KPU Registry ID Number: 1036 **Date submitted: 28th June 2017**

Study Registration For the KPU Study Registry

https://koestlerunit.wordpress.com/study-registry/

The registration information for the study is given below. Each section can be expanded as needed.

1. The title or name of the experiment (for listing the experiment in the registry).

Measuring precognitive effects using a *fast implicit* and *fast explicit* task.

2. The name, affiliation, and email address for the lead experimenter(s) for the study.

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3. A short description or abstract of the purpose and design of the experiment.

The idea that behaviour can be influenced by practice that occurs in the *future* has been explored across a range of studies (see, Bem, 2011; Mossbridge, Tressoldi, & Utts, 2012; Vernon, 2015). The counterintuitive, yet positive, effects emerging from such studies have been referred to as *presentiment* (Lobach, 2009), *unexplained anticipatory effects* (Mossbridge et al., 2012), *precognitive priming* (Vernon, 2015), and retroactive influence or *precall* (see Bem, 2011). However, such effects are not consistently evident across tasks (see e.g., Galak, LeBouf, Nelson, & Simmons, 2012; Ritchie, Wiseman, & French, 2012) and more work is needed to attempt to clarify the possible processes involved (Franklin, Baumgart, & Schooler, 2014).

One possibility that has been proposed to account for the inconsistent pattern of data is the level of conscious cognitive effort required to complete a specific task. For instance, some have suggested that psi based effects may be better understood and explored using faster implicit tasks compared to the slower explicit tasks (Bargh & Ferguson, 2000). In general implicit tasks do not make reference to any prior learning episode and as such can be completed without the need for conscious cognitive processes. In contrast, an explicit task requires conscious recollection of material from a previous episode and as such invokes a greater level of conscious cognition and control (see, Roediger, Buckner, & McDermott, 1999). Such a proposal is consistent with the suggestion that a precognitive task that is more reliant on fast implicit non-conscious processes may be more likely to exhibit an effect (Maier et al., 2014). Furthermore, a recent meta-analysis showed that fast implicit type tasks showed more robust precognitive effects compared to the slower explicit type tasks (Bem, Tressoldi, Rabeyron, & Duggan, 2015). However, this picture is neither consistent nor clear. For instance, in the studies reported by Bem (2011), it is the slower explicit recall tasks (i.e., Expts 8 & 9) that show the greatest precognitive effect. Furthermore, the supposedly *fast* implicit tasks reported by Bem (2011) assessing precognitive approach/avoidance (i.e., Expts 1 & 2) and retroactive habituation (i.e., Expts 5 & 6), whilst requiring participants to press a key in response to a possible preference, were not conducted under *time pressure* and no response times were reported.

As such, it is not clear if a precognitive effect would be elicited if an implicit task were conducted under speeded response conditions. Furthermore, there is an absence of research focusing on speeded explicit tasks, with researchers relying on the slower recall paradigm. It may be that it is the *speed* of responding that is more important than the implicit/explicit nature of the processing involved. Of course, it is possible that both components are required to successfully elicit psi-based behaviours. Nevertheless, what is needed is a more precise and thorough examination of the role of speeded response type tasks that tap into either implicit or explicit processing capacities in an effort to greater understand potential mediating factors in precognitive performance. Hence, the aim of this study will be to conduct two fast thinking tasks, one that relies predominantly on implicit processes and one that incorporates more explicit processes and examine which of these two tasks elicits the most robust precognitive effect.

The fast thinking implicit task selected will be a speeded version of the *precognitive preference task*. This type of task involves presenting the participant with two hidden target locations on a screen, usually depicted by two curtained areas, and requiring the participant to select the location with the hidden target picture behind it. Here, emphasis will be placed on participants to respond as '*quickly and as accurately'* as possible. Research has shown that this task elicits the most robust precognitive effect when using erotic images at the target (see Bem, 2011; Bem et al., 2015). That is, participants correctly select the erotic image significantly more than chance. Hence, erotic images will be used.

