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ARE FALSE MEMORIES PSI-CONDUCIVE?

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ABSTRACT: S. J. Blackmore and N. J. Rose (1997) reported an experiment that used false memory creation to generate a significant psi effect. This article reports a series of 3 experiments that attempted to replicate this effect and examines the relationship between false memory creation and paranormal belief. Experiment 1 is a faithful replication of the original. Experiment 2 is a computerised version involving individual participant trials, but because of a computer error, no psi scores were obtained. Experiment 3 is an improved version of the original, designed to maximise the number of false memories obtained. Experiments 1 and 3 failed to find a significant psi effect, and all 3 experiments found no relationship between false memory creation and belief in the paranormal.

Blackmore and Rose (1997) reported an experiment designed to examine the operation of psi when reality and imagination were confused. The original experiment used a situation in which participants were encouraged to generate false memories of common household objects.

The topic of false memory is highly relevant to parapsychologists and psychical researchers in two ways. First, it may be the case that psi lurks in this borderline between reality and imagination. There are abundant examples of phenomena that appear to utilise such a confusion: spontaneous cases, which often involve "realistic dreams," lucid dreams, false awakenings, hypnagogic images, waking imagery, and sleep paralysis; and states in which reality and imagination are often confused. The occult traditions, for example, shamanistic traditions that entail the use of drugs and sensory deprivation to induce altered states of consciousness in which imagery is enhanced, and experienced journeys are interpreted as real excursions. Finally, laboratory psi techniques, for example, the use of hypnosis or encouraging imagery to arise unbidden, can also be thought of as utilising this kind of confusion.

Alternatively, confusions between reality and imagination can represent a serious problem for parapsychologists and psychical researchers who often have to rely on eyewitness reports of spontaneous, ostensibly psychic, or paranormal events. The fact that the investigation of

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spontaneous phenomena relies so heavily, in most cases, on eyewitness testimony is a concern, as even the most honest and confident witness may be reporting a false memory. To understand the extent of the potential problem, we review briefly the range of techniques that have been found to be effective for the creation of false memories.

It has long been known that asking leading questions can influence a person's memory for events. Questions asked immediately after an event can introduce new, and not necessarily correct, information, which is then incorporated into the memory of the event (Loftus, 1975). For example, Loftus (1974) asked leading questions to participants who had watched a film of an automobile crash and elicited higher estimates of vehicle speed by using the word *smashed* in place of words like *collided* or *hit*. She found that even changing the words *a broken headlight* to *the broken headlight* led some witnesses of a film to be certain that they saw a broken headlight when, in fact, they did not. This effect, sometimes called the *misinformation effect*, can be resisted by a person who has a strong recollection of some detail and who is asked to make a decision or commitment about a particular detail. However, if a person has no original recollection of a detail, new information has a good chance of being incorporated in the memory of the witness, particularly if the new information is plausible within the context or is delayed for some time after the event (see Loftus, 1979). In later experiments, Loftus (1993) created entire memories for childhood events that never happened by having a relative encourage teenage participants to "remember" that they had been lost in a shopping mall.

Hypnosis can also be used to encourage the creation of false memories. Orne (1979) was able to create false memories for noises at night by asking leading questions while the participant was hypnotised. Similarly, Laurence and Perry (1983) used highly hypnotisable participants under hypnosis and suggested a false memory for having been awakened at night, sometime during the previous week, by a loud noise. Nearly half of the participants stated posthypnotically that the suggested event had actually occurred. Sheehan and Tilden (1983) examined whether people who are highly suggestible during hypnosis were more likely to form false memories from leading questions. Despite the fact that hypnosis did not enhance recall in any way, participants were frequently confident that distorted memories "recovered" under hypnosis were accurate. However, Sheehan and Tilden found that hypnotic suggestibility was not associated with more ready memory distortion. Contrary to their findings, Heaps and Nash (1999) found that a participant's tendency to form false memory was based on the predisposition to both hypnotic suggestion and dissociation. Laurence, Nadon, Nogrady, and Perry (1986) found that highly hypnotisable participants had a particular cognitive style (dual cognitive functioning) that made such distortions of memory using hypnosis more likely. The participants who reported duality in hypnotic age

regression and the hidden observer effect were more prone to accept a suggested memory as real.

