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# Do Decisions Shape Preference? Evidence From Blind Choice

**Tali Sharot[1], Cristina M. Velasquez[2], and Raymond J. Dolan[1]**
[1]Wellcome Trust Centre for Neuroimaging, Institute of Neurology, University College London, and [2]Lake Forest College

## Abstract

Psychologists have long asserted that making a choice changes a person's preferences. Recently, critics of this view have argued that choosing simply reveals preexisting preferences, and that all studies claiming that choice shapes preferences suffer from a fundamental methodological flaw. Here we address this question directly by dissociating preexisting preferences from decision making. We studied participants who rated different vacation destinations both before and after making a blind choice that could not be guided by preexisting preferences. As an additional control, we elicited ratings in a condition in which a computer made the decision for the participants. We found that preferences were altered after participants made a blind choice, but not after a computer dictated the decision. The results suggest that just as preferences form choices, choices shape preferences.

## Keywords

cognitive dissonance, decision making, choice, preferences

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For decades, the idea that choice alters preferences has enjoyed widespread acceptance (see Ariely & Norton, 2008). This phenomenon, first demonstrated experimentally in 1956 by psychologist Jack Brehm, refers to an observation that after choosing between two similarly valued items, participants rate the selected item better than they initially did, and the rejected option worse (Brehm, 1956). This method is known as the *free-choice paradigm*, and the results of Brehm's classic experiment have been replicated numerous times (Egan, Santos, & Bloom, 2007; Lieberman, Ochsner, Gilbert, & Schacter, 2001; for a review, see Harmon-Jones & Mills, 1999).

One of the most influential theories in psychology, cognitive dissonance theory, was generated to account for these findings (Festinger, 1957). According to cognitive dissonance theory, a choice between two similarly desirable alternatives engenders a psychological tension mediated by the desirable aspects of the rejected alternative and the undesirable aspects of the selected alternative (Festinger, 1957). Within the framework of the theory, this tension is reduced by reevaluating the options after the choice is made (for an alternative account, see Bem, 1967, 1972).

Recently, it has been suggested that all studies demonstrating choice-induced preference change suffer from a fundamental methodological flaw (Chen, 2008; Chen & Risen, 2009). The core argument is this: Because people's preferences cannot be measured perfectly, and are subject to rating noise, participants will provide more accurate ratings as they gain experience with the rating scale. Consequently, postchoice shifts in ratings simply reflect participants' initial preferences (which can be predicted by their choices) rather than any change in preference induced by choice.

This critique presents a major challenge to the idea that choice evokes reevaluation. Testing whether decision making does in fact alter preferences, rather than merely reveal them, requires an experimental design in which preexisting preferences can be dissociated from the decision-making task. Such a design was recently implemented in nonhuman primates and children (Egan, Santos, & Bloom, 2010). In the study reported here, we asked adult participants to rate vacation destinations both before and after a decision-making task. Critically, the participants made their choices without seeing the alternatives (which were revealed only after the fact), so that the decisions could not be affected by preexisting preferences. If postchoice changes in ratings are merely an artifact of preexisting preferences, one would not expect to observe them under this design constraint. If, however, choices do alter preferences, this should be apparent even under the stringencies of making blind choices. Furthermore, to test whether a sense of agency

**Corresponding Author:**
Tali Sharot, Wellcome Trust Centre for Neuroimaging, Institute of Neurology, University College London, 12 Queen Square, London WC1N 3BG, United Kingdom
E-mail: t.sharot@fil.ion.ucl.ac.uk

over the decision is critical for choice-induced reevaluation, we examined preferences both when the participants made blind choices and when a computer dictated the participants' choices.

## Experiment 1: Blind Choice

Experiment 1 investigated the main question of this study—namely, whether postchoice changes in valuation are observed even when choices cannot be determined according to preexisting preferences.

### Participants

Data from 21 participants (9 males, 12 females; age range = 18–31 years) were included in the analysis. Two additional participants were eliminated because they gave no response on an excessive number of trials (> 25%). This level of performance is an a priori cutoff utilized in previous studies (Sharot, De Martino, & Dolan, 2009; Sharot, Shiner, Brown, Fan, & Dolan, 2009). Two participants were eliminated for using incorrect button keys, and 1 was eliminated because of a computer error. All participants gave informed consent and were paid for their participation.

