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Investigating How Resource and Situation Type Influence the Sunk-Cost Fallacy

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The Sunk-Cost Fallacy

Imagine that you just rented a DVD from Redbox at Target. You drove through traffic for an hour and arrived at the store for the DVD only to find out that you have to wait 15 minutes for the machine to be fixed because it is broken. You travel home, stick the DVD into its player, and begin to watch the movie. After 10 minutes, you realize you're bored to tears. Do you stop watching the movie immediately, wait to see if it gets better, or watch it until the end?

If you continue watching the movie—even though you are bored—you've committed the sunk-cost fallacy. Derived from economic theory and with applications in psychology, the sunk-cost fallacy refers to a decision making bias that people often have to continue investing future resources, whether time, money, or effort, into something they have already made prior investments in (Arkes & Blumer, 1985). The sunk-cost effect has been studied mainly regarding hypothetical decisions of everyday problems (Frisch 1993; Klaczynski, 2001; Stanovich, 1999), for example like the problem stated above: Continuing to watch a boring movie until it ends because you paid for it (Strough et al., 2008). The sunk-cost effect has also been studied in real-life settings. Staw and Hoang (1995) investigated how the sunk-cost effect influenced how much NBA players were paid and how long they remained hired despite performance. The researchers found that despite players' on-court performance or number of injuries, highly drafted players were retained longer. Because the sunk-cost effect is shown in both

hypothetical and real-life situations, hypothetical situations are valuable and efficient tools for examining variables that might affect the sunk-cost fallacy.

Although an abundance of sunk-cost research has focused on individual situations, or situations in which a person's decision is not the result of his or her relationship with someone else (such as deciding to watch a boring movie or buying season tickets for a game), there is scant literature about how the sunk-cost effect may influence interpersonal situations. Coleman (2009) studied how the sunk-cost effect was related to commitment to dates arranged online. He found that as prior investments increased, the participants' likelihood to commit to a blind date increased, even if the date was described as "inferior." In a similar study, the sunk-cost fallacy was examined in real-life relationships. Rusbult (1980a, 1983) found that the larger intrinsic investments (money, effort, time, emotions) were in the current relationship, the less likely a participant would be to express interest in dating an alternative person. Even in cases in which participants reported high relationship costs, however, participants still reported being committed to their relationships if prior investments had been made.

Individual v. Interpersonal Situations

As previous research illustrates, the sunk-cost effect has implications for decision-making behavior in both individual and interpersonal situations. To date, no study has yet investigated how resources invested into both situation types might differ because of the situation. For example, could an investment of money drive the sunk-cost effect in an individual situation but

have no effect in an interpersonal situation? This type of question has yet to be answered by sunk-cost research and was a goal of the present study.

Perhaps one major difficulty in answering this question results from an unclear understanding of how resource types influence the sunk-cost effect. Researchers have noted that time, money, and effort predict the sunk-cost effect, but most researchers have not shown how each of these resources individually influences the sunk-cost effect (Arkes & Blumer, 1985). One article, however, has shown how investments of time and money could have different influences on the sunk-cost effect (Soman, 2001). Soman found that participants were more likely to commit the sunk-cost fallacy for prior investments of money than for prior investments of time, unless time was expressed in the form of monetary quantities. In addition, Coleman (2010a) extended Soman's research by investigating how an investment of effort was similar to and different from time and money investments. He found that prior investments of money predicted the sunk-cost fallacy, but prior investments of time and effort did not.

While Soman and Coleman's research aids sunk-cost research by illustrating how different resources affect sunk costs, more research is needed to investigate additional resource types and their effects on sunk costs. Research by Goodfriend and Agnew (2008) suggests that emotions and self-concept may also be resources invested into a romantic relationship and that these resources may be predictive of the sunk-cost effect. While emotions and self-concept are explored as investments in the research that links romantic

relationships with the sunk-cost effect, these investments are nearly absent from research on the sunk-cost effect in individual situations. To extend Coleman's research, an investigation of these two investment types in addition to the most commonly cited three (time, money, effort) could broaden peoples' understanding of the sunk-cost fallacy in both types of situations.

Investigating Another Type of Interpersonal Relationship

In addition to the paucity of articles describing how investment types directly influence the sunk-cost effect, another major limitation is the lack of research about how the sunk-cost effect affects friendships. Most of the research done on interpersonal relationships has focused on romantic relationships. There is some research that suggests, however, that the sunk-cost effect may also influence friendships.

Rusbult (1980b) studied commitment along with satisfaction and alternatives in college friendships. She found that prior investments helped to predict future commitment in friendships. Rusbult's research suggests that like romantic relationships, friendships may also be vulnerable to the sunk-cost effect if people have invested resources such as time, effort, and emotions that are inextricably connected to the friendship and thus are hard to recover (Rusbult, 1980b). Examining both types of interpersonal relationships in the same study could be helpful in determining exactly which individual resources may predict future commitment in both relationship types.

Psychological Motives Underpinning the Sunk-Cost Effect

Researchers posit that the sunk-cost effect results because of the “Don’t waste” rule or the idea that people are unable to ignore the costs that have already been sunk into an endeavor. Thus, they continue to invest more resources—or escalate commitment in response to sunk costs (Arkes & Ayton, 1999; Staw, 1981). In one study, Arkes and Blumer showed how the “Don’t waste rule” accounted for decisions made. The team asked participants to imagine spending \$100 on a ticket for a weekend ski trip to Michigan and then several weeks later buying a \$50 ticket for a weekend ski trip to Wisconsin. Participants were specifically told: “You imagine enjoying the Wisconsin trip more than the Michigan trip, but then you notice that each trip will occur on the same weekend and that it’s too late to sell or return either ticket.” Participants were asked to select which trip they would go on. The researchers found that participants selected to go on the less desirable Michigan trip, because they thought going on the Wisconsin trip albeit less expensive would “waste” twice as much money (Arkes & Blumer, 1985).

