Published in *Journal of the Academy of Marketing Science,* 21 (3), 1993, 247-253.

Escalation Bias: Does It Extend to Marketing?

J. Scott Armstrong
The Wharton School, University of Pennsylvania

Nicole Coviello
University of Auckland

Barbara Safranek
S. G. Warburg and Co.

Abstract

Escalation bias implies that managers favor reinvestments in projects that are doing poorly over those doing well. We tested this implication in a marketing context by conducting experiments on advertising and product-design decisions. Each situation was varied to reflect either a long-term or a short-term decision. Besides these four conditions, we conducted three replications. We found little evidence of escalation bias by 365 subjects in the seven experimental comparisons.

Research on sunk costs shows that decision makers often continue to invest unwisely because of commitments to prior investments (e.g., Arkes and Blumer 1985). Escalation research, starting with Staw (1976), yields evidence consistent with research on the sunk-cost fallacy. In addition, escalation research has concluded that committed managers are likely to reinvest more in a project when they *receive* information that the project is doing poorly than if told it is doing well. This has been called "escalation bias." This bias of "throwing good money after bad" has intuitive appeal.

Should marketing managers be concerned about escalation bias? Common sense would say "yes." We examined whether escalation bias is likely to lead to poor marketing decisions. We first provide a brief review of the literature. This is followed by a series of experiments to test whether escalation bias occurs in marketing decision making. Our hypothesis was that escalation bias would occur for marketing decisions.

Brief Evaluation Of Prior Research

When people make a decision, they often develop a commitment to it. This seems especially likely for people in organizations. For example, Fox and Staw (1979) showed that "trapped administrators" showed a higher level of commitment to a previous course of action than "nontrapped administrators." If decisions turn out poorly, the "escalation of commitment" hypothesis suggests that they may invest further so as to make the decision turn out well. Conlon and Parks (1987) called this retrospective rationality. In simple terms, decision makers are often unwilling to take a loss. Staw (1981, p. 577) commented that:

> Because it is often possible for persons who have suffered a setback to recoup their losses through an even greater commitment of resources to this same course of action, a cycle of escalating commitment can be produced.

Staw and Ross (1987a) and Garland (1990) summarized a variety of reasons for the existence of escalation bias. For example, managers may be affected by partial reinforcement and have difficulty accepting information that rewards have disappeared. They might also distort negative information through perceptual defense mechanisms.

Organizational factors, such as the need for external justification and self-presentation, reinforce this tendency to stay with an unfavorable course of action (Staw 1981). The manager's future may depend on avoiding bad decisions, so he may support a project until it becomes successful. In this latter case, behavior that is irrational for the firm may be rational for managers who want to avoid bad marks on their long-term records. Still another explanation is the gambler's fallacy (Jarvik 1951); people may think that it is less likely that bad results would occur again. Brockner (1992) reviewed the theoretical explanations for escalation bias.

Staw and Ross (1987a) summarized literature on escalation bias and recommended procedures for overcoming this "defect" in decision making. In *Psychology Today*, they stated, "Research shows that people often become overly committed to losing courses of action" (Staw and Ross 1987b, p. 30). Schwenk's review of the literature led him to conclude:

> Researchers have found that once an individual commits a significant amount of money or other resources to an investment project, he will tend to allocate more to the project if he receives feedback that the project is failing than if he receives feedback that the project is succeeding (Schwenk 1985, p. 76).

Consistent with this, subjects who experienced a loss were more concerned about explaining this result than were those who experienced success (Conlon and Parks 1987).

Staw and others subsequently replicated and extended the original study. For a comprehensive review of these studies, see Bowen (1987). Entrapment research (see Brockner and Rubin 1985 for a summary) also provides evidence to support escalation bias.

To our knowledge, Singer and Singer (1985, 1986) provided the only direct replication that did not find the escalation bias. They conducted a replication of Staw's (1976) negative feedback treatment in the high responsibility condition. The 96 subjects reinvested an average of 46 percent of the funds in the R&D project that was doing poorly (versus 64.8% for this treatment in Staw 1976). In other words, escalation bias was not found in the condition under which Staw had found the strongest effect.

