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The Interpersonal Sunk-Cost Effect

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Abstract

The sunk-cost fallacy—pursuing an inferior alternative merely because we have previously invested significant, but nonrecoverable, resources in it—represents a striking violation of rational decision making. Whereas theoretical accounts and empirical examinations of the sunk-cost effect have generally been based on the assumption that it is a purely intrapersonal phenomenon (i.e., solely driven by one's own past investments), the present research demonstrates that it is also an interpersonal effect (i.e., people will alter their choices in response to other people's past investments). Across eight experiments (N = 6,076) covering diverse scenarios, I documented sunk-cost effects when the costs are borne by someone other than the decision maker. Moreover, the interpersonal sunk-cost effect is not moderated by social closeness or whether other people observe their sunk costs being "honored." These findings uncover a previously undocumented bias, reveal that the sunk-cost effect is a much broader phenomenon than previously thought, and pose interesting challenges for existing accounts of this fascinating human tendency.

Keywords

decision making, heuristics, preferences, social influence, open data, open materials, preregistered

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The *sunk-cost fallacy*—pursuing inferior alternatives merely because we have previously invested significant, but nonrecoverable, resources in them—represents a striking violation of rational decision making.[1] Its fallacy status derives from the logic that past "sunk" investments should not influence subsequent decisions ("what's done is done") and is evidenced by the fact that different—and more appealing—alternatives would have been chosen had the decision maker not borne the sunk costs.

The sunk-cost fallacy is the result of a more general, and well-documented, sunk-cost effect[2] (Arkes & Blumer, 1985; Thaler, 1980), whereby individuals are more likely to pursue alternatives if they have invested substantial amounts of time or money to obtain them. This phenomenon leads to continued investments in losing endeavors ("throwing good money after bad") and the consumption of goods and services that have become less enjoyable, all in vain efforts to "recover" sunk costs (Arkes & Blumer, 1985; Thaler, 1980). A surprisingly large variety of theoretical accounts have been proposed to explain the sunk-cost effect, including waste aversion (Arkes, 1996; Arkes & Ayton, 1999; Arkes & Blumer, 1985), prospect theory (Garland & Newport, 1991; Kahneman & Tversky, 1979; Thaler, 1980), mental accounting (Thaler, 1999), regret aversion (Wong & Kwong, 2007; Zeelenberg & Van Dijk, 1997), self-justification (Brockner, 1992; Staw, 1976, 1981), and adaptive learning (Pompilio, Kacelnik, & Behmer, 2006).

Interestingly, nearly all accounts and empirical examinations of the sunk-cost effect seem to be based on the assumption that it is a purely intrapersonal phenomenon (i.e., solely driven by one's own past investments).[3] One exception is an article by Gunia, Sivanathan, and Galinsky (2009), who hypothesized a vicarious sunk-cost effect in escalation-of-commitment contexts but (as I will explain in the Discussion section) never properly tested this effect. The literature has thus largely ignored the possibility that the sunk-cost effect might also be interpersonal (i.e., driven by other people's past investments). This oversight is surprising for several reasons.

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First, an interpersonal sunk-cost effect seems intuitively plausible. Imagine, for example, receiving a rather gaudy and uncomfortable sweater from a well-intentioned aunt and consider how your willingness to keep it and wear it (at family events) would be affected by learning that she had saved a month's salary to purchase it. I suspect that many readers would find it (psychologically) more difficult to discard the sweater in light of their aunt's significant investment.

Second, documenting an interpersonal sunk-cost effect would reveal a novel behavioral tendency that is no less of a bias than the classic intrapersonal sunk-cost effect. Just as it is suboptimal to pursue an inferior alternative merely because we personally invested substantial resources in it, so too is it suboptimal to do so when someone else has made the costly investment. There is nothing to be gained by pursuing a less desirable option, and the fact that someone—self or other—previously sunk resources to make it available, although unfortunate, does not change this logic. "Honoring" other people's sunk costs is clearly irrational when they cannot observe our decisions because their feelings cannot be bolstered if they do not know that we did so. Yet even when they would know our choices, their past sunk investments do not justify making ourselves less happy. Surely, friends and family members should not prefer that we pursue undesirable alternatives merely because they invested resources to give us those options.[4] In fact, the knowledge that we are pursuing an inferior option should reduce their happiness, thereby making them worse off as well.

Third, demonstrating a sunk-cost effect in the absence of personal investment would pose an interesting challenge for existing accounts of this phenomenon. Personal investment seems necessary for accounts based on regret aversion, self-justification, or adaptive learning. Similarly, prospect theory and mental accounting focus on the way people attend to their own losses and expenditures, not the costs borne by other people. As for waste aversion, the "desire not to appear wasteful" (Arkes & Blumer, 1985, p. 124) would presumably be mitigated when the "waste" is produced by other people (see Note 3).

In sum, showing that the sunk-cost effect generalizes beyond the intrapersonal domain would elucidate the nature and impact of this fascinating human bias. To investigate this possibility, I carried out eight experiments involving different intrapersonal and interpersonal sunk-cost scenarios.

General Method

A combined total of 6,076 paid participants from Amazon's Mechanical Turk completed the eight experiments reported in this article. All eight experiments were run separately within larger sets of unrelated studies, and sample sizes were determined to fit the needs of these other studies. However, I made sure to insert each experiment into a study set with at least 600 participants (i.e., ≥ 150 participants per condition). These sample sizes are several times larger than those collected in both early (e.g., Arkes & Blumer, 1985) and recent (e.g., Strough, Mehta, McFall, & Schuller, 2008) studies that obtained significant sunk-cost effects. In each experiment, I simultaneously varied two key factors: (a) the presence (or size) of the sunk cost and (b) whether the decision maker (self) or another person (other) had incurred the sunk cost prior to the key decision. All eight experiments generally followed the same basic procedure: Each one was administered via a Web-based survey (within a larger set of unrelated studies) that participants completed on their own electronic devices; participants read and responded to the key sunk-cost decision scenario and then later provided demographic information (e.g., age and gender). For the key analyses in each experiment (i.e., the effects of the sunk-cost manipulation), I report the results of the relevant statistical test comparing the two samples, the corresponding effect-size estimate and its 95% confidence interval (CI), and the Bayes factor (BF) in support of the alternative hypothesis (calculated using JASP software; JASP Team, 2017). All data and scenario materials for these experiments are available to download.

