

Too Close to Quit: The Role of Project Completion in Maintaining Commitment¹

HOWARD GARLAND

*Department of Business Administration
University of Delaware*

DONALD E. CONLON²

*Department of Management
Michigan State University*

Conlon and Garland (1993) demonstrated that information about the degree of project completion, as compared with information about sunk costs, seemed to be the driving force behind continued investment in an R&D project. In the present paper, we replicate and extend this work. In studies with experienced bank managers, Chinese graduate students, and advanced-level MBA students, we find overwhelming support for the importance of project completion on investment intentions, with no indication of typical sunk cost effects. We argue that our results support a goal substitution explanation for many escalation phenomena where, as progress moves forward on a project, completion of the project itself takes increasing precedence over other goals (e.g., economic profit) that may have been more salient at the time the project was initiated.

Following some pioneering work by Staw (1976) and Brockner, Shaw, and Rubin (1979), interest in understanding what drives decision makers to continue investment in projects that appear to be “losing courses of action” remains very high among researchers in organizational behavior and psychology. Numerous explanations exist in the literature to explain why apparently rational people are so willing to “throw good money after bad.” One popular explanation has been the sunk-cost argument (Arkes & Blumer, 1985), which states that the more money, effort, or time that has been invested in a project, the more likely the project will continue to receive resources. Underlying explanations for this presumed sunk-cost effect have included both self-justification processes (e.g., Brockner, 1992; Staw & Ross, 1987) and cognitive framing effects (Garland, 1990; Garland & Newport, 1991; Whyte, 1986).

¹Our thanks to C. Gopinath, Robert Schweitzer, and Chinyere Uzoukwu for their assistance with the bank manager study. This research was partially supported by a grant from the UNIDEL Foundation. Portions of this manuscript were presented at the meetings of the Academy of Management, Dallas, Texas, August 1994.

²Correspondence concerning this article should be addressed to Donald E. Conlon, Department of Management, Eli Broad Graduate School of Management, Michigan State University, East Lansing, MI 48824.

In a recent article, Conlon and Garland (1993) suggested that in many previous experimental studies (e.g., Arkes & Blumer, 1985; Garland, 1990; Garland & Newport, 1991), as well as in most real-life case studies (e.g., Ross & Staw, 1986), sunk costs (i.e., the proportion of a budget invested in a project) and project completion (i.e., the degree to which a project is finished) are completely confounded. For example, Arkes and Blumer (1985) told subjects in a sunk-cost experiment that they had invested \$9 million out of \$10 million in a project, and that the project was 90% complete. Thus, in comparing the willingness of these subjects to invest the last million of their budget with those asked about their willingness to invest the first million, these researchers were also comparing people who had almost completed what they had started to those who had not even begun.

Anecdotal evidence suggesting that project completion is an important variable in organizational decisions to continue investment in a project is as readily available as evidence suggesting the importance of sunk costs (i.e., too much invested to quit). For example, the London Stock Exchange recently scrapped an electronic share-transfer system known as TAURUS, despite work spanning a decade and investments estimated to be as high as 400 million pounds (e.g., Drummond, 1996; Duffy, 1993). Originally intended to be operational in 1989, TAURUS was abandoned in Spring 1993, when it became clear that the system was still several years from completion. Drummond reports that a major factor in the decision to abandon the project was the state of project incompletion.

Although sunk costs and project completion may be highly correlated in most situations, they are conceptually distinct variables, worthy of separation in experimental studies in order to uncover any separate or combined effects they may have on escalation behavior. In two studies with undergraduate business students, Conlon and Garland (1993) found that when sunk-costs and project-completion information were manipulated independently, there was no evidence of sunk-cost effects, even in a series of control conditions where no information was presented regarding the degree of project completion. There was, however, considerable evidence of project-completion effects, where the closer the project was to completion, the greater the likelihood that decision makers would continue to invest in the project. These project-completion effects occurred under varying conditions of sunk costs, including control conditions in which no information about sunk costs was provided. Project-completion effects also occurred under varying budget conditions, with the amount of money remaining in a project budget unknown, held constant, or inversely related to the amount that had been spent. Finally, project-completion effects occurred whether or not subjects were personally responsible for the initial investment in the project.

Citing Brockner et al.'s (1979) assertion that motivation for an investment may shift from an economic motive at the outset to some other motive later as additional resources are invested, Conlon and Garland (1993) proposed that "what has often been labeled a sunk cost effect might actually be a goal substitution effect, whereby project completion becomes a new goal, replacing profit maximization, and the desire to complete a project increases as its completion nears" (p. 410).

The present article has several purposes. First, we review literature supporting the notion of a project-completion effect. We then present the results of three studies that extend earlier findings across a wider variety of subject samples and decision problems. We conclude by more formally describing our goal-substitution effect and discuss how it fits within existing theoretical frameworks and research data from motivational psychology and organizational behavior.