Researchers continue to investigate the psychological motivations underpinning escalating commitment to a course of action, or continuing to work on an assignment even when the costs are evident or the payoffs aren’t. Economist Glen Whyte (1986) found that escalating commitment could be explained through prospect theory or the idea that people frame decisions from a reference point and the decision to escalate commitment is based on both negative and positive consequences. In his model, Whyte shows that if an

action has negative consequences, a person's decision to commit further resources is framed as a choice between losses, whereas if the action has positive consequences, the choice to continue investing further resources is framed as a choice between both gains. Despite either consequence, Whyte posits that either consequence would lead to escalation commitment because negative consequences would lead to risk-seeking behavior and positive consequences to risk-averse behavior (Tversky & Kahneman, 1981; Whyte, 1986).

Escalating commitment is directly linked to the sunk-cost effect, because prior investments usually enter into future decisions even in the face of a course of action that's going terribly awry (Staw, 1981). Economist Barry Staw (1981) explained that people might escalate commitment because of self-justification or the need to justify prior choices (Brockner, 1992; Staw, 1976; Staw, 1981). Self-justification is directly linked to the sunk-cost effect, because in the need to justify prior choices, people often invest additional resources. An illustrative example that Staw describes in his study is an administrator that has allocated research funds to an operating division of a company and tries to justify his or her potentially ineffective decision by escalating commitment and committing future resources to the project, thus committing the sunk-cost fallacy.

Predictions of Five Resources

The present study investigated which resources: time, money, effort, emotion, or self-concept, would be most likely to lead people to commit the

sunk-cost fallacy in an individual and interpersonal situation. Because there is limited research about how each resource type influences the sunk-cost effect, I extrapolated from other areas and concepts in psychology in order to make predictions about the role each resource would play in influencing the sunk-cost effect.

Money

An entire body of sunk-cost literature supports the prediction that money leads people to commit the sunk-cost fallacy in individual situations (Arkes & Blumer, 1985; Phillips, Battalio & Kogut, 1991; Staw, 1981). Soman (2001) suggested that this might be the case, because people are better at mentally accounting for money than they are for time. Some of the reasons he listed for a difference in the sunk-cost effect for money and time were: time cannot be inventoried or replaced; time is not as easily aggregated as money; and accounting for money (unlike accounting for time) is a routine activity (Soman, 2001). In contrast, Goodfriend and Agnew (2008) found that money was not a predictor of commitment in romantic relationships, because couples often value nonmaterial resources over material resources such as money and because happiness is more directly linked to nonmaterial resources such as emotions and time (Diener, et al., 1999; Goodfriend & Agnew, 2008). This research helped me to predict that money would increase the likelihood of people committing the sunk-cost fallacy in individual situations but wouldn't increase the likelihood of people committing the sunk-cost fallacy in interpersonal situations.

Time

Soman (2001) predicted that time wouldn't lead participants to commit the sunk-cost fallacy, because individuals account for time and money differently. In six separate experiments, he gave participants scenarios in which the only thing he varied was a time or money investment. Soman found that while participants committed the sunk-cost fallacy for money, the sunk-cost effect disappeared for time investments. Soman concluded that participants might be unable or unwilling to account for time in the same way that they account for money (Soman, 2001). While Soman's research provides evidence that time does not lead to the sunk-cost effect in individual situations, research on interpersonal relationships suggests that time is an intangible investment that predicts the sunk-cost effect (Goodfriend & Agnew, 2008). Thus, based on this research, it was logical to predict that time would not lead people to commit the sunk-cost effect in the individual situation used in this study, but that time would lead to the sunk-cost effect in the interpersonal situation.

Emotion

Little research has been done to explain what effect invested emotions might have on the sunk-cost fallacy. Coleman (2010b) investigated the role emotions would play on participants' likelihood to continue signing up online for a class. He found that participants that were induced to feel anger committed the sunk-cost effect but that participants that were induced to feel

fear did not commit the sunk-cost fallacy. Coleman reasoned that the findings might have occurred because participants that are angry are likely to feel that they have control of the situation, whereas those that are fearful might have less circumstantial control. As a result, those who perceive themselves as having more control might be more likely to escalate commitment, thus committing the sunk-cost fallacy, while those who feel that they have little control are less likely to escalate commitment (Coleman, 2010b).

Although Coleman's research might be helpful in predicting how induced emotions might predict the sunk-cost effect, his research does little to suggest how emotions invested in interpersonal relationships could predict the sunk-cost effect in that context. Some research suggests that emotions may lead people to remain in relationships that they aren't necessarily satisfied with (Rusbult, 1980a), although Rusbult doesn't explicitly state why this might be the case. Other research supports the idea that emotions exert an important influence on cognition and decision-making across everyday problems (Bower, 1981; Labovie-Vief, 1992; Sinnott, 1989).

Effort

Coleman (2010a) investigated whether effort would lead participants to commit the sunk-cost fallacy. Coleman found that invested effort did not produce the sunk-cost effect. Coleman reasoned that people aren't good at mentally accounting for effort because they're not well versed in keeping track of this type of investment. Coleman also explained that there were alternative explanations for the sunk-cost effect other than the sunk-cost effect

such as cognitive dissonance, self-perception theory, and learned industriousness. Coleman's research provides support for my prediction that invested effort will not lead people to commit the sunk-cost fallacy for individual situations. Effort, however, is described as an intangible investment that leads people to commit the sunk-fallacy in interpersonal relationships (Goodfriend & Agnew, 2008). As a result, I predicted that effort would lead to the sunk-cost effect in interpersonal relationships in our study.