Experiment 1

Method

Experiment 1 provided the first basic tests of the interpersonal sunk-cost effect, across four different scenarios (Experiments 1a–1d). All four experiments followed the same design: Each participant was randomly assigned to one of four conditions in a 2 (sunk cost: high/present vs. low/absent) × 2 (person incurring sunk cost: self vs. other) fully between-subjects design. The dependent variable was the proportion of participants choosing the less enjoyable alternative (i.e., the option less likely to be chosen in the absence of a sizeable sunk cost).

Experiment 1a. Participants ($N = 602$; 48% female, 52% male; age: $M = 35.6$ years, $SD = 11.0$, $Mdn = 32$) read a variation of the basketball-game scenario (Thaler, 1980). Specifically, they imagined that they had obtained a front-row ticket to a basketball game but that a terrible storm on the day of the game meant that travel to the game would be extremely cold, very slow, and potentially hazardous. However, it was too late to exchange the ticket or

to give it to someone else. Participants imagined either that they had obtained the ticket on their own (self condition) or that a friend had obtained the ticket, but because of an unexpected work-related trip, could not attend the game and therefore gave it to them (other condition). They also imagined that they or their friend had either obtained the ticket for free (no sunk cost) or paid $200 for it (sunk cost). Participants indicated whether they would (a) go see the basketball game (in spite of the unpleasant and hazardous travel conditions) or (b) stay home and watch it on TV.

Experiment 1b. Participants (N = 1,007; 51% female, 49% male; age: M = 35.2 years, SD = 11.1, Mdn = 33) read a variation of the tennis-club scenario (Frisch, 1993; Thaler, 1980). Specifically, they imagined that they enjoyed playing tennis and had obtained a 6-month membership to a tennis club but also that they had sprained their elbow during the first week of their membership, which made it painful to continue playing tennis. They could continue playing tennis without causing additional damage, but the pain would persist for about a year. However, their membership to the tennis club would expire in 6 months, whether or not they used it. Participants imagined that they (self condition) or a close family member (other condition) had either obtained the membership for free (no sunk cost) or paid $900 for it (sunk cost). They indicated whether they would (a) keep playing tennis despite the pain or (b) stop playing tennis until the pain stops.

Experiment 1c. Participants (N = 605; 55% female, 45% male; age: M = 35.3 years, SD = 11.6, Mdn = 33) read a variation of the hotel-TV-movie scenario (Frisch, 1993; Strough et al., 2008). Specifically, they imagined that they were on vacation with two close friends but that one day they felt sick, so they decided to stay in bed and watch a movie in their hotel room, while their two friends went out to visit a museum. However, after 5 min of watching the movie, they realized that it was pretty boring. Participants imagined that they (self condition) or one of their friends (other condition) had either found the movie playing on TV for free (no sunk cost) or paid $19.95 for it (sunk cost). They indicated whether they would (a) continue watching the boring movie or (b) find something else to watch on TV.

Experiment 1d. Participants (N = 618; 58% female, 42% male; age: M = 36.3 years, SD = 12.1, Mdn = 33) read a potluck-cake scenario that combined elements of the TV-dinner (Arkes & Blumer, 1985) and rich-dessert (Frisch, 1993) scenarios. Specifically, they imagined that they had organized a potluck dinner with close friends and ended up serving themselves a slice of chocolate amaretto Kahlua cheesecake that had been brought for dessert. However, the cake was so rich that they felt full after just two bites. Participants imagined that they (self condition) or a friend (other condition) either had found the cake on sale for $15 at a bakery located less than 5 min away (low sunk cost) or could only find it for $60 at a bakery located more than 45 min away (high sunk cost). The inferred quality of the cake was kept constant across conditions by telling all participants that a "cake of this quality normally costs $50." Participants indicated whether they would (a) finish the slice of cake (despite feeling full) or (b) not finish it.

Results

Table 1 and Figure 1 present the results of Experiments 1a through 1d. I observed the standard (intrapersonal) sunk-cost effect in three of these four experiments: Specifically, participants were more likely to choose the less enjoyable alternative when they had invested substantial amounts of their own time or money to obtain it (sunk cost for self: high/present) than when they had invested little or nothing (sunk cost for self: low/absent). The main exception was Experiment 1b: Surprisingly, participants in this experiment were no more likely to choose the painful option (continuing to play tennis with a sprained elbow) when they had paid for their tennis club membership (sunk cost for self) than when they had obtained it for free (no sunk cost for self). Although the intrapersonal sunk-cost effect was only marginally significant in Experiment 1d, additional analyses suggest that the effect is likely real (see Table 1).

Critically, I also observed a significant interpersonal sunk-cost effect in all four experiments: Participants were more likely to choose the less enjoyable alternative when someone else had invested substantial time or money to obtain it (sunk cost for other: high/present) than when that same person had invested little or nothing (sunk cost for other: low/absent). In sum, Experiment 1 repeatedly demonstrated the existence of an interpersonal sunk-cost effect across four different contexts.