The fast thinking explicit task will be an explicit *precognitive recognition task*. Although a recognition task has been used previously within a precognition paradigm, the reliance here on a fast thinking explicit recognition memory task will provide a unique opportunity to expand and explore the impact of explicit processing on precognition. In essence, this is a standard explicit recognition task with an additional 'precognitive' twist. The traditional recognition task has a study phase, during which stimuli are initially presented, followed by a test phase when a selection of the original stimuli along with new unseen items are presented and the participant needs to recognise the 'old' (i.e., seen before) and 'new' (i.e., not seen before) items. Added emphasis will be placed during this phase on responding as '*quickly and as accurately'* as possible. The precognitive twist is that following on from the test phase there will be a *post-test practise phase* during which half of the old items will be presented again with an emphasis on practise and re-processing. Previous research using explicit based tasks has shown that the most robust precognitive effect size occurs when participants had to practise by imagining the referent to target words (see Bem, 2011 Expts 8 & 9). Hence, the aim here will be to present a selection of target words, relating to common nouns, which participants will then have to recognise as either old or new. Following this they will then complete a post-test practise session requiring them to imagine the referent to each of the target words. The expectation is that post-recognition practise will result in significantly faster and more accurate recognition of these items in the *previous* test phase.

Materials

Both experiments will utilise a standard PC to randomly present all stimuli using SuperLab software and a standard response pad for entering responses. A revised paranormal belief scale (Tobacyk, 2004) will be used to assess participants' belief in anomalous events. Participants and the RA will also both complete experimenter-participant interaction questionnaires (Hitchman, Pfeuffer, Roe, & Sherwood, 2016). As part of the relaxation induction for each of the tasks images downloaded from the NASA website depicting nebula/star fields along with new-age type music will be used.

The implicit precognitive preference task will utilise 36 images from the International Affective Picture Systems (IAPS) database (Lang, Bradley, & Cuthbert, 1997) to create 3 lists. List 1 will contain 12 neutral images, list 2 will contain 12 negative images and list 3 twelve erotic images`. These lists have been created such that valence level of the *Erotic* list is significantly higher than both the *Neutral* ($p<0.001$) and *Negative* ($p<0.001$) lists, whilst the arousal level of the *Erotic* list is also be significantly higher than the *Neutral* list ($p<0.001$). The valence level of the *Negative* list is significantly lower than the *Neutral* list ($p<0.001$) and its arousal level is significantly higher than the *Neutral* list ($p<0.001$).

For the explicit precognitive recognition task six lists of 12 words referring to nouns has been created with each of the lists matched for mean word frequency (see Van Heuven, Mandera, Keuleers, & Brysbaert, 2014).

Design

This is a within participants design with participants completing both the implicit and explicit precognitive tasks, with a short 5min break between tasks, and task order counterbalanced. First, there will be an *informed consent* phase, followed by *information capture* during which demographics, psi belief and information relating to the participant-experimenter interactions will be obtained. This will be followed by either the implicit task or the explicit task.

The *implicit precognitive preference* task contain 2 phases. An initial *relaxation induction* phase followed by the *preference selection* phase. During the relaxation induction participants will be shown an image of a star field and listen to relaxing new-age type music for 3minutes. In the preference selection phase participants will be randomly presented with all 36 images randomly appearing to either a left or right hidden location. This will be achieved using a nested randomisation procedure whereby the software initially randomly selects either the left or right location, then randomly selects one of the 36 images to present. This process will then be repeated for the remaining 35 images. The two dependent measures will be the *speed* of correct responses measured in milliseconds (ms), and the *accuracy* of responses in terms of participant's ability to identify the correct location of the erotic images. The expectation is that participants will respond faster (compared to neutral images) and be more accurate than chance (i.e., >50%) at identifying the location of erotic images.