Self-Concept

Perhaps the most under investigated area of sunk-cost research deals with how the self-concept is related to the sunk-cost fallacy. We were particularly interested in investigating self-concept, most simplistically defined as "a person's perception of him- or herself. Self-concept is influenced by peoples' interactions with their environments and by attributions for their own behavior (Marsh & Shavelson, 1985; Shavelson, Hubner, & Stanton, 1976).

Peoples' self-perceptions could potentially influence whether they escalate commitment to a particular course of action. Coleman suggested this when he argued that there were alternative explanations of effort other than the sunk-cost effect (Coleman, 2010a). One of the theories he discussed—cognitive dissonance theory—could provide the link between the sunk-cost fallacy and self-concept. Some research on cognitive dissonance describes it as a psychological discomfort that people are motivated to decrease (Elliot & Devine, 1994). Oftentimes, cognitive dissonance results when an individual's

actions conflict with his or her view of his or herself and must resolve that conflict by changing his or her behavior or adding a cognition that's consistent with one's view of his or herself (Festinger, 1957).

If participants view themselves as caring and supportive and are told that a friend or romantic partner has stopped talking to them and participants are asked to select how much longer they'd remain in the relationship, cognitive dissonance theory implies that participants may choose a behavior in line with their self-perceptions. In this particular example, participants may be more likely to remain in the relationship in order to reduce any dissonant view of themselves as distant. This escalation of commitment suggests that people with this type of self-perception are likely to commit the sunk-cost fallacy. On the flip side, people that view themselves as distant and detached in a friendship or relationship would be unlikely to change their behavior during cognitive dissonance. Thus, we can expect that someone who views his or herself that way would end the relationship, thus not committing the sunk-cost fallacy. All in all, I predicted that participants in the high investment condition for self-concept (caring and supportive) would commit the sunk-cost effect, while participants in the low invest condition would not fall prey to the sunk-cost effect.

Personality Variables

We were interested in investigating how personality could moderate the sunk-cost fallacy. Research about personality traits and the sunk-cost effect were limited, so we looked at articles that linked personality traits to

escalation of commitment. Moon et al. (2003) divided neuroticism into anxiety and depression and investigated how those facets of the neuroticism construct influenced escalation of commitment. The authors found a moderately significant effect of neuroticism on escalation of commitment. Anxious individuals were more likely to escalate commitment while depressed individuals were not. Conscientiousness, however, did not predict escalation of commitment, although achievement strivers were more likely to escalate commitment (Moon, 2001). Based on these studies, we predicted that neuroticism and conscientiousness would predict the sunk-cost effect, because they may lead participants to escalate commitment.

The Present Study

The present study sought to address the limitations of extant sunk-cost research. A major goal of the present study was to answer the question: Which type of invested resources would result in the highest sunk-cost fallacy scores? To do so, I investigated five resources that people likely invest in individual and interpersonal situations. The current study also sought to investigate how these resources may be alike or different in individual and interpersonal situations, so these situations were investigated simultaneously for comparison purposes. Another goal of the present study was to identify whether any personality traits predicted the sunk-cost effect.

There are two independent variables in this study. One independent variable is the situation type (or context) that was divided into two levels: individual and interpersonal. These levels were further divided into romantic

relationship and friend, two important types of interpersonal relationships.

Another independent variable is the type of invested resources that we divided into five levels: time, money, effort, self-concept, and emotions. There are two dependent variables. One dependent variable is the sunk-cost fallacy. The second dependent variable is personality that is measured using a 10-item inventory.

The present study sought to accomplish its goals by investigating how the sunk-cost effect influences a population of college students, an age group that may be particularly vulnerable to the sunk-cost effect based on prior research that found that younger adults are more likely than older adults to commit the sunk-cost fallacy (Strough et al., 2008). The present study is also a pioneer in determining what types of investments are important to college-aged students—both in individual and interpersonal situations.

Method

Design

A 3x5 mixed-factorial design was used. The between-subjects variable was resource. Participants were randomly assigned to receive one of the five resources (money, time, emotion, effort, self-concept). The within-subjects variable was situation. Each participant answered questions based on 3 levels (exam, romantic relationship, and friend). The dependent variable was the sunk-cost fallacy score.

Participants

Students at Syracuse University ($N=207$) were recruited through an email announcement, via SONA, and by word of mouth. Participants were brought into the laboratory where they completed the study. They volunteered or received research credit or extra credit for their psychology classes as compensation for participating. There were 81 male and 126 female students that ranged in age from 18 to 25 ($M= 19.54$, $SD= 1.39$).

Procedure

Participants were brought into the laboratory and were seated at a table where they completed the informed consent form. After participants completed the consent form, I selected a slip of paper numbered Version 1 through 30. Participants were randomly assigned to complete a version, each of which was counterbalanced. Sunk-cost fallacy scores did not significantly differ by version. There were five versions for each resource. Each participant completed a series of questions for three situations and based on one resource. Each situation had two questions that were identical except that one involved high investment of a resource and the other, a low investment. In all, each student completed six questions for Packet A.

The individual situation asked them how much longer they would continue to take a standardized exam if they hadn't gotten the score they needed the first time around. The friendship and romantic relationship vignettes were modeled similarly. Participants were asked how much longer

they would remain in a friendship or romantic relationship in which their friend or partner had recently stopped responding to text messages, phone calls, and was not supportive of their goals and interests.

Next, participants completed a 10-item personality inventory. Finally, participants completed a demographics questionnaire that asked them to report such things as their household income and whether or not they had been in a romantic relationship or friendship in which their partner or friend stopped talking to them. In addition, participants were asked to rate the five resources in order of importance for each situation type. After participants completed the questionnaire, their data was entered into a computer, and the sunk-cost fallacy was calculated and personality inventories were scored.

