

Retrocausal Habituation and Induction of Boredom. A Successful Replication of Bem (2010; Studies 5 and 7).

Alexander Batthyány

alexander.batthyany@univie.ac.at

Abstract:

Bem (2010) reports evidence suggestive of unconscious retrocausal processes in human cognition. Bem's findings appear to imply that under some circumstances, human subjects may display psychologically or physiologically meaningful reactions to future stimuli about whose occurrence they have no direct or indirect knowledge. This working paper describes a group replication attempt of Bem's (2010) studies 5 and 7, i.e. "time-reversed" affective habituation to highly arousing negative pictures and retrocausal induction of boredom/aversion to low arousing, mildly positive pictures (n=70). Evidence suggestive of a retrocausal influence of later stimulus display on subjects' preference ratings was found for affective habituation with high arousing negative stimuli; further, as in Bem's study 7, retrocausal boredom induction was found for subjects high in boredom proneness.

INTRODUCTION

In a review of a number of experimental studies on putative retroactive influences on affective preferences and judgments, Bem (2010) presented evidence suggestive of attitude change towards stimuli depending on the type and content of subsequent exposure to affect-inducing stimuli.

The basic notion of Bem's "feeling-the-future"-model is that under some circumstances, human subjects appear to display psychologically or physiologically meaningful reactions to future stimuli about whose occurrence they have no direct or indirect knowledge (hence the putative "retrocausality"). Of the four proposed effects discussed by Bem (2003; 2010), one of the first which was tested for potential time-reversed effects is called "retrocausal habituation", i.e. the notion that subjects' attitudes towards pictorial stimuli is, to some extent, a function of the subsequent repeated exposure of these stimuli (hence habituation). In the following, a recent¹ replication attempt of Bem's original retrocausal habituation protocol (for negative and high arousing stimuli) and retrocausal induction of boredom (for mildly positive and low arousing stimuli) is reported.

¹ The study was conducted in 2006. Far from being a case of retrocausal replication of Bem's 2010 paper, it was undertaken as a replication attempt instigated by Bem's earlier reports on retrocausal habituation (Bem 2003) and retrocausal induction of boredom (Bem 2005).

AFFECTIVE HABITUATION, FORWARD AND BACKWARD

The conventional finding behind Bem's protocol, affective habituation, is that repeated exposure to an affectively arousing stimulus produces a progressively smaller arousal response due to habituation effects; and further, that habituation does not depend on the conscious encounter with the affectively arousing stimulus. For instance, in a study by Dijksterhuis and Smith (2002) subjects who were subliminally exposed to positive or negative words (e.g., 'happiness', 'summer', 'free', 'hell', 'bomb', 'fear') subsequently perceived these stimuli to be significantly less extreme than novel positive or negative words. Affective habituation is believed to be an unconscious adaptive mechanism serving to avoid hyper-arousal due to repeated or enduring exposure to emotional and arousing stimuli (Dijksterhuis and Smith 2002).

The retrocausal version (Bem 2003, 2005, 2008, 2010) of the affective habituation protocol consists of a forced choice affective habituation study, run backwards. Subjects are shown two pictures side by side (matched for valence and arousal induction) on a computer monitor and are *first* asked to choose, according to their momentary and spontaneous preference ('gut feeling') one of the two pictures per pair. Directly after their choice is registered by the computer, a random number generator² chooses one of the pictures of the pair just shown, which is then *subsequently* repeatedly flashed on the monitor. The experiment is fully computerized; subjects merely have to indicate their preferences by mouse-click; otherwise, they are guided through the experiment by instructions displayed on the computer monitor, and data are registered by the computer (see procedure section).

To reiterate, within the framework of Bem's feeling-the-future-model, it is claimed that a subsequent exposure to a negative and arousing stimulus would render the target-to-be of a picture pair less negative, and thus subjects are expected to choose the subsequently shown negative stimulus more often than its only once presented counterpart (due to backwards habituation). For mildly positive stimuli, the reverse applies: a subsequent exposure to a positive stimulus should render the target-to-be of a picture pair less positive (i.e. boring), and thus subjects are expected to choose the subsequently shown positive stimulus more often than its only once presented counterpart (due to backwards induction of boredom), especially for subjects high on boredom proneness. In the following, a replication attempt of retrocausal affective habituation and retrocausal induction of boredom is reported.