Newman (1997) suggested that reports of abduction by aliens are actually false memories fleshed out and elaborated experiences based on episodes of sleep paralysis and hypnagogic or hypnopompic hallucinations. Newman highlighted the use of hypnosis, and the fact that the investigator "retrieving" the memories believes in the possibility of such extraterrestrial contacts and expects to find evidence for them, as contributing factors in the elaboration process. Newman and Baumeister (1998) suggested that up to 70% of alien abduction cases involve the use of hypnosis but noted that hypnotic procedures are not necessary for the elicitation of false memories.

Other techniques have produced false memories in participants without the use of hypnosis. Hyman and Pentland (1996) used guided imagery instructions to increase the likelihood of false memory creation and of recalling previously unremembered true events (although it was unclear whether these recovered memories were truly recalled or created in response to the interview demands). Loftus (1997) reported that, along with suggestion, pressure on a participant to remember more and more about events he or she does not have a previously strong memory for can lead to false memories of the events. False memories can also be induced by asking people to imagine that they had experiences in the past that they never actually had. Loftus and Mazzoni (1998) described a new method for influencing people's memories for the past called the *expert personalised suggestion paradigm* (EPS). They used EPS during a pseudo-analysis of dreams with 24 adult participants. Using the influencer's ostensible expertise and authoritativeness and personalising the nature of the content to the individual participants, they were able to influence autobiographical recall by the participants. The technique appears to have parallels to the Barnum effect used by some mediums, clairvoyants, and tarot card readers. Loftus and Mazzoni suggested that such methods might inspire new techniques for changing client behaviours in positive ways.

Finally, the role of context, based on stereotypical expectations, appears to have strong influence on the character and formation of false memories. Miller and Gazzaniga (1998) used single presentations of stereotypic scenes to produce false memories of objects participants may have expected to see in the pictures. They found that this technique produced almost as many false memories of items in a scene as true recognition of items that did occur. Seamon, Luo, Sclegal, Green, and Goldenburg (2000) found that by using lists of category exemplars, both children and college students falsely recognised pictures of related high-frequency category exemplars.

In summary, the ease with which false memories can be produced should be recognised as a major problem for parapsychologists and

psychical researchers who study spontaneous phenomena and rely on eyewitness testimony as evidence for the reality of those phenomena. The use of hypnosis to "enhance" recall of an event or "recover" memories (e.g., of alien abduction or past lives) must be brought into question as there is a very real danger that the reports retrieved by such processes will be iatrogenic.

If false memory could only be produced through hypnosis, then it would be relatively easy for researchers to avoid the problem of false memory. However, it seems that the kinds of questions we might ask witnesses could easily distort their recall of the events being investigated. The fact that researchers will want as much detail as they can get from the witness of an ostensibly psychic event might encourage the witness to inadvertently invent detail, based on their cultural expectations or stereotypes regarding such events, to suit the demands of the interview. Indeed, in the overwhelming majority of spontaneous cases, researchers will arrive on a scene after, often long after, the event has occurred. Usually there has already been a great deal of time for memory distortion to occur as the witness discusses the event with friends, family, and often authority figures on such matters, including members of the clergy or professional psychics. Finally, a witness reporting the false memory may well appear both entirely honest and highly confident that the spontaneous phenomenon occurred. These virtues may well impress an investigator, and of course the witness is being entirely honest, but the event being related may still be a false memory nonetheless.

To explore the association between a person's confusion between reality and imagination and psi, we offer two hypotheses. First, it is possible that the confusion of reality and imagination leads people to misinterpret their own imagination as reality, leading them to conclude that a psychic phenomenon has occurred when in fact it has not. If this were the case, we would expect people who have more psychic experiences and believers in the paranormal to be those most likely to confuse reality and imagination.

