

INSTITUTE OF NOETIC SCIENCES

Research Protocol
For Koestler Registry

Protocol Title: Retroactive Facilitation of Recall and Music

Investigators

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Type of experiment: Confirmatory.

Objectives: The objective of the study is to attempt to replicate an online experiment indicating that streamlined music produced by Focus@Will facilitates better access implicit to future information than regular music.

Design: Double-blind, mixed design (3 groups x 2 conditions), online study.

Methods: Participants will be sequentially assigned to a Focus@Will, silence, or regular music group and will perform an online quick-thinking version of the retroactive facilitation of recall experiment, in which recall for words to be trained in the future is compared to recall for words not to be trained in the future.

Participants: 1500 participants, with a target of 500 per group. Note that 306 participants in the Focus@Will group are required for 80% power given a significance level of 0.001. This calculation is based on the effect size of 0.244 for a two-tailed paired t-test on the two conditions in the Focus@Will group, as found in the pilot study. The extra participants are necessary because about 30% of the participants in the pilot study were removed for one of two reasons (explained below) and we estimate this percentage will remain the same in the confirmatory study. No differences were found in the regular music group in the original study, but the same numbers should be allowed for all three groups so that the opportunity to find an effect is consistent across groups.

Background and Introduction

Recent empirical evidence strongly suggests that people can have access to information about future events that are generally considered to be unpredictable. While many anecdotal experiences suggest that this is the case, controlled laboratory evidence is required to verify this phenomenon, called precognition. In the laboratory, precognition seems to occur only in certain circumstances, such as when individuals are in a relaxed state, they are responding quickly, and/or future events are salient.

The reverse-time nature of precognition violates everyday intuitions about the order of events in time, and it is therefore regarded as controversial by most scientists. Nonetheless, according to the results of two recent meta-analyses examining different types of precognitive effects (Bem, Tressoldi, Rabeyron, & Duggan, 2015; Mossbridge, Tressoldi, & Utts, 2012), precognition is statistically reliable. While the cumulative evidence for precognition is quite strong relative to most other psychological and psychophysiological phenomena, there is still no agreed-upon explanation for it.

When the mechanism underlying an effect is unknown, any consistent parameter dependencies in the effect can help shed light on the mechanism. For instance, recently it has become clear that some forms of precognition are more likely to be revealed when participants respond quickly rather than deliberating over a choice (Bem et al., 2015), implying that at least these forms of precognition may not dependent on conscious analysis.

We recently discovered what we believe to be another parameter dependency in precognition, specifically that certain types of music support implicit or nonconscious access to future information. To our knowledge we are the only group that has empirically assessed the relationship between concurrent music and precognition. We have found in our pilot study that implicit precognition, as measured using a retroactive-facilitation-of-recall task (Bem, 2011), is facilitated when participants listen to “streamlined” music as they perform the task. Streamlined music is designed to help people focus on their work by ensuring that distracting features are removed.

In the proposed experiment, we will attempt a replication of this pilot study and compare two types of music, as well as silence, in terms of their influence on implicit precognition. If our prior results are any indication, this experiment could allow us to gain a toehold on understanding the currently unknown mechanisms underlying implicit precognition.

Study Overview:

Participants who indicate their consent after reading an online consent form will be asked to indicate their age and gender. They will also be asked to complete a 10-question Big-5 personality assessment (Rammstedt & John, 2007), which will be used to determine whether any personality traits correlate with implicit precognition performance. After completing that assessment, they will be placed into one of the three listening groups (silence, streamlined music, regular music). To ensure relatively equal numbers of participants in each condition, the placement of the participants will be performed using a WordPress script that will assign participants to alternating conditions (first participant to silence group, second to streamlined music, through to regular music). They will be asked to listen to music (or silence) during the experiment, as appropriate to the listening condition, and then they will be led to a verbal memory task.

In this task, 48 nouns are displayed one at a time and participants are asked to try to memorize all of them. Following this list, participants are immediately given a memory assessment, consisting of 48 two-item forced-choice trials, each containing one word from the original word list and one word that was not on that list. On each trial, participants are asked to respond as quickly and accurately as possible by clicking on the word that was in the original word list. After this assessment, 24 of the original 48 words are randomly chosen to be “training” words. The random number generator is a number generator coded in Javascript called Math.random. Math.random is truly random on some browsers and configurations and pseudorandom on other browsers and configurations.

Participants are then given practice on the randomly selected words in two ways: 1) they are asked to select each of four different word types (people, clothing, food, and animals) from the group of words, a task that draws attention to the 24 training words, and 2) they are asked to type each of the words underneath a picture representing the word, a task that again draws attention to the 24 training words. Finally, participants are asked to complete another 2-item

forced-choice assessment with 48 trials, each containing one word from the original word list and one word that was not on that list. This final assessment is used to determine whether participants learned from the training or not.