The *explicit precognitive recognition* task contains 4 phases. An initial *relaxation induction* followed by the *study* phase, then the *test* phase and finally the *post-test practise* phase. During the relaxation induction participants will be shown an image of a star field and listen to relaxing new-age type music for 3 minutes. In the study phase participants will be randomly presented with 48 words and asked to 'visualise the referent of each word as it appears on screen'. Immediately following the study phase participants will complete the test phase during which they will be shown another 48 words, 24 Old (i.e., seen before) and 24 New (i.e., not seen before) and asked to recognise the words as either 'Old' or 'New' by pressing a key on a response pad as quickly and as accurately as possible. On completion of the test phase participants will then be presented with a sub-set of words from the 'Old' list (i.e., a list of 12 words) and asked to visualise the referent to each word as it appears on screen. This post-test practise phase will be repeated 3 times. Throughout the study the word lists will be rotated through each of the conditions to ensure that each word appears equally often in each condition. There will be two dependent measures. First, the *speed* of correct responses measured in milliseconds. The second will be a measure of *sensitivity*, commonly used in recognition tasks and referred to as d′ (d prime). The score d′ will be calculated by subtracting the z score that corresponds to the false-alarm rate from the z score that corresponds to the hit rate (Macmillan & Creelman, 2005). The larger the d′ score the better the participant's ability to discriminate between items that will be repeated compared to those that will not. The expectation is that participants will be faster to respond to 'old' items in the test phase that are repeated in the post test phase compared to 'old' items in the test phase that are not repeated. They will also show a greater (i.e., higher) d′ score for 'old' items in the test phase that are repeated in the post test phase compared to 'old' items in the test phase that are not repeated.

4. A statement or list of the specific hypothesis or hypotheses being tested, and whether each hypothesis is confirmatory or exploratory. (confirm/explore guidance)

Confirmatory hypotheses for the implicit task

1. Participants will correctly identify the position of hidden erotic images faster than neutral images
2. Participants will identify the position of the hidden erotic image at a level significantly greater than chance (i.e., >50%)

Confirmatory hypotheses for the explicit task

1. Participant's recognition scores will be faster for those items repeated after the test phase compared to those that are not repeated
2. Participant's recognition scores will be more accurate for those items repeated after the test phase compared to those that are not repeated

Exploratory hypothesis

1. Precognitive effect size for response times in the implicit task may be greater than that of response times in the explicit task
2. Precognitive effect size for accuracy of responses in the implicit task may be greater than that of accuracy of responses in the explicit task
3. Precognitive performance on either/both implicit/explicit tasks will positively correlate with belief in psi
4. The interaction between participant and experimenter will predict precognitive performance on either/both implicit/explicit tasks

5. The planned number of participants and the number of trials per participant.

The plan is to recruit an opportunity sample of 159 participants, to complete all aspects of both the implicit preference task and the explicit recognition task.

For the implicit preference task each participant will complete 36 trials. This will consist of 12 trials relating to neutral images, 12 relating to negative images and 12 with erotic images.

For the explicit recognition task each participant will complete 48 trials in the study phase, 48 in the test phase and 36 in the post test practice phase, creating a total of 132 trials.

6. A statement that the registration is submitted prior to testing the first participant, or indicating the number of participants tested when the registration (or revision to the registration) was submitted.

This study has yet to be started.

The following additional information is needed for studies that include confirmatory analyses:

7. Specification of all analysis decisions that could affect the confirmatory results, including: the specific statistical test for each confirmatory hypothesis, whether the test is one-sided or two-sided, the criterion for acceptable evidence, any transformations or adjustments to the data, any criteria for excluding or deleting data, and any corrections for multiple analyses. Checklists and examples for registering classical analyses, permutation and bootstrap analyses, Bayesian analyses, and classification analyses are provided in the statistics registration document. **(This information can be included in section 4 above for simple experiments.)**

For both the implicit preference task and the explicit recognition task the two dependent measures, response time (RT) and accuracy will be recorded directly by the software (SuperLab).

For both tasks, trials will be classified as outliers if the response time is less than 200ms or above 2.5 Sd from the mean which will be used in a non-recursive manner and takes sample size into account (see, Selst & Jolicoeur, 1994, Table 4). Trials with response times classified as an outlier will be excluded from all analyses.

For accuracy, a trial will be scored as an error if the participant gives an incorrect response (e.g., chooses ‘Left’ when the image is presented to the ‘Right’ and vice versa; or chooses ‘Old’ when a word is ‘New’ and vice versa).

