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Is Choice-Induced Preference Change Long Lasting?

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Abstract

The idea that decisions alter preferences has had a considerable influence on the field of psychology and underpins cognitive dissonance theory. Yet it is unknown whether choice-induced changes in preferences are long lasting or are transient manifestations seen in the immediate aftermath of decisions. In the research reported here, we investigated whether these changes in preferences are fleeting or stable. Participants rated vacation destinations before making hypothetical choices between destinations, immediately afterward, and 2.5 to 3 years later. We found that choices altered preferences both immediately after being made and after the delay. These changes could not be accounted for by participants' preexisting preferences, and they occurred only when participants made the choices themselves. Our findings provide evidence that making a decision can lead to enduring change in preferences.

Keywords

decision making, cognitive dissonance, preferences, social cognition

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The idea that choice shapes preferences has implications for many domains, from marketing to health and relationships (Ariely & Norton, 2008). After choosing between options, including presidential candidates (Beasley & Joslyn, 2001), household objects (Brehm, 1956), and medical conditions (Sharot, Shiner, & Dolan, 2010), people tend to value the chosen alternative more and the rejected alternative less. One explanation for this effect is that selecting between two similarly valued options creates dissonance that is resolved by reevaluating the options after the selection is made (Festinger, 1957; for an alternative account, see Bem, 1967, 1972; Sharot, De Martino, & Dolan, 2009).

An unresolved question concerns how stable these choice-induced changes are. Although numerous studies have demonstrated postchoice changes in preferences (for a review, see Harmon-Jones & Mills, 1999), all of these studies have examined such changes shortly after a decision is made (with one exception noted in the following paragraph; see Vroom & Deci, 1971). It is therefore difficult to answer the question of whether choice-induced modulations of value are stable and long lasting or evanescent, fading away quickly after a decision is made. If the latter is true, it could be argued that the phenomenon has attracted more attention than it deserves.

Studies examining other forms of cognitive dissonance that are not triggered by choice have often found long-term behavioral change (Freedman, 1965; but see Aronson & Carlsmith, 1963; for a review, see Walster & Berscheid, 1968). For example, Higgins, Rhodewalt, and Zanna (1979) reported attitudinal changes that persisted for 2 weeks following counterattitudinal behavior. However, some researchers have suggested that the choice-induced reevaluation of options is a fleeting phenomenon. Recently, it has been shown that postchoice changes in preference can be eliminated simply by washing one's hands (Lee & Schwarz, 2010). The preferred explanation for this finding is that physical cleanliness serves as a metaphor for psychological purity and removes choice-evoked cognitive dissonance, obviating the need for reevaluation. The implication here is that postchoice changes in preference are highly unstable and might be affected by apparently minor everyday behaviors. Moreover, experiencing a selected option reduces its choice-induced overvaluation,

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despite persistent devaluation of the rejected option (Vroom & Deci, 1971). This finding suggests that when people sample their selected option, the experience itself alters their preference, diluting the impact of their initial decision.

Thus, there is little consensus as to the temporal profile of choice-induced change in preference. In the research reported here, we examined whether making a hypothetical choice can induce changes in preference that are stable over long intervals. We asked participants to rate vacation destinations, make hypothetical choices between destinations, and then rate these destinations again immediately after the choices and 2.5 to 3 years later. To test whether the long-term choice-induced reevaluation of options requires a sense of agency over the decision, we examined preferences both when the participants made decisions themselves and when a computer made decisions for them.

Critically, we controlled for the possibility that any postchoice changes in ratings were merely reflections of participants' preexisting preferences rather than changes induced by the decisions themselves (Chen & Risen, 2010). People's preferences are subject to rating noise, but as participants gain experience in using a rating scale, their ratings become less noisy. Consequently, postchoice shifts in ratings might simply reflect participants' true initial preferences (which can be predicted by participants' choices) rather than changes in preferences induced by choice.

