNTS  
(STANDARDIZED AMOUNTS)

Scenario	Individual	Group consensus
Neutral decision frame—Control		
1	33,100,000 (33.1)	11,000,000 (11.0)
2	393,000 (78.6)	286,400 (57.3)
3	4,850 (48.5)	3,730 (37.3)
4	520,000,000 (52.0)	480,000,000 (48.0)
5	25,500,000 (127.5)	20,400,000 (102.0)
$\bar{6}$	1,540,000 (77.0)	1,760,000 (88.0)
$\bar{x}$	(69.5)	(57.3)
Negative decision frame—Sunk costs		
1	96,400,000 (96.4)	97,000,000 (97.0)
2	349,100 (69.8)	454,500 (90.9)
3	6,900 (69.0)	6,890 (68.9)
4	960,000,000 (96.0)	940,000,000 (94.0)
5	33,900,000 (169.5)	26,500,000 (132.5)
$\bar{6}$	2,570,000 (128.5)	2,440,000 (122.0)
$\bar{x}$	(104.9)	(100.9)
Negative decision frame—Personal responsibility for sunk costs		
1	111,000,000 (111.0)	116,800,000 (116.8)
2	448,100 (89.6)	545,500 (109.1)
3	8,930 (89.3)	9,270 (92.7)
4	940,000,000 (94.0)	1,020,000,000 (102.0)
5	30,500,000 (152.5)	31,400,000 (157.0)
$\bar{6}$	2,140,000 (107.0)	2,270,000 (113.5)
$\bar{x}$	(107.2)	(115.2)

sion making resulted in a marginally significant reduction in the frequency of investment in the control condition ( $F = 3.0; p < .09$ ), and a significant increase in the frequency of the decision to escalate in the SC and SC + PR conditions ( $F = 70.0; p < .0001; F = 104.2, p < .0001$ , respectively). Group decision making resulted in a significant increase in the chance taken in all three conditions ( $F = 5.0, p < .03; F = 16.1, p < .0002; F = 31.4, p < .0001$ , respectively). Group decision making significantly reduced the amount invested in the control condition ( $F = 5.8, p < .02$ ), had no effect on the amount invested in the SC condition ( $F = 0.2, p < .67$ ), and significantly increased the amount invested in the SC + PR condition ( $F = 3.7, p < .05$ ).

Subject responses exhibit a clear and consistent pattern. Regarding the decision whether to escalate, the chance taken, and the amount invested, individual subjects were considerably more favorably disposed toward escalation in the SC than in the control condition. The addition of per-



sonal responsibility further slightly enhanced the preference for escalation. Group decision making in general magnified the preferences that were apparent at the individual level.

*Social combination processes.* Individual decisions whether to escalate were tracked through group decisions and ultimately to individual choices made after group discussion. Consistent with arguments based on pressures for uniformity, an initial majority predicted 111 of the 130 group decisions (85%) in escalation situations. The combined total of group decisions made in the experimental conditions was 130, although 5 group decisions produced a "Can't Decide" response. Data were aggregated across conditions due to highly similar patterns of majority influence.

An initial minority in favor of escalation in an escalation situation, however, was very influential. Of the 24 decisions made by groups with an initial minority in favor of escalation, 12 of these decisions (50%) favored escalation. In contrast, an initial minority in favor of project abandonment in an escalation situation had almost no success in influencing group outcomes. Of the 101 decisions made by groups with an initial minority in favor of project abandonment, only 2 decisions (2%) reflected the initial minority position.

Pre- and postdiscussion individual decisions in escalation situations were compared to determine whether preference shifts occurred. The proportion of individual responses in favor of escalation increased from .29 to .30, from .66 to .74, and from .72 to .87 after group decision making in the control, SC, and SC + PR conditions, respectively.

## DISCUSSION

It is of theoretical and practical significance to compare individual with group decision making. Intuitively, many escalation situations involve choices that are so important it seems inappropriate to leave them to an individual. According to the results of this study, that intuition in some respects is not well founded. There was no evidence in terms of frequency of escalation, chance taken of losing additional investment, or amount of additional resources committed that group performance is superior to individual performance in this domain. Groups may perform better than individuals on some tasks, but decision making in escalation situations is apparently not one of them. In contrast to a prevalent assumption in group psychology, groups did not make fewer errors than individuals. Instead, groups increased the number of errors committed in escalation situations. The present results, however, are consistent with a large body of evidence on the effects of majority influence and group discussion on decision making.