Clearly, many researchers believe that an escalation bias exists and that it leads to incorrect decisions. However, escalation studies have not shown that decisions were incorrect, only that *different* decisions were made for projects that had been doing poorly than for those that had been doing well (Bowen 1987; Northcraft and Wolf 1984; Leatherwood and Conlon 1988). The proper way to invest, according to standard economic theory, is to select the project that yields the highest return on investment by determining the expected return on future investments at any given decision point (Northcraft and Wolf 1984). This was not possible in Staw's original study (Staw 1976). lie presented subjects with a choice between two research and development projects. At first, the subjects had to put all of their resources into one of the projects. Each subject was then given feedback on how well the decision turned out and was asked to make another investment decision concerning these two projects. For the second decision, subjects were allowed to allocate part of their budget to each of the two alternatives.

The key issue was whether those who received feedback about poor results would be more likely to support their original decision than those who received feedback about good results. Subjects who were told that their initial choice was doing poorly tended to put more resources back into this alternative than did subjects who were told that their initial choice was doing well. This bias was stronger for the treatment group subjects who were told that they had been responsible for the initial decision (the design described here) than for subjects who did not make the initial decision. Note that the subjects did not have sufficient information to make an economically sound decision. One could rationally justify investment in either project. This lack of information was ignored in that study, as well as in many replications and extensions.

Escalation Bias In Marketing Decisions

The original study on escalation bias was conducted on R&D investments. Staw and Fox (1977) encouraged extensions to other decision contexts. They stated (1977, p. 448) that the key condition was an "initial choice of a course of action and an opportunity for subsequent escalation or withdrawal." Extensions have successfully replicated

the effect showing that responsibility for the prior decision leads to heightened escalation of commitment (cf. the extension to personnel decisions by Bazerman, Beekun, and Schoorman 1982).

We decided to extend the study to marketing. Although it cannot presently be said that escalation bias contributes to poor decisions, the existence of such a bias is of interest. If this bias extends to marketing decisions, then it would make sense to determine whether it leads to poor decision making. If this bias is not found, then further action need not be taken.

Based on the many successful replications and extensions, the escalation bias seemed robust. This led us to conclude that the effect would be found in marketing decisions. However, Barton, Duchon, and Dunegan (1989) found no evidence of escalation bias in their extension based on selling expenses; they speculated that this result may have been due to their use of a familiar decision for their subjects, who were from a single organization.

We conducted a series of experiments to determine whether marketing decisions are susceptible to escalation bias. The decisions related to investments in advertising and product design. We examined the situation where escalation bias was expected to be strongest by having all subjects belong to what Staw referred to as the high responsibility group. These subjects made the first decision as well as the subsequent decision. In other words, we accepted the results that prior responsibility leads to increased escalation and examined only whether escalation affects decision making.

Experiment 1: An Advertising Investment

Staw provided us with copies of the original case materials. Our design conformed to that used by Staw, with the exception that the decision related to advertising instead of R&D, and we used more recent dates for the context of the problem.

Subjects

In common with Staw's study, we used a convenience sample of business school students. These subjects, 80 MBA students, all had a significant amount of prior work experience. (One subject did not make a decision, so we report on the remaining 79.) Most subjects (n = 43) were captive; they were administered the experiment during classes in marketing management and organizational behavior. The others (n = 36) were walk-ins to a test center in the building housing the MBA program. We solicited the latter by signs offering free doughnuts and a chance to win $50. Staw's subjects were undergraduate volunteers who received course credit.

Procedure

The instructions were similar to those used by Staw (1976). The two-part experiment was described as measuring the effectiveness of decision making under varying amounts of information. Subjects were assured that they had sufficient information to make their decisions.

Subjects were told that the experiment typically took about 15 minutes. We based this on the time required by 20 pretest subjects. However, like Staw's subjects, our subjects were allowed to take as much time as they needed.

The decision was based on a case describing the fictitious A & S Company. Once a successful developer of home and industrial appliances, A & S was now, in 1981, having a difficult time. In the face of declining market share, sales, and earnings, the board had decided that an additional $10 million of advertising, beyond budget, was necessary in one of the firm's two divisions – Consumer Products or Industrial Products.

Adopting the role of the A & S marketing vice-president, subjects had to decide which division should receive the extra $10 million investment. The investment could not be split between the two divisions. Their decision was to be based on anticipated future earnings. Subjects received a brief description of each division along with sales and profit figures for the past ten years (see Appendix A). The figures were the same as those used by Staw, but the dates were

brought forward by 14 years to make the case contemporary. Thus, with the exception of the context, the situation was identical to the one used by Staw.