Existing Theory and Research

Scanning some of the earliest work in motivation provides support for the notion that individuals have or develop a motive to finish projects or tasks which they have initiated. For example, the importance of "finishing what you start" is inherent in Lewin's (1926, as cited in Ryan, 1970) notion of *task tension*, in which the acceptance of a task (e.g., some project) for whatever reason (e.g., economic gain) creates an independent motive to complete that task. In an empirical test of Lewin's ideas, Zeigarnik (1927, as cited in Katz & Kahn, 1966) demonstrated that uncompleted tasks result in both frustration and perseverance.

More specific evidence that the motive to complete a task gets stronger as one gets closer to completion can be found in later work by Lewin (1935), who postulated that the motive to approach a goal gets stronger as individuals get closer to that goal. Support for Lewin's hypothesis was found in empirical work by Krech (1935, as cited in Krech, Crutchfield, & Liuson, 1969), Miller (1944), and Brown (1948). In a series of animal experiments, these researchers demonstrated that motivational intensity increased as the subjects moved closer to a desirable goal object.

If individuals are motivated to complete what they start and if this motive gets stronger as one gets closer to completion, then project completion may be a driving force behind individuals' continued investment in projects that are already well under way. Such a conclusion is certainly consistent with case-study research that has been conducted on escalation and de-escalation. For example, in their study of the Shoreham nuclear-power plant, Ross and Staw (1993) note that most of the expenditures on the project took place when the plant was already 80% complete.

Constructive Extensions

Although Conlon and Garland's (1993) findings suggest that degree of project completion may more accurately explain some escalation phenomena than sunk-cost effects, the popularity of sunk-cost explanations for these phenomena demands more than just two experimental tests with undergraduate students. Thus, in order to convince ourselves as well as other scholars with an interest in escalation phenomena that this alternative explanation is worthy of further study, we designed and conducted several additional studies related to Conlon and Garland's work, using different subject samples and decision problems.

Conlon and Garland (1993) reported two experiments with undergraduate students. In contrast, none of the studies to be reported here uses undergraduate subjects. In Study 1, an experienced group of bank managers responded to a bank-loan scenario constructed especially for them with the help of individuals familiar with the banking industry. In Study 2, we sampled Chinese graduate students from science and engineering programs using the original decision scenario that has been the foundation of much of the prior sunk-costs research (e.g., Arkes & Blumer, 1985). Thus, the first two studies can potentially enhance the external validity of prior work in two ways: by demonstrating that project-completion effects exist among experts working on a problem with which they are familiar (Study 1), and by demonstrating that project-completion effects can occur in other cultures (Study 2).

The three studies allowed us to examine the effects of sunk costs and project completion on subjects' willingness to continue investment in projects that were already under way. Because two earlier studies (Conlon & Garland, 1993) had revealed only a project-completion effect (i.e., no main effects or interactions involving sunk costs), we propose only this effect. Consistent support for this hypothesis, in the absence of any sunk-cost effects, would enhance the external validity of project-completion effects, while calling into question the importance of sunk costs in decision situations involving incremental investments.

Hypothesis 1. As project completion increases, subjects' willingness to continue investment in the project will increase.

In Study 3, we used advanced-level MBA students with considerable work experience. In addition to examining the above hypothesis, this study tests a new hypothesis based on Brockner et al.'s (1979) suggestion that motives for investment shift from economic concerns, at the beginning of a

project to other concerns (the “other” concerns, in our case, being project completion). This hypothesis involves a proposed interaction of project-completion and opportunity-cost information on intentions to continue investment in an ongoing project.

Hypothesis 2. Awareness of opportunity costs will reduce subjects’ reported willingness to continue investment in an R&D project when project completion is low, but not when project completion is high.

Study 1: The Bank Manager Sample

Method

Participants and Procedure

The target population was 457 mid- and senior-level bank managers enrolled in a 3-year program run by a nationally recognized graduate school of banking, which convenes on the campus of a large university in the eastern United States every summer. Respondents were contacted by mail at the dorm where they were staying. They were asked to read a bank lending scenario and respond to two questions regarding the scenario. Demographic data were collected on the reverse side of the sheet. Respondents were asked to place their completed surveys in a box in the main lobby of their dorm. A total of 111 managers responded to the survey, for a response rate of 24%.

The scenario, developed in consultation with a colleague who had significant banking experience, read as follows:

You are a loan officer at a large commercial bank. Custom Molds Inc., a manufacturer of plastic injection molds for high tech and precision parts, is one of your clients of long and good standing.

About 1 year ago, the CEO of Custom Molds approached you with a request for funds in order to revamp his manufacturing capabilities in a manner that would allow the firm to gear up for new competition. After long discussion and detailed scrutiny of the project plans, you recommended that the bank approve a \$10 million loan for this project. The bank did approve up to \$10 million for the project, with an agreed schedule of disbursement. The covenants provide for bank monitoring of project progress.

To date, \$2 (\$8) million has been disbursed to the company.

Over the past few months, industry data and market information have suggested that the firm's competitive position has been negatively affected by new entrants into this increasingly global market. In fact, just last week, a principal client of Custom Molds dropped the company from its approved vendor list.

The CEO of Custom Molds has now asked you to authorize the next installment of \$2 million in order to continue with his revamping project. In his letter to you, he indicates that the revamping project is about 20% (80%) completed.

