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Do decisions shape preference? Evidence from blind choice

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Abstract

Psychologists have long asserted that making a choice changes a person's preferences. Recently, critics of this view have argued that choosing simply reveal pre-existing preferences, and that all studies claiming that choice shapes preferences suffer a fundamental methodological flaw. Here, we address this question directly by dissociating pre-existing 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 pre-existing preferences. As a further control we also elicited ratings in a condition where a computer made the decision. We found that preferences were altered after participants made a blind choice, but not when a computer instructed the participants decision. The results suggest that just as preferences form choices, choices shape preferences.

For decades, the idea that choice alters preferences has enjoyed widespread acceptance (see Ariely & Norton, 2008). This phenomenon, first demonstrated experimentally in 1956 by the 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 as worse (Brehm, 1956). The results of this classic experiment, known as the "free-choice paradigm", have been replicated numerous times (for a review see Harmon-Jones and Mills, 1999).

One of the most influential theories in psychology, cognitive dissonance theory, was generated to account for the findings (Festinger, 1957). Under cognitive dissonance theory, a choice between two similarly desirable alternatives engenders a psychological tension mediated by the desirable aspect 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 re-evaluating the options post-choice (for an alternative account see Bem, 1967; Bem, 1972).

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

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This critique provides a major challenge to the idea that choice evokes re-evaluation. To test whether making a decision does in fact alter our preferences, rather than merely reveal them, requires an experimental design where pre-existing preferences can be dissociated from the decision making task. We note that such a design has recently been implemented in primates and children (Egan et al., 2010). Using a similar design, we asked participants to rate vacation destinations both before and after a decision making task. Importantly, choices were made without the participant seeing the alternatives which were revealed after the fact, such that decisions could not be effected by pre-existing preferences. If post-choice changes in ratings are merely an artifact of pre-existing preferences, then we would not expect to observe them under this design constraint. If, however, choices do alter our preferences this should be apparent even when under the stringencies of making "blind" choices. Furthermore, to test whether a sense of agency over the decision is critical for choice-induced re-evaluation we examined preferences both when the participants made "blind" choices and when a computer instructed the participants' choices.

Experiment I – Blind Choice

Experiment I addresses the main aim of this paper. Namely, we test whether post-choice changes in valuation are observed even when choices cannot be determined according to pre-existing preferences.

Materials and Methods

Participants—Data from 21 participants (males = 9, females = 12; age range = 18-31) were included in the analysis. Two additional participants were eliminated due to excessive number of trials with no response (> 25%). This level of performance is an a-priori cut off utilized previously (Sharot, De Martino & Dolan, 2009; Sharot, Shiner, Brown, Fan & Dolan, 2009). Two participants were eliminated due to usage of incorrect button keys, and one because of a computer error. All participants gave informed consent and were paid for their participation.

Stimuli—Stimuli consisted of 80 names of vacation destinations adapted from a previous study (Sharot, De Martino & Dolan., 2009). The order in which stimuli were presented was random.

Procedure—Pre-choice Rating task consisted of eighty trials of 11s. On each trial a name of a vacation destination appeared on screen for 6s. The participants were instructed to imagine themselves spending next year's vacation at that location. The participant then had 2s to rate how happy they estimate 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) using the keyboard. If the participant did not respond that trial was excluded from the final data analysis. A fixation cross was then presented for 3s.

Choice task: Pairs were determined by a Matlab program as implemented previously (Sharot et al., 2009) such that approximately 75% of the trials included two options that were rated the same in session 1 (critical condition), and the rest (approximately 25% of the trials) included two options that were rated differently in session 1 (non-critical condition). This was implemented to enhance the power for detecting difference in the critical trials for which data and analysis is reported here. Each stimulus appeared in only one pair. All choices were hypothetical.