After choosing to invest in either the Consumer Products or the Industrial Products division, subjects were asked to "briefly explain why you made your choice" and "what additional information would have been helpful." The latter question was included to support the explanation that the experiment dealt with decision making under varying amounts of information.

After they had finished the first part of the experiment, subjects were administered the second part, which described the A & S situation five years later, in 1986. The board had decided to provide $20 million beyond budget for advertising in the two divisions. At this stage, the subject's task as marketing vice-president was to divide the $20 million in any proportion between the two divisions. AS before, the decision was to be based on anticipated future profits. Sales and earnings for the past five years were provided (see Appendix B). Half of the subjects, randomly selected, received positive results; the division they initially selected for the $10 million investment in advertising returned to profitability, whereas the other division had sunk further into the red. The other half of the subjects was given information showing negative results; their chosen division showed a decline in profitability, whereas the other division had improved. The same follow-up questions were used as in the first part of the experiment. To match replies from the two parts, we asked subjects to write their social security numbers on each page. Staw used names in his experiments for the same purpose.

Results for Experiment 1

The 38 subjects who received the less favorable feedback reinvested an average of 57.8 percent of the $20 million in the division of their initial choice; the 41 subjects who received feedback that their first choice was doing well reinvested an average of 58.8 percent of the $20 million.[1] The direction of the effect was opposite to that predicted by escalation bias although the difference was not statistically significant. This contrasts with Staw's results; in his experiment (n = 119 for the high-responsibility treatment), 64.8 percent of the funds were reinvested by those receiving bad outcomes and 46.0 percent by those receiving good outcomes. To examine whether the failure to replicate was due to administrative procedures, we compared results from the 43 captive and 36 volunteer subjects; their reinvestment decisions were almost identical.

The one subject who did not make a decision claimed that there was insufficient information. However, most subjects noted on the follow-up questionnaire that they needed more information.

Experiment 2: Advertising With Annual And Quarterly Data

Prior studies on escalation bias concluded that there was a time effect; escalation occurred initially, but it did not persist with repeated negative feedback (Garland and Newport 1991; McCain 1986). The decision maker might believe that, in early stages, not enough time had elapsed to evaluate the results of the investment. Thus, the subject's original arguments for the selected investment would be unchanged. Alternatively, the subject might believe that not enough had been invested yet, such that additional investment was required.

Therefore, given the results of Experiment 1, we were interested to learn whether the failure to find escalation bias was due to a time effect; that is, if the decision makers believed that the prior investment had not had sufficient time to take effect. Such a belief would seem plausible for R&D investments (Northcraft and Wolf 1984) in that, when the decision maker expects sales revenue to lag behind costs, it is reasonable to ignore early losses. If career advancement is based on overall results, decision makers might want to continue supporting their original R&D investment decisions. However, this explanation seems less plausible for investments in advertising, because advertising is often believed to have only short-term effects (Clarke 1976). Thus, there would be no need to stay with the original decision. An analysis of explanations by subjects in Experiment 1 revealed that only three of the 38 subjects who

[1] It was irrelevant whether subjects initially chose the industrial or consumer division. In any event, the direction of the results was the same whether the subject invested initially in the industrial or in the consumer products division.

received negative feedback based on the annual data said that they continued to support that division because they did not want to give up yet. Escalation bias might not have occurred because most subjects may have believed that the effects of the advertising decision would have been fully observed within the five-year period.

Procedure

The second experiment replicated the first experiment and examined the time span. The time span was labeled as "annual" for half of the subjects and "quarterly" for the other half. The two treatments were identical in all other respects.

We also were concerned that our results could be due to slight changes that had been made in administrative procedures, or to wording of the advertising problem. Thus, in the second experiment:

1. We followed Staw's original procedure more closely. Undergraduate subjects were used, they were solicited on the basis of course credit, and they were asked to provide their names. One exception here was that subjects were not assured that there was sufficient information to make a decision. We saw no reason to mislead them.

2. We reversed the labels for the industrial and commercial divisions.

3. We changed the wording to make the task appear more relevant to an advertising decision.

To avoid experimenter bias, the second experiment was administered by a research assistant who did not know the purpose of the experiment. The experiment was conducted at a testing center with 55 undergraduates.