Failure to authorize the requested funds would place Custom Molds in a very precarious position, with a high probability of default on their outstanding loan.

Independent Variables

Subjects were randomly assigned one of four decision problems, in which our sunk-cost and project-completion variables were manipulated, as described below.

Sunk cost. Subjects were told that, to date, either \$2 million (low sunk cost) or \$8 million (high sunk cost) of the \$10 million approved for lending has been disbursed.

Percentage of project complete. Subjects were told that the CEO had informed them that the revamping project was either 20% (low project completion) or 80% (high project completion) complete.

Dependent Variable

After reading the scenario, subjects indicated the probability (from 0% to 100%) that they would authorize the expenditure of the next \$2 million of the loan toward completion of the project.

Results

Characteristics of the Response Sample

Five respondents failed to complete all of the measures, so they were excluded from analysis. The remaining 106 respondents ranged in age from 21

Table 1

Descriptive Statistics and Correlations Among the Dependent and Demographic Measures in the Bank Manager Sample

Variables	<i>M</i>	<i>SD</i>	1	2	3
1. Allocate next \$2 million	70.48	22.79			
2. Age	38.10	6.17	.08		
3. Years banking experience	12.79	5.68	-.03	.49	
4. Years lending experience	7.25	6.56	.13	.37	.50

Note. *N* = 106. All correlations greater than .20 are significant at $p < .05$ or more.

to 55 years, with an average age of 38. Males ($n = 86$; 81%) greatly outnumbered females ($n = 20$; 19%). The vast majority ($n = 101$) were Caucasian. The number of years of banking experience ranged from 1 to 30, and 76 of 106 (72%) had lending experience, which ranged from 2 to 23 years. They were a highly educated group, with 55 respondents (52%) holding bachelor's degrees, 42 (40%) holding master's degrees, and 2 (2%) holding doctorate degrees.

It appears that our sample is quite similar to the entire population of bank managers from which they were drawn. Of the 457 bankers who attended the program, 388 (85%) were males and 69 (15%) were females. The average age was 37. With regard to education, 37 (8%) bankers had some college experience, 264 (58%) had bachelor's degrees, 135 (30%) had master's degrees, and 10 (2%) had Ph.D.s or law degrees (J.D.s or LL.B.s). Data on the distribution of minorities in the population were not available, but we were told in a follow-up telephone conversation that the proportion of minorities was "quite small," which is consistent with their representation in our response sample.

Contingency analysis and preliminary one-way ANOVAs revealed that respondents in each of the four cells of the 2×2 design were not significantly different due to age or experience in banking or lending. In addition, the distribution of gender and educational level within each cell was also unremarkable. Table 1 reports descriptive statistics and correlations for our dependent measure and for several of the demographic measures. As can be seen in the table, there is no relationship between the dependent measure and age, banking experience, or lending experience.

Resource-Allocation Intentions

Table 2 shows the cell means for the dependent measure as a function of both sunk cost and project completion. A 2×2 ANOVA revealed a

Table 2

The Effects of Sunk Cost and Project Completion on Resource Allocation in the Bank Manager Sample

	Project completion			
	20%		80%	
	Sunk cost		Sunk cost	
	\$2 million	\$8 million	\$2 million	\$8 million
Allocate next \$2 million	66.27 (<i>n</i> = 26)	56.26 (<i>n</i> = 19)	77.16 (<i>n</i> = 37)	76.00 (<i>n</i> = 24)

significant effect only for project completion. As can be seen in the table, there is a strong effect for percentage complete on the "willingness to allocate the next \$2 million" variable, with high project completion leading to greater willingness to allocate resources than low project completion ($M = 76.70$ vs. 62.04 , respectively), $F(1, 102) = 11.63, p < .001$, partial $\eta^2 = .11$. Neither the sunk-cost effect, $F(1, 102) = 1.34, p < .25$, partial $\eta^2 = .02$, nor the interaction, $F(1, 102) = 1.04, p < .31$, partial $\eta^2 = .01$, was significant.³

Discussion

The bank managers' resource-allocation intentions are perfectly consistent with our project-completion hypothesis. While project completion leads to greater willingness to continue funding, sunk costs do not. Our significant findings for project completion and nonsignificant findings for sunk costs are important for two reasons. First, these patterns are consistent with Conlon and Garland's (1993) earlier findings. Second, in contrast to Conlon and Garland's undergraduate students responding to a novel situation, we obtained these results from a sample of experts responding to a scenario with which they had a high degree of familiarity.

It is particularly noteworthy (as is the case with Conlon & Garland's, 1993 results) how completely project completion dominates sunk costs in influencing subjects' reported decisions. Equally interesting is the fact that while the various combinations of sunk costs and project completion that were provided to subjects suggest differences in overall project performance (i.e., low costs with a high percentage completed suggests very good performance, or at least being ahead of schedule; while high costs with a low

³Identical results were obtained when we examined the decisions made by those with lending experience.

percentage completed suggests rather poor performance or being behind schedule), these differences did not seem to have any significant impact (in the form of a significant interaction) on subjects' decisions. Conlon and Garland also found no interactions between these variables across a wide variety of combinations of sunk cost and project completion.