To examine whether changes in preferences could be explained solely by preexisting preferences, we adopted a paradigm used recently by Izuma et al. (2010). Participants rated all stimuli and then either made free choices between stimuli (experimental condition) or had decisions made for them by a computer (control condition). They then rated all stimuli again immediately after the decision-making task and 2.5 to 3 years later. In the control condition, they then freely chose between stimuli. The inclusion of this task made the control condition analogous to the "rate rate choose" condition used by Chen and Risen (2010). Because participants in the control condition had not been responsible for the first set of choices during the computer-choice trials, their final choices provide information about their true preferences and are informative about the extent of rating change that can be expected in the absence of choice.

Finally, according to cognitive dissonance theory, choice-induced changes in preferences should occur when people make difficult decisions between two similarly desirable alternatives. Such changes in preferences presumably arise because making a difficult choice engenders psychological discomfort, given that the decision conflicts with the desirable aspects of the rejected alternative and with the undesirable aspects of the selected alternative (Festinger, 1957). According to this theory, psychological tension is reduced through a reevaluation of the options after the choice is made (for an alternative account, see Bem, 1967). To test whether long-term choice-induced changes in preferences are specific to cases involving difficult decisions, we compared the change between prechoice and postchoice ratings for cases in which choices were between equally rated destinations (difficult choices) with the change in ratings for cases in which choices were between unequally rated destinations (easy choices).

Method

Participants

The study comprised two phases. Forty-five University College London undergraduates (age range: 19–35 years; 7 males, 38 females) took part in Phase 1. One participant began the experiment but did not complete it. Five participants were eliminated because they failed to respond on an excessive number of trials (> 25%; this level of performance is an a priori cutoff used in previous research; Sharot, De Martino, & Dolan, 2009; Sharot, Shiner, Brown, Fan, & Dolan, 2009; Sharot, Shiner, & Dolan, 2010; Sharot, Velasquez, & Dolan, 2010). Our final sample comprised 39 participants (experimental condition: 19 participants; control condition: 20 participants). (Partial data for control participants' immediate postchoice ratings have been published previously, in Sharot, Velasquez, & Dolan, 2010). Between 2.5 and 3 years later, 18 of the participants completed Phase 2 of the study (experimental condition: 9 participants; control condition: 9 participants). All participants gave informed consent and were compensated for their participation.

Stimuli

Stimuli consisted of 80 names of vacation destinations adapted from a previous study (Sharot, De Martino, & Dolan, 2009; Sharot, Shiner, et al., 2009; Sharot, Shiner, & Dolan, 2010; Sharot, Velasquez, & Dolan, 2010). The order of stimulus presentation was random.

Conditions

Experimental condition. In Phase 1, participants in the experimental condition completed prechoice ratings, a free-choice decision task, and immediate postchoice ratings a few minutes after the decision task. Phase 2 was conducted approximately 3 years after Phase 1 and consisted of delayed postchoice ratings. Five participants who were no longer living in London completed the delayed postchoice ratings from home via e-mail.

Control condition. In Phase 1, participants in the control condition completed prechoice ratings, a computer-choice decision task, and immediate postchoice ratings a few minutes after the decision task. Phase 2 was conducted between 2.5 and 3 years after Phase 1 and consisted of two stages. In the first stage (2.5 years after Phase 1), participants made delayed postchoice ratings. In the second stage (approximately 6 months later), participants completed a postexperimental free-choice decision task, in which they were asked to choose between vacation destinations that had been presented during the computer-choice task in Phase 1. Because participants in this condition were not responsible for the decisions made during the computer-choice task, responses in the free-choice task provided information about these participants' true underlying preferences and about the extent to which ratings can be expected to change in the absence of choice. This task design was adopted from a recent study (Izuma et al., 2010) and was analogous to the design used by Chen and Risen (2010). Four participants who were no longer living in London completed the delayed postchoice ratings from home via e-mail.

Ratings of vacation destinations

All vacation-destination ratings (prechoice, immediate postchoice, and delayed postchoice) were carried out in an identical manner. The rating task consisted of eighty 11-s trials. On each trial, the name of a vacation destination appeared on a computer screen for 6 s. Participants were instructed to imagine themselves spending the next year's vacation at that location. They then had 2 s to rate how happy they would be if they were to vacation at that location (1 = *unhappy*, 2 = *a bit unhappy*, 3 = *neutral*, 4 = *happy*, 5 = *very happy*, 6 = *extremely happy*). Ratings were made using the computer keyboard. After each rating was made, a fixation cross was presented for 3 s. If a participant did not respond on a trial, data for that trial were excluded from the final analysis.