### Stimuli and procedure

Stimuli consisted of 80 names of vacation destinations taken from a previous study (Sharot, De Martino, & Dolan, 2009). The stimuli were presented in random order. The prechoice rating task consisted of 80 trials of 11 s each. On each trial, the name of a vacation destination appeared on a computer screen for 6 s. The participants were instructed to imagine themselves spending next year's vacation at that location. They then had 2 s to estimate how happy they would be if they were to vacation at that spot. Responses were entered on the keyboard, using the following scale: 1 = *unhappy*, 2 = *a bit unhappy*, 3 = *neutral*, 4 = *happy*, 5 = *very happy*, 6 = *extremely happy*. If a participant did not respond, that trial was excluded from the final data analysis. A fixation cross was presented for 3 s before the next trial.

Pairs for the choice task were determined by a MATLAB program (The MathWorks, Natick, MA) used in an earlier study (Sharot, De Martino, & Dolan, 2009). Approximately 75% of the trials included two options that the participant had rated the same in the prechoice task (the critical trials); the remaining trials included two options that the participant had rated differently in the prechoice task (the noncritical trials). The purpose of having so many more critical than noncritical trials was to enhance the power for detecting differences in the critical trials reported here. Each stimulus appeared in only one pair, and all choices were hypothetical.

As a cover story, participants were told that the study was designed to examine "subliminal decision making." To ensure that participants believed this to be the case, the experimenter showed them a copy of an article describing research on subliminal decision making that was carried out in the same laboratory (Pessiglione et al., 2008) and told them that the current experiment was a follow-up study. Participants were also instructed that on each trial two masked names of vacation destinations from the first task would appear on screen, side by side, for 2 ms. Participants were told that they would not be able to consciously perceive these stimuli because the stimuli would appear very briefly and would be masked. In reality, only nonsense strings were presented during those 2 ms (e.g., *"%^!x *&()%*), and no vacation destinations were presented. Then the word "choose" appeared on the screen, instructing participants to indicate, by pressing one of two buttons, which of the "masked" holiday destinations (the one on the right or the one on the left) was their preference (again, no names of vacation destinations were actually presented). Participants had 2 s to respond. Once the decision was made, the pair of destinations that had been assigned to the trial (but not displayed) was presented on the screen, one on the left and one on the right (e.g., Greece, Thailand), and a star appeared above the destination the participant had blindly chosen (i.e., the destination on the side that the participant had selected). The trial lasted for 4 s, and a fixation cross was then presented for 3 s. The final task was the postchoice rating task, which was identical to the prechoice rating task.

### Analysis

Analysis was conducted in the same way as in a previous study (Sharot, De Martino, & Dolan, 2009). For each participant and stimulus, postchoice shifts in preference were calculated by subtracting the mean-corrected prechoice rating from the mean-corrected postchoice rating (i.e., difference scores). Then, for each participant, the average difference scores were calculated for stimuli that had been selected in the choice task and those that had been rejected in the choice task. A *t* test was conducted to examine whether these scores were significantly different from zero and from each other. The mean-corrected score is the distance of a particular stimulus's rating from the average rating for that participant and session ($x_i - \mu$) and indicates the value of the stimulus relative to all other stimuli in that session.

### Results

The results revealed a choice-induced change in preference (Fig. 1). Specifically, ratings for the selected stimuli increased after the decision-making stage, $t(20) = 2.4$, $p < .03$. Thus, even though the choice was random and not determined by preexisting preferences, participants rated selected stimuli as more desirable after the blind decision than before. Ratings did not change for rejected stimuli, $p > .9$. The increase in ratings for selected stimuli tended to be larger than the nonsignificant decrease for rejected stimuli, $t(20) = 1.8$, $p < .1$.