Study 2: The Chinese Graduate Student Sample

We designed Study 2 with several purposes in mind. First, because Study 1 and the two earlier studies by Conlon and Garland (1993) had utilized between-subjects experimental designs, we sought to replicate our results using a within-subjects experimental design, where each subject got to respond to each combination of sunk costs and project completion in a random order. Second, we returned to the original "radar blank plane" R&D scenario used in many of the prior studies on sunk-costs effects (e.g., Arkes & Blumer, 1985; Conlon & Garland, 1993; Garland & Newport, 1991). Third, we changed our sample from undergraduate business students and bank managers to male graduate students from the People's Republic of China studying for advanced degrees in engineering and the physical sciences. Given these changes, a replication of our earlier results would further increase the generalizability of our findings.

Method

Participants and Procedure

Subjects were 75 Chinese graduate students attending an eastern university. All were citizens of the People's Republic of China who were recruited to participate by a Chinese colleague who attended social functions with the graduate students. Sixty-eight students agreed to complete a "business decision survey." Each experimental protocol contained four versions of an R&D decision scenario, presented in random order. We used the original scenario developed by Arkes and Blumer (1985) and modified by Garland and Newport (1991). Subjects were asked to "read each scenario carefully and respond to the questions as if [they] were really experiencing the decision situation." The scenario read as follows:

You are the President of Aero-Flite Corporation, an airplane manufacturer. You have spent \$1 (\$9) million of the \$10 million budgeted for a research project to develop a radar-scrambling device that would render a plane undetectable by

conventional radar (in effect, a radar blank plane). The engineering department has informed you that the project is 10% (90%) complete.

You have just discovered that another firm has begun marketing a similar product that takes up less space and is much easier to operate than Aero-Flite's.

The decision you face now is to either abandon the project or authorize the next \$1 million from the budget to continue this radar-scrambling research project.

Independent Variables

As can be seen in the scenario, low and high sunk-cost conditions were created by informing the subject that \$1 or \$9 million of the \$10 million budget has been spent. Low and high project-completion conditions were created by informing the subject that the project was either 10% or 90% complete.

Dependent Variable

Following each scenario, subjects were asked to indicate, on a scale from 0 to 100, the likelihood of their authorizing the next \$1 million in the budget to continue with the project.

Results

We used a repeated-measures MANOVA to test for all possible effects. Significant within-subjects effects were found for both the sunk-cost, $F(1, 67) = 17.47, p < .001$, partial $\eta^2 = .21$, and project-completion, $F(1, 67) = 416.94, p < .001$, partial $\eta^2 = .86$, manipulations. The interaction was not significant, $F(1, 67) = 2.85, p = .10$, partial $\eta^2 = .04$. Cell means for the four conditions are presented in Table 3. As can be seen in the table, the sunk-cost effect in this study, while significant, is negative. In other words, the more money that had been invested, the less willing respondents were to allocate the next million dollars. This is completely the opposite of the sunk-cost hypothesis. The significant within-subjects effect for project completion indicates that, as expected, projects that were 90% complete were more likely to receive additional funds than projects that were only 10% complete.

Table 3

Mean Reported Likelihood of Allocating the Next Million Dollars of the Budget in the Chinese Graduate Student Sample

Sunk cost	Percentage of project complete	
	10% complete	90% complete
\$1 million	13.82	88.24
\$9 million	7.21	73.38

Discussion

Consistent with Conlon and Garland (1993) and with the results of Study 1, there was a very strong and significant main effect of project completion on reported willingness to allocate resources, with subjects much more willing to allocate funds to a project when it was close to, as compared to far from, completion.

Also consistent with earlier results, the sunk-cost hypothesis continues to receive no support. However, unlike the results of earlier studies, there was actually a negative sunk-cost effect in this study, where at each level of project completion, higher costs were associated with a lower likelihood of project continuation. While we cannot be certain why this effect occurred among Chinese graduate students but not bank managers (Study 1) or undergraduate business students (Conlon & Garland, 1993), we can point to at least one other study which found a negative sunk-cost effect (Garland, Sandefur, & Rogers, 1990). In that study, petroleum geologists responded to an oil-drilling scenario in which increasing sunk costs were associated with increasing negative feedback (i.e., as the number of dry wells drilled increased, so did both sunk costs and negative feedback). It is interesting to note that the study in Garland et al. where the negative sunk-cost effect was strongest was also a within-subjects design where subjects responded to multiple decision problems. Perhaps the within-subjects design of our Chinese graduate student study heightened respondents' sensitivity to expenditures, leading them to behave more cautiously in allocating future resources.

Another result of interest among our Chinese graduate student sample is the extremity of their responses to our decision scenarios as a function of project completion. For example, in the scenarios where project completion was low, 73% of subjects responded by stating that there was zero likelihood of their continuing the project. When project completion was high, 51% of subjects reported 100% likelihood of continuing investment. Such "all or

nothing" decisiveness was not apparent in any of the past studies reviewed here.