As a cover story participants were told that the study was designed to examine "subliminal decision making". To ensure participants believed this to be the case they were shown a copy of an article "Subliminal instrumental conditioning demonstrated in the human brain"

describing similar type of research carried out in this laboratory (Pessiglione et al., 2008). Subjects were told the current experiment constituted a follow-up study. Participants were told that on each trial two masked names of vacation destinations from session 1 would appear on screen side by side for 2ms. Participants were told they would not be able to consciously perceive these stimuli because they would appear very briefly, and would be masked. In reality, *only nonsense scribbles* were presented during those 2ms (such as: "%^! x *&()%), and no vacation destination were ever 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) they would prefer to spend a vacation (again - in reality no masked stimuli were presented). Participants had up to 2s to respond and once the decision was made the names of the 'chosen' and 'rejected' destinations were revealed on screen (e.g., Greece - Thailand), and a star appeared above the destination the participant had blindly chosen. The trial lasted for 4s. A fixation cross was then presented for 3s.

Post-choice Rating was identical to pre-choice rating task.

Analysis: Analysis was conducted as done previously (Sharot, De Martino & Dolan, 2009; Sharot, Shiner, Brown, Fan & Dolan, 2009). For each participant and stimulus post-choice shifts in preference were calculated by subtracting the mean-corrected pre-choice rating from mean-corrected post-choice rating (i.e. difference scores). Then, for each participant, the average difference scores were calculated for selected and rejected stimuli. A t-test was conducted to examine whether these were significantly different from zero, and from each other. Mean-corrected ratings are the distance of a particular stimulus' rating from the average rating for that participant and session ($x_i - \mu$), indicating the value of a stimulus relative to all other stimuli in that session.

Results

The results revealed a choice-induced change in preference (see Figure). Specifically, ratings increased after the decision making stage for the selected stimuli ($t(20) = 2.4$, $P < 0.03$). Thus, even though the choice was random and not determined by pre-existing preferences, participants rated selected stimuli as more desirable after the blind decision, relative to before. Ratings did not change for rejected stimuli ($P > 0.9$). This increase in ratings for selected stimuli tended to be larger than the non-significant decrease for rejected stimuli ($t(20) = 1.8$, $P < 0.1$).

Experiment II – Computer Choice A

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

Participants

Data from 19 participants (males = 9, females = 10; age range = 18-27) were included in the analysis. Data from three additional participants were eliminated due to excessive number of trials with no response (> 25%).

Procedure

Post-choice and pre-choice rating tasks were identical to Experiment I. The decision making task differed, as participants were told that on each trial the computer will select which vacation destination out of two options the participant will vacation at next year. On each trial two names of vacation destinations from session 1 appeared on screen side by side for

4sc. Then the word “choose” appeared on screen above the two options and a star sign appeared next to the stimuli the computer had randomly chosen for the participant for 2sc. To ensure the participants were attending to the task, and to equate motor action to the blind choice condition, participants were instructed to indicate which stimulus the computer had chosen for them by pressing one of two buttons to indicate right or left location once they saw the star sign. A fixation cross was then presented for 3s.

Results

No choice-induced changes in preferences were observed (Figure). Ratings did not shift after the decision making stage for either selected ($P > 0.15$ – note that this is a numerical *decrease*) or rejected ($P > 0.7$) stimuli. Neither were changes in ratings for selected and rejected stimuli different from each other ($P > 0.4$).

Experiment III – Computer Choice B

As an interim summary, we have shown (Exp 1) that blind choices can affect subsequent preferences, and that this effect is abolished in the computer-choice (instructed) condition. However, we acknowledge one potential difference between Experiment I and II that tempers this overall conclusion. Our caveat relates to a possibility that symbol strings are common substitutions for vulgarities. Thus, seeing the nonsense scribbles (e.g., “%^!x *&() %) in Experiment I may have emphasized the alternatives and the decision that followed. These symbols were not present in Experiment II. Thus, we run an additional group of participants on a second computer choice task (Exp III) that incorporate nonsense scribbles as in Experiment I.

Participants

Data from 20 participants (males = 8, females = 12; age range = 18-35) were included in the analysis. Data from three additional participants were eliminated due to excessive number of trials with no response (> 25%).