Measures

Decision vignettes. Vignettes were similar to the ones used by Strough et al. (2008) that they adopted from Frisch (1993). The scenarios included different situation types such as taking a standardized exam after failing to meet a desired goal the first time and remaining committed to a friendship or romantic relationship that was going bad. An example of the vignette for the individual situation for effort was: “You spent a lot of effort preparing for a standardized exam. After taking the exam, you received a score lower than what’s required to be admitted to your program of choice. Considering all the factors involved, how many more times will you take the exam?” There were five choices for participants to select from: don’t take it again, take it one more time, take it two more times, take it three more times, or take it

indefinitely (until I get the score I need). Participants received a low investment and high investment version of each situation (See Appendix). An exam situation was selected because it is a situation in which college students have experience and are likely to be able to relate to.

Vignettes for the interpersonal situations were similar, and the only words that were changed in each were friend and partner. An example of an interpersonal situation vignette for money was: “You’ve been friends with someone and have spent about \$500 on gifts for your friend. Lately, your friend hasn’t been returning your calls or texts messages and has not been supportive of your goals and interests. How much longer will you remain friends?” Participants could select from five choices: end the friendship immediately, wait for a couple weeks to see if the friendship improves, wait for a month to see if the friendship improves, wait for 6 months to see if the friendship improves, or remain committed to the friendship. Participants also received a low investment and high investment question of each situation. In this particular example, the low investment condition for money was \$40.

Computing the sunk-cost fallacy. To compute the sunk-cost fallacy score, each participant’s decisions for the low investment and high investment questions were compared. If a participant indicated that he or she would spend more time for the high investment than for the low investment choice, a score of 1 was assigned to indicate that the sunk-cost fallacy occurred. In addition, we computed *normatively-correct decision scores* (Klaczynski, 2001). The normatively correct decision was made if a participant chose the same answer

choice for the low and high investment conditions. A score of 0 was assigned. Finally, an error score was computed. Participants made errors if they indicated they would spend more future time in the low investment condition than in the high investment condition. Only sunk-cost fallacy scores are analyzed in this paper.

Ten-item personality inventory. We included a 10-item personality inventory known as the Big Five Inventory-10 (BFI-10) (Rammstedt & John, 2007). The BFI-44 is shown to have high convergent validity with the established measures of the Big Five personality traits (John, Naumann, & Soto, 2008). The BFI-10 is a reliable and valid alternative to the BFI-44 for a brief personality assessment (Rammstedt & John, 2007). There are 10 phrases on the inventory. Participants were asked the question, “How well do the following statements describe your personality?” Some of the phrases that participants selected from were: “...is reserved,” “...is generally trusting,” “tends to be lazy...” Participants rated their responses on a 5-point Likert-type scale. An answer of 1 indicated that participants disagreed strongly. An answer of 5 meant that participants agreed strongly.

Results

Resource Type and Situation Type Interaction

A mixed 3x5 ANOVA was used for the between-subjects independent variable, situation type with three levels (individual, romantic relationship, and friendship), and the within-subjects independent variable, resource type

with five levels (money, time, emotion, effort, and self-concept) and to determine both of the independent variables' effect on the dependent variable, sunk cost fallacy scores.

Significant main effects of resource type $F(4,200) = 8.12, p < .001, \eta_p^2 = 0.40$ and situation type $F(2,400) = 16.54, p < .001, \eta_p^2 = .076$, were qualified by a significant two-way interaction of Resource X Situation $F(8,400) = 5.69, p < .001, \eta_p^2 = .140$. In order to localize the interaction effect, post-hoc tests were performed to assess the simple effect of situation at each level of resource. A Bonferroni-type correction was used to reduce Type I errors associated with multiple post-hoc tests; alpha was set at .05. To follow up significant simple effects of situation, I performed multiple comparisons of situation at each level of the significant simple effect of resource type.

Money

The simple effect of money was statistically significant $F(2,82) = 3.69, p < .05$. There was no statistically significant difference ($p = 1.00$) between the means for the exam situation ($M = .23, SD = .421$) and the friend situation ($M = .44, SD = .497$), but there was a marginal difference between the exam and romantic relationship situations ($M = .43, SD = .496$). The difference in sunk-cost fallacy scores between the interpersonal relationships was non-significant ($p = .17$).

Time

The simple effect of time was statistically significant $F(2,80) = 37.99$, $p < .001$. Students that received the time resource ($p < .001$) were more likely to commit the sunk-cost fallacy for the romantic relationship situation ($M = .43$, $SD = .496$) and friend situation ($M = .44$, $SD = .497$) than for the exam situation ($M = .23$, $SD = .421$). The difference in sunk-cost fallacy scores between the two types of interpersonal relationships was non-significant ($p = 1.00$).

Emotion

The simple effect of emotion was non-significant $F(2,80) = 2.53$, $p = .086$. The means of participants' sunk-cost fallacy scores did not significantly differ among the romantic relationship situation ($M = .43$, $SD = .496$), friend situation ($M = .44$, $SD = .497$), or exam situation ($M = .23$, $SD = .421$).

Effort

The simple effect of effort was non-significant $F(2,80) = 1.58$, $p = .212$. The means of students' sunk-cost fallacy scores did not differ significantly among the romantic relationship situation ($M = .43$, $SD = .496$), friend situation ($M = .44$, $SD = .497$), or exam situation ($M = .23$, $SD = .421$).

Self-Concept

The simple effect of self-concept was non-significant $F(2,78) = .275$, $p = .760$. The means of students' sunk-cost fallacy scores in the romantic

relationship situation ($M = .43$, $SD = .496$), friend situation ($M = .44$, $SD = .497$), and exam situation ($M = .23$, $SD = .421$) were not significantly different from each other.