It is possible that among our Chinese graduate students, relative to United States samples, there was a heightened sensitivity to overall project performance. For a given level of project completion (i.e., 10% or 90%), higher costs provide more negative information than do lower costs. Such a pattern is also consistent with data reported by Rubin and Brockner (1975) suggesting that escalation was less likely to occur if costs are made salient at an early rather than a late point. It may also simply be that the higher costs provide greater evidence of unambiguous negative feedback for the Chinese sample than it does for the United States samples. Staw and Ross (1987) suggest that such feedback can effectively reduce escalatory pressures.

Study 3: The MBA Sample

As mentioned previously, there is both theoretical (e.g., Brockner et al., 1979) and case-study (e.g., Duffy, 1993; Ross & Staw, 1993) support for the notion that as project completion draws near, the motivation to continue with a chosen course of action increases, overshadowing concerns with cost/benefit information that was relevant to the original decision to begin the project. Our prior studies have found a strong main effect of project completion on continued project investment in the face of information about a clear competitor threat to overall project profitability. In Study 3, we introduce and vary a new piece of cost/benefit information.

Few studies of escalation effects have directly considered the impact of opportunity costs on decisions to continue investment in a project. One exception to this was a study by Northcraft and Neale (1986). As pointed out by these authors, "opportunity costs are abstract possibilities 'expended' by the passage of time [and are] less likely to be considered in a decision maker's deliberations" (p. 351). Northcraft and Neale varied information about opportunity costs in the context of a real-estate investment decision. Their results showed that subjects who received explicit information about alternative opportunities for investment were more likely to abandon (i.e., sell off) a partially completed project than were those who did not receive this information. However, in their study, neither sunk-cost nor project-completion information were varied.

In our final study reported here, we varied the salience of opportunity costs, along with both sunk costs and project completion. Thus, in addition to testing our first hypothesis, our manipulation of opportunity costs allowed us to test a new hypothesis derived from the theory and case research mentioned earlier. If economic considerations become less important as project

completion draws near, then we should expect an interaction effect of project completion and opportunity costs on subjects' willingness to continue investment in a questionable project.

Method

Participants and Procedure

The subjects for Study 3 were 32 second-year MBA students enrolled in an advanced-level management class, who served as voluntary research subjects. In contrast to the undergraduate subjects used by Conlon and Garland (1993), these subjects were older (mean age = 29.03), had considerable full-time work experience (mean number of years = 6.22), and had taken a considerable number of graduate-level business courses (mean number of courses = 12.16).

The experiment utilized a $2 \times 2 \times 2$ mixed factorial design, with sunk costs and project completion treated as within-subjects factors and opportunity costs treated as a between-subjects factor. Subjects were given an experimental protocol, in class, containing four versions of an R&D decision scenario, presented in random order. The scenario from Study 2 was used with one additional paragraph added in one experimental condition.

Independent Variables

Once again, low and high sunk-cost conditions were created by informing the subject that \$1 or \$9 million of the \$10 million budget has been spent. Low and high project-completion conditions were created by informing the subject that the project was either 10% or 90% complete.

In addition, 15 of the respondents were randomly assigned to a control condition in which no explicit information about opportunity costs was given. The remaining 17 respondents were assigned to an opportunity-cost condition, in which additional information, designed to highlight an alternative use for the research funds, was presented. In this condition, the following paragraph was added to each scenario:

In making this decision, assume that you have just received some information about another promising research project. Abandoning the radar-scrambling project would allow you to allocate the funds to the start up of this new project. If you decide to continue with the radar-scrambling project, you will not have the funds required for the start up of this new project.

Table 4

MANOVA Results for the MBA Sample

Multivariate test	Source of variation	df	MS	F
Opportunity cost				
Between-subjects effects	within cells	30	2,329.58	
	Opportunity cost	1	1,688.14	0.72
Sunk cost				
Within-subjects effects	Within cells	30	503.31	
	Sunk cost	1	1,221.79	2.43
	Opportunity Cost \times Sunk Cost	1	3.04	0.01
Percentage complete				
Within-subjects effects	Within cells	30	933.18	
	Percentage complete	1	28,880.95	30.95**
	Opportunity Cost \times Percentage Complete	1	4,487.83	4.81*
Sunk cost by percentage complete				
Within-subjects effects	Within cells	30	291.05	
	Sunk Cost \times Percentage Complete	1	443.57	1.52
	Opportunity Cost \times Sunk Cost \times Percentage Complete	1	6.07	0.02
	Complete	1		

* $p < .05$. ** $p < .001$.*Dependent Variable*

Following each scenario, subjects were asked to indicate, on a scale from 0 to 100, the probability of their authorizing the next \$1 million in the budget to continue with the project.

Results

We used a MANOVA to test for all possible main effects and interactions. The results of this analysis are displayed in Table 4. Cell means for the eight conditions in the study are presented in Table 5.

