A conceptualisation of task dimensions affecting escalation of commitment

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Weighing the past and the future in decision making

E. Ásgeir Juliusson, Niklas Karlsson, and Tommy Gärling
Göteborg University, Sweden

Prior irreversible investments of money, time, or effort referred to as sunk costs frequently lead to decisions to continue a chosen course of action despite that this is irrational. With the aim of demonstrating that such escalation of commitment is a special case of a more general phenomenon, two experiments were carried out employing undergraduates as participants. Experiment 1 showed for fictitious personal and business investment scenarios that both prior losses and gains (sunk outcomes) affected choices to continue or discontinue the investment. In Experiment 2 the effect of sunk outcomes was reduced although not eliminated by a monetary bonus that in one condition depended on the future outcomes of the second gamble in two-stage gambles, in another condition on the future returns in personal investment scenarios. In support of a more inclusive theory subsuming escalation of commitment, the decisions were affected by both past and future outcomes and both gains and losses.

Prior irreversible investments of money, time, or effort are referred to as sunk costs (Arkes & Blumer, 1985). To take sunk costs into account when making decisions about the future is not considered to be normatively correct (Dawes, 1988). It is always better to choose an alternative that is expected to give the most beneficial future outcome irrespectively of whether or not this alternative has been chosen before. Still, this type of irrational decision making referred to as the *sunk-cost effect* (Arkes & Ayton, 1999) or *escalation of commitment* (Staw, 1976, 1997) is frequently observed in the laboratory (Karlsson, Juliusson, & Gärling, 2005) as well as in real-life business or political decision making (Staw & Ross, 1989).

Several explanations of escalation of commitment have been proposed. Arkes and Blumer (1985) argued that escalation of commitment stems from an overgeneralisation of a ''don't waste'' decision rule (see also Arkes, 1996). Drawing on research showing that people who are responsible for an initial decision

Correspondence should be addressed to Tommy Gärling, Department of Psychology, Göteborg University, PO Box 500, SE-40530 Göteborg, Sweden. Email: Tommy.Gärling@psy.gu.se

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escalate commitment to a greater extent than those who are not responsible, another proposed explanation (Brockner, 1992; Staw & Ross, 1989) is that escalation of commitment reflects a need for justification to self or others. Still another explanation (Garland & Newport, 1991; Northcraft & Neale, 1986; Schaubroeck & Davis, 1994) assumes that discontinuing or continuing a chosen course of action is interpreted as a choice between a sure and an uncertain loss. According to prospect theory (Kahneman & Tversky, 1979), people are risk seeking (i.e., escalate commitment) when making such choices.

Sometimes people discontinue a course of action too early, or deescalate commitment, in response to sunk costs (Heath, 1995; Karlsson, Gärling, & Bonini, in press; Karlsson, Juliusson, Grankvist, & Gärling, 2002; McCain, 1986). A ''don't waste'' rule, justification, and prospect theory all fail to explain this. Analogous to business investments, Heath (1995) proposed that people set ''mental budgets'' so that they can track ongoing investments. Escalation of commitment occurs when prior investments are difficult to track or when the absence of estimated returns makes it difficult to set a mental budget. In contrast, deescalation of commitment occurs when a mental budget is set but total investments (prior investments plus current investments) exceed estimated total (prior and future) returns. In this way Heath thus accounted for when people escalate commitment and when they deescalate commitment.

Other research raises the more general question of how to explain that people integrate or segregate prior gains and losses when facing a current decision (Gärling, Karlsson, Romanus, & Selart, 1997; Laughunn & Payne, 1984; Linville & Fischer, 1991; Thaler & Johnson, 1990). Such accounts would subsume explanations of escalation of commitment as a special case. In this vein, a major finding in Karlsson et al. (2002, in press) was that participants are influenced by both past losses and *gains* (what may be termed sunk *outcomes*) as well as outcomes or returns expected to occur in the future as a result of the decision being made. On the basis of these results, we propose a more inclusive theory. In this theory it is assumed that decision-makers search for information that promises to have bearings on the future. If only information about the past is available, they place weight on this information (cf. the representative heuristic; e.g., Kahneman & Frederick, 2002). However, when information about future outcomes is available, this information will be attended. Nevertheless, future outcomes are uncertain. Even though not described as such (see Experiment 1), people may still not cognitively represent future outcomes in the concrete way they are described (Trope & Lieberman, 2003). This should be contrasted to a usually concrete mental representation of past outcomes. Therefore, compelling concrete information about the past may not be totally disregarded in favour of abstract information about the future. The proposed theory posits that weights are placed on information about both gains and losses in the past as well as on information about future outcomes when available. In this paper we compare this theory to its less inclusive

competitors, theories of escalation of commitment, mental budgeting theory, and expected-value theories.