The results also indicate that groups in escalation situations exacerbate tendencies dominant at the individual level, even if those tendencies are

counterproductive. Moreover, group interaction had opposite effects in the control versus experimental conditions on preferences for investment, although the choices across conditions were identical in terms of future costs and benefits. That is, in the control condition where the dominant tendency among individuals was to forgo the investment, group decisions increased this conservative tendency. However, when the predominant individual tendency was for escalation, as it was in the experimental conditions, group responses magnified this disposition. Magnification was largest in group decision making where personal responsibility for sunk costs had been assigned.

In terms of chance taken of losing additional investment, group decision making had the predicted polarizing impact in both experimental conditions. Although the magnitude of the increase in risk preference was not large, it was similar in both experimental conditions and more substantial than the increase sustained in the control condition.

The pattern of results was somewhat different when the amounts invested were examined. Consistent with group polarization, reliance on group process in the control condition resulted in a moderate decline in the amount of resources committed to the risky endeavor. Results in the SC condition are consistent with an earlier study that found no difference between individuals and groups in the average amount of resources committed to a failing venture (Bazerman *et al.*, 1984). It appears that the strength of the escalation tendency prior to group discussion in this case may not have been sufficient to lead to an exacerbation of trends apparent at the individual level. Group polarization cannot occur unless individual group members possess a sufficiently strong preference in one direction or the other when group discussion begins. Consistent with group polarization, group decision making in the SC + PR condition led to a moderate increase in the amount of resources dedicated to the losing course of action.

Regarding social combination processes and patterns of social influence, initial majority positions in favor of escalation in escalation situations were almost always reflected in the group decision. This pattern is consistent with predictions based on the notion of pressures for uniformity. However, the majority frequently did not rule in escalation situations when it was initially in favor of project abandonment. Why did the majority prevail in one situation but not in the other? The pattern of results indicates that majorities in favor of escalation were more committed to their initial positions than majorities in favor of abandonment, and hence were less susceptible to minority influence. Minorities in favor of escalation were also likely considerably more forceful in their opposition to the majority than were minorities in favor of abandonment, and hence

were able to shake the confidence of the majority and induce them to reexamine their views. Evidence demonstrates that if minorities provide from the outset of discussion a consistent and vigorous opposition to the majority, they can exert rather than merely submit to social influence (e.g., Moscovici & Faucheux, 1972; Moscovici & Personnaz, 1980).

The results also demonstrate that the proportion of individual responses in favor of escalation increased considerably after group decision making, and shed some light on the processes occurring in group decision making in escalation situations. These data indicate that group decisions were not simply individual decisions combined by a majority decision rule but mainly reflect real changes in individual preferences toward escalation. As the two primary explanatory mechanisms thought to underlie group polarization and conformity pressures, the motivation to perceive and present oneself in a socially favorable light as well as exposure to a preponderance of arguments in favor of the majority view are the factors most likely to explain much of the group shift toward escalation. The tendency to rely on majority rule in the absence of unanimity is a less important factor. In contrast, prospect theory and self-justification effects explain why there is a preference for escalation at the outset of group discussion, the strength of which can be used as a crude index of the group dynamics that are responsible for the shift toward escalation.

The results of this study are consistent at two levels of analysis with a prospect-theory-based explanation for the escalation phenomenon. Support for the self-justification approach was also found. A negative decision frame was sufficient to induce a frequent and pronounced tendency toward escalation in individual decision making. This propensity for escalation was exacerbated when individuals were motivated to perpetuate past errors, as when they were assigned personal responsibility for initiating the failing policy. Personal responsibility for initiating the failing course of action, however, does not appear to be a necessary condition for inappropriate escalation. Escalating commitment was pronounced in all six decision scenarios in the absence of personal responsibility, although frequency and severity of escalation were consistently increased by it. Escalating commitment in the absence of personal responsibility for previous expenditures is inexplicable when viewed through the lens of self-justification theory. Prospect theory determinants, in contrast, can be invoked to explain escalating commitment regardless of personal responsibility for previous failed choices.

Moreover, group decisions were more consistent with prospect theory than with individual decisions. Groups may possess the potential to employ multiple frames (Neale *et al.*, 1986), but sunk costs appear to powerfully frame subsequent choices in a negative way. As a result, alterna-

tive frames seem inappropriate and are unlikely to be used. Process analysis of group decision making in escalation situations is required to confirm this speculation.