Table 5

Mean Reported Likelihood of Allocating the Next Million Dollars of the Budget Across Experimental Conditions, Showing the Opportunity Cost \times Percentage Complete Interaction—MBA Sample

Sunk cost	10% project completion opportunity costs?		90% project completion opportunity costs?	
	No	Yes	No	Yes
\$1 million	40.88	21.87	55.82	59.67
\$9 million	43.47	24.20	65.00	70.33

Consistent with the findings of Conlon and Garland (1993) and our bank-manager study, there were no main effects or interactions involving sunk costs. Also consistent with Conlon and Garland and both of the previous studies reported here, there was a strong and significant main effect of project completion on reported willingness to allocate resources. Thus, in support of Hypothesis 1, our subjects were much more willing to allocate funds to a project when it was close to completion ($M = 32.61$ and 62.71 , for low and high project completion), $F(1, 30) = 30.95$, $p < .001$, partial $\eta^2 = .49$.

While there was no significant main effect of opportunity costs on willingness to continue investment, there was a significant Opportunity Cost \times Project Completion interaction, $F(1, 30) = 4.81$, $p < .04$, partial $\eta^2 = .12$. Figure 1 allows us to examine this interaction graphically. Collapsing across the sunk-cost variable, when project completion was low (10%), subjects were significantly less likely to allocate additional funds when given information about opportunity costs ($M = 23.11$) than when not given such information ($M = 42.26$), $t(30) = 2.43$, $p < .03$. On the other hand, when project completion was high (90%), subjects' willingness to allocate additional funds did not significantly differ across between the opportunity-cost ($M = 65.00$) and no-opportunity-cost ($M = 60.41$) conditions, $t(30) = 0.58$, *ns*. Thus, Hypothesis 2, which predicted that awareness of opportunity costs would reduce subjects' willingness to continue investment in an R&D project when project completion is low but not when project completion is high, is supported.

Discussion

As in our first study, there was no evidence for the sunk-cost hypothesis when sunk costs and project completion were manipulated independently in

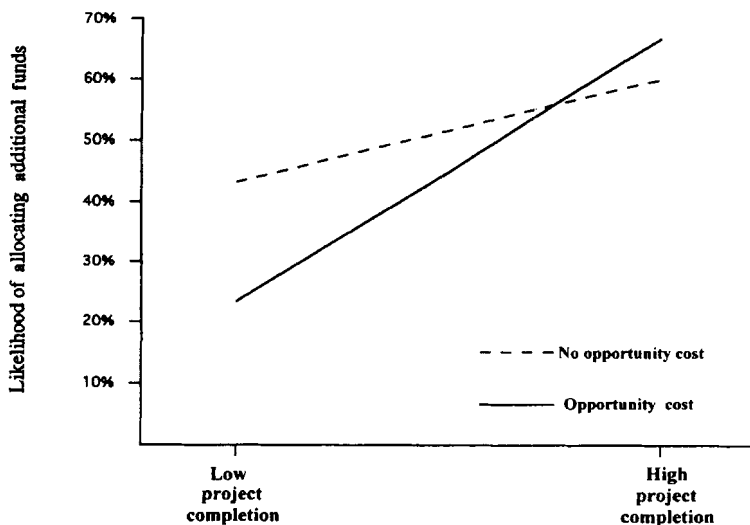


Figure 1. The Opportunity Cost \times Percentage Complete interaction on reported likelihood of allocating the next million dollars of the budget—MBA sample.

the context of a decision problem requiring continued investment or withdrawal from a threatened project. Once again, however, the degree of project completion strongly influenced resource-allocation intentions.

Our new hypothesis, predicting that awareness of opportunity costs would influence subjects' decisions to continue with a project when project completion was low but not high, received strong support in this study. This finding suggests the need for a caveat regarding the utility of opportunity-cost information in decision making. It appears that opportunity-cost information, like other forms of economic information, is more potent at the start of a project than it is toward the end of a project (Brockner & Rubin, 1985). Perhaps Northcraft and Neale (1986) would have found such an effect if project completion had been manipulated in their study.

General Discussion

In this section of our paper, we would like to address two issues. With respect to sunk costs, we will offer some ideas about when they may and may not be important to decision making. We then conclude the paper by outlining our own theoretical explanation for the findings, and propose some questions for future research. While we realize that theoretical development is typically found at the beginning of a paper rather than the end, we feel that

we needed the results of our three studies presented here to form a strong enough basis for our suppositions.

The Role of Sunk Costs in Decision Making

The consistency of our findings across undergraduate samples (Conlon & Garland, 1993), bank managers, Chinese graduate students, and advanced MBA students, together with other research that has failed to find that sunk costs contribute positively to escalation (Garland et al., 1990; Heath, 1995), calls into question whether sunk costs in and of themselves play any significant role in escalation of commitment. We believe that such costs are important, but more so for some types of decision situations than for others.

For example, image theory (Beach, 1990; Beach & Mitchell, 1990) provides a useful distinction among types of decisions which might help to suggest when sunk costs will matter in decision making. The theory distinguishes between (a) *adoption decisions*, which concern making initial choices about what projects to undertake or reject, and (b) *progress decisions*, which concern whether a plan (already in motion) is making sufficient progress toward goal attainment. More recently, Staw and Hoang (1995) have described adoption decisions as resource utilization decisions.