Personality

Preliminary multiple linear regression analyses showed that personality traits did not predict sunk-cost fallacy scores. I also examined neuroticism and conscientiousness as covariates in our analysis of variance. They were non-significant.

I conducted an exploratory analysis to find out whether sunk-cost scores differed by age or sex. Although age was not a significant factor, sunk-cost fallacy scores did differ by a Sex x Situation interaction, $F(2,390) = 3.58$, $p < .05$, $\eta_p^2 = .02$. Follow-ups showed that men had higher sunk-cost fallacy scores for the exam situation, women had higher sunk-cost scores for the friend situation, and there was no sex difference for the romantic relationship situation. Because there was no main effect of sex and sex did not interact with resource, nor was there a three-way interaction of sex, situation, and resource, I did not include sex as an additional factor in our main analyses.

Discussion

The present study investigated the relationship between situation and resource type and hypothesized that there would be a significant interaction between the two independent variables. My hypothesis was supported, revealing that the simple main effect of situation type changed over the five

levels of resource or that the simple main effect of resource type changed over the three levels of situation. To determine more information about the interaction, I conducted further analyses. A closer examination revealed results that we I did not necessarily predict.

Money

Students differed in their likelihood to commit future resources to the situations in the present study when previously invested money was involved. In particular, students tended to be more likely to invest further in a romantic relationship when money had been spent on a partner than to invest further in taking an exam after money had been spent. The finding that money could predict the sunk-cost effect in a romantic relationship is inconsistent with research by Goodfriend and Agnew (2008) who argued that money is a material resource that is not linked to happiness in relationships.

Prior research about the effects of resources on the likelihood to escalate commitment in interpersonal relationships has mainly been anecdotal (Lala, 2005). It might be possible that while college students report that money does not—or should not—predict future commitment in a romantic relationship, the reality is that money might predict future commitment in a population of college students. This result might have been easier to explain if we knew how participants viewed money. Perhaps, students might have viewed money as an intangible investment in a romantic relationship—something that they could not recover. Thus, they might have been more likely to escalate commitment in the relationship, because as Goodfriend and

Agnew (2008) found, intangible investments are more likely to predict future commitment in a romantic relationship.

The finding that students commit the sunk-cost fallacy (albeit to a low degree) for the exam situation is supported by previous research that has found that prior investments of money predict the sunk-cost effect (Arkes & Blumer, 1985). However, I predicted that students would commit the sunk-cost fallacy more for the exam (or individual) situation than for the interpersonal situations. This prediction was not supported in the present study.

There are several reasons why sunk-cost fallacy scores for the resource of money were lowest in the exam situation. It is important to point out that if the exam situation was not compared against the interpersonal situations, then I might have concluded that money predicted the sunk-cost effect in an individual situation. Aware of this limitation of prior research, I wanted to compare an individual situation against interpersonal situations to observe differences—or similarities between situation types. Perhaps a prior investment of money did not really motivate students to continue investing future resources to a failing course of action (an exam that they performed poorly on).

Although previous research has not yet investigated this possibility, students perhaps felt that their chances of future gain (doing well if they continued taking the exam) were bleak. Staw (1981) explained that people might reduce future commitment to a course of action if they perceive that

future gains are nearly impossible. Thus, they may be less likely to commit the sunk-cost fallacy. The type of individual situation we used in this study may also help to explain our results. We constructed an exam vignette, because about all college students have taken standardized exams and many college students will likely take standardized exams to obtain admittance to a graduate school, law school, or medical school. Metalsky et. al (1982) studied how attributional styles affected students' reactions to a low exam grade. The researchers found that students with an internal and global attributional style (likely to attribute their poor exam grade to their performance) were more likely to report being depressed than were students with an external and specific attributional style (likely to attribute their poor exam grade to a bad day or a poorly written test, for example). Results from this study suggest that attributional styles along with invested money may predict students' future commitment to taking an exam. Future studies should investigate this relationship.

Why other researchers suggest that money predicts the sunk-cost effect in *all* individual situations requires further investigation. As our results suggest, students may have perceived that doing better was beyond their control even though money had been invested. Perhaps in other sunk-cost situations in the extant literature, students felt greater personal control over their course of action or maybe didn't care. For example, in Coleman's study of college students' commitment to medical treatment, he asked students to imagine going to a chiropractor's website and finding out that a special deal

was being offered but later finding out that there's a physical therapist that has a better chance of curing their condition (Coleman, 2010a).

While Coleman's study is ambitious, it might be possible that college students might find it harder to imagine or personally identify with a situation that many of them have never been placed in, while they might be more likely to identify with an exam situation. Thus, Coleman's finding that money predicted the sunk-cost effect for the medical treatment situation may be the result of students imagining having personal control over a situation that they did not particular identify with, thus students were more likely to commit the sunk-cost fallacy. Future research should compare two situations in which students feel they have personal control or lack control over the situation and see how these differences may predict the sunk-cost effect.

Overall, the finding that college students slightly differed in how they committed the sunk-cost fallacy for the exam situation and romantic relationship situations suggests that college students might mentally account for money differently between both situation types. Future research should investigate this possibility.

Time

The finding that students were significantly more likely to remain committed to an interpersonal relationship even when a friend or romantic partner had stopped communicating with and supporting them is important. This finding is consistent with research by Goodfriend and Agnew (2008) that found that time is an intangible investment that may predict future

commitment in romantic relationships.

Although participants did commit the sunk-cost fallacy for time in the exam situation, these participants' mean sunk-cost fallacy scores were the lowest for any of the resources, suggesting that time might lead to a lesser tendency of people escalating commitment to a previous course of action in an individual situation. This finding can be supported by recent research by Soman and Coleman who found that people were less likely to commit the sunk-cost fallacy for time, because people can't mentally account for time in the same way that they can account for money (Soman, 2001; Coleman, 2010).