The study of individual behavior in escalation situations has received increasing attention over the years, yet the phenomenon is likely most important at the group level because of the widely consequential and pervasive nature of group decisions (Donaldson & Lorsch, 1983). Prospect theory, motives for self-justification, group polarization, and pressures toward uniformity provide the theoretical mechanisms to explain a group decision to persist in a course of action that is unlikely to succeed. In the context of irrevocable commitments and as a result of group interaction, conditions favorable to the occurrence of the distinct processes of group convergence around an inappropriate option and group polarization will be established. Unless the tendencies of groups to succumb to these subtle and separate processes are overcome, perhaps by following a systematic decision making process (e.g., Janis, 1982), it is more likely than in individual decision making that escalating commitment to a losing course of action will occur. It is also likely that the option chosen will be even riskier than that an individual acting in isolation and facing the identical situation would have selected.

Future research should address the external validity of the present findings. The extent to which subjects were psychologically involved with the experimental task did not approach the level of involvement that actual decision makers experience in an organizational setting. This suggests, however, that since the manipulations had a significant effect in the experimental context in the absence of true personal responsibility or genuine sunk costs, they might have dramatic effects in the context of personal responsibility for incurring sunk costs in real-world organizational settings (Staw & Ross, 1987).

In another vein, two studies have recently indicated that escalation may be demonstrable only under conditions of relative information poverty (Leatherwood & Conlon, 1986; Conlon & Parks, 1986). That proposition was not supported in this study, in which escalation was observed consistently under conditions where there was sufficient information provided for subjects to apply normative guidelines such as disregarding sunk costs in decision making, which subjects failed to do.

Many decisions in business, government, and the military involving choices about the fate of an entire course of action seem too important to be made by just one person. Sometimes this intuition is correct, but the considerations are always complex (Davis, 1969). At the very least, the relative proficiency of groups versus individuals in problem solving is a function of the characteristics of the problem undertaken (Hackman &

Morris, 1975). The nature of escalation situations is such that groups may be even less competent at successfully resolving them than individuals.

## APPENDIX 1

### Control and Experimental Decision Frame Conditions of a Representative Scenario

#### *Neutral Decision Frame—No Sunk Costs*

As the head of the financial planning committee for a major company, you are required to make a decision. The company is contemplating spending \$1 billion on an investment project. The project involves the construction of a facility to generate electricity using conventional and safe technology.

To your dismay, you have just learned of a recent technological breakthrough made by a competing company. That breakthrough will probably allow for the generation of electricity by the competing company more cheaply, and in an equally safe manner, as compared with the method that your company would employ.

Consequently, you are faced with a choice. If investment in the project occurs, it is likely that such investment will simply be wasted. There is, however, the possibility that such investment will allow the firm to earn a return. More precisely, if your company does not invest in the project, it will with certainty neither suffer any losses nor achieve any gains. In contrast, if you decide to invest \$1 billion in the project, there is a 75% chance that a total loss of \$1 billion will be realized on the project and a 25% chance that a net gain (i.e., after deducting the \$1 billion investment) of \$3 billion will be realized on the project.

The company for which you work will not be threatened by bankruptcy in the event that the \$1 billion is invested and no return is realized.

As head of the financial planning committee, it is your decision whether or not to spend \$1 billion on the project. Do you decide to invest the funds?

#### *Negative Decision Frame—Sunk Costs and [Personal Responsibility for Sunk Costs]*

As the head of the financial planning committee for a major company, you are required to make a decision. As a result of an earlier decision that *your predecessor made* [you personally made], your company has to date spent \$3 billion of a budgeted total of \$4 billion allocated to an investment project. The project involves the construction of a facility to generate electricity using conventional and safe technology.

The investment [for which you are personally responsible] was made on

the assumption that your company would be the lowest cost provider of electricity to the area. *It was known* [You were aware], however, at the time [you made] the initial investment *was made* that this might turn out not to be the case.

To your dismay, you have just learned of a recent technological breakthrough made by a competing company. That breakthrough will probably allow for the generation of electricity by the competing company more cheaply, and in an equally safe manner, as compared with the method that your company would employ.

