Exploring precall using arousing images and utilising a memory recall practise task on-line.

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Abstract

The idea that future practise can somehow influence current behaviour has been examined within the paradigm of precognition. Previous work attempting to examine possible precognitive effects using a modified repetition priming task showed that participants were more accurate to respond to material they would see again in the future. Such a finding was taken to indicate that a task relying primarily on accuracy of performance, such as a memory recall task, could be a more sensitive measure of precognition, or 'precall'. Furthermore, utilising arousing images as opposed to everyday words may elicit a stronger precall effect, and by conducting such a study on-line it may be possible to eliminate and/or reduce any potential experimenter effects. The prediction when completing such a task was that post-recall practise would lead to greater precall of those items practised compared to items not practised. Such an on-line precall study utilising emotive images was completed by 94 participants. However, comparison of the accuracy between images that were subsequently repeated and those that were not showed no evidence of a precall effect. Nevertheless, post recall practise did show an initial improvement in accuracy which plateaued after the second trial. The failure to find any evidence of precall could simply be indicative of the impossibility of such a notion. However, given that others have reported precall effects the failure to find a precall effect in this study is discussed in terms of possible methodological factors inhibiting psi performance.

Background

Precognition refers to the ability to perceive and/or behave in a way that is influenced by a future event that would not be anticipated through any known inferential process (see, Mossbridge, Tressoldi, Utts, Ives, & Radin, 2014; Taylor, 2014). Such behaviour may be conscious or unconscious, cognitive or affective, and has been examined utilising a variety of methods. Over time, this has included Zener cards, dice, light configurations, as well as possible changes in physiology (see, Cardena, Marcusson-Clavertz, & Palmer, 2015; Irwin & Watt, 2007). More recently, Bem (2011) utilised a range of standard psychology paradigms that incorporated a time reversed element to test for potential precognitive effects. These included a mere exposure paradigm, repetition priming, habituation and recall paradigms. In all cases the idea was that an individual's performance would be influenced by exposure to and/or processing of a stimulus after an original response has been made and recorded. For instance, the time reversed recall task would examine the positive effect on memory recall performance for items that are practiced after the recall responses have been made. Given the commonplace finding that practice or rehearsal of items improves subsequent recall performance (see, Bahrick, 2000) the question posed here is whether practice after the recall performance would have a reversed time influence such that recall performance is improved for those items practiced compared to those that are not. Such an effect is generally referred to as a precall effect. Thus, precall represents the positive effect on memory recall performance for items that are practised after the recall test.

Bem (2011) reported on nine such experiments testing precognition across a range of paradigms and found that eight out of the nine studies showed evidence of a significant precognitive effect. Interestingly, the non-significant study did show a trend in the predicted direction. Furthermore, the studies utilising the precall type paradigm showed the most robust effect sizes (mean ES 0.31) compared to the habituation (mean ES 0.15), or priming (mean ES 0.25) studies. However, attempts by a number of independent research teams have yielded conflicting results (see e.g., Galak, LeBouf, Nelson, & Simmons, 2012; Ritchie, Wiseman, & French, 2012). Though modifications in the precise methodology may to some extent account for such differences (see, Bem, Tressoldi, Rabeyron, & Duggan, 2015). Given the variability in findings some have suggested utilising meta-analyses as a possible way of attempting to resolve such debates and identify possible generality effects across samples, stimuli and protocols. For instance, early work

by Honorton and Ferrari (1989) examining possible precognitive effects from 1935 to 1987 reported a small but significant effect of precognition. More recently, Storm, Tressoldi, and Di Risio (2012) examined studies from 1987 to 2010 and though they found a slightly lower effect size their results were still significantly above chance expectations. Finally, Bem et al. (2015) undertook a more comprehensive review of research conducted from 2000 to 2013, which included unpublished reports, as well as conference proceedings and once again found clear and decisive evidence in support of precognitive effects. Nevertheless, some still argue that the findings overstate the evidence and that when such data is re-analysed the evidence is 'not sufficient to sway an appropriately skeptical reader' (Rouder & Morey, 2011, p.688). Unsurprisingly this has resulted in some suggesting that the use of meta-analyses rarely succeeds in resolving ideological debates (Ferguson, 2014). This in turn has meant that such contentious and often ambiguous findings have led to calls for more research to be conducted in an effort to bring both sides of the argument together (Franklin, Baumgart, & Schooler, 2014).