Experiment 2

Method

In Experiment 1, the interpersonal (and intrapersonal) sunk-cost effects were demonstrated by observing between-subjects inconsistencies in preferences (i.e., comparing choice proportions across sunk-cost conditions). Experiment 2 tested whether the interpersonal sunk-cost effect would also yield within-subjects inconsistencies in preferences. Specifically, the participants in Experiment 2 were later asked (after completing the

Table 1. Results of Experiments 1, 3, and 4

Experiment and condition	*n*	Sunk cost: Low/ absent condition	Sunk cost: High/ present condition	Difference	χ^2	*p*	φ	BF
1a: basketball game (*N* = 602)								
Self	307	31%	54%	+23%	16.05	< .0001	.23 [.11, .34]	433.3
Other	295	26%	37%	+11%	4.04	.044[a]	.12 [.00, .23]	1.02
1b: tennis club (*N* = 1,007)								
Self	525	37%	37%	+0%	< 0.008	.931	.00 [–.09, .09]	0.11
Other	482	35%	50%	+15%	11.19	< .0009	.15 [.06, .24]	30.41
1c: hotel-TV movie (*N* = 605)								
Self	304	7%	82%	+75%	168.41	< .0001	.74 [.66, .80]	$> 10^{40}$
Other	301	8%	69%	+61%	121.90	< .0001	.64 [.54, .71]	$> 10^{27}$
1d: potluck cake No. 1 (*N* = 618)								
Self	311	54%	65%	+11%	3.63	.057[a,b]	.11 [–.01, .22]	0.85
Other	307	54%	69%	+15%	7.68	.006	.16 [.04, .27]	6.37
3a: cello lessons (*N* = 809)								
Self	402	33%	35%	+2%	< 0.07	.804	.01 [–.09, .12]	0.12
Other	407	29%	44%	+15%	10.00	.002	.16 [.06, .26]	17.58
3b: airline investment (*N* = 603)								
Self	293	54%	80%	+26%	21.76	< .0001	.27 [.15, .38]	$> 10^3$
Other	310	49%	71%	+22%	15.85	< .0001	.23 [.11, .34]	407.5
4: potluck cake No. 2 (*N* = 1,230)								
Self	292	51%	64%	+13%	5.28	.022[a]	.13 [.01, .25]	1.99
Other (combined)	938	63%	75%	+12%	15.19	< .0001	.13 [.06, .19]	152.7
Other (friend)	306	65%	70%	+5%	1.03	.311[c]	.06 [–.06, .17]	0.22
Other (acquaintance)	308	60%	78%	+18%	11.53	< .0007	.19 [.08, .30]	44.72
Other (stranger)	324	63%	75%	+12%	5.46	.020[a]	.13 [.01, .24]	1.92

Note: The table compares the percentage of participants who chose the less desirable option in each sunk-cost condition. For φ values, 95% confidence intervals are given in brackets. BF = Bayes factor in support of the alternative hypothesis (of a difference between conditions). [a]For *p* values close to .05, I carried out a second (and arguably more conservative) analysis as a robustness check, testing the sunk-cost effect after controlling for participant age and gender via a logistic regression (using robust standard errors). In three of these four cases (for *p* = .044, .057, and .020), the resulting regression *p* value for the sunk-cost effect was lower (*p* = .033, .050, and .015, respectively) than the one reported in the table. In the fourth case, this regression *p* value was essentially equal to the one reported in the table (both *p*s = .022). [b]This intrapersonal sunk-cost effect was significant when I combined data from the self conditions in Experiments 1d and 4 (thereby doubling the sample size): 52% vs. 64%, $\chi^2(1, N = 603) = 8.72$, $p = .003$, φ = .12, 95% CI = [.04, .20], BF = 7.84. [c]This interpersonal sunk-cost effect was significant when I combined the other-friend data from Experiments 1d and 4 (thereby doubling the sample size): 59% vs. 70%, $\chi^2(1, N = 603) = 7.33$, $p = .007$, φ = .11, 95% CI = [.03, .19], BF = 3.76.

main study) to indicate which option they would prefer in the absence of any (sunk) costs, thereby allowing me to measure preference inconsistencies within the same participant. In particular, I examined the proportion of participants who selected the option that they reported liking less, as a function of whether that option was costlier than their preferred alternative. In addition, the decision scenario in Experiment 2 was different from those used in Experiment 1.

Participants (*N* = 602; 45% female, 55% male; age: *M* = 36.2 years, *SD* = 11.3, *Mdn* = 33) read a variation of the weekend-trip scenario (Arkes & Blumer, 1985). Specifically, they imagined that they had obtained two round-trip (economy class) flights for two weekend getaways (one to Cancun, the other to Montreal) but that these flights were inadvertently booked for the very same weekend. However, it was impossible to cancel, exchange, or get reimbursed for either round-trip flight, meaning that they had to choose one trip (and forgo the other). Each participant was randomly assigned to one of six conditions in a 3 (cost of less enjoyable option: higher vs. equal vs. lower) × 2 (person incurring sunk cost: self vs. other) fully between-subjects design. The dependent variable was the proportion of participants who chose their less desired alternative (as later indicated by them; see below). Participants in the self condition imagined that they had "treated themselves to" (i.e., paid for) both round-trip flights and