In order to make explicit comparisons among the different theories, we assume that strength of the choice of continuing investment (*C*) is related as follows to prior investment (*PI*), prior returns (*PR*), current investment (*CI*), and future returns (*FR*):

$$C = b_{PR}PR - b_{PI}PI + b_{FR}FR - b_{CI}CI + a$$

where *a* is a constant and *b*s are weights. As proposed in Table 1, theories of escalation of commitment imply that no weight is placed on current investment and future returns. In previous research this has frequently been induced by the experimental procedure since no information about future returns has been available (Karlsson et al., 2005; Staw, 1997). The justification for this is reflected in Staw's statement (1997, p. 193): ''Few doubt that escalation effects would disappear if the decision maker is confronted with clear-cut information that persistence will lead to disaster, while withdrawal would bring positive results.''[1] Furthermore, most studies of escalation of commitment have confined themselves to investigate choices when there is a sunk cost (i.e., when $PR < PI$), thus further excluding tests of the proposed more inclusive theory. The mental budgeting theory (Heath, 1995) implies that when there is a sunk cost and information about past and future outcomes is available, equally strong positive weights are placed on this information so that escalation of commitment occurs if prior and future returns exceed prior and current investments (referred to as rate of return), otherwise deescalation of commitment occurs. The normative expected-value principle implies that no weight is placed on information about the past (Dawes, 1988). Thus, only future returns minus current investment

TABLE 1
Theoretical predictions of weights placed on past and future outcomes in decision making

Theory	*Boundary condition*	*Prediction*
Theories of escalation of commitment	PR < PI	$b_{PR} = b_{PI} < 0$; $b_{FR} = b_{CI} = 0$
Mental budgeting theory	PR < PI	$b_{PR} = b_{PI} = b_{FR} = b_{CI} > 0$
Expected-value theories	None	$b_{PR} = b_{PI} = 0$; $b_{FR} = b_{CI} \neq 0$

PR denotes prior returns, PI prior investment, FR future returns, and CI current investment. The *b*s are weights.

[1] This citation seems to imply that expected-value theories are valid when future returns are known. Thus, it may be argued that Table 1 misrepresents the predictions by escalation of commitment theories. Staw's position is however extreme and is not necessarily shared by others (e.g., Arkes & Blumer, 1985).

(referred to as expected value) influence the decision. The weights placed on future returns are assumed to decrease with uncertainty. No weights are placed on future returns in the limiting case when these are totally unknown.

The primary aim of the present experiments is to show that both past losses and gains as well as future outcomes affect decisions to continue or discontinue a chosen course of action. We are however not assuming that the weights placed on the past and the future are necessarily always equal but that these may vary with other factors. Research disentangling such factors would extend the theory further. In part the present experiments are therefore also attempts in this direction. As will be detailed further below, in Experiment 1 personal investment decisions are compared to business investment decisions as well as a loss-minimising decision goal to a gain-maximising decision goal. Experiment 2 investigates the effect of a monetary bonus on personal investment decisions and gambling decisions.

EXPERIMENT 1

According to the loss-sensitivity principle (Gärling & Romanus, 1997), people are only influenced by prior outcomes when they evaluate potential losses (for empirical support, see Romanus, Hassing, & Gärling, 1996; Romanus, Karlsson, & Gärling, 1997). It is therefore implied that a loss-minimising decision goal that stresses avoidance of future losses leads to that choices to continue or discontinue a course of action are more influenced by sunk outcomes. In the special case when there are sunk costs, whether escalation or deescalation of commitment occurs may be predicted by the mental budgeting theory (Heath, 1995). In contrast, if the decision goal is to maximise gains, sunk outcomes are expected to have no effect. Thus, in this case expected-value theories would predict the choices.