With this in mind an initial study was conducted utilising a modified repetition priming paradigm to examine possible precognitive priming effects (Vernon, 2015). This modified priming task showed no evidence of precognition when looking at the response times, but did find that participants were more accurate to respond to words they would see again in the future (Vernon, 2015). It was noted that such an anomalous finding could represent either a Type I error, or suggest that the component of memory that relies on accuracy, as opposed to speed, may be more susceptible to precognitive influences. While such a possibility is speculative, given the unknown nature of precognition, there is some support that tasks relying only on speed of response show less evidence of precognitive effects (e.g., Traxler, Foss, Podali, & Zirnstein, 2012), compared to those relying on accuracy of performance (see, Bem, 2011; Subbotsky, 2013). This would suggest that a memory task relying primarily on accuracy of performance, such as a memory recall task, could be a more sensitive measure of precognition. Hence, one aim of the current study was to utilise a memory recall task that was based on the accuracy of recall as opposed to the speed.

Alongside changes to the nature of the task from one that focuses on speed to one that relies more on accuracy it may also be that changing the stimuli and the nature of the post recall practise sessions could also influence potential precall effects. For instance, the repetition priming paradigm reported by Vernon (2015) used everyday words relating to living and non-living

objects. However, others have suggested that possible precognitive effects may be proportional to the level of physiological arousal elicited by the stimuli used (see, Lobach, 2009; Maier et al., 2014). The point here is that stimuli that elicit stronger feelings of pleasure and/or discomfort may be better suited to producing precognitive effects. Hence, using positive and negative arousing images, compared to everyday words, may lead to a more robust precall effect. In addition, previous research has utilised a variety of post-recall practise tasks that include categorisation of the presented words and visualisation of the related image (Bem, 2011; Galak et al., 2012; Ritchie et al., 2012). The rationale for selecting these specific practise tasks is unclear and may simply relate to the fact that they were used in the initial studies by Bem (2011). However, there are two points that need to be considered here. First, researchers fail to report performance on these post-test practise tasks. That is, how well participants were able to classify and/or image the referents. Second, that such practise tasks can be completed without the need to 'remember' the stimuli. That is, neither the categorisation nor visualisation tasks require the participant to 'recall' the words/images and as such there is no requirement to strengthen the memory representation for those items. It has long been known that rehearsal and practise enhances standard memory recall of items (see e.g., Bjork, 1988). However, it is not known yet if the retroactive memory effects evidenced by precall are subject to the same influences and potential limitations as standard memory effects but if so it would make sense to ensure that the memory representation for the practised items was strengthened as much as possible. Hence, having a practise task that requires participants to recall the items multiple times would lead to a stronger memory representation, which in turn could lead to more robust precall effects. Furthermore, consistent with the transfer appropriate processing view of memory, and Taylor's (2014) block view of the universe, it may be that similarity in processing between the recall test and the post recall practise task facilitates precognitive performance (see, Brown & Craik, 2000).

Thus, this study tested potential precall effects by using both positive and negative arousing images whilst incorporating a post-test recall practise task. In addition, the task was run on-line to reduce any possible bias and/or experimenter effects (see, Schlitz, Wiseman, Watt, & Radin, 2006). The prediction was that in the test phase participants will recall more of the items that appear in the later post-test practise phase compared to those that do not.

Method

Pre-Registration with KPU

This study was pre-registered at the Koestler Parapsychology Unit (ref#1019) and a copy of the raw data uploaded to the site.

Participants

The study was halted once 121 participants had begun the study with 94 completing it (completion rate of 77.68%). This was based on a-priori power analysis showing that an N of 90 would be required (see KPU ref#1019). These 94 participants were opportunity sampled via an advertised web-link to the on-line study and completed the study voluntarily. Of the 94 participants, 26 were male and 68 female, with ages ranging from 22 to 62 (mean 42.9, SD 11.61).