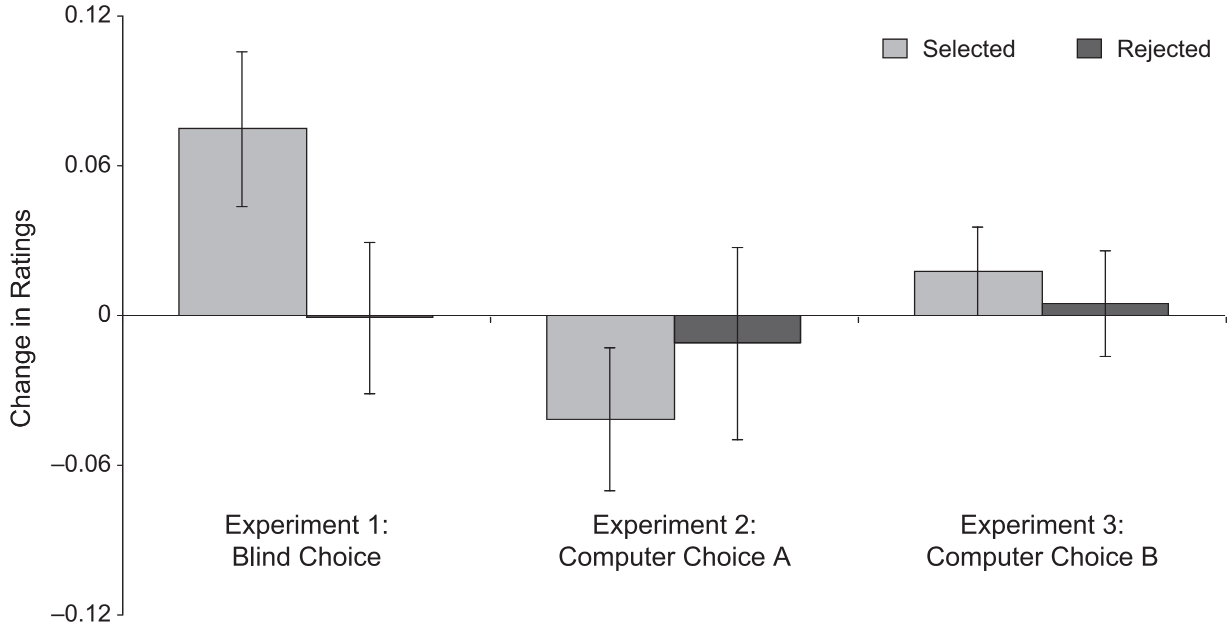


**Fig. 1.** Difference in mean-corrected ratings between the prechoice task and the postchoice task for alternatives that were selected and rejected in the blind-choice condition (Experiment 1) and the computer-choice conditions (Experiments 2 and 3). A higher difference score indicates higher ratings after the decision-making task relative to before. Error bars represent standard errors of the mean.

## Experiment 2: Computer Choice A

Experiment 2 was conducted to test whether choice-induced changes in preferences are contingent on participants making the decision themselves, or are also observed when choices are made for participants.

### *Participants*

Data from 19 participants (9 males, 10 females; age range = 18–27 years) were included in the analysis. Five additional participants were eliminated because they gave no response on an excessive number of trials (> 25%). One participant did not complete the study.

### *Procedure*

The postchoice and prechoice rating tasks were identical to those in Experiment 1. The choice task differed, however: Participants were told that on each trial, the computer would select, out of two options, the vacation destination at which participants would vacation the next year. On each trial, two names of vacation destinations from the prechoice task appeared on the screen for 4 s. Then the word "choose" appeared on the screen, above the two options, and a star appeared for 2 s next to the stimulus the computer had randomly chosen. To ensure that the participants were attending to the task, and to equate motor action in this condition and the blind-choice condition (Experiment 1), we instructed participants to indicate which stimulus the computer had chosen by pressing one of two buttons (to indicate the right or left location) after the star sign appeared. A fixation cross was then presented for 3 s.

### *Results*

No choice-induced changes in preferences were observed (Fig. 1). Ratings did not shift after the decision-making stage for either selected stimuli, $p > .15$ (note that there was a numerical decrease), or rejected stimuli, $p > .7$. Neither were changes in ratings for selected and rejected stimuli different from each other, $p > .4$.

## Experiment 3: Computer Choice B

We found that blind choices can affect subsequent preferences (Experiment 1) and that this effect is eliminated when a computer, rather than the participant, makes the choice (Experiment 2). However, one difference between Experiments 1 and 2 tempers this overall conclusion: Symbol strings were used in Experiment 1, but not in Experiment 2. Because symbol strings are common substitutions for vulgarities, the nonsense strings (e.g., *"%^!x *&()%*) in Experiment 1 may have influenced the decisions that followed. For example, as a result of the strings' association with vulgarities, they may have imbued the outcome of the blind choices with greater emotional impact. Therefore, we tested an additional group of participants on a second computer-choice task (Experiment 3) that incorporated nonsense strings, as in Experiment 1.