Two previous experiments (Karlsson et al., 2002; Exps 1 and 2) failed however to demonstrate the expected stronger effect of sunk outcomes when participants were instructed to minimise losses in contrast to maximise gains. The only outcome in line with the prediction was obtained when the decisions entailed personal investments (Exp. 3). The explanation offered was that loss minimisation was felt to be more important in the personal domain.

Contrary to the proposed hypothesis derived from the loss-sensitivity principle, Juliusson (in press) showed that a gain-maximising goal led to more escalation of commitment than a loss-minimising goal. It was argued that when the goal is to maximise gains, sunk costs are taken into account because they reduce possible gains. The implication, borne out by the results, is that preference for continuing an investment increases with the size of the sunk cost. In contrast, when the goal is to minimise losses, it was expected and shown that preference for continuing decreased with the size of the sunk cost, presumably because it was felt that even larger losses were avoided.

In Experiment 1 we employ a fractional factorial design (Kirk, 1995; Landsheer & van Den Wittenboer, 2000) making possible estimation of the weights participants place on prior returns (*PR*), prior investments (*PI*), future returns (*FR*), and current investments (*CI*) when they choose between continuing or discontinuing investment in a business venture. The aim is to first test the hypothesis that nonzero weights are placed on all these factors and second to investigate whether the weights are differentially affected when participants are instructed to maximise gains or minimise losses. Both personal decision and business decision scenarios are furthermore employed to determine whether the effects of decision goal are moderated.

Method

Participants and design. Forty eight undergraduates at Göteborg University volunteered in return for the equivalent of approximately 6 euro in payment. Their mean age was 25.5 years (ranging from 19 to 47 years). Two of them had studied economics or business administration for more than one semester. Participants were randomly assigned to four groups. In two groups they were instructed to make the decision with the goal of maximising gains, in two other groups with the goal of minimising losses. In one of the former and in one of the latter groups, the participants were instructed to imagine that they made decisions to invest their own money in a project. In the remaining two groups participants were instructed to imagine that they were a company manager whose task was to make an investment decision for his or her company.

Procedure. Participants were seated in private booths facing a personal computer. They made nine independent investment decisions described in scenarios displayed on the computer screen. The general instructions asked the participants to carefully read the descriptions of the scenarios and answer questions related to them.

The investment scenarios were similar to those used in Karlsson et al. (2002) that were modelled after the scenarios in Staw's (1976) pioneering study. Information was given about prior investments (*PI*), prior returns (*PR*), current investments (*CI*), and future returns (*FR*). In the fractional factorial design (see Table 2) each factor had three equally spaced levels that were combined so that the main effects of these factors were orthogonal. The number of scenarios was kept to nine by confounding the interaction effects with the main effects.[2]

In the business investment scenarios participants imagined that they were a company manager whose task was to continue or discontinue a prior investment of the company's money he or she was responsible for. The levels of each factor were 4, 8, and 16 million Swedish Crowns (SEK) (1 SEK is about 0.10 euro). In

[2] In the study by Karlsson et al. (2002), interaction effects were in general not significant.

TABLE 2
Mean ratings and percentages of choices to continue investments for levels of prior investment (PI), prior returns (PR), current investment (CI), and future returns (FR) related to type of investment decision and decision goal (Experiment 1)