Materials

The experiment utilised Qualtrics software (www.qualtrics.com) to build and present the study on line. This incorporated a Revised Paranormal Belief Scale (RPBS: Tobacyk, 2004) to assess participants' belief in anomalous events and a selection 28 images from the International Affective Picture Systems (IAPS) database (Lang, Bradley, & Cuthbert, 1997). These 28 images consisted of 14 positively valenced items and 14 negatively valenced items (see Appendix A). The images differed significantly in terms of valence (Positive: 7.19; Negative: 3.52; t(26)14.47, p=0.001, 95% CI (3.14, 4.18), d=5.5) but were matched for mean arousal level (Positive: 5.86; Negative: 5.78; t(26)0.343, p=0.734, 95% CI (-0.395, 0.553), d=0.13.). The 28 images were then used to construct 8 sub-lists each containing 14 images (7 positive and 7 negative) with each sub-list matched for mean valence and arousal levels (see Appendix B).

Design

The six stages of the experiment are illustrated in Figure 1. The first stage provided a brief written outline of the study, stating that it aimed to examine extra sensory perception (ESP) and that this would involve viewing images that contained both positive and negatively valenced items which may elicit an emotional response and that if exposure to such images would be thought to have any negative impact then there was a recommendation not to continue. This was followed by a multiple choice question obtaining informed consent, a captcha question to exclude possible bots participating and then a question regarding demographics and finally the revised paranormal belief scale. The second stage followed on immediately and presented the 28 images, cropped to a width of 700px and a height of 525px, with each image appearing in the centre of the screen along with a written identifier (i.e., name) written in Arial font size 36pt. Each image, along with its name, was presented on screen for 3 seconds. The third stage presented an open text box along with instructions to recall and enter the name of as many of the previously seen 28 images as possible in any order within 3 minutes. A clock also appeared in the top left of the screen counting down the time. Stage four presented participants with a sub-set of 14 images in the same format and for the same time duration as the initial images. These sub-sets of images were completely counterbalanced to ensure that each image occurred equally often in the repeated and non-repeated conditions. Stage five presented an open text box along with instructions to type in the name of the images just seen in any order within 2 minutes. Again, a clock appeared in the top left of the screen counting down the time. Stages 4 and 5 were then repeated three more times. This meant that across the main recall and post-recall practise stages each participant saw 84 images. Stage 6 required participants to answer whether they had left their PC or switched to another window/application during the study and then provided debrief information along with the experimenters contact details.

Figure 1 about here

Procedure

The study was conducted on-line using Qualtrics software to deliver all information and stimuli and record all participant input via their keyboard. The study began by presenting an information screen informing participants they are about to participate in a study exploring ESP, although the precise nature of this was not made clear until the final debrief at the end of the study. Once informed consent was obtained participants progressed to an information capture screen and entered demographic details and completed the revised paranormal belief scale (Tobacyk, 2004). The precise instructions given to participants then stated they would 'be presented with a selection of both positive and negative images. Each image will remain on screen for 3 seconds. Please attend to the images and do not write anything down'. Following this the software presented all 28 images, with the appropriate image name appearing above the image, in a random sequence with each image/name appearing on screen for 3 seconds. The software used an inbuilt Mersenne Twister pseudorandom number generator (PRNG) to randomly select the order of stimuli presentation. Once all images had been shown participants then completed a surprise recall test. Precise instructions were 'your task is now to recall as many of the images you have just seen and write their names in the box below. You have 3 minutes to do this. You can write them in any order and spelling isn't important'. A timer on screen counted down from 3 minutes to provide an indication of how much time remained. Following this the software pseudo-randomly presented participants with one of four sub-lists of 14 images (see Appendix B), with the proviso that the PRNG evenly select the four sub-lists. This sub-list of 14 images (7 positive and 7 negative) was then presented in exactly the same way as the original list of 28 images. Once this had been completed another recall screen appeared with an open text box and a 2-minute timer. Participants then had 2 minutes to recall, in any order, as many of the just seen 14 images as they could in the allotted time. This presentation of the same sub-list of 14 images followed by a recall stage was repeated a further three times. Following this a check screen asked participants if at any time during the study they shifted screens to check emails, looked away from their PC, wrote down the words etc. to help their recall. Finally, participants were provided with an information/debrief screen containing contact details of the Principal Investigator (PI) should they wish to obtain more information.