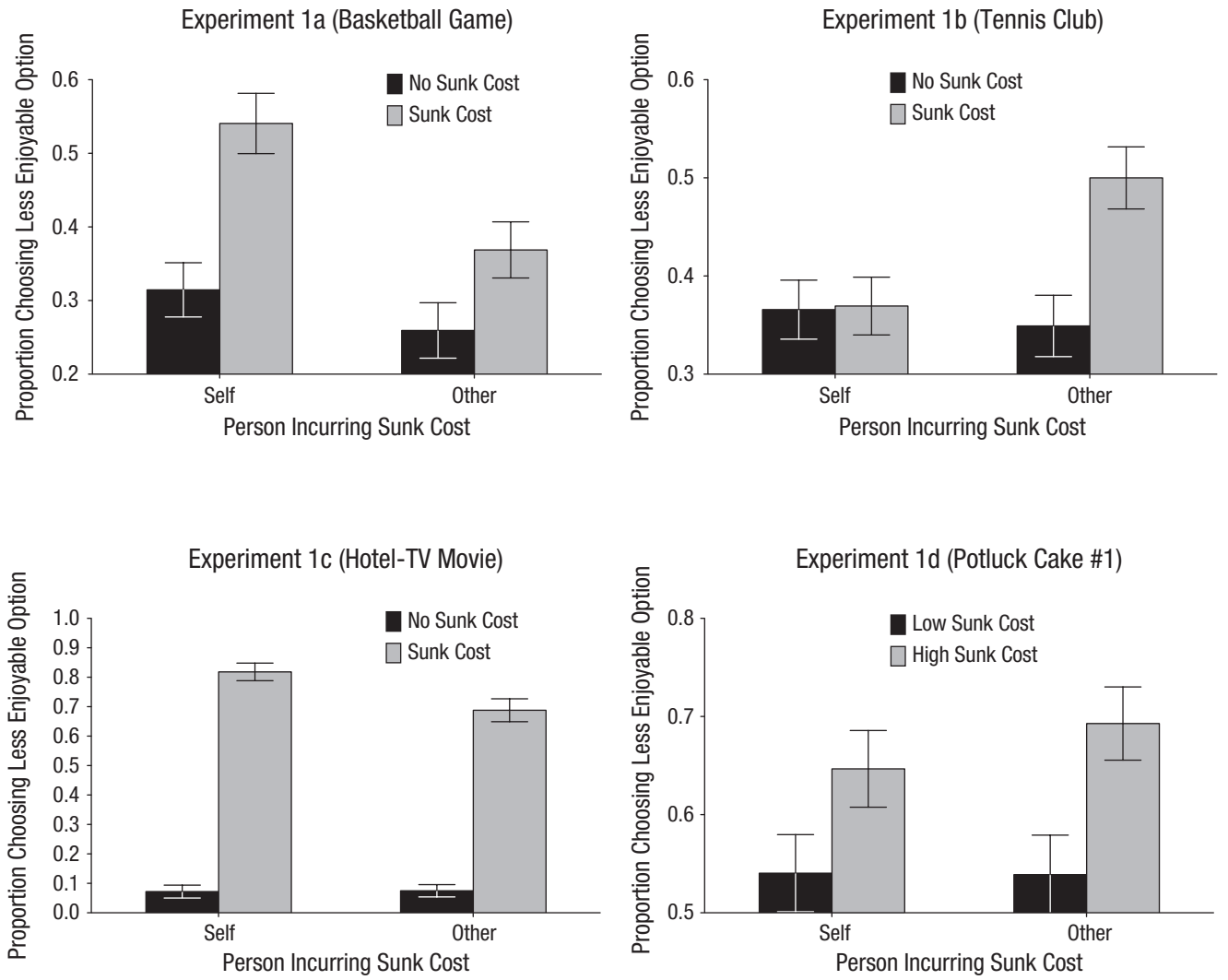

Fig. 1. Results from Experiments 1a through 1d: likelihood that participants chose the less enjoyable option as a function of who incurred the sunk cost (self vs. other) and the presence or size of the sunk cost. In Experiments 1a through 1c, a sunk cost was either present or absent. In Experiment 1d, the sunk cost incurred was either small or large. Error bars represent ±1 *SE*.

accidentally booked them for the same weekend. Those in the other condition instead imagined that two close friends had (separately) treated them to the round-trip flights, with one friend booking the Cancun flights and the other friend inadvertently booking the Montreal flights for the same weekend. I also manipulated whether the Cancun flights were more expensive (Cancun: $800, Montreal: $200), less expensive (Cancun: $200, Montreal: $800), or equally priced (Cancun: $500, Montreal: $500). Importantly, all participants were told that both round-trip flights were economy-class tickets so that they would not expect the more expensive one to be substantially more enjoyable. Participants indicated which of the two weekend trips they would choose.

Toward the end of the experiment (after completing several unrelated questionnaires), all participants answered two questions designed to assess which weekend trip they would enjoy more. First, they were asked whether they would prefer a free, economy-class round-trip flight to Cancun or Montreal; next, they indicated which weekend trip they would enjoy more: Cancun or Montreal. I classified participants into two groups on the basis of their responses to these two questions: those deriving greater utility from the Cancun trip (if they chose Cancun for both questions) and those deriving greater utility from the Montreal trip (if they chose Montreal for both questions). Participants who did not indicate a consistent preference for one location across these two questions (n = 30) were excluded from the analyses. The key dependent variable of interest in this experiment was the percentage of participants who chose the weekend trip they would enjoy less.

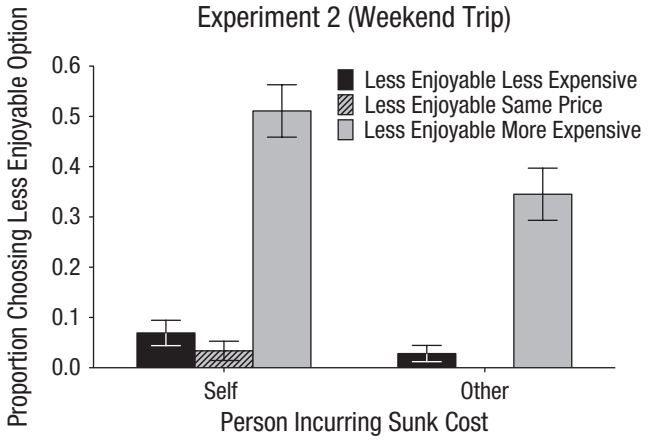

Fig. 2. Results from Experiment 2: likelihood that participants chose their less preferred option as a function of who incurred the sunk cost (self vs. other) and the relative size of the sunk cost associated with this less enjoyable option (whether the price of the less enjoyable option was greater than, equal to, or smaller than the price of the more enjoyable option). Error bars represent ±1 *SE*.

Results

Figure 2 presents the results of Experiment 2. When the scenario involved paying for these trips themselves (self condition), participants were more likely to opt for the less enjoyable weekend trip when it was more expensive, compared with when it was less expensive (51% vs. 7%), $\chi^2(1, N = 193) = 46.58$, $p < .0001$, $\varphi = .49$, 95% CI = [.36, .58], BF > 10^9, or equally priced (51% vs. 3%), $\chi^2(1, N = 181) = 51.52$, $p < .0001$, $\varphi = .53$, 95% CI = [.41, .59], BF > 10^{11}. Similarly, when the scenario involved their friends paying for these trips (other condition), participants were more likely to opt for the less enjoyable weekend trip when it was more expensive, compared with when it was less expensive (35% vs. 3%), $\chi^2(1, N = 190) = 33.61$, $p < .0001$, $\varphi = .42$, 95% CI = [.28, .48], BF > 10^6, or equally priced (35% vs. 0%), $\chi^2(1, N = 184) = 40.98$, $p < .0001$, $\varphi = .47$, 95% CI = [.35, .47], BF > 10^9. Experiment 2 thus demonstrated within-subjects choice inconsistencies driven by the interpersonal (and intrapersonal) sunk-cost effect.