Prior to conducting any analysis on either the implicit or explicit tasks both response time data and accuracy/sensitivity data will be checked with regards to the parametric assumption of normality. The assumption of independence does not need to be tested as both experiments utilise a repeated participants approach and as such independence would not be expected (see, Field, 2013). As recommended the assumption of normality will be examined using a multiple methods approach, which will consist of a specific test (i.e., Shapiro-Wilk test) to test for normality along with an examination of data skewness and kurtosis (DeCarlo, 1997; Razali & Wah, 2011). Multiple methods are essential as Field (2013) has pointed out that parametric tests are robust to minor variations in the distribution of data and significance tests, such as the Shapiro-Wilk test, when used for large samples are likely to return a significant effect even when they are 'not too different from normal' (p. 185). Furthermore, whilst there is general agreement that skewness and kurtosis values within $\pm$ 2 are acceptable (see e.g., Gravetter & Wallnau, 2014), a more conservative approach is to convert the skewness and kurtosis values into z scores (e.g., by subtracting the mean of the distribution from the score and then dividing by the standard error) and compare these values to zero to see if they are significantly different (i.e., >1.96) (Field, 2013). Hence, the data will be classified as 'not normally distributed' if it fails the Shapiro-Wilk test and the range of both converted skewness and kurtosis values are greater than 1.96. In this case a non parametric Wilcoxon test will be used, otherwise parametric repeated measures t tests will be used.

Analysis to confirm H_A1 will be conducted using a repeated measures test. This will compare mean RT for trials with correct right/left predictions for erotic images to mean RT for trials with correct right/left predictions for neutral images.

Analysis to confirm H_A2 will be conducted using a one sample t test. The unit of analysis is the percent correct right/left predictions for a participant on trials with erotic images. The mean of the percent correct responses will be compared to chance (i.e., 50%).

Analysis to confirm H_A3 will be conducted using a repeated measures test. This will compare mean RT for trials in the test phase with correct identification of 'Old' words that were repeated in the post test phase to mean RT for trials in the test phase with correct identification of 'Old' words that were not repeated in the post test phase.

Analysis to confirm H_A4 will be conducted using a repeated test. This will compare mean sensitivity (i.e., d′) in the test phase for trials with 'Old' words that were repeated in the post test phase to sensitivity for trials with 'Old' words that were not repeated in the post test phase.

All statistics tests will be 2-tailed to allow for the possibility of an interference effect impairing performance (see, Ritchie et al., 2012) and utilise a p value of 0.05, including 95% confidence intervals and Cohen's effect sizes.

Finally, only data from participants that fully complete each task will be included in the main analysis. However, data from those who fail to complete either task will be clearly summarised.

8. The power analysis or other justification for the number of participants and trials.

The average effect size of the implicit precognitive approach and explicit precall tasks reported by Bem (2011) was d = 0.265. Using the software package G*Power with a standard alpha criterion of 0.05 (two-tailed) and power of 0.90 an apriori power analysis was computed to identify the necessary sample size (Faul, Erdfelder, Lang, & Buchner, 2007). Given that it is not yet known whether a parametric test or a non-parametric test will be conducted an apriori analysis was conducted for both approaches, see output below:

t tests – Means: Difference between two dependent means (matched pairs)

Analysis:	A priori: Compute required sample size		
Input:	Tail(s)	=	Two
	Effect size dz	=	0.265
	α err prob	=	0.05
	Power (1–β err prob)	=	0.90
Output:	Noncentrality parameter δ	=	3.2671394
	Critical t	=	1.9757989
	Df	=	151
	Total sample size	=	152
	Actual power	=	0.9008355

t tests – Means: Wilcoxon signed–rank test (matched pairs)

Analysis:	A priori: Compute required sample size		
Input:	Tail(s)	=	Two
	Effect size dz	=	0.265
	α err prob	=	0.05
	Power (1–β err prob)	=	0.90
Output:	Noncentrality parameter δ	=	3.2653529
	Critical t	=	1.9758165
	Df	=	150.8338
	Total sample size	=	159
	Actual power	=	0.9005215

For the parametric t test this identified a necessary sample size of 152, for the Wilcoxon signed ranks test this identified a sample size of 159. Hence, to ensure sufficient statistical power, and avoid the criticism of optional stopping, the aim will be to recruit an opportunity sample of 159 participants for each of the two experiments.