Ethics

Full University Faculty ethics approval was obtained for this study (Ref: 15/SAS/213C).

Results

The RPBS was coded according to Tobacyk (2004) to create the 7 sub-scales of; traditional religious belief; Psi; Witchcraft; Superstition; Spiritualism; Extraordinary Life Forms, and Precognition. Precall was measured using level of recall accuracy for images recalled in stage 3 that were later repeated in stage 4 compared to those that were not-repeated. Given the requirement for participants to type in the name of the image it is possible that a name could be miss-spelt or that a name may only be partially typed due to the time restriction. To deal with this all incorrectly spelled items were viewed by two external judges, blind to the aims of the study, to ascertain whether they sufficiently identified the appropriate image. For partially typed responses a key criterion used was the requirement that there be a greater than 50% level of mapping between the letters and placements of the partially typed input and the name of the image.

RPBS Data

Data on the seven sub-scales of the RPBS are presented in Table 1.

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Table 1 about here

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Precall Data

Ninety-four participants were each exposed to 28 images, creating a total of 2632 trials. Of these there were 51 (1.9%) that required additional consideration by two coders blind to the aims of the study due to spelling and/or grammar issues. The two coders who examined these items agreed

100% on the outcome. This included 7 instances of accepting ‘motorbike’ for ‘motorcycle’, 8 instances of accepting ‘cockroaches’ for ‘cockroach’, 18 instances of accepting ‘lightening’ for ‘lightning’, 1 instance of accepting ‘lighting’ for ‘lightning, 1 instance of accepting ‘jaguer’ for ‘jaguar’, 10 instances of accepting ‘windsurfer’ for ‘windsurfers’ and 6 instances of accepting ‘skydiver’ for ‘skydivers’. There were also 14 (0.5%) intrusions which did not refer to any of the images seen but were invariably semantically related (e.g., cheetah and leopard in place of jaguar) and were excluded from the analysis.

A repeated measures t test was conducted on recall scores comparing level of recall of images that were repeated with those that were not-repeated. A 2-tailed test was used to allow for the possibility that post-recall repetition of the images could impair precall performance (see, Ritchie et al., 2012). This showed that the level of mean recall for repeated images did not differ from images not-repeated (respective means: 7.28 vs. 7.38), $t(93)=0.374$, $p=0.710$, 95% CI (-0.604, 0.413), $d=0.05$. The effect sizes of the precall scores for positive images was $d = -0.11$, for negative images was $d = 0.05$. The precall score for positive and negatively valenced images along with their respective baseline can be seen in Table 2.

Table 2 about here

Of the 94 participants that took part 35 (37.2%) reported in the post study questionnaire that they were either distracted or switched to another application (e.g., to check emails, facebook) during the study. When the main analysis was re-run, restricting the sample to those that did not report any such distractions or switching there was still no difference in the level of mean recall for repeated images compared to images not-repeated (respective means: 7.0 vs. 7.18), $t(58)=0.574$, $p=0.568$, 95% CI (-0.836, 0.463), $d=0.08$.

To examine possible links between participant belief in paranormal events correlations were conducted between participant's precall scores and their scores on the RPBS, see Table 3. None of these correlations were significant (all ps>0.3).

Table 3 about here

Post Recall Practise

The pattern of post recall performance was examined using a repeated measures analysis of variance (ANOVA) with single factor of Time containing 4 levels (time1, time2, time3 and time4). The assumption of sphericity was not met, Mauchly's W(5)=0.816, p,0.01, hence the Greenhouse-Geiser correction was used when interpreting the ANOVA. This showed a main effect of Time $F(2.67,248.9)=16.201$, $p<0.001$, Mse=2.36, $\eta^2=0.148$. Pairwise comparisons using a Bonferroni correction to control for inflated Type I errors showed a significant increase in mean recall from time1 to time2 (respective means: 10.56 and 11.54) $p<0.001$, 95% CI(-1.473, -0.484), d=0.5. There was no further change in mean recall from time2 to time4 (all ps>0.5), see Table 4.