				Personal investment						*Business investment*					
				Loss-minimisation			*Gain-maximisation*			*Loss-minimisation*			*Gain-maximisation*		
PI	*PR*	*CI*	*FR*	*M*	*SD*	*%*	*M*	*SD*	*%*	*M*	*SD*	*%*	*M*	*SD*	*%*
Low	Low	Low	Low	−6.5	4.3	8.0	−1.2	8.2	50.0	−1.8	6.8	42.0	2.7	7.5	67.0
Low	Medium	Medium	High	6.2	5.0	92.0	8.4	1.9	100.0	5.9	6.5	83.0	8.8	1.6	100.0
Low	High	High	Medium	−3.2	7.2	42.0	0.5	8.1	50.0	0.0	7.9	50.0	1.5	7.7	50.0
Medium	Low	Medium	Medium	−3.1	6.7	33.0	−2.6	7.5	42.0	−3.4	6.8	42.0	1.0	7.3	50.0
Medium	Medium	High	Low	−6.4	3.3	8.0	5.9	5.4	8.0	−7.5	4.7	8.0	−3.6	7.2	33.0
Medium	High	Low	High	8.0	5.4	92.0	9.0	1.5	100.0	9.1	1.1	100.0	9.6	0.6	100.0
High	Low	High	High	−4.4	6.4	25.0	−4.0	5.7	25.0	−3.3	6.3	33.0	1.3	8.3	50.0
High	Medium	Low	Medium	1.4	7.4	58.0	2.4	6.7	67.0	2.9	7.3	75.0	4.0	7.0	83.0
High	High	Medium	Low	−6.7	3.9	8.0	−8.0	2.8	5.0	−7.5	3.8	8.0	−4.1	5.7	25.0

The low, medium, and high factor levels were 4,000, 8,000, and 16,000 Swedish Crowns in the personal investment decisions, 4, 8, and 16 million Swedish Crowns in the business investment decisions.

the personal investment scenarios participants imagined that they were facing the decision to continue or discontinue to invest their own money in a project in which they had already invested. The levels of each factor were 4,000, 8,000, and 16,000 SEK. An alternative investment opportunity yielding returns of 10% was specified. In each scenario the participants in the loss-minimising groups were told that the future financial situation was bad so that minimising losses was an important goal, whereas participants in the gain-maximising groups were told that the future financial situation was good so that there was no reason to be concerned about possible losses.

Participants used the keyboard to type their choice to continue or discontinue investments. They also typed a number on a scale indicating how much they favoured the chosen alternative. The scale ranged from 0 to 10, where 0 was defined as indifferent and 10 as completely in favour of the chosen alternative. The scenarios were presented in individually randomised orders. A session lasted for about 15 min after which participants were debriefed and paid.

Results

The main dependent variable in this and the following experiment is the ratings that were given a positive sign if the choice was to continue, a negative sign if the choice was to discontinue. Hence, the signed ratings range from -10 (completely in favour of the choice not to continue) to 10 (completely in favour of the choice to continue). A 0 indicates indifference between to continue or discontinue.

The results are given in Table 2 for each scenario and between-groups condition. In this table the percentages of choices to continue are reported for comparison (more than 50% represents continued investment, less than 50% discontinued investment, and 50% indifference). As may be seen, participants in the loss-minimising group discontinued to invest to a larger extent than did participants in the gain-maximising group ($M = -3.9$ vs. 0.5). That this effect was reliable was substantiated by a 2 (gain-maximising vs. loss-minimising decision goal) by 2 (business investment vs. personal investment decision) by 9 (scenario) mixed factorial analysis of variance (ANOVA) with repeated measures on the last factor yielding a main effect of decision goal, $F(1, 48) = 5.94$, $p < .05$. There was no significant difference between personal and business investments ($M = -1.5$ vs. -1.9), $F(1, 48) = 3.75$, $p = .07$. Neither did the between-groups factors interact with each other or with the within-group factor, whereas the main effect of the latter was significant, $F(5.08, 198.7) = 47.51$, $p < .001$.[3]

[3] In all tests involving the within-group factors, the Greenhouse-Geisser correction is applied to the *df*s.

To further illuminate the main effect of the within-group factor, one-way repeated-measures ANOVAs were conducted with three levels (low, medium, and high) separately for prior investment, prior returns, current investment, and expected returns, respectively. Overall there were significant main effects of prior investment ($M = 1.8$ vs. 0.3 vs. -2.2), $F(1.87, 88) = 21.50$, $p < .001$, prior returns ($M = -2.1$ vs. 1.4 vs. 0.7), $F(1.78, 88) = 14.90$, $p < .001$, current investments ($M = 3.3$ vs. -0.4 vs. -3.0), $F(1.60, 88) = 44.40$, $p < .001$, and future returns ($M = -4.8$ vs. 0.1 vs. 4.1), $F(1.90, 88) = 119.00$, $p < .001$. As estimates of the weights placed on each factor, the following $\omega^2 s^4$ (Kirk, 1995) were computed: .46 (prior investment), .36 (prior returns), .60 (current investment), and .83 (future returns). As should be noted, although all effects were significant, the weights associated with current investment and future returns were larger.