PREDICTIONS

This was a confirmatory study based on Bem (2010), studies 5 and 7. Therefore, in line with Bem (2010) study 5, it was expected that subjects would tend to prefer the negative and high arousing targets-to-be of each pair (i.e. the pictures which would subsequently be repeatedly flashed on the monitor) more often than the non-targets (i.e. retrocausal affective habituation).

Further, it was predicted that for the mildly positive and low arousing ("boring") pictures, a reverse trend would be found, i.e. subjects would tend to prefer the non-targets-to-be (i.e.

² For details on the RNG used both in Bem's studies and the research reported here, see Bem (2010).

the targets-to-be would be disproportionately disliked by the subjects), due to the putative retrocausal induction of boredom. In line with Bem (2010) study 8, it was further predicted that the retrocausal boredom effect would be comparatively more pronounced for subjects high on Boredom Proneness (conceptualised as scoring above midpoint on a respective scales of a brief Boredom Proneness Survey).

METHOD

The study followed a standard within-subjects protocol with two types of stimuli (high arousing negative and low arousing mildly positive). The dependent variable was the number of trials (as a proportion of the total) for which the participant expressed a preference for the stimulus that was subsequently chosen by the random number generator and displayed subliminally after subjects made their choice.

Subjects

The sample consisted of seventy female subjects (mean age = 24.4 yrs., age range = 19–44 yrs.) who participated in the experiment in exchange of a small reward (a non-alcoholic drink or a chocolate bar). All had normal or corrected-to-normal vision, were sufficiently familiar with working with computers, and were naïve regarding the purposes of the experiment. Only female subjects were recruited because earlier research suggested that there are significant gender differences in Emotional Reactivity (as defined by Bem's 2-item scale [Bem 2005:9]). The sample consisted mainly of university students (82.8%), followed by college students (9.1%) and young professionals, e.g. medical doctors in training, nursing instructors, etc. (8.1%). Sessions took place during term holidays (September 2006).

Apparatus and Materials

Subjects were tested in groups of fives in a quiet large room, tables and chairs and bookshelves and neutral posters (on the history of psychology) were the furnishings of the laboratory room. A laptop and a projector were used for stimulus display. Subjects were seated at a table and viewed the stimuli from a distance of about 2.5 meters. For the preference ratings and the screening for Boredom Proneness, an experimental booklet and pencils were provided by the experimenter.

Boredom Proneness Survey

All subjects were first screened for Boredom Proneness. Subjects had to rate how well two sentences described them: "I am easily bored" and "I often enjoy seeing movies I've seen before" (reverse scored). Responses were recorded on 5-point scales that ranged from *Very Untrue* to *Very True* and averaged into a single score ranging from 1 to 5. Bem (2005, 2010) reports that subjects high on Boredom Proneness according to this brief test (conceptualized as scoring above midpoint in the composite) were especially susceptible to retrocausal induction of boredom, and since this was a confirmatory study, Bem's brief survey rather

than the longer Boredom Proneness Scale (Farmer and Sundberg 1986) was used in this study, too. In contrast to Bem (2010, studies 5-7), however, there was no further screening for individual differences.

Picture Preference Task / Stimulus Material

The experimental program - an adaption of Bem's original PBA2.0 program, subliminal version - was run on a computer and projected on a large canvas. The original precognitive habituation software (PBAs 2.0) uses pictures from the IAPS (Lang & Greenwald 1993) and a number of additional pictures from the internet, designed to elicit strong affective reactions and arousal. An earlier exploratory study of retrocausal habituation (Batthyany, Kranz and Erber 2009), however, had suggested that there might be cultural differences at work in the valence evaluation of the IAPS pictures. For instance, in a number of cases, neither experimenters nor test subjects were able to figure out whether a picture pair was supposed to be of a positive or a negative valence (e.g. a beautiful old graveyard or a swarm of bees). Therefore, an entirely new picture database was created. The stimulus material was selected through a standardization process. For the pictorial stimuli, a database of 64 low arousing mildly positive and 64 highly arousing negative pictures was created. In a pre-test, 57 subjects evaluated the valence and arousal potential of the pictures. The 16 most negatively and highly arousing pictures and 16 mildly positive, low arousing pictures from this study were later matched according to valence and content/conceptual similarity, resulting in a database of 8 mildly positive and low arousing picture pairs and 8 negative and high arousing picture pairs with a total of 16 pairs, or 32 pictures. These pictures were used in this study.