Experiment 3

Method

Despite their varying contexts, the five preceding experiments all consisted of first-person consumer decision-making scenarios and measured preferences only in terms of binary choices. In Experiments 3a and 3b, I presented participants with qualitatively different scenarios and included more continuous measures of preference. In Experiment 3a, I asked participants to take a third-person decision-making perspective (rather than choosing for themselves), whereas Experiment 3b involved an escalation-of-commitment business investment scenario (rather than a consumer decision-making context). In addition, Experiment 3b was preregistered (https://aspredicted.org/mb6y6.pdf). However, both experiments (3a and 3b) followed the 2 × 2 fully between-subjects design used in Experiment 1.

Experiment 3a. Participants ($N = 809$; 50% female, 50% male; age: $M = 39.1$ years, $SD = 12.1$, $Mdn = 36$) read a variation of the cello-lessons scenario (Bornstein & Chapman, 1995; Bornstein, Emler, & Chapman, 1999). Unlike the other scenarios I examined, this scenario presented a third-person decision-making problem: Participants read about a protagonist named Agatha who initially decides that she wants to learn to play the cello and obtains both a beginner cello and introductory lessons. However, after taking these first lessons, she realizes that she no longer enjoys the cello and wants to stop taking lessons; in fact, the scenario specifically stated that "it is almost certain that if Agatha signs up for more lessons, she will not enjoy them and will never enjoy playing the cello." Participants read that Agatha (self condition) or her husband (other condition) either had bought a $100 cello and paid $40 for 1 month of lessons (low sunk cost) or had bought a $1,000 cello and paid $200 for 3 months of lessons (high sunk cost). They indicated whether they thought Agatha should (a) continue playing the cello and take additional lessons, (b) continue playing the cello without taking additional lessons, or (c) stop playing the cello altogether.

Because it is clear that Agatha will not enjoy continuing to play the cello, the rational course of action would be for her to stop playing altogether. Thus, the binary dependent variable of interest was the proportion of participants who indicated that Agatha should continue playing in some form (i.e., with or without additional lessons) as opposed to stopping completely. Alternatively, one could transform the dependent variable into a pseudocontinuous measure by recoding participants' responses as 0 (no investment) if they thought that Agatha should stop playing the cello altogether, 0.5 (partial investment) if they thought that she should continue playing the cello but not take additional lessons, and 1 (full investment) if they thought that she should continue playing the cello and take additional lessons. This recoded variable provided a relatively more continuous measure of the extent to which participants believed that Agatha should further invest in learning the cello.

Experiment 3b. Participants ($N = 603$; 58% female, 42% male; age: $M = 35.8$ years, $SD = 11.1$, $Mdn = 33$) read a variation of the airline-investment scenario (Arkes &

Blumer, 1985). Specifically, they imagined that they were the current president of an airline company that had a $100 million research budget. Following a prior decision to invest $99 million of this research budget, they were now considering whether to invest the last $1 million to develop a fuel-efficient plane that would reduce emissions and cut fuel costs. However, another firm has just begun marketing a fuel-efficient plane that is much faster, far more fuel-efficient, and cheaper to produce than the plane that their own company could build. Participants imagined that they (self condition) or the previous president of the company (other condition) had previously invested the $99 million to develop the fuel-efficient plane (sunk cost) or had invested that money in other, unrelated research projects (no sunk cost). After reading the scenario, participants provided two dependent variables (each presented one at a time and in counterbalanced order). One was a standard binary-choice measure: They indicated whether (or not) they would invest the last $1 million of their company's research funds to build a fuel-efficient plane (despite learning that another firm was already producing a superior version of the same concept). The second was a continuous measure: They indicated what percentage of the last $1 million of their company's research funds they would invest in a fuel-efficient plane.

Results

Table 1 and Figure 3 present the results for the binary measures in Experiments 3a and 3b. The standard (intrapersonal) sunk-cost effect was observed in Experiment 3b: Participants were more likely to choose to invest in the fuel-efficient plane when they had already invested $99 million in its development (sunk cost for self) than when they had invested that money in other projects (no sunk cost for self). Surprisingly, however, I did not observe an intrapersonal sunk-cost effect in Experiment 3a: Participants were only directionally more likely to indicate that Agatha should continue playing the cello when she had invested heavily in an instrument and lessons (high sunk cost for self) than when she had invested relatively little (low sunk cost for self). Critically, I observed a significant interpersonal sunk-cost effect in both experiments: In Experiment 3a, participants were more likely to indicate that Agatha should continue playing the cello when her husband had invested heavily in her instrument and lessons (high sunk cost for other) than when he had invested relatively little (low sunk cost for other); in Experiment 3b, participants were more likely to choose to invest in the fuel-efficient plane when someone else had invested the $99 million in the plane's development (sunk cost for other) than when that person had invested the money in other projects (no sunk cost for other).

Figure 3 also presents the results for the continuous preference measures, revealing similar patterns to those observed for the binary measures. In Experiment 3a, participants advocated greater levels of engagement with the cello when Agatha's husband had invested heavily in her cello playing compared with when he had invested relatively little, *M*s = .29 vs. .17, *t* test for unequal variances: $t(390.81) = 3.46$, $p < .0006$, $d = 0.34$, 95% CI = [.15, .54], BF = 33.46. By contrast, participants in this experiment advocated only slightly greater levels of cello engagement when Agatha herself had invested heavily in her cello playing (high sunk cost for self) compared with when she had invested relatively little (low sunk cost for self), *M*s = .21 vs. .19, *t* test for unequal variances: $t(396.12) < 0.7$, BF = 0.13.