Second, it is possible that the confusion of reality and imagination is itself psi-conducive, as though psi can somehow sneak into the uncertainty gap. Although this may occur in a borderline state of consciousness, this is not essential. What is essential is that there be confusion over whether images or ideas are real or imaginary.

The principle behind this present series of experiments was as follows: At the start of the experiment, the participants were shown slides of some objects and were asked to imagine others. To encourage the confusion, we showed some slides three times, and the participants were asked to describe, draw, and answer questions about all the objects several times over the following weeks. By the end of the experiment, some time later, we expected that many of them will have been confused into thinking that they actually saw some objects that, in fact, they only imagined (i.e., false memories).

The targets for the psi task were pictures of half of the imagined objects and were concealed in envelopes during the first session. We hoped that the concealed targets would encourage the participants to form a more vivid and memorable mental image of these objects than of the imagined objects that were nontargets. In the last session, we hoped the participants would be more likely to have false memories for these pictures. The analysis compared the number of false memories on targets (hits) with the number on nontargets (misses) for each participant. Belief was measured using the Revised Paranormal Belief Scale (PBS; Tobacyk, 1988), and scores were correlated with the number of false memories for each participant.

This technique, used in Blackmore and Rose (1997), successfully induced false memories in several of the participants; that is, they said that they had seen an object when in fact they had only imagined it. Eight of the 23 participants made a total of 12 errors of this kind. There were 6 errors in the opposite direction (i.e., a participant claimed to have imagined an object when he or she had seen it). We predicted a correlation between the number of false memories and PBS score. However, no such correlation was found, r_s (30) = .069, p = .70. Neither was there any correlation between total errors (regardless of type) and PBS score, r_s (31) = .046, p = .80. We compared the number of false memories each participant had for target objects with the number for nontarget objects (ESP hits vs. misses) and found that significantly more false memories occurred for target than nontarget objects, t(32) = 2.25, p = .032, two-tailed. Using Cohen's d (Rosenthal, 1984), the effect size was 0.80.

In this article, we report three additional experiments carried out using the same technique. The first of these studies is an exact replication of the original experiment designed to see whether the apparent psi effect could be repeated. The second experiment used a computer-based task to investigate the factors that might be conducive to false memory formation. Finally, in the third experiment, we used these findings to modify the design in an attempt to increase the number of false memories obtained.

EXPERIMENT 1: REPLICATION OF THE ORIGINAL EXPERIMENT

Method

Participants

Participants were psychology students at the University of the West of England, Bristol, England. Forty-eight first-year students took part in Session 1. Participation in the experiment was entirely voluntary, and no incentives were offered to participants (other than to take part in an interesting experiment). To be included in the final analysis, a student had to be present at the first and last sessions and attend at least one of the

intervening sessions (Session 2 or 3). Twenty-six students fulfilled this requirement. The participants were tested in a large lecture hall in four separate sessions. For the first session only, they were divided into two groups (X and Y) determined by their seminar groups (the departmental administration assigns students to different seminar groups based on the alphabetical order of their surnames). For all later sessions, they were all tested together. Participants included in the final analysis were 6 male and 20 female students, age between 18 and 23 years (mean age = 18.6 years).

Materials

The materials used were the same as in the original experiment and are described below.

Slides

The 12 images were of two kinds. Half of the slides showed a common household object with a label underneath it (object seen); the other half showed only a label (object imagined). The objects were beer mug, book, bottle of wine, box of tissues, cereal packet, flowering plant, hat, shoe, teapot, teddy bear, telephone, and torch. In each group, half of the slides were shown three times to further confuse the participants. Thus, for the two groups there was a total of 48 slides, 24 for each of the two groups, X and Y.

For Group X, half of the objects (randomly chosen) were seen and half were imagined. These were reversed for Group Y. In addition, half of the images were seen three times. This too was counter-balanced across the groups. A carrousel slide projector with a built-in timer was used to display the slides for 10 s each.

Questionnaires

Imagination test. This test consisted of a list of all the objects (seen and imagined), with space for participants to describe or draw each object from memory and with instructions to do as many as possible in the 5 min allowed. On the back of the imagination test was stapled a plain envelope that contained the ESP targets.

