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Three Attempts to Replicate the Behavioral Sunk-Cost Effect: A Note on Cunha and Caldieraro (2009)

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Abstract

Cunha and Caldieraro (2009) investigated whether sunk-cost effects, which are well documented in hypothetical situations involving monetary investments, also occur in choice situations with purely behavioral investments. Their results suggest that decision makers indeed fall prey to behavioral sunk-cost effects under certain circumstances. I have been unable to replicate their pattern of results in three separate investigations. In these studies, I attempted to recover the effect using two other behavioral effort manipulations in addition to the manipulation used by Cunha and Caldieraro. This failure to replicate the pattern of results calls into question the robustness of the initial findings.

Keywords: Decision making; Sunk costs; Effort justification; Failure to replicate

It is well documented that individuals allow nonrecoverable monetary investments made in the past to influence decisions made in the present, a phenomenon called the sunk-cost effect (Arkes & Blumer, 1985). However, a recent study by Cunha and Caldieraro (2009) examined the possibility that past behavioral investments could influence future choices. For example, a consumer might research a set of options when considering the purchase of an appliance, finally settling on the best one. Suppose that after making this initial choice, the consumer learns about a new product that is objectively superior to the interim choice. If the consumer placed value on the effort put in so far (the sunk cost), then the consumer might stick with the objectively inferior option because of the value put in on that choice.

In Cunha and Caldieraro's Experiment 1, participants made an initial choice between five brands of a hypothetical product, each described by four attributes with numerical values. Participants were instructed to add all the dimension values for each product and choose the product with the highest total. Crucially, half the participants were given integer values of

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the attribute ratings (the Lesser-Effort condition) and half the participants were given fractional values of the attribute ratings (the Greater-Effort condition), which required more cognitive effort to sum. The two effort conditions, therefore, demanded different levels of behavioral investment on the behalf of the participants. After making an initial choice, participants were informed that a better brand had become available and they could switch to this new option. In their study, this new option was either slightly better that the interim choice (the Small Opportunity Cost condition) or was significantly better (the Large Opportunity Cost condition). When the opportunity cost was large, participants in both effort conditions were equally likely to switch to the new option. However, when the opportunity cost was small, participants in the Greater-Effort condition were less significantly likely to switch to the new option—and hence more likely to stick with the interim choice—than participants in the Lesser-Effort condition. The authors reasoned that behavioral investment sunk-cost (BISC) effects—driven by effort-justification mechanisms—were operating when opportunity costs were sufficiently small for participants to switch.

In an effort to extend these results, we first tried to replicate Cunha and Caldieraro's (2009) first experiment utilizing undergraduates at the University of Texas at Austin using identical stimuli and instructions. Because BISC effects appeared to operate only under Low Opportunity cost, the present replications were constrained to the Low Opportunity cost conditions and solely manipulated behavioral investment level (Lesser- or Greater-Effort). We were unable to replicate the authors' BISC effect with three different behavioral investment manipulations. In addition to the original effort manipulation used by the authors, two other operationalizations of behavioral effort failed to recover the BISC effect.

Experiment 1 utilized the same procedure as Experiment 1 in Cunha and Caldieraro. Participants saw the stimuli in Table 1 in a grid format on a computer screen and were instructed to choose the best option as defined by the product with the highest total attribute rating.[1] Participants were shown either integer values (Lesser-Effort condition) or fractional values (Greater-Effort condition) of the attribute ratings. The ''target'' initial choice had a total value of 31. Ratings of satisfaction with the initial choice (from 1 to 7) were collected. Participants were then told that immediately before purchasing the product, they learned about a new product that had a total value of 32. Participants rated the likelihood that they would switch to the new product from 1 (''definitely keep initial choice'') to 7 (''definitely switch to new product'').

Table 1
Attribute values for each option

	Attribute A	Attribute B	Attribute C	Attribute D
Product 1	6 (18/3)	8 (32/4)	8 (32/4)	7 (14/2)
Product 2	8 (32/4)	3 (9/3)	9 (18/2)	4 (16/4)
Product 3	7 (14/2)	9 (18/2)	8 (32/4)	7 (14/2)
Product 4	6 (18/3)	8 (32/4)	5 (25/5)	9 (18/2)
Product 5	9 (18/2)	5 (25/5)	7 (14/2)	6 (18/3)

Note. Attribute values used in Greater-Effort condition appear in parentheses.