Table 4 about here

Discussion

The results show no evidence for any precall effect when using both positive and negative arousing images. Nevertheless, the post recall practise phases do show an initial increase in recall accuracy but this plateaus after the second practise session suggesting that two post recall practise phases may be sufficient to establish a robust memory with continued practise having little or no effect.

There are in essence two alternative views that can be taken when attempting to interpret the pattern of data here. On the one hand, the data show no precall effects simply because there were none as such effects represent a scientific impossibility. This view would fit more consistently with others who report null effects when examining the possibility of precognition (see e.g., Galak et al., 2012; Ritchie et al., 2012) and possibly bolster the arguments that any such reported effects may at best be more simply accounted for in terms of improper statistical analysis (e.g., Wagenmakers, Wetzels, Borsboom, & van der Maas, 2011), or at worst, represent potential fraud (see e.g., Stokes, 2015). Of course, the argument that precognition is impossible, or any cognitive process for that matter, may say more about our current understanding of science, or the lack of it, than it does about the nature of such unusual phenomena. On the other hand, it may be that precognition represents a real effect and this study simply failed to find it. This approach would be more consistent with those reporting significant precognitive effects (Bem, 2011; Maier et al., 2014; Subbotsky, 2013) as well as the positive overviews obtained from the various meta-analyses (Bem et al., 2015; Honorton & Ferrari, 1989; Steinkamp, Milton, & Morris, 1998). At this moment in time however it is not possible to clearly identify which of these interpretive possibilities is correct. Hence, in an attempt to remain critical, yet open minded, which should be the hallmark of any scientist, the author offers the following discussion points as possible reasons why no potential precall effect was found in the current study. This includes the level of participant's belief in such phenomena, whether they are relaxed and/or distracted during the task, the potential arousing nature of the stimuli themselves, and the slow/explicit nature of the task.

It is possible that individual belief may have influenced participant's behaviour in this study. For example, research has shown that belief can be an important predictor of success in psi experiments (see e.g., Palmer, 1971). Where individuals can be classified into the unflattering categories of either sheep (i.e., believers) or goats (i.e., non-believers) with research showing that those with a higher belief in the paranormal tend to score above chance whereas those with a lower level of

belief score either at chance or below it (see e.g., Parker, 2000). Given that the initial information page explicitly informed participants they would be taking part in a study looking at possible ESP effects it is likely that their belief could have influenced the outcome. Furthermore, the mean overall score on the RPBS for the current group was 77.6 which is slightly lower than the reported norm of 89.1 by Tobacyk (2004). Hence, it is possible that the opportunity sample utilised in this study may have contained individuals with a more sceptical frame of mind, which in turn may have reduced any possible precall effects. Furthermore, recruiting potentially sceptical participants may have led to a reduction in variability, which could account for the lack of any correlation between scores on the belief scale and precall scores. Future research could address this by either attempting to recruit participants from specific target groups thought to have higher levels of belief in psi phenomena, and/or pre-screen all participants to ensure a target level of belief is expressed prior to having them take part in the experiment.

Alongside belief in psi phenomena it is possible that participants in the current study were not sufficiently relaxed during the memory task for any possible precall effects to emerge. For instance, Bem (2011) in his original suite of experiments began by presenting participants with an image whilst simultaneously playing new-age type music in an effort to help them relax. Such a view would be consistent with the early findings of Braud (1974) suggesting that relaxed participants perform better in psi related tasks (see also, Honorton, 1977). However, no images/music or relaxation induction stage were included in the current study. As such, future research could address this by including a specific 'relaxation induction' phase in an effort to help the participants relax and potentially facilitate any possible precall effects.

Given that the current study was also run on-line it is also possible that participants may have experienced other 'distractions' during the task that took them away from the focus of the study. For instance, of the 94 participants that took part 35 (37.2%) of them reported in the post recall question phase that they had either switched applications and/or been distracted by something in their environment during the completion of the task. Such a possibility would be consistent with the suggestions of Braud (2002) who suggested that psi 'type' effects are invariably weak signals that can be overwhelmed and/or obscured by noise or distractions. Of course, it is not always possible to control all aspects of the environment, particularly when using an on-line delivery method as in the current study. Nevertheless, greater emphasis could be made at the beginning of

such a study emphasising to the participants the need to complete the task in a quiet place away from any external distractions.