Paranormal Belief Scale (PBS). The PBS (Tobacyk, 1988; Tobacyk & Milford, 1983) consists of 25 items on seven dimensions, with a 5-point rating scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). A score is obtained by adding the ratings. This scale has many shortcomings and has been strongly criticised by Lawrence (1995a). However, it is the most widely used scale available, and an improved measure of broad paranormal belief has not yet been devised (Lawrence, 1995b; Tobacyk, 1995).

Picture tests. All of the participants were asked to fill in three questionnaires consisting of a question about each object (regardless of whether originally seen or imagined). These were given out in Session 2, Session 3, and at the start of Session 4. Examples of the questions were "Did the shoe

have laces?" and "To which side was the handle of the beer mug?" They contained no reference to the fact that some of the objects had been imagined and some seen. The questions for each session were varied for each object.

Picture memory test. In the last session, all of the participants were given a picture memory test. This listed all the objects seen or imagined in the original session along with 12 distractors, objects that had not been previously used. For each object, participants had to indicate whether the object had been seen, imagined, or not shown at all. In addition, they were asked to rate their confidence on each of these judgements on a scale ranging from 1 (*just guessing*) to 5 (*completely certain*).

ESP Targets

The targets were individually prepared in advance by NR. Each pack consisted of three colour reproductions of the objects with their labels. In the original experiment, these were chosen at random for each participant from the six objects that the participant had imagined, without replacement (using a pseudorandom number generator, with entry point randomised by the computer clock and further randomised based on the timing of a button press). However, this technique meant that some target objects were more common than others (although this was not the reason for the significant results; see Blackmore & Rose, 1997). In this (and all subsequent experiments), sets of target objects were assembled by using all possible combinations of three pictures from six for each group. This meant that the distribution of target objects was more even and prevented the possibility of bias affecting the results. The pictures were wrapped in opaque black paper and sealed in brown envelopes. The envelopes were stapled to the back of the imagination test.

A *hit* was scored when a false memory (i.e., the participant reported having seen an object when they had in fact been asked to imagine it) corresponded with one of these target pictures. A *miss* was scored when a false memory corresponded with one of the nontarget pictures.

In the original experiment and in this replication, no mention of psi testing or ESP was made to the participants at any time during the experiment. The participants had no explicit reason to connect the envelope to the slides they had seen, the PBS questionnaire, or the imagination test.

Procedure

Session 1

The procedure was identical to that used in Blackmore and Rose's (1997) article. We were both present for this session. First, the students were given the consent form to read and sign. This described the experiment as one on cognitive processes. Students were told that during the first week they would view some slides, answer questions about them, and

complete the PBS, and that in the following two sessions they would be needed for just 2 min, and after the final session, SB would explain what the experiment was about. They were told they were under no obligation to take part, could withdraw at any time, were assured anonymity, and were asked to sign the consent form if they wished to take part.

Instructions were read explaining that two types of slide would be shown. When participants saw a label with no object, they were to imagine the object as clearly as they could. If they saw the same label again, they were to imagine the object in exactly the same way as they had the first time. The 24 slides were then shown in random order for 10 s each.

Next they were given the imagination test with the target envelopes stapled to it. They were asked to describe or draw each of the objects in as much detail as they could and not to look at their neighbour's work. The participants were not told anything about the envelopes stapled to the back of the imagination test except that they were not to tamper with them or try to look inside. We were not sure how the amount of time participants spent completing the test items would affect their number of false memories. To overcome this, we decided that some of the test items would be completed within a time limit. We allowed 5 min for completion of the imagination test.

Next the PBS was handed out. We did not feel that the time taken to complete this questionnaire would affect the number of false memories, so this was not timed.

Sessions 2 and 3

All of the students came to the lecture as usual for these sessions, and both groups were tested together. Again, we were both present for these sessions. One of the picture tests was given out, and the participants were allowed 2 min to complete the test. One-week intervals were left between Session 1 and Sessions 2 and 3.