Table 2
Participant sample sizes, average decision times, initial satisfaction ratings, and likelihood-to-switch ratings for the two effort conditions in Experiments 1, 2, and 3

	Greater Effort	Lesser Effort	t	BF	log(BF)
Experiment 1 (n = 88)					
Decision time	242.48 (222)	80.77 (43.34)	4.39	< .0001	−13.09
Initial satisfaction	6.51 (.91)	6.37 (1.15)	0.59	6.62	1.89
Likelihood-to-switch	5.33 (.35)	5.08 (.36)	0.50	8.47	2.14
Decision time vs. initial satisfaction	$r = -.21$, $p = .24$	$r = .25$, $p = .13$			
Decision time vs. likelihood-to-switch	$r = -.19$, $p = .28$	$r = .03$, $p = .83$			
Experiment 2 (n = 102)					
Decision time	140.29 (60.24)	72.13 (33.35)	8.69	0.01	−4.46
Initial satisfaction	6.59 (1.89)	6.48 (1.19)	0.66	8.57	2.15
Likelihood-to-switch	4.95 (2.21)	4.91 (2.13)	0.09	8.47	2.14
Decision time vs. initial satisfaction	$r = .32$, $p = .03$	$r = .10$, $p = .47$			
Decision time vs. likelihood-to-switch	$r = .02$, $p = .90$	$r = .20$, $p = .13$			
Experiment 3 (n = 106)					
Decision time	193.87 (41.97)	67.79 (114.29)	7.02	< .0001	−13.60
Initial satisfaction	6.36 (0.96)	5.98 (1.28)	1.53	2.17	0.77
Likelihood-to-switch	5.10 (0.32)	4.94 (0.27)	0.40	7.55	2.02
Decision time vs. initial satisfaction	$r = .33$, $p = .04$	$r = .25$, $p = .09$			
Decision time vs. likelihood-to-switch	$r = .13$, $p = .41$	$r = .31$, $p = .03$			

Note. Standard deviations are shown in parentheses along with t-values for each comparison. Bayes' factors and Log Bayes' factors calculated by the Savage-Dickey t-test procedure are reported in the two rightmost columns, which quantity support for the null over the alternate hypothesis in the form of an odds ratio. Intuitively, larger values of the Bayes' factor indicate substantial evidence favoring the null hypothesis. For each experiment we also report Pearson's correlation coefficient between each subject's decision time and satisfaction with original choice as well as reported likelihood-to-switch.

For each group comparison that follows we report t-values as well as Savage-Dickey Bayes' factors (Wetzels, Raaijmakers, Jakab, & Wagenmakers, 2009), which quantify evidence favoring null hypotheses over alternate hypotheses reported in the target study. In Experiment 1, consistent with the target study, Greater-Effort participants spent more time evaluating the initial options than Lesser-Effort participants (see Table 2). In contrast to Cunha and Caldieraro's study, we found little evidence for the activation of an effort-justification mechanism: Greater-Effort participants did not indicate greater satisfaction with the initial choice than Lesser-Effort participants, nor did they indicate decreased likelihood to switch to the new product. This apparent null result suggests that, among our participant population of University of Texas undergraduates, Cunha and Caldieraro's behavioral effort manipulation was not able to evoke the effort-justification mechanisms that purportedly drive BISC effects.

Experiment 2 employed the same procedure as Experiment 1 for the Lesser-Effort condition. Participants in the Greater-Effort condition saw integer values for the attributes, but attribute values were all hidden by boxes. To view an attribute rating, participants had to click on the box hiding that rating and click a second button labeled ''SHOW'' to reveal the

rating. To view another rating, they had to click on a button labeled ''HIDE'' to hide the rating currently being viewed and repeat the procedure. This cumbersome task interface increased the behavioral investment in the task. In Experiment 3, we further raised the effort in the Greater-Effort condition by combining Experiment 2's cumbersome interface with fractional ratings. In both experiments, we found participants in the Greater-Effort condition spent more time evaluating the initial options. And as in Experiment 1, we found little evidence that these behavioral effort manipulations influenced participants' initial choice satisfaction—suggesting that these alternate operationalizations of behavioral effort also failed to activate the effort-justification mechanisms that purportedly drive the BISC effect. In turn, we found little evidence that behavioral investment levels influenced participants' likelihood-to-switch ratings.

One might be concerned that a general lack of motivation among our participants could entirely prevent effort-justification mechanisms from activating. If our participants by and large failed to engage in the initial option evaluation, we would expect no apparent relationship between initial decision times and initial choice satisfaction ratings. However, we found moderate positive relationships within the high effort conditions of Experiments 2 and 3, suggesting that people were sensitive to the degree of effort they put into initial choices and did enact effort-justification processes. While it is unlikely that a lack of motivation among all participants could explain the apparent absence of effort-justification effects in our data, it is possible that heterogeneity of participants' motivation levels could obfuscate group differences in initial choice satisfaction levels.

Our inability to replicate the initial satisfaction effects, and consequently, the BISC effect, raises a number of issues. At a minimum, it calls into question the generalizability of Cunha and Caldieraro (2009) effort-justification effects to other participant populations. Further, if BISC effects indeed exist, the present choice paradigm may not be ideal for studying BISC effects because it was unable to activate effort-justification mechanisms—vis-à-vis initial choice satisfaction ratings—in the present studies. Last, the extent to which effort-justification processes generate conditions under which behavioral investments influence future choices should be evaluated in future studies.

Note

1. We discarded the choice data of participants who failed to select the best option in the first phase of the study. In Experiments 1, 2, and 3, we discarded the data from 23, 16, and 20 participants, respectively. The same pattern of data is observed if these subjects are included.

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