Procedure

Participants were tested in groups of five. Each participant was seated about 1 or 2 meters from her neighbour, so that subjects would be undisturbed and could not easily see the other subjects' preference ratings. Each subject was given a booklet which along with the instructions from the computer (projected on the canvas), guided subjects through the experiment.

On the first page of the booklet, subjects were asked to sign a consent form which informed them that they were about to see unpleasant pictures during the experiment and that they could withdraw from the study at any time without penalty. After all subjects of the group signed the form, they were asked by the experimenter to turn the page of their booklet. On the next page, subjects read the two Boredom Proneness questions, and after subjects had rated themselves, they again were asked to turn the page. On the next page, the instructions for the picture rating test were printed, especially emphasizing the affective nature of the study. Subjects were informed that they were about to see some picture pairs, each for about 10 seconds, some perhaps negative, others positive, in no particular order, and that from each picture pair, they should choose the one they liked most according to their "momentary gut feeling" by recording their choice in the prepared table of their booklet. For negative stimuli, the instructions were that subjects should choose the picture which they

currently find less appalling, or more interesting, or generally are more able and willing to relate to; for the mildly positive stimuli, subjects were simply asked to choose the picture of each pair which they at that moment enjoyed most looking at. After all subjects signalled that they understood the instructions, the computer program was run. It randomly displayed a pair of previously matched pictures side by side for ten seconds, within which subjects had to note (on a prepared table) which picture of each pair they liked better.

After ten seconds, the program randomly picked one of the pictures of the previously shown pairs and flashed it twelve times in the parafoveal field (subliminal with 20 ms flash, interflash interval 750 ms, followed by a mask). Subjects were prompted to passively, yet attentively observe what appeared them to be merely random flashes and masks while they kept their gaze fixed to a cross in the centre of the screen. The order of the stimulus pairs was randomly selected for each trial, as was the left/right placement of the pictures per pair. After 32 such pairs (16 negative, 16 positive) were shown, the booklets were collected by the experimenter. Subjects were thanked for their participation and were handed their reward. Subjects were then asked in a funnelled debriefing procedure (Bargh & Chartrand 2000) what they thought the experiment was about; unsurprisingly, none suspected the experiment's purpose, nor did most of them believe it after they were told.

RESULTS

All 70 female subjects completed the full experiment. As in Bem's original paper *t*-tests were used to investigate whether the hypothesized deviations from the mean chance expectation of 50% could be found. All *t*-tests were one-tailed, with statistical significance (α) set at .05.

In line with the results reported by Bem (2010), study 5, when choosing between two negative high arousal pictures, subjects tended to express higher liking for the future target-to-be by choosing it more often than the future non-targets (53.3%), i.e. a retrocausal habituation effect. Thus for high arousal negative stimuli, there was significant trend towards selecting the stimulus the subjects were later repeatedly exposed to (53.3%; $t(69)=2.18$; $p=0.02$).

In accordance with Bem (2010), study 7, a different picture emerges for the low arousal, "boring" stimuli. Here, subjects choose the targets-to-be at 48.1%, a hit rate which is in the predicted direction of retrocausal induction of boredom, but failed to approach significance (48.1%; $t(69)=-1.28$; $p=0.10$). However, the second prediction on the retrocausal boredom effect was that subjects high on Boredom Proneness (i.e. with Ms above midpoint) would choose the low arousal "boring" targets-to-be less often than expected by chance (and subjects not high on Boredom Proneness). These predictions were confirmed: Subjects with High Boredom Proneness had a significant tendency to avoid those pictures of boring picture pairs they were subsequently repeatedly exposed to (45.9%; $t(25)=-1.72$, $p=0.049$).

CONCLUSION

In this replication attempt, two retrocausal effects reported by Bem (2010) were replicated with 70 female subjects: retrocausal affective habituation to negative stimuli, and retrocausal induction of boredom for mildly positive stimuli, although the latter effect was found only for boredom prone subjects.

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