Results of Experiment 2

Only one of the 55 subjects refused to make a decision, claiming that there was not sufficient information. However, on follow-up questionnaires, 17 subjects (3l%) claimed that there was insufficient information to make a decision.

Results for subjects in the annual (long-term) treatment were similar to those from Experiment 1. The 15 subjects with negative feedback reinvested 55.5 percent of their funds in their original choice. The l 1 subjects with positive feedback reinvested 64.8 percent in their original choice. As in experiment 1, the direction of these results was opposite to that predicted by escalation bias.

The time span had the predicted effect with respect to direction. In the short-term version, the 14 subjects who received negative outcomes reinvested 64.3 percent in their original division; the 14 subjects who received positive outcomes reinvested 53.6 percent. This difference was not statistically significant ($t = 1.41$).

Thus, Experiment 2 also failed to find escalation bias. While the direction of the results was consistent with the hypothesis that the elapsed time between decisions might help to explain why escalation bias did not occur, this finding was not statistically significant. However, our test of the time effect was not very powerful. Following Cohen (1988), the power levels for small, medium, and large effects were .13, .36, and .66 respectively. Thus, the test would only have about a two-thirds chance of rejecting a false null hypothesis if the effect size were large. This suggested the need for further study of the time effect.

Experiment 3: Replicating For Annual & Quarterly Advertising

Experiment 3 tested the replicability of results from Experiments 1 and 2. This was deemed appropriate given the surprising results on escalation and the lack of power for the test on time. All procedures were identical to those for Experiments 1 and 2. The study was administered by one of the authors to 105 New Zealand business school undergraduates who were taking a class on marketing management. Thus, it was again a captive audience.

Results for Experiment 3

As with Experiment 2, no escalation was found when subjects were presented with annual (long-term) data. The 25 subjects with negative feedback reinvested 49.8 percent of their funds in their original choice, whereas the 31 subjects with positive feedback reinvested 50.4 percent in their original choice. This difference is opposite to that predicted by escalation bias and the result is not statistically different if one adopts a null hypothesis of no difference.

We examined the effect of the time span. For the short-term version, the 21 subjects with negative outcomes reinvested 58.1 percent of their funds, whereas the 28 who received positive results reinvested 54.2 percent. This difference is not statistically significant ($t = .21$). The results were combined with those in Experiment 2 by using the method of adding *ts* (Rosenthal 1978). The overall t was only 1.1. Hence, there is insufficient evidence to suggest that these data might not have been obtained given a true null hypothesis of no time effects. The power of the combined test was about .22, .70, and .96 for small, medium, and large effects (Cohen 1988). Thus, it was likely that a false null hypothesis would be detected given a large effect (the test provides a 96% chance of detecting a large effect.)

Experiment 4: A Product Design Investment

Experiment 4 extended our study by converting the decision to one involving an investment in product design.[2] We replaced the word "advertising" by "product design" in the description of the problem given to the subjects. We expected escalation bias for both short- and long-term versions because some subjects would expect that five quarters or even five years may not be sufficient to see results from their investment in product design. However, bias should be smaller in the long-term than in the short-term version (Garland, Sandefur, and Rogers 1990). We expected bias to be stronger in the product design case than in the advertising case because cumulative investments in design may hold greater long-term promise.

Administrative procedures for Experiment 4 followed those of Experiment 3. Replies were obtained from 127 undergraduate business students in New Zealand.

Results for Experiment 4

For annual data, the 30 subjects with negative feedback reinvested only 45.8 percent of the funds in their original choice, whereas the 29 subjects with positive outcomes reinvested 48.5 percent. The direction of this result is opposite to that predicted by escalation bias and it is not significantly different given a standard null hypothesis ($t = 0.4$).

In the test for the time effect, we gave quarterly (shortterm) data to 68 subjects. Those whose original selection performed poorly (n = 34) reinvested less money than those subjects who received positive results (47.5% versus 56.3%). This did not differ significantly from a null hypothesis ($t = 1.4$).

Only one subject chose not to make a decision. Analogous to the indecisive subjects in Experiments 1 and 2, this person claimed that the information was insufficient. However, on follow-up questionnaires, 78 subjects (61%) said that additional information was desirable.