Soman explained that investments of time did not motivate people to remain committed to a failing course of action, unless a particular situation was expressed in monetary terms. It is possible that mental accounting played a role in our study, whereby participants were unable to adequately mentally account for time. This could explain why participants with the time resource for the exam situation had the lowest sunk-cost fallacy scores. However, because we did observe a sunk-cost effect for time for the exam situation, that might suggest that maybe participants could be better at mentally accounting for time in situations that are particularly relevant to them. For example, while it may be difficult for participants to imagine escalating commitment to inferior medical treatment in Coleman's hypothetical situation, they might be better able to account for time for a situation in which most of them have probably experienced—studying for an exam and doing poorly and

considering whether or not to retake it.

Our findings regarding how investments of time could differ between situation types further illustrates the purpose of the present study, which was to show that resources differ depending on context. Thus, researchers that have studied the sunk-time cost effects in individual contexts should perhaps make a caveat based on our findings: People are better at mentally accounting for time in interpersonal relationships, although they aren't as well-versed in mentally accounting for time in individual situations. Future research should compare an individual and interpersonal situation that both involve explicit mental accounting and investigate whether there are differences or similarities in participants' future commitment.

Emotion

Students were just as likely to commit the sunk-cost fallacy for the exam situation as they were for the interpersonal situations. This suggests that emotions about the exam likely drove participants to commit future resources to taking the exam repeatedly. To date, the only study that investigates the role of emotion on the sunk-cost effect in an individual situation is Coleman's, who found that participants who were made angry were more likely to commit the sunk-cost fallacy (Coleman, 2010).

Although we are limited in interpreting how students felt as they imagined having to make the choice of taking an exam again after doing poorly, it's possible that as students placed themselves in the situation, they became angry with themselves for having done poorly the first time and as a

result, were more likely to keep investing future resources to taking the test. Students who felt upset about receiving an inadequate exam score were perhaps more likely to escalate commitment, because they assumed personal control over the situation and were optimistic about future gains (Lerner & Keltner, 2000; Coleman, 2010).

The finding that students are no more likely to commit the sunk-cost fallacy for an exam situation than for an interpersonal situation calls into question how college students view emotions in romantic relationships and friendships. Research by Labouvie-Vief et. al. (1989) and Carstensen and Turk-Charles (1994) suggests that older adults are better at understanding emotion states and are better at controlling emotions than are younger adults such as college students. Thus, age differences in the salience of emotion might help to explain why emotion was not the resource that predicted the greatest sunk-cost effect for the interpersonal situations. Perhaps college students are better at mentally accounting for time than they are for emotions. A future study should further isolate these variables to determine which is more predictive of future commitment in interpersonal relationships.

Effort

Like the present study's results about the effects of emotions on both situation types, results about invested effort revealed that students were also as likely to commit the sunk-cost fallacy for the individual and interpersonal situations. Effort has been repeatedly stated as one of the predictors of the sunk-cost effect (Arkes & Blumer, 1985), but only recently has effort been

isolated to determine its effects on the sunk-cost effect. Coleman (2010a) found that participants in the effort condition were the worst at mentally accounting for effort when compared to participants in the time and money conditions. Coleman concluded that this was the case, because either people have not practiced keeping track of expended effort or did not care to keep track of it.

Because I did find that people committed the sunk-cost fallacy for effort in the exam situation, this might suggest that participants were motivated to expend additional effort to do better on the exam. The theory of learned industriousness (Eisenberger, 1992) may help to explain why a prior investment of effort could lead to further investments of effort in an exam situation. Learned industriousness theory suggests that rewarding the completion of a difficult task may make the difficult task seem less aversive; thus, people may be more likely to invest high effort. When this theory is applied to the exam situation, it might seem plausible to imagine that if students imagined that future invested effort would be rewarded by receiving the score that they needed on the exam for graduate school admittance, then they were perhaps more motivated to continue investing effort to see the reward come to fruition.

Self-Concept

Similar to the results of both emotion and effort, results about the effects of self-concept on future commitment revealed that participants were just as likely to escalate commitment in the exam situation as they were to do

the same in the interpersonal situations. Put even more simply, the way participants viewed themselves did not change their commitment behavior in either situation type.

I predicted that cognitive dissonance theory (Festinger, 1957) would account for escalation of commitment for the self-concept resource, or that once people's opinions of themselves came into conflict with a particular choice (for example, viewing themselves as a caring friend but then faced with the option of ending the friendship), people might be more likely to remain committed to a particular course of action to avoid viewing themselves as a bad friend for example. The results of the present study suggest that dissonance may have occurred, leading participants to escalate commitment in order to reduce a dissonant view of themselves. People may be likely to escalate commitment in the presence of dissonance whether the situation is individual such as the exam or interpersonal if their view of themselves is consistent across situations.

Personality

Results did not support what others have found about the relationship between personality and sunk-cost: conscientious and neurotic individuals are perhaps more likely to commit the sunk-cost fallacy (Moon, 2001; Moon et al., 2003). There are a couple explanations for the present study's findings. The personality inventory that I used was different from the one that Moon and colleagues used. I did not split neuroticism into its constructs, therefore, maybe I was unable to observe the effects that these specific constructs might

have had on sunk-cost behavior. Alternatively, our finding that personality did not influence sunk-cost behavior may suggest that the situation is a better predictor of behavior than personality. This explanation can be supported by research that shows that personality is not consistent from situation to situation and that there are low correlations between personality and behavior (Kenrick & Funder, 1991; Mischel, 1968).

Sex

Although we did not manipulate sex in our study, the finding that men had higher sunk-cost fallacy scores in the exam situation and women had higher sunk-cost fallacy scores in the friend situation merits some discussion.