In Experiment 3b, participants were willing to invest a significantly larger portion of the last $1 million in the fuel-efficient plane when they had already invested $99 million in that same project (sunk cost for self) than when they had invested the $99 million in other projects (no sunk cost for self), *M*s = 64.99% vs. 43.77%, $t(291) = 4.48$, $p < .0001$, $d = 0.52$, 95% CI = [.29, .76], BF = 1,445. Participants were also willing to invest a significantly larger share of the last $1 million in the fuel-efficient plane when someone else had invested the $99 million in the plane's development than when that person had invested the $99 million in other projects, *M*s = 62.68% vs. 48.20%, $t(308) = 3.00$, $p < .003$, $d = 0.34$, 95% CI = [.12, .57], BF = 8.94. In sum, Experiment 3 replicated the interpersonal sunk-cost effect in both third-person and nonconsumer decision-making contexts, using both binary and continuous preference measures.

Experiment 4

Method

With the exception of Experiment 3b, the "other" in the interpersonal sunk-cost scenarios was always someone close to the decision maker (i.e., a friend or family member). We might therefore wonder whether the interpersonal sunk-cost effect becomes smaller (or disappears) when sunk costs are borne by distant others. To address this question, Experiment 4 (which was preregistered at https://aspredicted.org/vh24u.pdf) examined whether the interpersonal sunk-cost effect was moderated by how socially close the prior investor was to the participant.

Participants (N = 1,230; 51% female, 49% male; age: M = 37.1 years, SD = 11.3, Mdn = 34) read a slightly modified version of the potluck-cake scenario from Experiment 1d. Specifically, in Experiment 4, the potluck dinner attendees did not solely consist of close

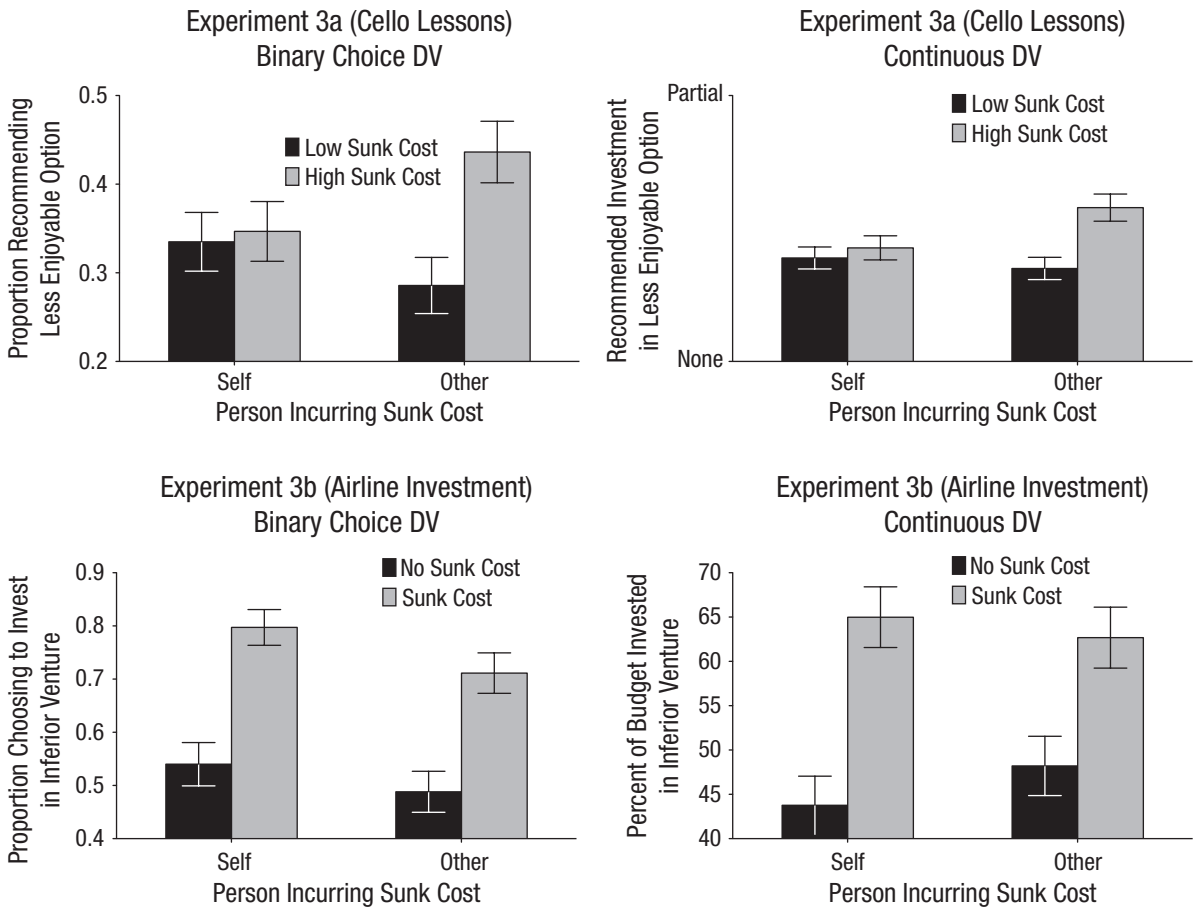

Fig. 3. Results from Experiment 3: preference for the lesser option as a function of who incurred the sunk cost (self vs. other) and the presence or size of the sunk cost. In Experiment 3a, the sunk cost incurred was either small or large. In Experiment 3b, a sunk cost was either present or absent. The graphs on the left present results for the binary preference measure (likelihood that participants chose the lesser option). The graphs on the right present results for the continuous preference measure (amount of investment in the lesser option). Error bars in all graphs represent ±1 *SE*. The *y*-axis labels in the top-right graph represent categorical translations of a scale ranging from 0 to 1: 0 = none (no investment), 0.5 = partial investment, 1 = full investment (not visible). DV = dependent variable.

friends, and the amounts of money and time spent obtaining the cake in the high sunk-cost conditions were increased (from $60 to $75 and from 45 to 55 min, respectively). A quarter of the participants were randomly assigned to the self condition and imagined that they had brought the cake to the potluck dinner. The remaining three quarters were randomly assigned to one of three *other* conditions: They imagined that either a friend (high social closeness), a work acquaintance (low social closeness), or a stranger (zero social closeness) had brought the cake. Participants also imagined that they or the other person either had found the cake on sale for $15 at a bakery located less than 5 min away (low sunk cost) or could only find it for $75 at a bakery located more than 55 min away (high sunk cost). In sum, Experiment 4 consisted of a 2 (sunk cost: high vs. low) × 4 (person incurring sunk cost: self vs. friend vs. acquaintance vs. stranger) fully between-subjects design. All other aspects of this study were identical to those of Experiment 1d.