Consequently, you are faced with a choice. If additional investment in the project occurs, it is likely that such investment will simply be wasted. There is, however, the possibility that such investment will allow the firm to recover its initial investment in the project. More precisely, if your company does not invest further in the project, a \$3 billion loss on the project will be realized with certainty. In contrast, if you decide to invest the remaining \$1 billion allocated to the project, there is a 75% chance that a total loss of \$4 billion will be realized on the project and a 25% chance that no net loss (i.e., after deducting the \$4 billion total investment) will be realized on the project.

The company for which you work will not be threatened by bankruptcy in the event that the final \$1 billion is invested and no return is realized.

As head of the financial planning committee, it is your decision whether or not to spend the final \$1 billion allocated to the project. Do you decide to invest the remaining funds?

#### Sample Items—Chance of Losing Additional Investment and Amount Invested

##### *If Yes*

1(i) If you chose to continue the construction of the facility although as a result there is a 75% chance that your company will lose an additional \$1 billion, what would the chance that your company will lose an additional \$1 billion have to increase to before you would stop the project?

1(ii) If you chose to continue the construction of the facility although as a result your company may lose additional money, up to how much additional money are you willing to invest to complete the project under the conditions described?

##### *If No*

1(i) If you chose not to continue the construction of the facility since otherwise there is a 75% chance that your company will lose an additional \$1 billion, what would the chance that your firm will lose an additional \$1 billion have to decline to before you would complete the project?

1(ii) If you chose not to continue the construction of the facility since otherwise your company may lose additional money, is there any amount of additional money that you are willing to invest to complete the project under the conditions described above? If so, how much?

## APPENDIX 2

### Personal Responsibility Manipulations

#### *Scenario 1*

The situation, however, is complicated by the fact that only recently, upon your authorization, the bank purchased a substantial number of shares of the company that is now requesting the loan. You decided that the bank should make such a purchase even though you knew a certain amount of risk was involved.

#### *Scenario 2*

As the director of product development, it was your personal decision to undertake the development of this particular vaccine. At the time you elected to undertake the project, you were aware that at least one competing firm had already launched an attempt to develop the new vaccine. As a result, you knew when you undertook the project that it might not succeed.

#### *Scenario 3*

You personally invested \$40,000 in the shares of the company a short time ago. Although you realized the investment was risky, you decided that the investment was probably a good one to make.

#### *Scenario 4*

As a result of an earlier decision that you personally made, your company has to date spent \$3 billion of a budgeted total of \$4 billion allocated to an investment project. The investment for which you are personally responsible was made on the assumption that your company would be the lowest cost provider of electricity to the area. You were aware, however, at the time you made the initial investment that this might turn out not to be the case.

#### *Scenario 5*

Some time ago you made a major decision for which you were personally responsible. That decision involved approval for the construction of a second airport near a major metropolitan center, at a cost of \$200 million. At the time you made your decision, however, you were aware of

the possibility that air traffic to and from the region might never increase to the point at which the construction of the second airport was justified.

### Scenario 6

You have been personally responsible for the firm investing \$8 million in the development of a new model car that is still in the planning stages and that has only a small potential market. The decision to invest in the development of this particular model car was entirely your own, although you were aware at the time that the attempt might end in failure.