Discussion

In line with the proposed theory, the results showed that weights were placed on both past and future outcomes, somewhat smaller weights on the latter than on the former. The theory may thus subsume the theory of mental budgeting (Heath, 1995) that predicts escalation or deescalation of commitment when there are sunk costs (prior losses) as well as theories of escalation of commitment (Staw, 1997) that predicts escalation of commitment when there are sunk costs. Expected-values theories were however refuted since the results showed that sunk outcomes affect the choices.

The results also demonstrated that a gain-maximising decision goal led to stronger preferences to continue investment than did a loss-minimising decision goal. Thus, the instructions instigating different decision goals had a main effect, exactly as observed in previous research (Juliusson, in press; Karlsson et al., 2002). No other effects were however observed related to decision goal whether it was a business or personal type of decision task. Thus, there was no evidence of differences in weighing.

EXPERIMENT 2

In Experiment 2 another attempt is made to influence the weights placed on past and future outcomes. Economic incentives (bonuses) were to this end introduced in the scenarios. Using scenarios providing a noneconomic context may however counteract effects of economic incentives. Decontextualised two-stage gambles were therefore employed in one condition, whereas in another condition the same economic incentives as in the gambles were introduced in the personal investment scenarios.

[4] This measure was employed since it does not presuppose linearity.

In one (gain) condition the bonuses that participants were promised were only based on expected future returns. In another (gain–loss) condition the bonuses were based on expected future returns minus current investment. It was anticipated that, at least in the decontextualised gambles, the past outcomes would have no or less influence. Furthermore, conceptually replicating the results of Experiment 1, the differences in bonuses were expected to lead to a stronger preference for continuing investments in the gain condition than in the gain–loss condition.

Method

Participants and design. Another 48 undergraduates at Göteborg University volunteered in return for the equivalent of approximately 6 euro in payment. They were between 17 and 48 years old with a mean of 24.6. Four had studied economics or business administration for more than one semester. An equal number of participants were randomly assigned to four groups. Two groups received bonuses based on future returns (gain condition), another two based on future returns minus current investment (gain–loss condition). In each case one of the groups received the personal investment scenarios, the other group the decontextualised two-stage gambles.

Procedure. In the personal investment scenarios, prior investments, prior returns, and current investments were the same as in Experiment 1. However, future returns were stated as a probability (.20, .40, or .80) to obtain SEK 20,000. In the two-stage gambles the monetary amounts were 0.4% of those in the personal investment scenarios. Participants were instructed that they had played one gamble and won or lost, and that they were facing a second gamble. They could then either choose to gamble and pay the stake (''continue investment'') or choose not to gamble (''discontinue investment'').

The procedure was exactly the same as in Experiment 1 except that the instructions also thoroughly described the bonus. In the gain–loss condition, participants were first told that they would receive SEK 30, which was the highest amount they could lose. Then, in the gambles they were informed that one gamble would be randomly determined and played. In the gain condition participants were told that they would receive what they gain or nothing (and nothing if they choose not to gamble), in the gain–loss condition that they would receive what they gain minus the stake or lose the stake if they chose to gamble (and nothing if they chose not to gamble). In the personal investment scenarios the instructions similarly explained that the outcome would be determined for a randomly chosen scenario. In the gain condition, if participants continued the investment they would receive 0.25% (the sum divided by 400) of the future returns or nothing, whereas in the gain–loss condition they would receive 0.25% of the future returns minus 0.25% of the current investment or lose the latter. If they discontinued they would gain or lose nothing.

To check that participants understood the bonus instructions, they were asked to calculate the bonus for one practice example that was repeated until a correct answer was given. All participants managed to do this the first time or after the practice example had been repeated once.