Decision task

Free choice. On each trial of the free-choice task, two names of vacation destinations participants had rated earlier appeared side by side on the computer screen for 4 s. The word "CHOOSE" then appeared above the two options for 2 additional seconds. Participants were instructed to indicate which location they would hypothetically prefer to vacation at the next year by pressing one of two buttons when the word "CHOOSE" appeared. After a response had been made, an asterisk appeared next to the name of the chosen location. Finally, a fixation cross was presented for 3 s.

As in previous work (Sharot, De Martino, & Dolan, 2009; Sharot, Shiner, et al., 2009; Sharot, Shiner, & Dolan, 2010; Sharot, Velasquez, & Dolan, 2010), stimulus pairs were determined using a custom routine written in MATLAB (The MathWorks, Natick, MA). Stimuli on 70% of the trials were pairs of vacation destinations the participant had rated equally in the prechoice rating task (*difficult-choice* trials). On the remaining 30% of trials, stimuli consisted of pairs of vacation destinations that the participant had rated unequally in the prechoice rating task (*easy-choice* trials).

Computer choice. In the computer-choice task, participants were told that the computer would choose which vacation destinations they would vacation at the next year. (Choices were hypothetical.) On each trial, names of two vacation destinations participants had rated in the prechoice rating task appeared on-screen for 4 s. The word "CHOOSE" then appeared above the two options, and an asterisk appeared for 2 s next to the stimulus the computer had randomly chosen. To ensure that the participants attended to the task and to equate the action requirements in the free-choice and computer-choice decision tasks, we instructed participants to indicate which stimulus the computer had chosen for them on each trial by pressing one of two buttons (corresponding to the option on the right and the option on the left) once they saw the asterisk. A fixation cross was then presented for 3 s. Pairs of vacation destinations were determined as they were in the free-choice task.

Data analysis

Creating difference scores. Mean-corrected scores were computed as in our previous studies (Sharot, De Martino, & Dolan, 2009; Sharot, Shiner, et al., 2009; Sharot, Shiner, & Dolan, 2010; Sharot, Velasquez, & Dolan, 2010). The mean-corrected score ($x_i - \mu$) is the distance of a participant's rating of a particular stimulus from the average rating for that participant and rating session. The mean-corrected score indicates the value of the stimulus relative to that of all other stimuli in a particular rating session (prechoice, immediate postchoice, or delayed postchoice). For each participant, stimulus, and postchoice phase, we calculated the postchoice shift in preference by subtracting the mean-corrected prechoice rating from the mean-corrected postchoice rating. This procedure created two difference scores per stimulus: an immediate-change difference score (immediate-postchoice mean-corrected score minus prechoice mean-corrected score) and a delayed-change difference score (delayed-postchoice mean-corrected score minus prechoice mean-corrected score).

Dividing stimuli into rejected and selected options. For each participant in the experimental condition, stimuli were categorized as rejected or selected on the basis of the decisions the participant had made during the free-choice decision task that occurred between the two rating tasks in Phase 1.

For each participant in the control condition, stimuli were categorized as rejected or selected in two ways. First, to examine whether changes in preferences occurred when decisions were not made by the participants themselves, we divided stimuli into the two categories on the basis of whether the stimuli had been rejected or selected by the computer during the computer-choice decision task that occurred between the two rating tasks in Phase 1. Second, to examine whether changes in preferences could be accounted for by preexisting preferences (i.e., to examine whether choices simply reflected, rather than altered, preferences), we divided stimuli into the two categories on the basis of whether they had been rejected or selected by participants during the free-choice decision task that occurred at the end of the study, after all rating tasks.

Statistical analysis. Difference scores were entered into a mixed linear model with decision task (experimental-condition free choice, control-condition computer choice, control-condition free choice), time of postchoice rating (immediate, delayed), selection status (selected, rejected), and difficulty of decision (difficult, easy) as fixed effects and participants as random effects. This analysis was followed by separate analyses of variance (ANOVAs) in each condition and post hoc *t* tests.