Discussion

The results of our experiments, along with those of Barton, Duchon, and Dunegan (1989), suggest that escalation bias does not generalize well to marketing decisions. Escalation bias did not occur in five of our seven experimental conditions. Using an unweighted average across the seven conditions, we determined that 54.1 percent of

[2] Leatherwood and Conlon (1988, p. 217) suggested that product development decisions might be similar to R&D decisions with respect to escalation bias.

the funds were reinvested when negative outcomes were encountered, whereas 55.2 percent were reinvested when favorable outcomes were obtained. This direction of effects is contrary to escalation bias. Table 1 summarizes our results.

TABLE 1
Percentage of Funds Reinvested by Experimental Treatment

Treatment			Experiment (Sample Size)				
Context	Time Period	Outcome	Staw (119)	1 (79)	2 (54)	3 (105)	4 (127)
R&D	Annual	Negative	64.8	-	-	-	-
		Positive	46.0	-	-	-	-
Advertising	Annual	Negative	-	57.8	55.5	49.8	-
		Positive	-	58.8	64.8	50.4	-
	Quarterly	Negative	-	-	64.3	58.1	-
		Positive	-	-	53.6	54.2	-
Product Design	Annual	Negative	-	-	-	-	45.8
		Positive	-	-	-		48.5
	Quarterly	Negative		-	-	-	47.5
		Positive	-			-	56.3

The time required for the decision to have an impact did not affect escalation bias as we had expected for the advertising decision. Furthermore, the direction of the time effect was reversed for the product design decision. Combining across the three tests on the time effect (weighting by sample size), the effect size was nearly zero. Finally, a content analysis of follow-up responses revealed that none of the subjects in the short-term conditions (for either the advertising or product design decision) believed that more time was required for the original investment to take effect.

Because the subjects did not receive sufficient information, it is difficult to conclude that any of them were making poor decisions. The reasons they gave for their decisions seemed sensible to us. Typically, they wanted to diversify their portfolio in the face of uncertainty, and they tried to avoid abrupt changes in their decision-making behavior until additional relevant information was available.

Students as Subjects

Similar to the original research on escalation bias, we used students as subjects. Burnett and Dunne (1986) questioned the validity of students as subjects. However, in their review of the research, Ashton and Kramer (1980) found similarities between students and nonstudents in *decision-making* studies. The use of students for such a study is consistent with criteria suggested in Gordon, Slade, and Schmitt (1987); namely, the student sample is part of a stream of research and the population of interest is similar to the students.

Many of our subjects had prior business experience. We obtained insignificant differences in the results for those with and without business experience. This is consistent with results of Garland and Newport (1991), who did not find systematic differences across types of subjects in their research on sunk costs.

Fox and Staw (1979) reported that extensions of their studies produced similar results whether subjects were managers or undergraduate business students. Finally, results for our MBA subjects did not differ significantly from those of our undergraduates.

Limitations

The situations faced by subjects in both the original R&D situation and the current marketing situation were artificial. Interestingly, this limitation has not caused serious problems in prior research. Locke (1986) presents evidence that findings from artificial laboratory experiments are similar to those from realistic field studies for research in several areas of organizational behavior. It is also worthwhile to note that subjects took the task seriously, often taking up to 30 minutes on the exercise.

Funder (1987) claimed that subjects solving problems in laboratory exercises typically assume that they have been given sufficient information and they draw upon their experience for additional information. Thus, the problem they are solving might differ from what the researcher had in mind. Although almost all of our subjects made decisions, many of them claimed that there was a lack of information. Perhaps the most serious limitation of escalation studies, including ours, is that not enough information was provided to make a correct decision. In other words, if one uses future profits as the criterion, there is no evidence as to which decision should be selected.

Escalation bias might not occur if subjects were given the information needed to make a correct decision, such as net present value of relevant alternatives (Leatherwood and Conlon 1988) or opportunity costs (Northcraft and Neale 1986). This applies not only to the original study by Staw, and to our study, but also to many other replications.

Conclusions

Our studies of escalation bias in the context of marketing decisions failed to find evidence of bias in five of the seven situations examined. We were unable to explain differences between findings from earlier studies and our research as being due to administrative procedures. Also, we were unable to explain our results as being due to differences in the length of time for the decision to have an impact.