Session 4

All of the students came to the lecture as usual for this session, and both groups were tested together. NR, who had been responsible for preparing the ESP targets, was not present for this session. The third picture test was given out, and the students were allowed 2 min to complete the test. These were collected, and the picture memory test given out. This was not timed.

Data Handling

NR immediately locked away the data after each of the first three sessions so that SB had no access to it. He entered all the data into the computer in a password-protected file. For the final session, NR was not present. After this session, SB took away the picture memory tests and kept

them locked away. She entered the data into a separate computer. When this was done, both sets of data were brought together. We gave each other disk copies of our data so that they could be checked later to ensure that nothing had been changed. NR carried out the analysis.

Results

Each participant was given an *error score* according to how many confusions were made between the objects seen and the objects imagined and a *false memory score* for how many objects the participant wrongly categorised as seen when they had been imagined. (The latter is a subset of the former.) Each participant also had a PBS score.

An ESP hit was scored when a false memory (i.e., the participant reported having seen an object when he or she had in fact been asked to imagine it) corresponded with one of these target pictures. A miss was counted when a false memory corresponded with one of the nontarget pictures. For example, if a participant had originally been asked to imagine a teddy bear but on the picture memory test indicated that he or she had *seen* a teddy bear, a false memory was counted. If that false memory also coincided with one of that participant's target pictures, then it was counted as an ESP hit.

False Memories

The technique was intended to induce false memories in many of the participants. That is, the participants would say that they had seen an object when in fact they had only imagined it. In this experiment, 13 participants made a total of only 19 false memory errors. There were 21 errors in the opposite direction (i.e., a participant claimed to have imagined an object when he or she had seen it).

Correlations With Belief

We predicted a correlation between the number of false memories and PBS score. No such correlation was found, $r_s(23) = -.134$, $p = .53$. Neither was there any correlation between total errors (regardless of type) and PBS score, $r_s(23) = -.264$, $p = .20$.

ESP

The number of false memories each participant had for target objects was compared with the number for nontarget objects (ESP hits vs. misses). There were 10 hits and 9 misses in total, which is not significant, $t(12) = 0.25$, $p = .808$, two-tailed.

Discussion

The first hypothesis was not confirmed. That is, there seems to be no correlation between a person's belief in the paranormal and his or her susceptibility to false memories in this experimental situation. No support is lent to the idea that paranormal belief might be associated with an inability to distinguish memories of real events from imagination.

The second hypothesis was also not confirmed. That is, no more false memories were obtained on the pictures used as clairvoyance targets than those not used.

Does this technique produce false memories? There were actually fewer false memory errors than errors in the opposite direction (i.e., participants said they had imagined an object when they had in fact seen it). This might suggest that in this experiment we did not successfully use a technique for specifically producing false memories. Perhaps the participants were merely confused about all the items, and general memory errors were being made rather than specifically false memory errors. In the original experiment, 8 participants made a total of 12 false memory errors. There were only 6 errors in the opposite direction (i.e., a participant claimed to have imagined an object when in fact he or she had originally seen it). However, it appears that the technique used in this version of the experiment may not be a reliable enough method of producing false memories to adequately test our hypotheses.

To examine this problem further, we decided to carry out a second experiment involving a computer-based task and testing participants individually rather than in groups. By using individual trials, we can examine any relationship between the time taken to complete sections of the experiment and the number of false memories obtained. It was hoped that such information would allow us to make improvements to future experiments designed to increase the proportion of false memories obtained.

EXPERIMENT 2: THE COMPUTER-BASED VERSION OF THE EXPERIMENT

Method

Participants

Participants were students and staff at the University of the West of England, Bristol, England, and were tested individually. They were randomly assigned by computer to Group X and Group Y. A total of 37 participants took part in Session 1. To be included in the final analysis, a participant had to attend all sessions; 31 participants successfully completed this requirement. The final analysis included 10 male and 21 female participants, age between 18 and 61 years (mean age = 30.3 years).