Results and discussion

The results are displayed in Table 3 for the personal investment scenarios and decontextualised two-stage gambles in the gain and gain–loss conditions. As may be seen, participants in the gain condition showed as expected a weaker preference to discontinue to invest than did participants in the gain–loss conditions ($M = -0.2$ vs. -0.7). This difference was approximately the same in the two-stage gambles ($M = 0.3$ vs. -0.3) as in the personal investment scenarios ($M = -0.6$ vs. -1.1). A 2 (loss vs. gain–loss condition) by 2 (gamble vs. personal investment) by 9 (scenario/gamble) mixed factorial ANOVA with repeated measures on the last factor only yielded significant main effects of bonus, $F(1, 48) = 7.44$, $p < .01$, and of scenario/gamble, $F(6.02, 235.60) = 40.73$, $p < .001$.

Separate one-way repeated-measures ANOVAs showed that there were significant effects of prior investment ($M = 1.7$ vs. 1.1 vs. -0.5), $F(1.99, 93.53) = 10.82$, $p < .001$, $\omega^2 = .18$, prior returns ($M = -0.6$ vs. 1.1 vs. 1.7), $F(1.97, 92.59) = 11.08$, $p < .001$, $\omega^2 = .19$, current investment ($M = 3.2$ vs. 0.7 vs. -1.6), $F(1.76, 82.72) = 35.28$, $p < .001$, $\omega^2 = .42$, and expected future returns ($M = -3.2$ vs. 1.0 vs. 4.4), $F(1.65, 77.55) = 87.20$, $p < .001$, $\omega^2 = .87$. In line with what was expected, the effects of the prior investment and returns were smaller than the effects of current investment and future returns. Furthermore, the effect of future returns was larger than that of current investment.

In summary, the weights placed on the sunk outcome were reduced compared to Experiment 1 but were not zero despite that a bonus was offered based solely on future outcomes. Furthermore, there was no clear difference between the results for the personal investment scenarios compared to the two-stage gambles. Consistent with the main effect of the gain-maximising vs. loss-minimising decision goals in Experiment 1, preferences for continuing investment were stronger in the gain than in the gain–loss condition. Still, probably reflecting the strong aversion against gambling documented in previous research (e.g., Kahneman & Tversky, 1979), not even in the gain condition when the decision to continue would incur no monetary loss did participants invariably choose to continue investment. This suggests that noneconomic motives activated by the personal decision scenarios were not important since the results were similar for the decontextualised two-stage gambles.

GENERAL DISCUSSION

The results of both experiments yielded strong evidence for the proposed more inclusive theory positing that decisions about the future are affected by *both* the past and the future and *both* prior gains and losses. Neither theories of escalation

TABLE 3
Mean ratings and percentages of choices to continue investments for levels of prior investment (PI), prior returns (PR), current investment (CI), and future returns (FR) related to gamble vs. personal investment and type of bonus (Experiment 2)

				Gamble						*Personal investment*					
				Gain–loss			*Gain*			*Gain–loss*			*Gain*		
PI	*PR*	*CI*	*FR*	*M*	*SD*	*%*	*M*	*SD*	*%*	*M*	*SD*	*%*	*M*	*SD*	*%*
Low	Low	Low	Low	−2.7	7.2	33.0	2.2	6.6	67.0	−2.9	5.8	25.0	−1.2	7.0	50.0
Low	Medium	Medium	High	3.5	5.5	75.0	7.6	1.6	100.0	4.5	5.5	83.0	7.1	1.8	100.0
Low	High	High	Medium	−2.9	6.5	33.0	3.9	6.0	75.0	−1.2	5.7	33.0	2.6	5.8	75.0
Medium	Low	Medium	Medium	−0.2	6.3	67.0	4.3	4.6	75.0	−2.7	4.6	33.0	−1.4	5.9	42.0
Medium	Medium	High	Low	−5.4	7.2	17.0	−2.0	7.1	42.0	−7.2	3.1	0.0	−5.0	6.3	25.0
Medium	High	Low	High	7.6	2.3	100.0	8.0	5.4	92.0	8.7	1.2	100.0	8.7	1.4	100.0
High	Low	High	High	−2.1	6.2	42.0	2.6	6.3	75.0	−2.1	6.4	33.0	−0.7	7.7	50.0
High	Medium	Low	Medium	4.5	6.1	83.0	3.0	6.5	67.0	−0.5	6.8	50.0	3.5	4.4	75.0
High	High	Medium	Low	−4.7	6.1	25.0	1.6	7.4	67.0	−6.7	3.5	0.0	−4.5	6.5	0.25