Unfortunately, it is not possible to know how men felt about the exam situation, because I did not ask them. It could be possible that men became angry at the thought of not doing well on the exam the first time around. Consistent with research on emotion and escalation of commitment, if men were emotionally aroused to the point of anger about the exam, then they might have been more likely to commit the sunk-cost fallacy, because they would have assumed personal control over the situation.

I also do not know why women committed the sunk-cost fallacy more than men did for the friend situation, although research can provide an explanation. Women are likely to engage in long-term care giving with a friend, while men are more likely to engage in short-term heroic acts and be done (Eagly, 1987). Similarly, Gabriel and Gardner (1999) found that men spend more effort with groups while women spend more effort with individual

friends, similar to the situation in the present study's vignette. Based on this research, women are more likely than men to have the desire to escalate commitment to an individual friend, similar to situation in the present study.

Limitations and Future Directions

There are several limitations in the present study. Perhaps one of the biggest limitations is an inability to explain why participants committed the sunk-cost fallacy for each level of resource and situation. While I thought that personality would explain sunk-cost behavior, I found that it did not. Maybe if I had included a more detailed personality inventory that split neuroticism into its constructs of anxiety and depression, I might have found results more consistent with previous research that linked neuroticism to the sunk-cost effect (Moon, 2001). As the discussion of each resource may have revealed, there might be several other explanations for why participants chose to escalate commitment such as attribution theory, learned industriousness and cognitive dissonance. I might have learned more about participants' motives behind their decisions had I asked them to explain why they made the decision they made or by including, for example, an inventory that measured participants' anger and fear to enable us to determine whether those emotions indeed influenced the sunk-cost effect.

Another limitation of the present study was the use of only one scenario for the individual situation. While one situation helped me to observe differences between both situation types, it might have been more revealing if I had included another situation—perhaps about another topic that is relevant

to college students. Another individual situation may have enabled us to better generalize our findings. Perhaps there are differences within individual situations that might explain how these situations would differ with interpersonal situations.

The present study opens up many different possibilities for future research. Researchers could further investigate the role that self-concept plays in the sunk-cost effect. They can also conduct studies to tease apart the role that emotions and time play in people committing the sunk-cost fallacy.

The present study took on the enormous task of addressing many limitations that have existed in previous sunk-cost research. The present study adds to the literature by showing that the situation type does lead people to commit future resources differently. In particular, college students may be more likely to remain committed to interpersonal relationships even when things are going sour because of time and money already spent building the relationship; however, they are more likely to break off commitment to an exam if they'd already invested a large amount of time preparing. The present study has implications for intervention research that may want to target particular resources that predict the escalation of commitment in a population of college students.

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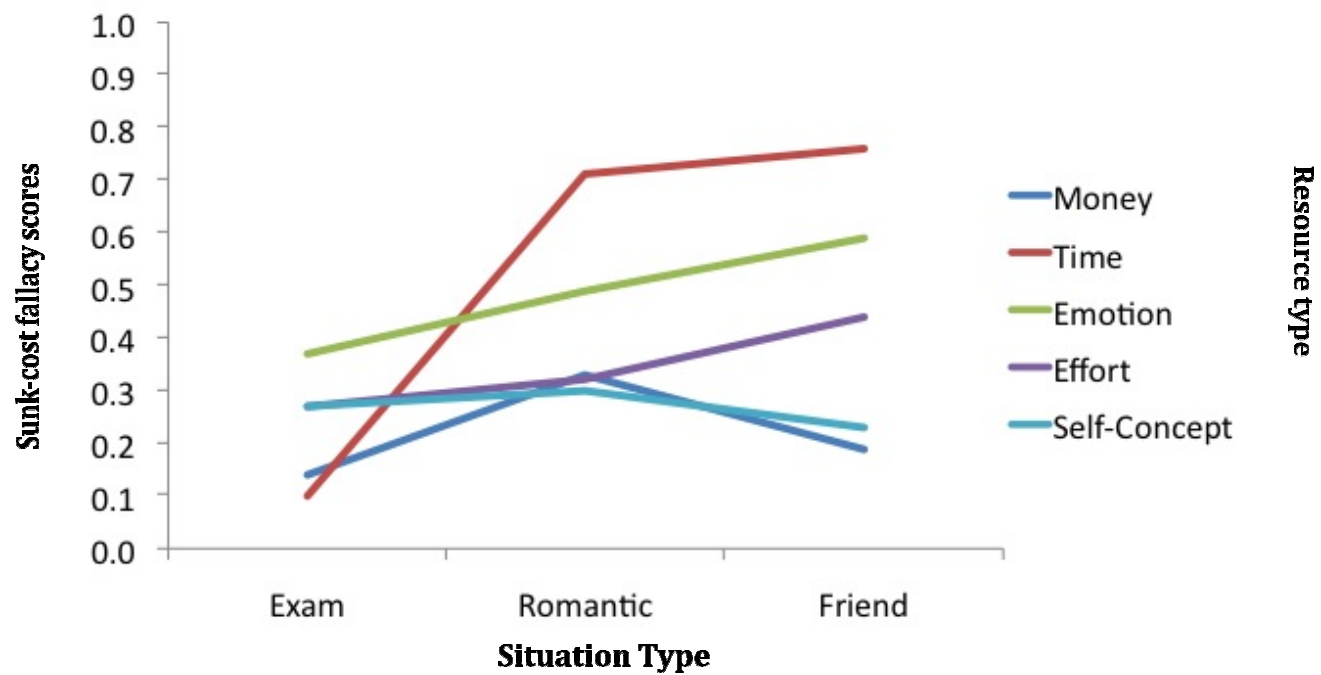
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Figure



Capstone Summary

Background

Stop what you're doing right now and recall a time you waited in a long line at the movie theater to watch a movie that you begrudgingly decided to give a try. Thirty minutes later you took your seat, watched the opening credits, and realized that you should have watched something else. Did you leave immediately or did you keep watching?