Procedure

The procedure was identical to Experiment I except that participants were informed that the computer will make a choice for them and that after observing the choice they should indicate by pressing the left or right button the option the computer had choose for them.

Results

No choice-induced changes in preferences were observed (Figure). As in Experiment II, ratings did not shift after the decision making stage for either selected ($P > 0.3$) or rejected ($P > 0.8$) stimuli. Neither were changes in ratings for selected and rejected stimuli different from each other ($P > 0.6$).

Conjunction Analysis

To formally test for the effects of choice, agency and emphasis (due to nonsense scribbles) on rating change in all participants, we conducted a linear regression analysis entering the shift in ratings (post-choice – pre-choice) for selected and rejected options as the dependent measures. The independent measures included choice, agency, and emphasis (which were entered each as 1 or 0), and the interaction between choice and agency, and choice and emphasis (which were entered as the product of the two variables). Results of a step-wise regression revealed that the model which best explained the change in ratings was one that included only the interaction between choice and agency (Beta = 2.3), $F(1,119) = 6.7$ $P < 0.01$. This suggests that shifts in preference are guided by choice where participants believe

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they are instrumental in the decision making process, but not when a computer instructs the choice.

Discussion

Our results demonstrate that choices not only reveal preferences alone but also shape them. We show that even when decisions are made randomly, and are not guided by pre-existing preferences, these choices change expectations of hedonic outcome. Furthermore, choice-induced change in preference is observed only when participants believe they have been instrumental in making a decision, and not when the decision was instructed by a computer.

The behavioral finding that making a decision can change our overall preferences is consistent with recent fMRI data. We have previously shown that a signal in the caudate nucleus, that tracks expected hedonic outcome, was altered by choice and resulting in enhanced post-choice activity for selected, and reduced post-choice activity for rejected, items (Sharot De Martino & Dolan, 2009). It is important to note that we do not rule out the likelihood that choices can be guided by pre-existing preferences. On the contrary, we have previously shown that decisions between two equally rated options are predicted by a neurophysiological signal in the caudate nucleus that indexes the expected hedonic impact of the option, consistent with the idea that decisions do indeed mirror a neural representation of pre-existing preferences (Sharot De Martino & Dolan, 2009). These prior results, coupled with the current findings, point to a conclusion that choices reflect and shape hedonic expectancies.

The claim that choice shape preferences is also consistent with a previous study demonstrating preferences changes in a context where non-human primates and children make blind choices, but not where an experimenter makes the choice for them (Egan, Santos & Bloom, 2010). The current results extend those findings to adults (using different dependent variables, stimuli, and operationalization of the blind choice), suggesting that preference re-evaluation following a blind choice is not constrained to agents lacking a fully developed brain, language, and/or 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 which commits to one option over another (Festinger, 1957). This psychological tension is reduced by re-evaluating the alternatives post-choice, such that the options are no longer perceived as equal. When a computer, rather than an agent, makes the selection dissonance does not arise, due to absence of agency in committing to an action which conflicts with an initial cognitive evaluation. We note that the choices made here 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 choices. The theory's explanation for the present results would be as follows: participants believed they were learning their preferences, and updated their explicit ratings accordingly. However, when a computer made the decision, preferences were not updated as those choices were not perceived as reflecting the participants' preferences.

In sum, the results support Brehm's (1956) initial claims of choice-induced changes in preference in a study that steers clear of the methodological flaw associated with the "free choice paradigm". Post-choice re-evaluation may serve an adaptive purpose by promoting commitment to our selected action, thus preventing us from wasting time dwelling on what may have been, and/or getting stuck by constantly changing our minds. Interestingly,

enhanced commitment to our chosen options likely occurs when decisions are random, such as blindly sticking a pin in a map to choose a travel destination, or flipping a coin to make a life altering decision.

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References

Ariely D, Norton MI. How actions create--not just reveal-preferences. Trends in Cognitive Science. 2008; 12:13–16.