Even if a bias had been found, research to date does not allow for the conclusion that such a bias leads to poor decision making. Thus, little evidence exists to suggest that marketing managers need to be concerned that escalation bias will harm decision making.

Acknowledgments

We thank Barry Staw for providing copies of the original materials and Kenneth Weissman for administering the second experiment. Hal R. Arkes, Michael G. Bowen, Jay Christensen-Szalanski, Howard Garland, Wendy Gladfelter, Gregory B. Northcraft, Robert A. Peterson, and William T. Ross provided useful comments on various drafts. Jennifer L. Armstrong, Gina Bloom, and Phan Lam provided editorial assistance.

Appendix A
Figures Provided to Subjects in Part 1 of A&S Case

	Industrial Products Division		Consumer Products Division	
YEAR	Sales ($ millions)	Earnings ($ millions)	Sales ($ millions)	Earnings ($ millions)
1971	670	15.31	624	14.42
1972	663	10.92	626	10.27
1973	689	11.06	649	8.65
1974	711	10.44	681	8.46
1975	724	9.04	674	4.19
1976	735	6.38	702	5.35
1977	748	5.43	717	3.92
1978	756	3.09	741	4.66
1979	784	3.26	765	2.48
1980	788	(.81)	770	(.12)
1981 est.	791	(.80)	769	(.63)

Appendix B
Figures Provided to Subjects in Part 2 of A&S Case

	Manipulated Improvement		Manipulated Decline	
YEAR	Sales ($ millions)	Earnings ($ millions)	Sales ($ millions)	Earnings ($ millions)
1982	818	0.02	771	(1.12)
1983	829	(0.09)	774	(1.96)
1984	827	(0.23)	762	(3.87)
1985	846	0.06	778	(3.83)
1986	910	1.28	783	(4.16)

References

Arkes, Hal R. and Catherine Blumer (1985), "The psychology of sunk costs," *Organizational Behavior and Human Decision Processes,* 35 (February), 124-140.

Ashton, Robert H. and Sandra S. Kramer (1980), "Students as surrogates in behavioral accounting research: some evidence," *Journal of Accounting Research,* 18 (Spring), 1-15.

Barnett, John J. and Patrick M. Dunne (1986), "An appraisal of the use of student subjects in marketing research." *Journal of Business Research,* 14 (August), 329-343.

Barton, Sidney L., Dennis Duchon, and Kenneth J. Dunegan (1989), "An empirical test of Slaw and Ross's prescriptions for the management of escalation of commitment behavior in organizations," *Decision Sciences,* 20 (Summer), 532-544.

Bazerman, Max H., Rafik I. Beekun, and F. David Schoorman (1982), "Performance evaluation in a dynamic context: a laboratory study of the impact of a prior commitment to the rate," *Journal of Applied Psychology,* 67 (December), 873-876.

Bowen, Michael G. (1987) "The escalation phenomenon reconsidered: Decision dilemmas or decision errors?" *Academy of Management Review,* 12 (January), 52-66.

Brockner, Joel (1992), "The escalation of commitment to a failing course of action: Toward theoretical progress," *Academy of Management Review,* 17 (January), 39-61.

Brockner, Joel and Jeffrey Z. Rubin (1985), *Entrapment in Escalating Conflicts.* New York: Springer-Verlag.

Clarke, Darral G. (1976), "Econometric measurement of the duration of advertising effect on sales," *Journal of Marketing Research,* 13 (November), 345-357.

Cohen, Jacob (1988), *Statistical Power Analysis for the Behavioral Sciences.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Conlon, Edward J. and Judi M. Parks (1987), "Information requests in the context of escalation," *Journal of Applied Psychology,* 72 (August), 344-350.

Fox, Frederick V. end Barry M. Staw (1979), ""The trapped administrator: Effects of job insecurity and policy resistance upon commitment to a course of action," *Administrative Science Quarterly*, 24 (September), 449-471.

Funder, David C. (1987), "Errors and mistakes: Evaluating the accuracy of social judgment," *Psychological Bulletin,* 101 (January), 75-90.

Garland, Howard (1990), "Throwing good money after bad: The effect of sunk costs on the decision to escalate commitment to an ongoing project," *Journal of Applied Psychology*, 75 (December), 728-731.