Results

The differences between mean-corrected prechoice and mean-corrected postchoice ratings for each group and condition are shown in Figures 1 and 2. Results revealed that choice-induced changes in preferences are long lasting and contingent on individuals making the choice themselves. Specifically, entering difference scores into a mixed linear model revealed the critical three-way interaction of decision task, difficulty of decision, and selection status, $F(2, 55) = 6.33$, $p < .005$. There was no main effect of time of postchoice rating, nor any significant interaction of time of postchoice rating with any other factor. No other main effects or interactions were significant.

Follow-up ANOVAs for each condition revealed that the critical three-way interaction was due to a significant interaction between difficulty of decision and selection status in the experimental condition, $F(2, 8) = 23.15$, $p < .001$, $\eta_p^2 = .743$, but not in the control condition (free choice: $p = .38$; computer choice: $p = .89$). The critical interaction between difficulty of decision and selection status in the experimental condition was also significant when we examined the data separately for the immediate ratings, $F(1, 18) = 14.78$, $p < .001$, $\eta_p^2 = .45$, and the delayed ratings, $F(1, 8) = 21.1$, $p < .002$, $\eta_p^2 = .725$.

Follow-up *t* tests on data for the experimental condition revealed that this critical two-way interaction was due to a long-lasting alteration of preferences (i.e., both immediately after the decision and 3 years later) when difficult decisions between two equally rated items were made. In particular, ratings for destinations participants had selected in difficult decisions increased—immediate rating condition: $t(18) = 5.2$, $p < .0001$, $d = 1.64$; delayed rating condition: $t(8) = 2.8$, $p < .025$, $d = 1.34$. This increase was significantly greater than the nonsignificant decrease in ratings of rejected stimuli—immediate rating condition: $t(18) = 5.3$, $p < .0001$, $r^2 = .6$; delayed rating condition: $t(8) = 3.4$, $p < .01$, $r^2 = .59$ (Fig. 1). In contrast, when participants made easy decisions between unequally rated items, changes in preferences were not observed immediately afterward, but after 3 years, ratings of selected items decreased, $t(8) = 2.9$, $p < .02$, $d = 1.38$, and ratings of rejected items increased, $t(8) = 2.3$, $p < .05$, $d = 0.97$ (Fig. 2). These unpredicted post hoc findings should be interpreted with caution, given that an ANOVA did not reveal an interaction of decision task, selection status, and time of postchoice rating.

Follow-up *t* tests on data for control participants revealed that their ratings were not affected by choices the computer had made. However, dividing stimuli into selected and rejected categories on the basis of the participants' choices at the end of the study revealed a significant increase in the immediate