## REFERENCES

- Argote, L., Seabright, M., & Dyer, L. (1986). Individual and group use of base rate information. *Organizational Behavior and Human Decision Processes*, 38, 65–75.
- Arkes, H., & Blumer, C. (1985). The psychology of sunk cost. *Organizational Behavior and Human Decision Processes*, 35, 125–140.
- Asch, S. E. (1951). Effects of group pressure upon the modification and distortion of judgments. In H. Guetzkow (Ed.), *Groups, leadership and men*. Pittsburgh: Carnegie Press.
- Bazerman, M. (1983). Negotiator judgment. *American Behavioral Scientist*, 27, 211–218.
- Bazerman, M., Beekun, R., & Schoorman, F. (1982). Performance evaluation in dynamic context: The impact of a prior commitment to the ratee. *Journal of Applied Psychology*, 67, 873–876.
- Bazerman, M., Giuliano, T., & Appelman, A. (1984). Escalation of commitment in individual and group decision making. *Organizational Behavior and Human Performance*, 33, 141–152.
- Brockner, J., Nathanson, S., Fried, A., Harbeck, V., Samuelson, C., Houser, R., Bazerman, M., & Rubin, J. (1984). The role of modeling processes in the "knee-deep in the big muddy" phenomenon. *Organizational Behavior and Human Performance*, 33, 77–99.
- Brockner, J., & Rubin, J. (1985). *Entrapment in escalating conflict: A social psychological analysis*. New York: Springer-Verlag.
- Caldwell, D., & O'Reilly, C. (1982). Response to failure: The effects of choice and responsibility on impression management. *Academy of Management Journal*, 25, 121–136.
- Conlon, E. J., & Parks, J. (1986). Information search in the escalation context. *Paper presented at the Academy of Management Meetings*, Chicago, IL.
- Cook, T. D., & Campbell, D. T. (1979). *Quasi-experimentation*. Boston: Houghton Mifflin.
- Darley, J. M., & Latane, B. (1968). Bystander intervention in emergencies: Diffusion of responsibility. *Journal of Personality and Social Psychology*, 8, 377–383.
- Davis, J. H. (1969). *Group performance*. Reading, MA: Addison-Wesley.
- Doise, W. (1969). Jugement collectif et prise de risque des petits groupes. *Psychologie Francaises*, 14, 87–95.
- Donaldson, G., & Lorsch, J. (1983). *Decision making at the top*. New York: Basic Books.
- Ferrell, W. (1985). Combining individual judgments. In G. Wright (Ed.), *Behavioral decision making*. New York: Plenum.
- Festinger, L. (1954). A theory of social comparison processes. *Human Relations*, 7, 117–140.
- Fiegenbaum, A., & Thomas, H. (1988). Attitudes toward risk and the risk–return paradox: Prospect theory explanation. *Academy of Management Journal*, 31, 85–106.
- Fox, F., & Staw, B. (1979). The trapped administrator: Effects of insecurity and policy



- resistance upon commitment to a course of action. *Administrative Science Quarterly*, 24, 449-471.
- Fraser, C., Gouge, C., & Billig, M. (1971). Risky shifts, cautious shifts, and group polarization. *European Journal of Social Psychology*, 1, 493-510.
- Hackman, J. R., & Morris, C. G. (1975). Group tasks, group interaction process, and group performance effectiveness: A review and proposed integration. *Advances in Experimental Social Psychology*, 8, 45-99.
- Isenberg, D. (1986). Group polarization: A critical review and meta-analysis. *Journal of Personality and Social Psychology*, 50, 1141-1151.
- Janis, I. L. (1982). *Groupthink*. Boston: Houghton Mifflin.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decisions under risk. *Econometrica*, 47, 263-291.
- Kahneman, D., & Tversky, A. (1984). Choices, values, and frames. *American Psychologist*, 39, 341-350.
- Keppel, G. (1982). *Design and analysis: A researcher's handbook* (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall.
- Kirk, R. E. (1982). *Experimental design: Procedures for the behavioral sciences* (2nd ed.). Monterey, CA: Brooks/Cole Publishing.
- Laughunn, D. J., & Payne, J. W. (1984). The impact of sunk outcomes on risky choice behavior. *INFOR (Canadian Journal of Operations Research and Information Processing)*, 22, 151-181.
- Leatherwood, M. L., & Conlon, E. J. (1986). *The impact of prospectively relevant information on persistence in a project following setbacks*. Unpublished manuscript. The University of Illinois, College of Commerce and Business Administration, Champaign.
- Leatherwood, M. L., & Conlon, E. J. (1987). Diffusibility of blame: Effects on persistence in a project. *Academy of Management Journal*, 30, 836-848.
- Levi, A. S. (1981). *Escalating commitment and risk taking in dynamic decision behavior*. Ph.D. Dissertation. Yale Univ. Press.
- McGlothlin, W. H. (1956). Stability of choices among uncertain alternatives. *American Journal of Psychology*, 69, 604-615.
- Moscovici, S. (1984). Social influence and conformity. In G. Lindzey and E. Aronson (Eds.), *Handbook of social psychology* (3rd ed.). New York: Random House.
- Moscovici, S., & Faucheux, C. (1972). Social influence, conformity bias, and the study of active minorities. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 6). New York: Academic Press.
- Moscovici, S., & Personnaz, B. (1980). Minority influence and conversion behavior in a perceptual task. *Journal of Experimental Social Psychology*, 16, 270-282.
- Myers, D. (1982). Polarizing effects of social interaction. In H. Brandstatter, J. H. Davis, and G. Stocker-Kreichgauer (Eds.), *Group decision making*. New York/London: Academic Press.
- Myers, D. G., & Lamm, H. (1976). The group polarization phenomenon. *Psychological Bulletin*, 83, 602-627.
- Myers, D. G., & Lamm, H. (1977). The polarizing effect of group discussion. In I. L. Janis (Ed.), *Current trends in psychology: Readings from the American scientist*. Los Altos, CA: Kaufmann.
- Mynatt, C., & Sherman, S. J. (1975). Responsibility attribution in groups and individuals: A direct test of the diffusion of responsibility hypothesis. *Journal of Personality and Social Psychology*, 32, 1111-1118.
- Nagao, D. H., Tindale, R., Hinsz, V., & Davis, J. H. (1985). Individual and group biases in information processing. *Paper presented at the annual meeting of the American Psychological Association*, Los Angeles, CA.