In our research, we have chosen to study progress decisions: In all of our scenarios, the projects are already under way. The results of five separate studies in which sunk costs and project completion have been manipulated independently in the context of such progress decisions (three in this paper and two in Conlon & Garland, 1993) are quite clear. Moreover, there is no unconfounded experimental evidence of which we are aware at the present time that would demonstrate that sunk costs contribute to escalation in incremental investment situations of the sort that we have studied.

With regard to certain adoption decisions, however, we believe that sunk costs may play a more important role. A reexamination of the findings in Arkes and Blumer (1985) supports such a thesis. For example, some of their scenarios placed subjects in the dilemma of having purchased two nonrefundable ski trips for the same weekend. The trips varied in cost, and the less expensive trip was expected to be more fun. Subjects typically decided to go on the ski trip which cost more money, even though it had a lower payoff in terms of the subjects' enjoyment. Similar sunk-cost patterns were obtained by Staw and Hoang (1995), who in their study of NBA draft choices found that players selected earlier in the draft (and who were paid more money) played more minutes and had longer careers than did those chosen later in the draft, even when performance was controlled for. These studies suggest that

product utilization decisions may be one type of adoption decision where sunk costs are likely to play an important role.⁴

Sunk costs may also have important affective implications. For example, there is evidence that people prefer and endorse products for which they paid higher prices (e.g., Cialdini, 1984). However, these effects can again be construed as examples of the consequences of adoption decisions, rather than progress decisions.

In addition, there are some situations in which degree of project completion cannot be easily or readily determined (the NBA draft scenario is one such context). In such contexts, information about expenditures (sunk costs) may be the only data available on which to make inferences about how a project is doing. For example, consider United States involvement in the Vietnam War (an event which actually triggered much of the early work on escalation): There was little objective data on degree of progress, other than expenditures, and as McNamara (1995) points out in his recent book, what data are available (such as guns destroyed or people captured) may actually be negatively correlated with degree of project completion.

A Goal-Substitution Explanation

We believe that the results of studies presented here and elsewhere (Conlon & Garland, 1993) suggest a potentially powerful new contributor to escalation phenomena that is worthy of more attention by researchers who are working in this area. We propose that as progress moves forward on a project, completion of the project itself takes increasing precedence over other goals (e.g., economic profit) that may have been salient at the time the decision was made to begin the project. It is this phenomenon that we have labeled *goal substitution*. In contrast to the sunk-cost hypothesis, goal substitution is not driven by past expenditures of money and effort; rather, it is driven by the belief that project completion is close at hand. In a sense, we argue that individuals get caught up in the desire to complete what they have started, and as this completion draws nearer, information that might have been taken into account before choosing to undertake the project (e.g., cost/benefit ratios, etc.) becomes increasingly unimportant.

It seems reasonable to seek to position the project-completion effect and the goal substitution explanation into some of the preexisting models of escalation and decision making. In terms of the escalation paradigm offered by

⁴In fact, some of Arkes and Blumer's (1985) other scenarios that purport to demonstrate sunk-cost effects can be criticized on the grounds that they do not control for the type of decision being made. For example, in one study, subjects are asked how likely they are to allocate the first \$1 million to a project (which is essentially an adoption decision) versus allocating the last \$1 million to a project (a progress decision).

Staw and Ross (1987), degree of project completion can be considered an example of a project determinant; an objective feature of a venture that motivates continued investment and ultimately binds a decision maker to a course of action. Staw and Ross describe project determinants as being potent commitment forces at both the beginning and end of a project's life span. Our work, and other anecdotal evidence (e.g., Ross & Staw, 1993) suggesting that individuals are more likely to persist as project completion draws near, is certainly consistent with Staw and Ross' description of the importance of project determinants at the end of a project's life span.

Of course, what is especially interesting about the kinds of decisions considered in much of the escalation research is that often the original goal that drives an individual or organization to undertake some course of action is not completion of a project itself (e.g., the building of a nuclear power plant), but some other outcome (e.g., economic gain) for which completion of the project undertaken is perceived to be a necessary, but not sufficient condition. Thus, in proposing a goal-substitution explanation, we are suggesting that in a variety of decision contexts, the more immediate and controllable outcome of completing what one has started can come to substitute either partially or completely for an originally desired outcome which is more distant and less controllable.

The goal-substitution effect that we have proposed is also consistent with the Brockner et al. (1979) entrapment paradigm, which argues that goals shift "from an economic motive at the outset to some other motive later" (p. 494). Indeed, the statement from Brockner et al. was highly influential in shaping our own thinking about goal substitution. Of course, Brockner et al. focus on self-justification as the "other motive" that entrapped individuals are responding to, while we focus on project completion.

In fact, our explanation may not conflict with a self-justification explanation. Project completion may be a mechanism through which justification of past expenditures is retrospectively rationalized. In other words, "Yes, we are way over budget—but just look at the finished product!" If we assume that resource allocators would like to be perceived as having made both successful and prudent investments, then it is important to understand whether these decision makers are defining "successful" in terms of economics or in terms of project completion. Being able to point with pride to a completed venture may be an important mechanism in leveraging one's self-esteem with regard to the project. Such reputational or symbolic payoffs should not be underestimated.