Results

Table 1 and Figure 4 present the results of Experiment 4. Participants were more likely to choose to finish the slice of cake (despite being full) when they had paid more and driven farther to obtain it (high sunk cost for self) than when they had invested relatively little (low sunk cost for self), replicating the results of Experiment 1d. Participants were also more likely to choose to finish it when someone else had paid more and driven farther to obtain the cake (high sunk cost for other) than when that person had invested relatively little (low sunk cost for other), further replicating the results of Experiment 1d.

However, a comparison of the interpersonal sunk-cost effect for each type of other did not reveal any

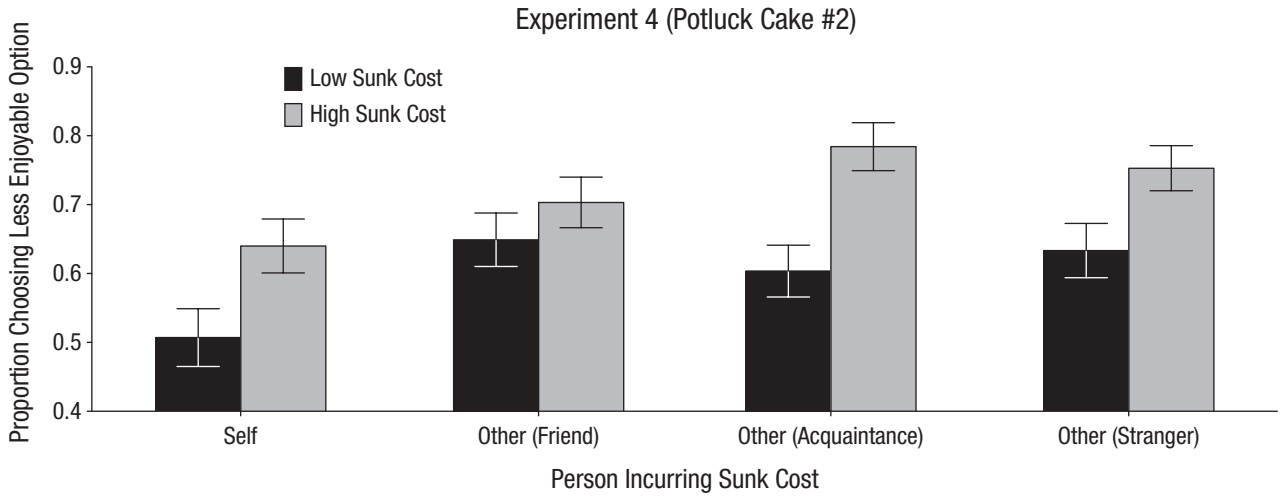

Fig. 4. Results from Experiment 4: likelihood that participants chose the less enjoyable option as a function of who incurred the sunk cost (self vs. friend vs. acquaintance vs. stranger) and the size of the sunk cost (low vs. high). Error bars represent ±1 *SE*.

obvious relationship between social closeness and the tendency to honor other people's investments: Participants were directionally more likely to choose to finish the cake brought by their friend (high social closeness) in the high sunk-cost condition, were significantly more likely to choose to finish the cake brought by a work acquaintance (low social closeness) in the high sunk-cost condition, and were also significantly more likely to choose to finish the cake brought by a stranger (zero social closeness) in the high sunk-cost condition. Moreover, a logistic regression with sunk-cost size (dummy coded), social closeness of other (with friend, acquaintance, and stranger recoded as 1, 2, and 3, respectively), and their interaction, all simultaneously entered, revealed no interaction between sunk-cost size and closeness of other on the likelihood that participants chose to finish the cake, $b = 0.16$, $z < 1$ (and $b = 0.07$, $z < 0.7$ if I also included the self condition recoded as 0). Thus, Experiment 4 found that social closeness does not moderate the interpersonal sunk-cost effect.

Discussion

The sunk-cost effect is a broader phenomenon than previously thought, which generalizes to interpersonal investment contexts. Across eight experiments representing a wide variety of scenarios adapted from the classic sunk-cost literature, I repeatedly observed a sunk-cost effect when the person incurring the cost was someone other than the decision maker. Moreover, this occurred even when that person would not observe whether the decision maker honored his or her sunk cost (e.g., Experiments 1a and 1c), suggesting that social desirability is not a key driver. And it occurred even when that other person was not close to the decision maker (e.g., Experiments 3b and 4), suggesting that social closeness is not a key moderator. It is also worth noting that the interpersonal sunk-cost effect was almost as likely to be larger (Experiments 1b, 1d, and 3a) as it was to be smaller (Experiments 1a, 1c, 2, and 3b) than the intrapersonal sunk-cost effect in terms of effect size and ability to shape preferences. Thus, the interpersonal sunk-cost effect is neither a diluted nor an enhanced version of the classic intrapersonal variant.

And yet the interpersonal sunk-cost fallacy can arguably be more detrimental to welfare than the standard intrapersonal one: In addition to the decision maker being worse off (with an inferior outcome), the other person who incurred the sunk cost may feel bad about—and perhaps partly responsible for—the former's undesirable outcome.

Theoretical Implications of the Interpersonal Sunk-Cost Effect

The interpersonal sunk-cost effect poses an interesting challenge for existing theoretical accounts, which do not (in their current forms) readily predict that other people's past investments will bias choices. That is not to say that they need all be abandoned; we may simply need to modify some theories so they allow for interpersonal sunk-cost effects.