- Neale, M., Bazerman, M., Northcraft, G., & Alpers, C. (1986, March). "Choice shift" effects in group decisions: A decision bias perspective. *International Journal of Small Group Research*, pp. 33-41.
- Northcraft, G., & Wolf, G. (1984). Dollars, sense, and sunk costs: A life cycle model of resource allocation decisions. *Academy of Management Review*, 9, 225-234.
- Ross, J., & Staw, B. (1986). Expo 86: An escalation prototype. *Administrative Science Quarterly*, 31, 274-297.
- Rubin, J. Z. (1981). Psychological traps. *Psychology Today*, 15, 52-53.
- Runyan, D. L. (1974). The group risky shift effect as a function of emotional bonds, actual consequences, and extent of responsibility. *Journal of Personality and Social Psychology*, 29, 670-676.
- Rusbult, C. E. (1980). Commitment and satisfaction in romantic associations: A test of the investment model. *Journal of Experimental Social Psychology*, 16, 172-186.
- Sandelands, L. E., Brockner, J., & Glynn, M. A. (1988). If at first you don't succeed, try, try again: Effects of persistence—performance contingencies, ego involvement, and self-esteem on task persistence. *Journal of Applied Psychology*, 73, 208-216.
- Staw, B. (1976). Knee-deep in the big muddy: A study of escalating commitment to a chosen course of action. *Organizational Behavior and Human Performance*, 16, 27-44.
- Staw, B. (1980). Rationality and justification in organizational life. In B. Staw and L. Cummings (Eds.), *Research in Organizational Behavior*. Greenwich, CT: JAI Press.
- Staw, B. (1981). The escalation of commitment to a course of action. *Academy of Management Review*, 6, 577-587.
- Staw, B., & Fox, F. (1977). Escalation: Some determinants of commitment to a previously chosen course of action. *Human Relations*, 30, 431-450.
- Staw, B., & Ross, J. (1978). Commitment to a policy decision: A multitheoretical perspective. *Administrative Science Quarterly*, 23, 40-64.
- Staw, B., & Ross, J. (1987). Behavior in escalation situations: Antecedents, prototypes, and solutions. In L. L. Cummings and B. Staw (Eds.), *Research in Organizational Behavior*. Greenwich, CT: JAI Press.
- Steiner, I. D. (1972). *Group process and productivity*. New York: Academic Press.
- Teger, A. (1980). *Too much invested to quit*. New York: Pergamon.
- Thaler, R. (1980). Toward a positive theory of consumer choice. *Journal of Economic Behavior and Organization*, 1, 39-60.
- Thaler, R. (1986). The psychology of choice and the assumptions of economics. In A. Roth (Ed.), *Laboratory experiments in economics: Six points of view*. Cambridge: Cambridge Univ. Press.
- Tuchman, B. W. (1984). *The march of folly*. New York: Alfred A. Knopf.
- Whyte, G. (1986). Escalating commitment to a course of action: A reinterpretation. *Academy of Management Review*, 11, 311-321.
- Winer, B. J. (1971). *Statistical principles in experimental design*. New York: McGraw-Hill.
- Zaleska, M. (1976). Majority influence on group choices among bets. *Journal of Personality and Social Psychology*, 33, 8-19.
- Zimbardo, P. G. (1970). The human choice: Individuation, reason, and order versus deindividuation, impulse, and chaos. In W. J. Arnold and D. Levine (Eds.), *Nebraska symposium on motivation* (Vol. 17). Lincoln, Nebraska: Univ. of Nebraska Press.

RECEIVED July 20, 1990