Future Research

The goal-substitution effect that we have proposed suggests that as project completion draws near, individuals pay less attention to factors that may have

been important in their initial decision to undertake a project (e.g., competitor threats, profit expectations, opportunity costs, etc.). Clearly, the next step in this research path is a longitudinal study which can demonstrate that attention shifts from initial goals to other concerns that are more controllable (e.g., project completion) as project completion nears. Finding such an attentional redirection would provide strong support for the goal-substitution explanation.

Given that degree of project completion (specifically, high project completion) appears to dominate other types of information (e.g., competitive threats or opportunity costs), future research might consider what kinds of information might cause most individuals to withdraw from a project, even in its final stages of completion. In other research, it would be very interesting to examine reactions from project participants to the cancellation of projects in varying stages of completion. Based on our goal-substitution proposition, we would expect increasingly negative affect in the later stages of project completion, if this is the primary goal to which respondents are attending and its completion has now been frustrated.

One type of information that would be particularly interesting to examine using a goal-substitution model is the role of feedback in decision making. The escalation and entrapment literature clearly acknowledges the important role that feedback plays in decision making. Escalation theory (e.g., Staw & Ross, 1987) argues that only feedback which is clear and unambiguous is likely to change intentions to continue with a project. In fact, several studies have found that unambiguous negative feedback reduces continued investment intentions (Garland et al., 1990; Kernan & Lord, 1989; Rubin & Brockner, 1975; Staw & Fox, 1977).

By extension, one can think of project-completion information as a particular type of feedback. For example, in our studies, variation of both project completion and percentage of budget expended provides implicit feedback about the overall level of project performance. Decision makers could choose to use these two pieces of information as a heuristic to determine how a project is going. For example, if 10% of the budget has been spent and the project is 90% complete, one might infer that the project is ahead of schedule (positive feedback) and increase their investment. Conversely, if 90% of the budget has been spent and the project is only 10% complete, one might infer that the project is hopelessly behind schedule (negative feedback) and decrease their investment. This may suggest to some that our results are confounded by the type of implicit feedback that occurs when subjects have such information. Perhaps a study where open-ended responses are obtained would help us to determine whether decision makers are using these two pieces of information in this way. However, none of the five studies in which

sunk costs and project completion were varied independently (those in this paper and the two in Conlon & Garland, 1993) found an interaction between sunk costs and project completion.

We can point to some data that question this explanation, however. Conlon and Garland's (1993) first study of the project-completion effect included conditions in which there was no mention of project-completion information, as well as conditions in which there was no information about sunk costs. Moreover, their study included a wider variety of levels of project completion and sunk cost (project-completion levels of 10%, 50%, and 90%; and sunk-cost levels of \$1, \$5, and \$9 million of a \$10 million budget). When no project-completion information was provided, there was no evidence of a sunk-cost effect (reported probabilities of allocating the next million dollars were 64%, 69%, and 66% for sunk-cost levels of \$1, \$5, and \$9 million, respectively). On the other hand, when no sunk-cost information was provided, project-completion levels continued to lead to higher probabilities of allocating the next million dollars (probabilities of 63%, 66%, and 73% for projects that were 10%, 50%, and 90% complete, respectively). Thus, there is experimental evidence that project-completion effects do not rely on combining level of completion with sunk costs to determine if projects are on schedule or behind schedule.

Other convincing data come from Drummond's (1996) analysis of the TAURUS share-transfer system, where she notes:

A project that had consumed 90% of its budget yet was only 10% complete might suggest woeful mismanagement. Wouldn't such a project be terminated long ago? The present case exemplifies the difference between pen-and-paper exercises and real conditions. In autumn 1991, TAURUS was 0% complete. Moreover, it had consumed 100% of its budget. (p. 119)

In spite of this obvious negative feedback, additional investments continued to be made on the project well into 1993. Drummond (1996) argues that the data from TAURUS support the assertion that level of project completion is more important than sunk costs.

In addition to the forces already noted, characteristics of the decision context, such as the tangibility or concreteness of the project, may also have a direct effect on continued investment or may interact with project completion to influence investments. For example, a building that can be seen and touched may be more likely to receive continued funding than a less tangible project (e.g., an electronic network), and this effect may be more pronounced as project completion draws near. Of course, more concrete projects might be

more susceptible to project completion effects, in part, because their salvage value is greater (e.g., Northcraft & Wolf, 1984). However, in some situations, completion of a project can greatly reduce salvage value by diminishing opportunities for alternate use.⁵

We close by noting some obvious limitations of our work. All of our scenarios, even the one explicitly developed for the bank manager sample, are less involving than the real-world situations decision makers face. While this is a common factor in much of the research on decision making, we feel that it is essential to conduct laboratory studies of decision making in which both sunk costs and project completion are varied for subjects who are personally involved in an ongoing task. While such studies may lack mundane resemblance to typical business situations, it is important to validate goal-substitution effects in situations that involve real outcomes for a decision maker.

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⁵Take the construction of a building intended to house a restaurant: If one alternative use for the building is office space, revamping the interior of the building from a restaurant to an office would be a major expense. Salvage value might have been higher if the interior design had not been completed. Thus, project completion can reduce opportunities for other uses of the space.

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