The current study used images from the IAPS database that were classified as either positive or negatively arousing however, it is possible that the level of valence and/or arousal of these images may not have been sufficiently emotive. For instance, Maier et al. (2014) in their study on precognition used images from the IAPS with a positive valence of 7.57 and negative valence of 1.73 compared to the images used in the current study which had a positive valence of 7.19 and a negative valence of 3.52. Interestingly Maier et al (2014) found a precognitive effect for the negative images but not for the positive images. Given this, it may be that using more emotive images would elicit a precall effect. Such a possibility would be consistent with suggestions that the more emotive the stimulus the more likely a psi effect will emerge (see e.g., Lobach, 2009; Radin, 2004).

Finally, the precall task used here involved presenting stimuli over time and allowing up to 3 minutes for participants to recall them. Such time would allow participants to adopt a more deliberate, conscious and attentive strategy for responding, all of which would naturally reflect explicit 'slow' processes. It may be that a task that is more reliant on slow explicit processes overshadows and/or reduces the possible influence of any psi-based behaviour. Whereas a task that is more reliant on faster implicit processes may be more amenable to eliciting such anomalous effects. This idea is consistent with the view put forward by Bargh and Ferguson (2000) that psi behaviour may be better understood and explored using more indirect and/or implicit measures. To some extent it also supported by the recent meta-analysis from Bem et al. (2015) which showed more robust precognitive effects for the fast-thinking type tasks, with no clear evidence of precognition when the slower thinking protocols were used. However, this picture is neither consistent nor clear. For instance, in the studies reported by Bem (2011) it is the slower explicit recall task that shows the greatest precognitive effect. In contrast, a repetition priming task requiring fast responses reported by Vernon (2015) failed to show any evidence of precognition. Furthermore, it may also be worth noting that researchers could be confounding the distinction between explicit/implicit processes with slow/fast thinking tasks. Hence, this distinction between explicit/slow and implicit/fast may be useful but needs to be more clearly examined to allow the contribution of each aspect to be teased apart. As such, it may represent a potentially fruitful avenue for future researchers.

In conclusion, no evidence of precall was found for an on-line task using emotive images. However, a number of methodological points are offered for consideration, including the level of belief in psi phenomena of the participants, the use of a relaxation induction, possible distractions and the emotive nature of the stimuli, which may have contributed to this null result.

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Appendix A

Showing the 28 images (14 positive and 14 negative) used in the study with valence and arousal ratings.

Positive Image	IAP#	Valence	Arousal	Negative Image	IAP#	Valence	Arousal
Jaguar	1650	6.65	6.23	Snake	1110	3.84	5.96
Waterfall	5260	7.34	5.71	Spider	1201	3.55	6.36
Skydivers	5621	7.57	6.99	Dog	1302	4.21	6.00
Mountains	5700	7.61	5.68	Shark	1930	3.79	6.42
Windsurfers	5623	7.19	5.67	Bomb	2692	3.36	5.35
Baby	2660	7.75	4.44	Cockroach	1274	3.17	5.39
Fireworks	5910	7.8	5.59	Gun	6610	3.6	5.06
Lightning	5950	5.99	6.79	Tornado	5971	3.49	6.65
Cakes	7220	6.91	5.3	Tank	6940	3.53	5.35
Pizza	7350	7.1	4.97	Boxer	8060	5.36	5.31
Gymnast	8470	7.74	6.14	Toilet	9301	2.26	5.28
Motorcycle	8251	6.16	6.05	Solider	9160	3.23	5.87
Pilot	8300	7.02	6.14	Skull	9480	3.51	5.57
Money	8501	7.91	6.44	Ship	9600	2.48	6.46
	Mean	7.20	5.87		**Mean**	3.53	5.79

Appendix B

The 8 sub-lists (consisting of 4 practise lists and 4 no-practise baseline lists) created from the original list of 28 images with valence and arousal ratings.