For example, mental accounting could be extended to include interpersonal accounts that track the well-intentioned costs borne by other people. Decision makers would be motivated to recuperate interpersonal sunk costs in an effort to close the accounts associated

with those costs. In a similar vein, we could extend the waste-aversion account to include displeasure from other people's wasteful investments. Indeed, some accounts of waste avoidance (outside the sunk-cost literature) appear less focused on whether waste is self-generated (e.g., Haws, Naylor, Coulter, & Bearden, 2012).

For accounts based on regret aversion or self-justification, this may require assuming a strong form of vicarious cognition (e.g., Goldstein & Cialdini, 2007; Norton, Monin, Cooper, & Hogg, 2003), particularly because the interpersonal sunk-cost effect can occur without directly observing other people incurring sunk costs. In fact, Gunia et al. (2009) hypothesized a vicarious entrapment effect in escalation-of-commitment contexts (e.g., when companies continue investing in losing ventures), whereby increasing the "psychological connectedness" between a prior decision maker and the current one would lead the latter to vicariously justify the former's initial decisions and thereby escalate his or her own commitment to these decisions. More specifically, Gunia et al. predicted that subtle manipulations designed to boost psychological connectedness could produce vicarious sunk-cost effects. Unfortunately, their studies lacked several key features needed to properly test such effects. For one thing, these studies employed small samples ($33 \leq N \leq 55$) and were therefore insufficiently powered (statistical power = 56%, 57%, 62%, and 76% for Experiments 1–4, respectively). More importantly, these studies failed to manipulate the size or presence of the sunk cost involved, which is a basic requirement for establishing any kind of sunk-cost effect (intrapersonal, interpersonal, or vicarious). Without such a manipulation, one cannot distinguish sunk-cost effects from other effects that would be moderated by psychological connectedness, such as social consistency motivations (i.e., the desire to continue what the previous decision maker started, merely for the sake of consistency or to seem agreeable), social copying strategies (i.e., anchoring on the previous decision maker's choice as a way to reduce decision-making effort), or trust in the previous decision maker's choice. Put another way, we do not know whether the participants in those studies would have been more, less, or equally likely to follow the prior decision maker's choice had the interpersonal sunk cost been smaller or absent (i.e., whether or how the manipulations designed to increase psychological connectedness—and thus vicarious entrapment—would have interacted with the size or presence of the sunk cost).

To address these concerns and provide a proper test of the vicarious-entrapment hypothesis, I ran two supplemental studies that served as conceptual replications and extensions of Experiments 1 and 4 in Gunia et al. (see Experiments S1 and S2 in the Supplemental Material available online). In contrast to their predecessors, these two supplemental studies featured both sunk-cost and psychological-connectedness manipulations, and their sample sizes were 5 to 9 times larger. The vicarious-entrapment hypothesis predicts an interaction between psychological connectedness and the size or presence of interpersonal sunk costs; specifically, greater psychological connectedness should produce larger interpersonal sunk-cost effects. However, neither supplemental study found that psychological connectedness significantly moderated the interpersonal sunk-cost effect. Nor did they find simple effects of the psychological-connectedness manipulations within the sunk-cost-present conditions. Both supplemental studies did find a significant main effect of adding an interpersonal sunk cost. These results suggest that interpersonal sunk-cost effects are not driven by vicarious entrapment and, moreover, that the vicarious-entrapment effect itself may not be as large or robust as previously thought. Additional evidence against a vicarious account of interpersonal sunk-cost effects is the finding that these were not moderated by actual social closeness (Experiment 4).

As the previous paragraph makes clear, not all sunk-cost theories will be able to accommodate the interpersonal sunk-cost effect; for example, the adaptive-learning accounts (e.g., Pompilio et al., 2006) cannot explain it. Consequently, its existence narrows the field of plausible accounts and suggests that human sunk-cost behaviors differ from similar behaviors observed in species without the capacity to consider or care about other individuals' investments (Arkes & Ayton, 1999).

Finally, these findings contribute to growing evidence of parallels between intrapersonal and interpersonal decision making (e.g., Jones & Rachlin, 2006; Pronin, Olivola, & Kennedy, 2008; Urminsky, 2017). In the case of sunk costs, it seems that we treat prior investments by our past self and by other people in much the same way.

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Supplemental Material

Additional supporting information can be found at http://journals.sagepub.com/doi/suppl/10.1177/0956797617752641

Open Practices

All data and materials have been made publicly available via the Open Science Framework (OSF) and can be accessed at https://osf.io/nzp8t/. The design and analysis plans for Experiments 3b, 4, S1, and S2 were preregistered at AsPredicted; copies can be found at OSF (https://osf.io/nzp8t/). Experiments 1 and 2 were not preregistered. The complete Open Practices Disclosure for this article can be found at http://journals.sagepub.com/doi/suppl/10.1177/0956797617752641. This article has received badges for Open Data, Open Materials, and Preregistration. More information about the Open Practices badges can be found at http://www.psychologicalscience.org/publications/badges.

Notes

1. The cornerstone of rational decision making is *utility maximization*—selecting alternatives that contribute the most (positively) to our welfare and rejecting those that do not. Moreover, rational decision makers should mentally "cancel out" common consequences (Samuelson, 1958) and therefore ignore sunk costs (Dawes & Hastie, 2001). However, if a decision maker's utility function violates additive separability, then responding to sunk costs can maximize utility (Busemeyer & Pleskac, 2009).
2. The sunk-cost *effect* refers to the greater tendency for people to pursue options associated with sunk investments, whereas the sunk-cost *fallacy* occurs when this tendency leads them to pursue inferior options. Thus, the latter is a special case of the former, in which welfare is reduced.
3. For example, Arkes and Blumer (1985) proposed an account of the sunk-cost effect "based on the appearance of wastefulness" and noted that this "waste aversion" account implied that wastefulness should be particularly aversive "if one's own money is at stake or if one is personally responsible for the initial investment" but less so "if someone else's money is involved or if someone else was responsible for the original investment decision" (p. 134).
4. If a gift giver cared nothing about our future welfare, we would still have no (rational) reason to let this person's past investment influence our consumption choices. In fact, we would presumably (and reciprocally) care less about potentially hurting his or her feelings and, thus, feel no obligation to use the gift.

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