### Participants

Data from 20 participants (8 males, 12 females; age range = 18–35 years) were included in the analysis. Data from 3 additional participants were eliminated because they gave no response on an excessive number of trials (> 25%).

### Procedure

The procedure was identical to that of Experiment 1 except that participants were informed that the computer would make a choice for them, and that after observing the computer's choice, they should indicate by pressing the left or right button the option the computer had chosen for them.

### Results

No choice-induced changes in preferences were observed (Fig. 1). As in Experiment 2, ratings did not shift after the decision-making stage for either selected stimuli, $p > .3$, or rejected stimuli, $p > .8$. Neither were changes in ratings for selected and rejected stimuli different from each other, $p > .6$.

## Conjunction Analysis

To test for the effects of choice, agency, and emphasis (due to nonsense strings) on rating change in all participants, we conducted a linear regression analysis using the shift in ratings (postchoice – prechoice) for selected and rejected options as the dependent measures. The independent measures included choice (selected, rejected), agency (participant, computer), and emphasis (nonsense strings, no nonsense strings); all three independent measures were entered as 1 or 0, and the interactions between choice and agency and between choice and emphasis were entered as the product of the two variables. Results of a stepwise regression revealed that the model that best explained the change in ratings was one that included only the interaction between choice and agency, $\beta = 2.3$, $F(1, 119) = 6.7$, $p < .01$. This suggests that shifts in preference are guided by choice when participants believe they are instrumental in the decision-making process, but not when a computer makes the choice.

## General Discussion

Our results demonstrated that choices not only reveal preferences, but also shape them. Even when decisions were made randomly, and were not guided by preexisting preferences, these choices changed expectations of hedonic outcome. Furthermore, choice-induced change in preferences was observed only when participants believed they had been instrumental in making a decision, and not when the decision was made by a computer.

The behavioral finding that making a decision can change overall preferences is consistent with recent functional magnetic resonance imaging data. We have previously shown that a signal in the caudate nucleus that tracks expected hedonic outcome is altered by choice (Sharot, De Martino, & Dolan, 2009). It is important to note that we do not rule out the likelihood that choices can be guided by preexisting preferences. On the contrary, we have previously shown that choices between two equally rated options are predicted by a neurophysiological signal in the caudate nucleus that indexes the expected hedonic impact of the option, a finding consistent with the idea that decisions do indeed mirror a neural representation of preexisting preferences (Sharot, De Martino, & Dolan, 2009). These prior results, coupled with the current findings, lead us to conclude that choices both reflect and shape hedonic expectancies.

The claim that choices shape preferences is also consistent with a previous study demonstrating preference changes in nonhuman primates and children when they made blind choices, but not when an experimenter made choices for them (Egan et al., 2010). The current results extend those findings to adults, albeit with different dependent variables and stimuli, and with different operationalization of the blind choice. This outcome suggests that preference reevaluation following a blind choice is not limited to agents lacking language, a fully developed brain, and mature cognitive capacities.

More broadly, the current findings can be interpreted within the framework of both cognitive dissonance theory and self-perception theory. According to cognitive dissonance theory, observing one's (blind) decision can trigger dissonance between the initial cognition that the two options are equally preferred and an action that commits to one option over the other (Festinger, 1957). This psychological tension is reduced by reevaluating the alternatives after the choice, such that the options are no longer perceived as equal. If a computer makes the selection, dissonance does not arise, because there is an absence of agency in committing to an action that conflicts with an initial cognitive evaluation. We note that the choices made in our study were hypothetical, and it is possible that different results may be observed for decisions that involve real consequences.

Within self-perception theory (Bem, 1967), it is assumed that subjects infer their preferences by observing their own choices. This theory's explanation for the present results would be as follows: Participants believed they were learning their preferences when they made choices and updated their explicit ratings accordingly. When a computer made the decisions, however, preferences were not updated, as those choices were not perceived as reflecting the participants' preferences.

In sum, in a study that steered clear of the methodological flaw associated with the free-choice paradigm, we obtained results that support Brehm's (1956) initial claims of choice-induced changes in preference. Postchoice reevaluation may serve an adaptive purpose by promoting individuals' commitment to a selected action, so that they do not dwell on what might have been or constantly change their minds.

Interestingly, enhanced commitment to chosen options likely occurs also when decisions are random, such as when one blindly sticks a pin in a map to choose a travel destination or flips a coin to make a life-altering decision.


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## 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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