Garland, Howard and Stephanie S. Newport (1991), "Effects of absolute and relative sunk costs on the decision to persist with a course of action," *Organizational Behavior and Human Decision Processes,* 48 (February), 55-69.

Garland, Howard, Craig A. Sandefur, and Anne C. Rogers (1990). "De-escalation of commitment in oil exploration: When sunk costs and negative feedback coincide," *Journal of Applied Psychology,* 75 (December), 721-727.

Gordon, Michael E., L. Allen Slade, and Neal Schmitt (1987), "Student guinea pigs*:* Porcine predictors and particularistic phenomena," *Academy of Management Review,* 12 (January), 160-163.

Jarvik, M. E. (1951), "Probability learning and negative recency effect in the serial anticipation of alternative symbols," *Journal of Experimental Psychology,* 41 (April), 291-297.

Leatherwood, Marya L. and Edward J. Conlon (1988), "The impact of prospectively relevant information on persistence in a project following setbacks," in *Advances in Information Processing in Organizations,* Volume 3, Lee S. Sproull and Patrick D. Larkey (Eds.). Greenwich, CT: JAI Press, 207-219.

Locke, Edwin A. (1986), *Generalizing from Laboratory to Field Settings.* Lexington, MA: Lexington Books.

McCain, Bruce E. (1986), "Continuing investment under conditions of failure: A laboratory study of the limits to escalation," *Journal of Applied Psychology,* 71 (May), 280-284.

Northcraft, Gregory B. and Margaret A. Neale.1(986), "Opportunity costs and the framing of resource allocation decisions," *Organizational Behavior and Human Decision Processes,* 37 (June), 348-356.

Northcraft, Gregory B. and Gerrit Wolf (1984), "Dollars, sense, and sunk costs: A life cycle model of resource allocation decisions," *Academy of Management Review*, 9 (April), 225-234.

Rosenthal, Robert (1978), "Combining results of independent Studies," *Psychological Bulletin*, 85 (January), 185-193.

Schwenk, Charles R. (1985), "Management illusions and biases: Their impact on strategic decisions," *Long Range Planning*, 18 (October), 74-80.

Singer, Ming S. and Alan E. Singer (1985), "Is there always escalation of commitment," *Psychological Reports*, 56 (June), 816-818.

Singer, Ming S. and Alan E. Singer (1986), "Individual differences and the escalation of commitment paradigm," *Journal of Social Psychology*, 126 (April), 197-204.

Staw, Barry M. (1976), "Knee-deep in the Big Muddy: A study of escalating commitment to a chosen course of action," *Organizational Behavior arid Human Performance*, 16 (June), 27-44.

Staw, Barry M. (1981), "The escalation of commitment to a course of action," *Academy of Management Review,* 6 (October), 577-587.

Staw, Barry M. and Frederick V. Fox (1977), "Escalation: The determinants of commitment to a chosen course of action," *Human Relations,* 30 (May), 431-450.

Staw, Barry M. and Jerry Ross (1987a), "Knowing when to pull the plug," *Harvard Business Review, 65* (March-April), 68-74.

Staw, Barry M. and Jerry Ross (1987b), "Good money after bad," *Psychology Today*, 22 (February), 30-33.

About The Authors

J. Scott Armstrong (Ph.D., M.I.T) has been a professor at The Wharton School since 1968. During this time he has also been a visiting professor in Sweden, Switzerland, Thailand, Australia, New Zealand, and Argentina. He is a founder and past editor of the *Journal of Forecasting* and the *International Journal of Forecasting.* In addition to forecasting, he has published research on strategic planning, the scientific method, social responsibility, and survey research methods.

Nicole Coviello is a doctoral candidate at the University of Auckland, New Zealand, and holds an M.Sc. (Technology Management) and B.Comm. (Marketing) from the University of Saskatchewan, Canada. Nicole's dissertation research focuses on the internationalization process of software developers. In particular, she examines "deviations" in international linkage development by small firms, with a focus on marketing management issues. Her other research interests relate to entrepreneurial growth, the marketing/ manufacturing interface, and strategic planning processes.

Barbara Safranek (M.B.A. Wharton) worked as a marketing consultant in Japan and was then co-president of the Friends of Japan (Tokyo, Japan) for three years. Currently she is vice-president of Japanese Equities-Sales at S.G. Warburg & Co.