Materials

Computer Presentation of the Slide Images

The same images were used as in the original experiment, but this time they were displayed on a computer screen using a specially written program (written in LabView). The computer randomly assigned each participant to one of four groups: XA, XB, YA, and YB. (A and B were the same images in a different order to counterbalance ordering effects of presentation.) The computer used a timer to display the images for 10 s each.

Questionnaires

Imagination test. This test consisted of a list of all the objects (seen and imagined), with space for participants to describe or draw each object from memory. Two versions of this test were produced, with the ordering altered for counterbalance.

PBS. As in Experiment 1, we used the PBS belief questionnaire (Tobacyk, 1988; Tobacyk & Milford, 1983).

Picture memory test. We used the same picture memory test as in Experiment 1.

ESP Targets

The ESP targets were prepared by SB with the technique used in Experiment 1.

Procedure

We ran the experiment with the help of Kerry Gray, a sociology student from Surrey University (Surrey, England) on placement with us for the year. Students were told that during the first week, they would view some images on a computer, answer questions about them, and fill in the PBS. The following two sessions would involve them filling out questionnaires, and after the final session KG would interview them about the experiment and then explain what the experiment was about. They were told they were under no obligation to take part, could withdraw at any time, were assured anonymity, and were asked to sign the consent form if they wished to take part.

Session 1

KG was the sole experimenter present for this session and recorded to which group the computer had assigned the participant. First, the participants were given the consent forms to read and sign. Instructions were read explaining that two types of image would be shown on the computer. When the participants saw a label with no object, they were to imagine the object as clearly as they could. If they saw the same label again, they were to imagine the object in exactly the same way. The 24

images were then shown in random order for 10 s each. During this time, the target envelopes (prepared as they were in Experiment 1) were placed in plain view, below the computer monitor. On the front of these envelopes, the participant's number was written.

Next the participants were given one of the imagination tests. They were asked to describe or draw each of the objects in as much detail as they could. They had no time restriction on this task, and KG timed how long it took them to complete the task. The participants were not told anything about the envelopes in front of them. Next, the PBS was handed out; again no time limit was imposed.

Session 2

Participants attended this session after approximately a 1-week interval. KG presented participants with the other version of the imagination test and timed how long they took to complete it.

Session 3

About a week after Session 2, participants completed the picture memory test. The participants were allowed, once again, to work in their own time, and NR (the sole experimenter present) recorded how long it took them to complete the tasks. After this final session, participants were briefly interviewed by KG to find out what they had thought the experiment was about.

Data Handling

NR and KG kept their data locked away for the duration of the experiment. When this was done, both sets of data were brought together. We gave each other disk copies of our data so that they could be checked later to ensure that nothing had been changed. KG carried out the analysis.

Results

Each participant was given an error score according to how many confusions were made between the objects seen and the objects imagined and a false memory score for how many objects the participant wrongly categorised as seen when they had been imagined. (The latter is a subset of the former.) Each participant also had a PBS score.

Unfortunately, the computer displayed some of the ESP target pictures during the first session. This meant that the participants saw some of the ESP targets (rather than imagining them). The cause of this error is uncertain, but it may have been that the filenames of the images were truncated when the program was transferred from a machine running Windows 95 to one running Windows 3.1. This may have meant that the program confused the ordering of the images. Although this did not affect the

false memory data, it did mean we were unable to examine the psi hypothesis.

False Memories

In this experiment, participants made 17 errors, of which 10 were false memory errors and 2 were errors in the opposite direction (i.e., a participant claimed to have imagined an object when he or she had seen it). The last 5 of these errors were when the participant claimed the object had not been either seen or imagined in the original session.

Correlations With Belief

We predicted a correlation between the number of false memories and PBS score. No such correlation was found, $r_s(27) = .12$, $p = .54$. Neither was there any correlation between total errors (regardless of type) and PBS score, $r_s(27) = .14$, $p = .48$. Note that 2 of the participants failed to complete the PBS and thus were excluded from this analysis.