The low, medium, and high factor levels were for PI, PR, and CI SEK 4,000, 8,000, and 16,000 in the personal investment scenario, SEK 16, 32, and 64 in the gambles. The levels of FR corresponded to the probability .2, .4, and .8 of returns of SEK 20,000 (SEK 32).

of commitment (Staw, 1997) nor the mental budgeting theory (Heath, 1995) can account for this since they are confined to explaining the effect of sunk costs. Furthermore, inconsistent with the escalation of commitment theories, weights were also placed on future outcomes, thus leading to less than expected influences of sunk costs. These weights were however not equally large, as assumed they would be by the mental budgeting theory, but were larger for the future outcomes. Expected-value theories are refuted by the results showing that weights were placed on the sunk outcomes.

It should be noted that a consequence of the above is that neither the escalation of commitment theories nor the mental budgeting theory are consistent with the present results *when there is a sunk cost* (prior investment larger than prior return). Table 4 shows that only in one of the three investment problems with a sunk cost did participants continue investments (escalate commitment), and only in two of these three cases did the mental budgeting theory correctly predict deescalation of commitment (when the rate of return is negative, i.e., when total investment exceeds total returns). It may be argued that the absence of a sunk-cost effect (escalation of commitment) is not a representative finding since many studies have demonstrated this effect. Still, the present study is not the first in showing no escalation (see, for instance, Heath, 1995; Karlsson et al., in press; Karlsson et al., 2002; McCain, 1986). The crucial factor may be that the future returns were explicitly stated in the present experiments (Staw, 1997). Important to note is then that explicit or salient information about future returns makes people take them into account. The results of Experiment 2 seems to provide additional support for this conclusion since the weights placed on the past were reduced when the value of the future outcomes were strengthened by monetary bonuses. However, sunk outcomes were still not fully discounted.

The proposed theory assumes that people search for any information that has bearings on the future. As a consequence, available information about the future as well as about the past influences the decision. It is however plausible to

TABLE 4
Mean ratings and percentages of choices to continue investments in Experiments 1 and 2 related to sunk cost (prior investment minus prior return) and rate of return (total return minus total investments)

		Experiment 1		*Experiment 2*	
Sunk cost	*Rate of return*	*M*	*%*	*M*	*%*
Low	Small negative	−2.0	41.8	0.0	54.0
Medium	Small negative	2.7	70.8	2.6	68.8
High	Large negative	−2.6	33.2	−0.6	50.0

assume that the weights placed on this information would vary. Furthermore, if information about the future is not available, weights may only be placed on the available information about the past. If the past outcomes are sunk costs, the theory predicts an effect of the sunk cost in this special case, although it does not predict the sign of the weight (whether the sunk cost results in escalation or deescalation of commitment). If information is available about the future outcomes, the mental budgeting theory is the special case when all weights are equally large. If only information about the future is available, expected-value theories represent another special case.

It was observed in Experiment 2 that the weights placed on past outcomes decreased compared to Experiment 1. This constitutes indirect evidence for changes in weights placed on the past and the future. However, direct evidence was not obtained. Irrespectively of type of decision context, only main effects (i.e., no change in differential weighing) were observed emphasising a loss-minimisation goal or potential bonus losses. When becoming more sensitive to losses, people are perhaps likely to still take the past into account in the same way but become more cautious to not incur more losses. This appears to be sensible but is an example of ''the prudence trap'' (Hammond, Keeney, & Raiffa, 1999). Additional research is needed to systematically investigate other factors that may affect the differences in weights placed on past and future outcomes.

In concluding, the present research makes two main contributions. First, it establishes that when future outcomes are known and salient, these tend to influence decisions more than do past outcomes. Nevertheless, the past is still not fully discounted as it should be from a normative stance. Thus, both the past and the future influence decision making. Second, not only prior losses (sunk costs) but also prior gains influence subsequent decisions. We suggest some lines along which these more general phenomena can be understood without ignoring past insights from research on escalation of commitment.

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