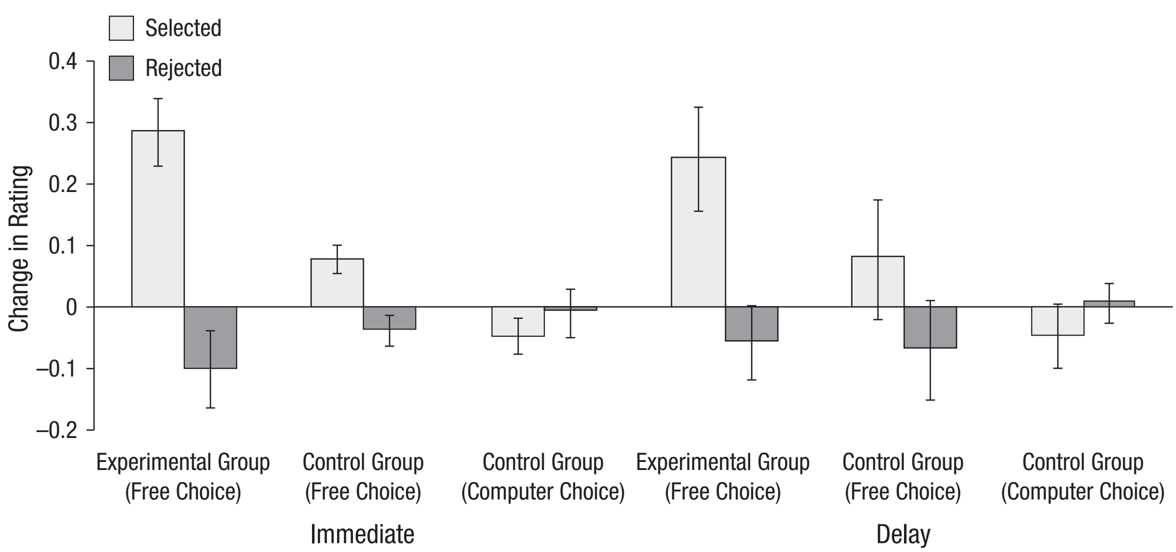

Fig. 1. Preference changes induced by making difficult choices between two equally rated items. The graph shows the differences between mean-corrected prechoice ratings and mean-corrected postchoice ratings, separately for selected and rejected vacation destinations and for immediate and delayed rating conditions. For the experimental condition, vacation destinations were divided into "selected" and "rejected" categories according to the choices participants had made between the two rating tasks in Phase 1. For the control condition, vacation destinations were divided into "selected" and "rejected" categories in two ways: according to the computer's (random) choices, which were made between the two rating tasks in Phase 1, and according to free choices made by participants in the free-choice task at the end of the study, after all rating tasks. Error bars represent standard errors of the mean.

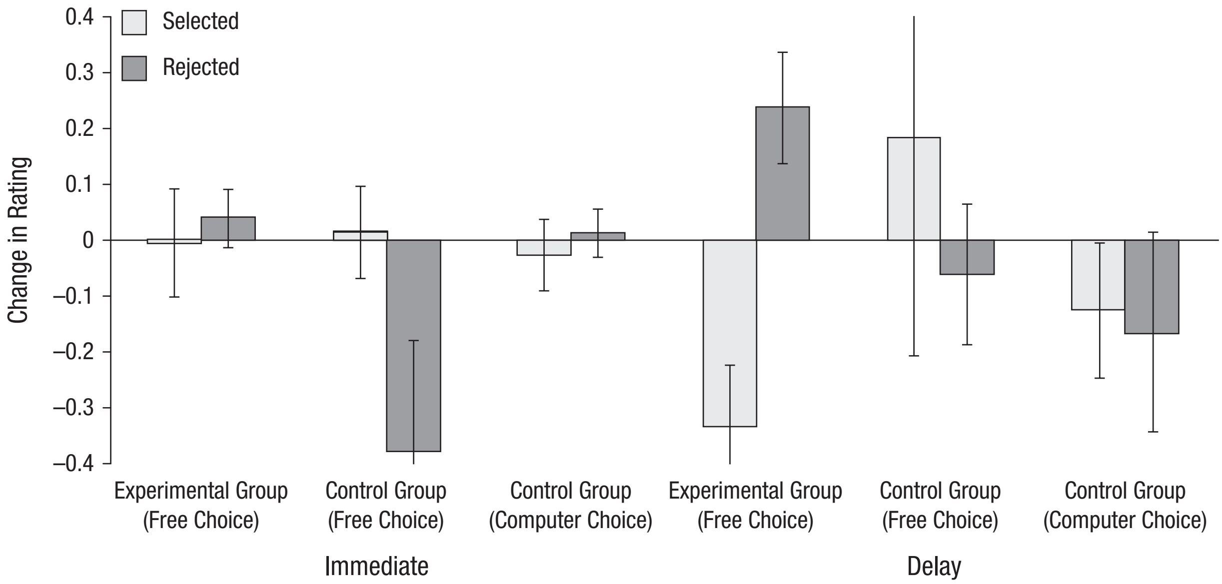

Fig. 2. Preference changes induced by making easy choices between differently rated items. The graph shows the differences between mean-corrected prechoice ratings and mean-corrected postchoice ratings, separately for selected and rejected vacation destinations and for immediate and delayed rating conditions. For the experimental condition, vacation destinations were divided into "selected" and "rejected" categories according to the choices participants had made between the two rating tasks in Phase 1. For the control condition, vacation destinations were divided into "selected" and "rejected" categories in two ways: according to the computer's (random) choices, which were made between the two rating tasks in Phase 1, and according to free choices made by participants in the free-choice task at the end of the study, after all rating tasks. Error bars represent standard errors of the mean.