Practice 1	**IAP#**	**Valence**	**Arousal**	**No practice baseline**	**IAP#**	**Valence**	**Arousal**
Snake	1110	3.84	5.96	Jaguar	1650	6.65	6.23
Spider	1201	3.55	6.36	Waterfall	5260	7.34	5.71
Dog	1302	4.21	6	Skydivers	5621	7.57	6.99
Shark	1930	3.79	6.42	Mountains	5700	7.61	5.68
Bomb	2692	3.36	5.35	Windsurfers	5623	7.19	5.67
Cockroach	1274	3.17	5.39	Baby	2660	7.75	4.44
Gun	6610	3.6	5.06	Fireworks	5910	7.8	5.59
Lightning	5950	5.99	6.79	Tornado	5971	3.49	6.65
Cakes	7220	6.91	5.3	Tank	6940	3.53	5.35
Pizza	7350	7.1	4.97	Boxer	8060	5.36	5.31
Gymnast	8470	7.74	6.14	Toilet	9301	2.26	5.28
Motorcycle	8251	6.16	6.05	Solider	9160	3.23	5.87
Pilot	8300	7.02	6.14	Skull	9480	3.51	5.57
Money	8501	7.91	6.44	Ship	9600	2.48	6.46
	Mean	5.31	5.88		**Mean**	5.41	5.77

Practice 2	**IAP#**	**Valence**	**Arousal**	**No practice baseline**	**IAP#**	**Valence**	**Arousal**
Jaguar	1650	6.65	6.23	Snake	1110	3.84	5.96
Waterfall	5260	7.34	5.71	Spider	1201	3.55	6.36
Skydivers	5621	7.57	6.99	Dog	1302	4.21	6
Mountains	5700	7.61	5.68	Shark	1930	3.79	6.42
Windsurfers	5623	7.19	5.67	Bomb	2692	3.36	5.35
Baby	2660	7.75	4.44	Cockroach	1274	3.17	5.39
Fireworks	5910	7.8	5.59	Gun	6610	3.6	5.06
Tornado	5971	3.49	6.65	Lightning	5950	5.99	6.79
Tank	6940	3.53	5.35	Cakes	7220	6.91	5.3
Boxer	8060	5.36	5.31	Pizza	7350	7.1	4.97
Toilet	9301	2.26	5.28	Gymnast	8470	7.74	6.14
Solider	9160	3.23	5.87	Motorcycle	8251	6.16	6.05
Skull	9480	3.51	5.57	Pilot	8300	7.02	6.14
Ship	9600	2.48	6.46	Money	8501	7.91	6.44

	Mean	5.41	5.77		**Mean**	5.31	5.88

Practice 3	**IAP#**	**Valence**	**Arousal**	**No practice baseline**	**IAP#**	**Valence**	**Arousal**
Jaguar	1650	6.65	6.23	Tornado	5971	3.49	6.65
Waterfall	5260	7.34	5.71	Spider	1201	3.55	6.36
Skydivers	5621	7.57	6.99	Dog	1302	4.21	6
Shark	1930	3.79	6.42	Mountains	5700	7.61	5.68
Bomb	2692	3.36	5.35	Windsurfers	5623	7.19	5.67
Cockroach	1274	3.17	5.39	Baby	2660	7.75	4.44
Gun	6610	3.6	5.06	Fireworks	5910	7.8	5.59
Snake	1110	3.84	5.96	Lightning	5950	5.99	6.79
Tank	6940	3.53	5.35	Cakes	7220	6.91	5.3
Toilet	9301	2.26	5.28	Pizza	7350	7.1	4.97
Gymnast	8470	7.74	6.14	Boxer	8060	5.36	5.31
Motorcycle	8251	6.16	6.05	Solider	9160	3.23	5.87
Pilot	8300	7.02	6.14	Skull	9480	3.51	5.57
Money	8501	7.91	6.44	Ship	9600	2.48	6.46
	Mean	5.28	5.89		**Mean**	5.44	5.76

