



Short Communication

Swayed by the music: Sampling bias towards musical preference distinguishes like from dislike decisions

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ABSTRACT

This study investigated the interaction between sampling behavior and preference formation underlying subjective decision making for like and dislike decisions. Two-alternative forced-choice tasks were used with closely-matched musical excerpts and the participants were free to listen and re-listen, i.e. to sample and resample each excerpt, until they reached a decision. We predicted that for decisions involving resampling, a sampling bias would be observed before the moment of conscious decision for the like decision only. The results indeed showed a gradually increasing sampling bias favouring the choice (73%) before the moment of overt response for like decisions. Such a bias was absent for dislike decisions. Furthermore, the participants reported stronger relative preferences for like decisions as compared to dislike decisions. This study demonstrated distinct differences in preference formation between like and dislike decisions, both in the implicit orienting/sampling processes prior to the conscious decision and in the subjective evaluation afterwards.

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1. Introduction

What role do implicit processes preceding the moment of conscious decision play in subjective decision making? In the classical view sensory sampling precedes decision making, and only after sampling is completed a decision can be made. An alternative view is that sampling plays an active role in the process of preference formation, and that orienting behavior can be taken as the somatic precursor of these implicit processes.

An elegant example of how sampling interacts with preference formation was recently demonstrated by Shimojo, Simion, Shimojo, and Scheier (2003). They studied individual's orientation patterns to two closely matched faces while participants made a preference decision ('choose the face you like more'), and reported a 'gaze cascade' before the moment of decision. The probability of a participant's orientation towards the eventually preferred face increased as the participant neared the moment of conscious decision (as marked by a button press), and this was interpreted as the result of a positive interaction between preferential looking and the mere exposure effect (Shimojo et al., 2003). Interestingly, this gaze cascade was much reduced when participants were asked to choose the face they disliked more.

According to classical expected utility theory (Von Neumann & Morgenstern, 1944), formation of relative preferences in a binary decision task should not differ when people are asked to choose the option they prefer more or the option they prefer

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less; in both cases one option is judged as superior and the other is judged as inferior. Previous research has shown, however, that asking people to select an option results in a stronger focus on positive aspects of the options, while asking people to reject an option results in a stronger focus on negative aspects, and that these differences in focus can influence the relative ranking of options (Meloy & Russo, 2004; Shafir, 1993; Shafir, Simonson, & Tversky, 1993; Westenberg & Koele, 1992).

A focus on positive attributes is likely to be intrinsically rewarding and these rewards might form an incentive to sample more extensively, allowing for the formation of a pronounced preference for one of the options. Generalizing the positive interaction as proposed by Shimojo and colleagues (2003) to account for the gaze cascade effect, we here hypothesize that a focus on the positive attributes results in a positive feedback loop between preferential sampling and increased preference mediated by an increased exposure. We also suggest that this positive feedback loop is crucial for the formation of preferences, especially when faced with a choice between two equally valued options. In such a case of ‘decision conflict’ individuals are initially not entirely certain about which option is preferred (Pochon, Riis, Sanfey, Nystrom, & Cohen, 2008). Often in such situation, the individuals are engaged with prolonged evaluations over available options before reaching a decision. Interestingly, participants do not take random preference decisions under conflict (Shafir et al., 1993). We predict that this positive feedback loop, as reflected by an increasing sampling bias up to the moment of decision, is the systematic component underlying such preference decisions.

While focussing on positive aspects of an option is likely to be rewarding, focussing on negative aspects is likely to be less rewarding or even punishing. A positive feedback loop is predicted to be largely absent under dislike instructions as a result of this focus on negative aspects, preventing the formation of a pronounced preference for one of the options.

We tested these differential predictions regarding sampling behavior and preference formation under like or dislike instructions in a two-alternative forced-choice task using closely matched excerpts of instrumental music, with the freedom for participants to listen and re-listen, i.e. to sample and resample options, until they reached a decision. The hypothesis of a positive feedback loop underlying preference formation has so far only been studied in the visual domain, and in cases where the choice options are presented simultaneously (Glaholt & Reingold, 2009a; Shimojo et al., 2003). The current paradigm examines if the active role of sampling and positive feedback in decision making can be generalized beyond such limits.

2. Methods

Twenty-two healthy human participants (8 female, 14 male, mean age of 32 years) gave written informed consent to the protocol which was approved by the local ethics committee. To simulate decision conflict and therefore emphasize subjective aspect of decision making, the two excerpts within a trial were closely matched on genre (rock, classical, pop, and ambient electronic) and independently obtained ratings of valence and arousal ($n = 5$). In total, 80 instrumental, 15 s long excerpts with a one-second fade-in and fade-out were used. The order of pairs was randomised, as was the order of presentation within each pair. In one half of the task participants were instructed to choose the excerpt they liked (*like condition*) and in the other half to choose the excerpt they did not like (*dislike condition*), with the order of conditions counterbalanced over participants.

In each trial, participants first listened to both excerpts in their entirety at least once to fulfil the basic assumption in a two-alternative forced-choice paradigm that a decision is made after the available options are evaluated and such evaluation would require sampling of the options at least for once (Bogacz, Brown, Moehlis, Holmes, & Cohen, 2006). Afterwards, participants were free to resample the two excerpts for any number of times, for any duration, and in any order (see Fig. 1A). Participants were instructed to press a button as soon as they reached a decision without further mental reconfirmation. Subsequently, participants were asked to rate their relative liking (in the like condition) or relative disliking (in the dislike condition) for the chosen excerpts on a 7 point scale (1: small to 7: very much). At the end of each trial the chosen excerpt in the like condition and the not-chosen excerpt in the dislike condition was played for a minimum of 5 s and a maximum of 30 s as a ‘feedback reward’, with the duration under control of the participant.

3. Results

Three participants did not show any resampling in one or both conditions and were subsequently excluded from data analysis. The percentage of trials on which resampling of excerpts occurred (‘resample trials’) did not differ between conditions (51% and 48% for like and dislike conditions, respectively, $t(18) < 1$; see Table 1). Due to a wide individual variability in the number of trials on which resampling occurred, the reported descriptive and test statistics were weighted by trial numbers (Bland & Kerry, 1998). Tests of differences were considered significant at $p < .05$. The sequential presentation of excerpts could have resulted in order effects, i.e. one option being more likely to be chosen due to its location in the sequence (Moore, 1999), but the proportion of first excerpts chosen did not differ significantly from chance probability (0.5) in either condition (like: $t(18) = 1.05$, $p = .306$; dislike: $t(18) = 0$), or between conditions ($t(18) < 1$).

In the like condition, participants listened to the preferred excerpt at the moment of decision on 73% of the trials, which differs significantly from chance level (50%), $t(18) = 6.12$, $p < .001$. In contrast, no clear resampling bias was visible in the dislike condition, and the weak trend of listening, at the moment of decision, to the not-chosen excerpt in 44% of the trials was not significant, $t(18) = 1.30$, $p = .211$. The percentage of trials on which participants listened to the preferred excerpt at the moment of decision was also significantly higher in the like than in the dislike condition, $t(18) = 3.18$, $p < .005$.

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