Correlations Between Test Times and False Memory

The amount of time that participants had taken to complete the imagination tests in the intervening sessions did not correlate with the numbers of false memories obtained: first picture test, $r_s(29) = 0.00$, $p = 1.0$; second picture test, $r_s(29) = .02$, $p = .91$. However, the amount of time they spent completing the picture memory test did correlate with the number of false memories, $r_s(29) = .46$, $p = .01$.

Discussion

The error in the sequence of images displayed on the computer screen, while preventing any test of ESP, did not affect the ability to generate false memories. Many more false memories were obtained than errors in the opposite direction. However, there was no correlation found between the number of false memories a person made and belief in the paranormal. In this experiment, we also examined the relationship between the time the participants took to complete the imagination tests and the number of false memories made; we expected that those who spent a longer time drawing and writing about the objects would be more likely to create false memories for those objects. There was no relationship between the time taken to describe the objects and false memory count. However, the amount of time taken to complete the picture test (i.e., determine whether the participant had seen or imagined each of the objects) did correlate with the number of false memories. Participants who made the most false memory errors also spent the longest time to answer all the items on the questionnaire.

The computer-based task, using individual participants, had a number of disadvantages when compared with the classroom design. First, it took a great deal longer to generate data, as each participant completed the test independently rather than all at the same time. Also, it was much harder to recruit and maintain contact with participants, and this limited the number of participants we could run with this design. The failure of the computer programme to correctly sequence the images was highly frustrating.

Following these results and also reviewing the results from the original experiment and the replication, we decided on a number of improvements to the design. First, we returned to the original classroom design, using slides and testing participants all together. We felt that the numbers of false memories so far obtained were rather small, thus by recruiting many more participants to the experiment, we hoped that the numbers would be improved. We also concluded that giving participants time limits to complete the test items was redundant, and that by allowing them an open-ended length of time we might encourage them to spend longer on the relevant test items. Also, as there was no relation between the numbers of false memories and the amount of time they spent describing the objects (either at the time or at the intervening session), we decided to include data from participants who missed the intervening sessions. Finally, we increased the amount of time between the first and last session. It was hoped that a period of 2 months rather than 2 weeks should dramatically increase the numbers of false memories obtained.

EXPERIMENT 3: AN IMPROVED VERSION OF THE CLASSROOM EXPERIMENT

Method

Participants

Participants were psychology students at the University of the West of England, Bristol, England. However, a much larger group of first-year students was used. These students made up two distinct module groups, one of which was designated Group X and the other Group Y. A total of 116 students took part in Session 1. To be included in the final analysis, a student only had to be present at the first and last sessions; 82 successfully completed this requirement. The final analysis included 14 male and 68 female participants, age between 18 and 49 years (mean age = 22.4 years).

Materials

The materials used were the same as in Experiment 1.

Procedure

The procedure was a slightly modified version of that used in Experiment 1. The differences are reported below.

Session 1

For this experiment, two modifications were made to the procedure for Session 1. First, participants were asked to complete the PBS between seeing the slides and completing the imagination test; thus it was used like a distractor item in many memory experiments. Second, we felt that 5 min was insufficient time for participants to adequately describe all of the objects. Having moved the position of the PBS, we were able to give participants an open-ended amount of time to complete the imagination test. Participants were allowed to work in their own time until they were satisfied with their descriptions for all of the items on the questionnaire.

In the original experiment and Experiments 1 and 2, no mention of psi testing or ESP was made to the participants at any time during the experiment. However, this technique is open to the criticism that the participants were not motivated to perform psi (although a psi effect was found in the original experiment). In this experiment, participants were informed of the positive results found in the original experiment and were told that the purpose of the experiment was to measure ESP. Participants were told that the envelopes stapled to the back of the imagination test contained ESP targets, but they were not told what these targets constituted. Thus, the participants were aware that they were involved in an ESP experiment but had no explicit reason to connect the contents of the envelopes to the slides they had seen.

Sessions 2 and 3

In this experiment, the two groups remained separate, and NR was the only experimenter present. Participants were given a picture test and were allowed to complete it in their own time. These sessions had approximately 3-week intervals between them.