postchoice ratings of options selected in difficult decisions (i.e., choices between equally rated items), $t(8) = 2.9$, $p < .02$, $d = 1.37$ (Fig. 1). This finding suggests that changes in ratings are partially due to preexisting preference (also see Chen & Risen, 2010; Sharot, De Martino, & Dolan, 2009). However, these changes were smaller than those observed in the experimental group, $t(27) = 2.4$, $p < .025$, $d = 1.13$. This pattern suggests that the change in preferences for items that is caused by selecting them exceeds the change that can be accounted for by preexisting preferences.

Discussion

After making a choice, humans (Brehm, 1956) and other animals (Egan, Santos, & Bloom, 2007, 2010) change their existing preferences to align more closely with their decision. Strikingly, our results show that this modulation lasts several years after the choice is made. Specifically, when participants made difficult choices between two vacation destinations they had rated equally, their ratings of the destinations they had selected increased both immediately and 3 years later. Furthermore, long-term choice-induced changes in preferences were observed only when participants had made the choices themselves, and not when the decisions had been made by a computer (also see Egan et al., 2007; Sharot, Velasquez, & Dolan, 2010; but see Lyubomirsky & Ross, 1999). These results suggest that choice-induced alterations of preference are stable and long lasting. This conclusion holds also after controlling for participants' preexisting preferences, as revealed by their free choices (see also Izuma et al., 2010).

We have previously shown that the magnitude of a signal in the striatum that tracks the value of a stimulus is altered by choice (Sharot, De Martino, & Dolan, 2009). Thus, making a decision regarding a stimulus changes the biological representation of the value of that stimulus, and this change may be relatively stable. Consequently, when a selected option is encountered months or years after it was chosen, this new value, as represented in the striatum, is likely to be retrieved. It is important to note that in our study, we examined the stability of updated values when selected options were not experienced. There is evidence to suggest that choice-induced changes in preference are less stable when the options are sampled (Vroom & Deci, 1971). Further, the changes in preferences observed in our study were restricted to preferences for selected items. It remains to be tested whether long-lasting changes in preferences for rejected items might be observed for other types of stimuli not used in our study.

Our finding that updated values are stable over time is consistent with prominent theories of choice-induced reevaluation. Festinger (1957) suggested that to reduce the cognitive dissonance caused by difficult choices, people seek information that confirms their choice and depreciate information that challenges it. Over time, such biased processing of information can preserve the overvaluation of selected options, or even enhance it further.

Whereas cognitive dissonance theory maintains that options are reevaluated after a decision is made, other models suggest that reevaluation may occur during the decision-making process itself (Russo, Medvec, & Meloy, 1996; Simon, Krawczyk, & Holyoak, 2004). For example, presenting competing possibilities side by side, as we did in our study, may highlight the unique aspects of the two alternatives and drive reevaluation while the decision is being made (Houston, Sherman, & Baker, 1991; Tversky, 1972). Thus, the context in which people make a decision may change their preferences by giving new weight to various aspects of the stimuli that would not have been considered beforehand. These new weights may then be used when people evaluate the stimuli again later.

Alternatively, long-term changes in preference may be contingent on an explicit memory of the prior choice. However, some studies have shown that choice-induced changes in preferences do not require such explicit memory (Coppin, Delplanque, Cayeux, Porcherot, & Sander, 2010; Lieberman, Ochsner, Gilbert, & Schacter, 2001), rendering this explanation unlikely. Another possibility is that long-term changes in preferences are contingent on immediate postchoice ratings: People may depend on an explicit or implicit memory of their last rating of an item when they evaluate it months later. In other words, long-term choice-induced changes in preferences may require the explicit expression of those preferences shortly after the choices are made. This hypothesis awaits future testing.

In conclusion, our results constitute the first evidence that making a decision generates long-term change in preference, at least until the decision is actualized. These findings underscore the importance of the phenomenon of choice-induced changes in preference, which has implications for a diverse array of fields, including economics, marketing, and the psychology of interpersonal relationships.

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Tali Sharot and Stephen M. Fleming contributed equally to this work.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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