Participants:

Participants will consist of adults (greater than 18 years old). There are no inclusion/exclusion criteria beyond this. Participants will be recruited through the Focus@Will website (Focus@Will is a provider of streamlined music). Participants will receive free months (number TBD) on the Focus@Will service in exchange for their participation.

Brief Big-5 Inventory:

The brief Big-5 Inventory will be administered online, using the following 10 questions:

Appendix A. Big Five Inventory-10 (BFI-10)

English version.

Instruction: How well do the following statements describe your personality?

I see myself as someone who ...	Disagree strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly
... is reserved	(1)	(2)	(3)	(4)	(5)
... is generally trusting	(1)	(2)	(3)	(4)	(5)
... tends to be lazy	(1)	(2)	(3)	(4)	(5)
... is relaxed, handles stress well	(1)	(2)	(3)	(4)	(5)
... has few artistic interests	(1)	(2)	(3)	(4)	(5)
... is outgoing, sociable	(1)	(2)	(3)	(4)	(5)
... tends to find fault with others	(1)	(2)	(3)	(4)	(5)
... does a thorough job	(1)	(2)	(3)	(4)	(5)
... gets nervous easily	(1)	(2)	(3)	(4)	(5)
... has an active imagination	(1)	(2)	(3)	(4)	(5)

Verbal Memory Test Stimuli

Stimuli for the verbal memory test are shown in separate documents, and are similar to those used by Bem for his 2011 retroactive facilitation of recall experiment.

Data Gathering

No data will be gathered until this registration is complete.

Data Selection

In the pilot study, we selected only participants who met the following three constraints, and we plan to use the same constraints for this study:

- 1) The participant completed the entire experiment (no partial data). Note that data files are not written until participants complete the entire experiment.¹

¹ Bias could be introduced if participants knew what the purpose of the task was, because when participants learned the trained words, they might remember whether they performed well on these words or not in the first test. However, they are told this is a memory test. As a result, they consider the words training for the second test. They are not told that these words could influence their prior performance, so we think it is highly

2) Their scores on the second test (regardless of condition) indicated that they had learned from the training. This means that they scored equally well, or better, on words that were trained as compared to words that were not trained.

3) Their scores on the first test indicated that they were *not* likely to have an exceptionally good verbal memory. This arbitrary cutoff, applied across all three conditions, is set at having at least 6 errors on the first test (6 errors would be 87.5% correct).

Any data from participants not passing these requirements, in any condition, will be removed from analysis.

Data Analyses

We will test one confirmatory prediction and make three exploratory examinations of the data:

- 1) The confirmatory prediction, for the streamlined music group, that the difference between the proportion correct on the first assessment for words to be trained minus not trained, or the *accuracy difference score*, will be significant. This will be tested via a two-tailed paired t-test on the streamlined music participants only.
- 2) An exploratory examination of whether the accuracy difference score for streamlined music is significantly different from either regular music or silence. This will be tested via two independent samples t-tests.
- 3) An exploratory examination of whether any of the three groups shows an additional effect – significantly faster performance on the first assessment for words that will be trained in the future as opposed to not trained. This will be tested via a 1-way ANOVA across the three groups, as well as independent samples t-tests.
- 4) An exploratory examination of whether implicit precognition accuracy difference scores, regardless of music listening condition, are correlated to any of the Big-5 personality traits. This will be tested via a correlation analysis.
- 5) We may perform other exploratory analyses once the data are obtained.

To avoid bias, all statistical analyses will be performed without knowledge of the music-listening condition to which a particular participant belongs. Our alpha will be 0.05.

References

Bem, D., Tressoldi, P., Rabeyron, T., & Duggan, M. (2015). Feeling the future: A meta-analysis of 90 experiments on the anomalous anticipation of random future events. *F1000Research*, 4.

Mossbridge, J., Tressoldi, P., & Utts, J. (2012). Predictive physiological anticipation preceding seemingly unpredictable stimuli: a meta-analysis. *Frontiers in Psychology*, 3, 390.

Rammstedt, B., & John, O. P. (2007). Measuring personality in one minute or less: A 10-item short version of the Big Five Inventory in English and German. *Journal of research in Personality*, 41(1), 203-212.

unlikely that they would leave the experiment based on doing poorly on the training words. They might leave the experiment based on boredom, a realization that they did poorly in general on the first test, or because they had something else to do. However, none of these reasons for leaving are likely to produce a result in which performance on the training words was faster or more accurate than the non-training words on the first test.