Bem DJ. Self-perception: An alternative interpretation of cognitive dissonance phenomena. Psychological Review. 1967; 74:183–200. [PubMed: 5342882]

Bem DJ. Self-perception theory. Advances in Experimental Social Psychology. 1972; 6:1–62.

Brehm JW. Post-decision changes in the desirability of choice alternatives. Journal of Abnormal and Social Psychology. 1956; 52:384–389.

Chen, MK. Rationalization and cognitive dissonance: Do choices affect or reflect preferences?. Yale University, Cowles Foundation for Research in Economics; New Haven, CT: 2008. (Cowles Foundation Discussion Paper No. 1669)

Chen MK, Risen JL. Is choice a reliable predictor of choice? A comment on Sagarin and Skowronski. Journal of Experimental Social Psychology. 2009; 45:427–429.

Egan LC, Santos LR, Bloom P. The origins of cognitive dissonance: evidence from children and monkeys. Psychological Science. 2007; 11:978–983. [PubMed: 17958712]

Egan LC, Santos LR, Bloom P. Choice-induced preferences in the absence of choice: Evidence from a blind two choice paradigm with young children and capuchin monkeys. Journal of Experimental Social Psychology. 2010; 1:204–207.

Festinger, L. A theory of cognitive dissonance. Stanford University Press; Stanford, CA: 1957.

Harmon-Jones, E. Cognitive Dissonance: Progress on a Pivotal Theory in Social Psychology. 1st ed. American Psychological Association (APA); 1999.

Lieberman MD, Ochsner KN, Gilbert DT, Schacter DL. Do amnesics exhibit cognitive dissonance reduction? The role of explicit memory and attention in attitude change. Psychological Science. 2001; 2:135–140. [PubMed: 11340922]

Pessiglione M, Petrovic P, Daunizeau J, Palminteri S, Dolan RJ, Frith CD. Subliminal instrumental conditioning demonstrated in the human brain. Neuron. 2008; 59:561–567. [PubMed: 18760693]

Sharot T, De Martino B, Dolan R. How Choice Reveals and Shapes Expected Hedonic Reaction. Journal of Neuroscience. 2009; 29:3760–3765. [PubMed: 19321772]

Sharot T, Shiner T, Brown AC, Fan J, Dolan RJ. Dopamine Enhances Expectation of Pleasure in Humans. Current Biology. 2009; 24:2077–1080. [PubMed: 19913423]

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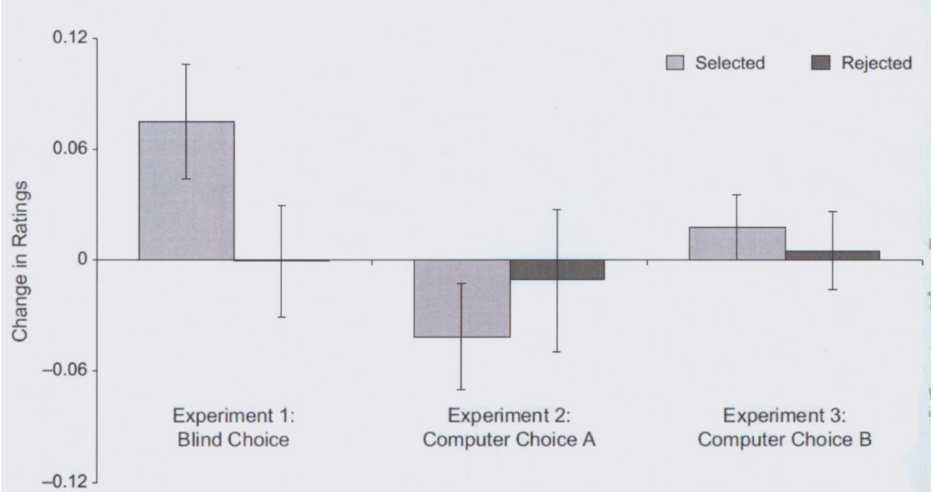

Fig. 1.

Post-choice Reevaluation

Difference in mean-corrected ratings between the prochoice 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 than before decision-making task. Error bars represent standard errors of the mean.