Now reflect on another situation: You were friends with someone for two years and he or she abruptly stopped calling you, responding to your messages, or being supportive of your future goals or interests. Did you break off the friendship immediately, wait a little while longer to see if the friendship got better, or did you stay committed? Did you have a romantic relationship that seemed to be going bad? Did you stay? Did you leave?

Why people continue to commit further to an apparent failing course of action is nothing new. Psychologists and economists refer to this phenomenon as the “sunk-cost fallacy,” or “sunk-cost effect,” because the prior investment that has already been made is “sunk” and it should have no influence on future decisions (Arkes & Blumer, 1985). The reality is: People do not like to waste what has already been invested, so they continue to invest even more, particularly money, time, and effort (Arkes & Blumer, 1985). Many psychologists and economists call this tendency to further commit an escalation of commitment. Escalation of commitment and the sunk-cost fallacy are related; when people perceive that they have invested too much to quit” (Teger, 1980), they often tend to invest further—or escalate

commitment.

While a lot of fascinating research has been done on behavioral sunk costs, unfortunately there are many limitations. For one, many articles discuss the commonly cited three resources that predict the sunk-cost effect: money, time, and effort, yet most of these studies have only focused on the effect that money has on sunk-cost behavior. What about time and effort?

Within recent years, some researchers have begun to explore the effects that time and effort have on the sunk-cost fallacy. Soman (2001) found that money, but not time, predicted the sunk-cost effect, because people cannot mentally account for time in the way that they account for money. To extend Soman's research, Coleman (2010) investigated the individual effects of money, time, and effort. Consistent with Soman's research, Coleman found that money did predict the sunk-cost effect, but time and effort did not. Coleman explained that people are not mentally good at accounting for effort either.

Although Soman and Coleman have paved the way for future studies to investigate the way that individual resources influence the sunk-cost fallacy, there is still another big limitation in the field of sunk-cost to address: There are opposing findings about sunk-cost effects in the literature about sunk-costs in interpersonal relationships. For example, although Arkes and Blumer have found that money predicts the sunk-cost fallacy in an individual situation (a situation where one makes a decision by himself, such as continuing to watch a boring movie), research by Goodfriend and Agnew

(2008) showed that money did not predict the sunk-cost effect in interpersonal relationships, because people don't tie happiness to money.

Methodology

Based on such a discrepancy in findings between the two situation types, the present study investigated what would happen if both situation types were manipulated in the same study. In particular, the initial research question was: Whether the resources that people invest in an individual situation, for example, would predict the sunk-cost effect, but that these same resources would not predict the sunk-cost effect in an interpersonal situation? Several resources that people invest into either situation type were selected after research into both literatures on the sunk-cost effect. Money, time, and effort were automatically selected, and then emotion and self-concept were chosen. Emotion and self-concept are listed as resources that predict the sunk-cost fallacy in the literature about sunk costs in interpersonal relationships. However, emotion was nearly absent from the literature on sunk costs in individual situations while self-concept was never mentioned.

A population of college students was selected, because research indicates that this age group is more likely than older adults to commit the sunk-cost fallacy, perhaps because younger adults focus more on losses than gains (Strough et al., 2008). In addition, the present study wanted to investigate why college students remain in relationships (friendships and romantic relationships) even when things start to go bad.

Two hundred seven students at Syracuse University were recruited to

complete the study. Each student came in and completed a packet of questions that pertained to one of the resources that was manipulated (money, time, emotion, effort, and self-concept). Each packet had three different types of situations (an exam situation, romantic relationship, and friend situation) pertaining to the particular resource. For example, a student may have received an exam situation for money that read, “You spent \$30 preparing for a standardized exam. After taking the exam, you received a score lower than what’s required to be admitted to your program of choice. Considering all the factors involved, how many more times will you take the exam?” The exam situation represented the individual situation type, and this particular type of situation was chosen because it is one that college students have had experience with.

Each of the three situations in the packet had a parallel situation but with another level of investment. For example, one vignette may have asked students about spending \$30 (which was regarded as the low investment), but students were also asked the same question, only with a different level of investment: \$1,500 (the high investment). To compute students’ sunk-cost fallacy scores, their selections for the high and low investment conditions were compared. If students chose to take the exam more times because of a large investment paid, then they committed the sunk-cost fallacy.

After students completed the packet, they completed a brief personality inventory, because previous research suggests that conscientiousness and neuroticism can predict the sunk-cost effect (Moon

2001; Moon et al. 2003). Students then filled out a demographics questionnaire that asked them questions such as their age, sex, and they were also asked to rate the resources in order of importance for each situation type.

Results and Discussion

The type of situation and the type of resource did interact with each other to exert an influence on sunk-cost fallacy scores. Students were more likely to spend more time in a friendship and romantic relationship if they had previously invested time, but they were less likely to continue taking an exam if they had previously invested a large amount of time. Students were slightly more likely to remain committed to a romantic relationship if money had been invested than they were to continue taking an exam if they had invested money. While students committed the sunk-cost fallacy for emotion, effort, and self-concept, the difference between situation types were not statistically significant.

The reasons behind the present study's findings are explained in depth in the Capstone paper; however, the major finding in this study is that invested time overwhelmingly predicts future commitment in college relationships (friendships and romantic relationships). This finding has implications for intervention studies that might want to investigate ways to alter sunk-cost behavior, at least among college students. The present study investigated the individual role of different types of resources in different types of situations to give researchers more insight on the type of resources that should be targeted in an intervention. Based on the results of the present study, teaching students

that previously invested time is irretrievable—and thus should not have an impact on future decisions—might be a good start.