9. The methods for randomization in the experiment.

The images and words viewed by each participant will be randomly presented using the inbuilt randomisation procedure of the SuperLab 5.0 software so that each participant views the images in a distinct order. The SuperLab randomisation algorithm is based on a time seed referring to the number of microseconds elapsed since the computer was started up.

To reduce the opportunity of possible bias in allocating participants to a condition an experimental management system (Sona Systems see: htt ps://canterburyccu.sona-systems.com/Default.aspx?ReturnUrl=%2f) will be used so that participants sign themselves up for the study and pick a timeslot that suits them. Hence, neither the Research Assistant (RA) nor the Primary Investigator (PI) are involved in enrolling participants.

The PI will also create a list of participants to ensure an even distribution across the stimulus rotations, with equal numbers of participants viewing each type of stimulus rotation from 1 to 159. The PI will randomly allocate participants to this list in blocks of 6 using a random number generator (see, https://www.random.org/) to identify where in the block the first participant should be placed. For example, in the first block participant 1 will be placed in position four which refers to completing the implicit task first followed by the explicit task with precognition reliant on word list 4. The second participant will then be entered into position five which refers to completing the implicit task first followed by the explicit task with precognition reliant on word list 5. This would continue for all 6 participants until all positions in the first block are filled. This means that on reaching the last position in the block the participant allocation will rotate around the early positions in this block. For example, if participant 3 is entered into position 6 participant 4 will be entered into position 1. For the second block of 6 the random number generator will be again to identify where in the block the first participant (in this instance participant 7) will be entered. This procedure will continue until all 159 positions have been filled. The RA will then run the participants in this sequence as they sign themselves up for the study.

10. A detailed description of the experimental procedure.

Both tasks will be completed in one of the quiet dedicated psychology labs. Following a brief greeting from the Research Assistant (RA), during which consent, demographic/belief and participant-experimenter information will be captured, the RA will then provide a clear explanation of what the task involves and the participant will be seated in front of a standard PC.

The implicit precognitive preference task will begin with a relaxation induction. Following this participants will be randomly presented with all 36 images hidden at either the left or right location. Their task will be to press one of two buttons on a key pad (one to denote left and one to denote right) as quickly and as accurately as possible to identify the hidden image. Once they have responded the image and its location will be revealed, with the image remaining on screen for 3 seconds to allow time for processing. Following this a blank inter stimulus interval (ISI) screen will be shown for 1500ms. This will be followed by the next trial until all 36 trials have been completed.

The explicit precognitive recognition task will also begin with a relaxation induction. Then participants will be randomly presented with 48 trials, with each trial consisting of a fixation cross for 1000ms, followed by the target word on screen for 4000ms and a blank ISI for 1000ms. During the presentation of these 48 words participants will be asked to '*visualise the referent of each word as it appears on screen'*. Immediately following the study phase participants will be given the test phase during which they will be presented with another 48 trials containing 24 old (i.e., seen before) and 24 new (i.e., not seen before) words. Each trial will consist of a fixation cross for 1000ms, followed by a target word, which will remain on screen until participants respond, and finally a blank 1500ms ISI. Participant's task will be to respond using one of two keys on a keypad as quickly and as accurately as they can identifying the words as either old or new. No feedback will be given regarding the accuracy of the recognition performance. On completion of the test phase participants will complete the post-test practise phase. During which they will be randomly presented with 12 trials, with each trial consisting of a fixation cross for 1000ms, followed by the target word on screen for 4000ms and a blank inter-stimulus interval (ISI) for 1000ms. During the presentation of these 12 words participants will be asked to 'visualise the referent of each word as it appears on screen'. This post-test practise phase will then be repeated twice more.

Once both the implicit and the explicit tasks have been completed participants will be fully debriefed by the RA or Experimenter.

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