Practice 4	**IAP#**	**Valence**	**Arousal**	**No practice baseline**	**IAP#**	**Valence**	**Arousal**
Snake	1110	3.84	5.96	Jaguar	1650	6.65	6.23
Spider	1201	3.55	6.36	Waterfall	5260	7.34	5.71
Dog	1302	4.21	6	Skydivers	5621	7.57	6.99
Shark	1930	3.79	6.42	Mountains	5700	7.61	5.68
Windsurfers	5623	7.19	5.67	Bomb	2692	3.36	5.35
Baby	2660	7.75	4.44	Cockroach	1274	3.17	5.39
Fireworks	5910	7.8	5.59	Gun	6610	3.6	5.06
Lightning	5950	5.99	6.79	Tornado	5971	3.49	6.65
Cakes	7220	6.91	5.3	Tank	6940	3.53	5.35
Pizza	7350	7.1	4.97	Boxer	8060	5.36	5.31
Gymnast	8470	7.74	6.14	Toilet	9301	2.26	5.28
Solider	9160	3.23	5.87	Motorcycle	8251	6.16	6.05
Skull	9480	3.51	5.57	Pilot	8300	7.02	6.14
Ship	9600	2.48	6.46	Money	8501	7.91	6.44
	Mean	5.36	5.82		**Mean**	5.36	5.83

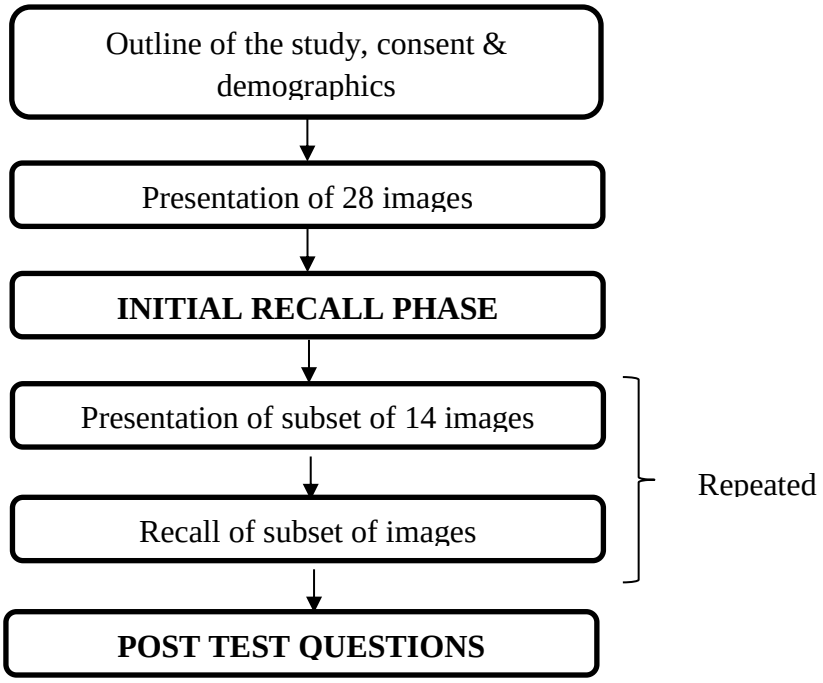

Figure 1**.** The six stages of the experiment.

Table 1. Showing mean belief levels for each of the seven sub-components of the RPBS.

	Traditional Religious Belief	**PSI**	**Witchcraft**	**Superstition**	**Spiritualism**	**Extra Life Form**	**Precognition**
Mean	3.56	3.11	3.18	1.61	3.09	3.20	2.83
SD	2.0	1.40	1.88	1.03	1.82	1.14	1.56

Table 2. Showing mean number of images (with SD) recalled (out of a total of 28) in the repeated and the non-repeated conditions for positively and negatively valenced images.

	Positive		Negative	
	Repeated	Not repeated	Repeated	Not repeated
Mean	3.27	3.43	4.01	3.94
SD	1.56	1.34	1.37	1.37

Table 3. Showing correlation coefficients (with significance values) between precall score and the seven sub-scales of the RPBS.

	Traditional Religious Belief	**PSI**	**Witchcraft**	**Superstition**	**Spiritualism**	**Extra Life Form**	**Precognition**
Correlation	-.009	.032	.106	-.053	-.068	-.016	-.016
Sig	0.93	0.75	0.30	0.61	0.51	0.88	0.88

Table 4. Showing mean (with SD) number of images recalled (out of a total of 14) in each of the four post-recall practice phases.

	Post Recall			
	Time 1	Time 2	Time 3	Time 4
Mean	10.56	11.54	11.80	11.81
SD	2.02	1.80	1.99	1.95