Session 4

As in Sessions 2 and 3, the two groups were tested separately. NR, who had been responsible for preparing the ESP targets, was not present for this session. Participants were allowed to complete the picture test in their own time, and after these were collected, they were given the picture memory test.

Data Handling

The data handling for this experiment was the same as in Experiment 1.

Results

Once again each participant was given an error score according to how many confusions were made between the objects seen and the objects imagined and a false memory score for how many objects the participant wrongly categorised as seen when they had been imagined. Each participant also had a PBS score.

An ESP hit was scored when a false memory (i.e., the participant reported having seen an object when he or she had in fact been asked to imagine it) corresponded with one of the target pictures. A miss was counted when a false memory corresponded with one of the nontarget pictures.

False Memories

The number of false memories was increased; 60 participants made a total of 148 false memory errors. There were only 51 errors in the opposite direction.

Correlations With Belief

Once again we looked for a correlation between false memories and belief. However, once again, no correlation was found, $r_s(79) = -.178$, $p = .11$. There was also no correlation between the total number of errors and the belief score, $r_s(79) = -.072$, $p = .52$.

ESP

The number of false memories each participant made for target objects was compared with the number for nontarget objects (ESP hits vs. misses). There were 73 hits and 75 misses in total, a nonsignificant difference, $t(79) = -0.22$, $p = .829$.

Discussion

Again, the first hypothesis was not confirmed. That is, there appears to be no correlation between a person's belief in the paranormal and his or her susceptibility to false memories in this experimental situation. The second hypothesis was also not confirmed. That is, no more false memories were obtained on the pictures used as clairvoyance targets than those not used.

False Memory Production

In Experiment 3, it seems that we were much more successful at specifically producing false memories (148 false memories compared with only 51 false imaginings). The number of false memories obtained was

nearly three times higher than the number of false imaginings. Here we believe we can clearly demonstrate that we successfully created false memories for objects.

In Experiment 1, participants were required to attend a minimum of one session between when they first saw the objects and the final recall. Twelve participants attended only one intervening session, whereas 14 attended both. Was there a difference in the number of false memories attained for those participants who were asked to reinforce their descriptions of the imagined objects once rather than twice during the 3-week period? The 12 participants who attended only one intervening session made 13 false memory errors, whereas the 14 participants who attended both only made 6. This is somewhat counterintuitive, as one might expect that it is the repeated prompting to give information about an imagined event or object that leads to false memory formation (see Orne, 1979). When a *t* test was conducted, this difference was not significant, $t(24) = 1.51$, $p = .15$, but it remains something of a puzzle. Perhaps participants were reminded by the questionnaire which objects they had imagined. This seems unlikely given that the content of the questionnaires was carefully considered so that they would provide no clue as to whether an object had been seen or imagined. In the extension of the design, the only criterion for being included in the data collection was that participants attend the first and last sessions. The removal of this constraint does not appear to have reduced the number of false memories obtained, and it is possible that the picture tests may be serving no useful function.

Did the fact that participants were asked to imagine some objects once and others three times affect the number of false memories? In Experiment 3, there were so many false memories that it was possible to see whether the errors tended to be made on objects the participants had been asked to imagine three times or objects they had been asked to imagine once. For the objects participants were asked three times to imagine, a total of 64 false memories were counted. For objects they were asked once to imagine, 84 false memories were counted. There was no significant difference, $t(24) = -1.17$, $p = .27$. This suggests that the number of times a participant is asked to imagine an object makes no difference to their propensity to form a false memory of the object. However, we cannot rule out that the variation in the number of times the participants were asked to imagine objects itself increased their confusion and generated more false memories.

ESP

The failure to obtain ESP in either Experiment 1 or Experiment 3 was disappointing. The result found in the original experiment appeared quite strong and was found despite the fact that (a) the ESP task had been embedded, (b) participants were given no expectation of psi occurring, and (c) there was a relatively long period before feedback about results

(and no individual results were given). Thus, such criticism of this series of experiments would appear unwarranted. It would be unfair to suggest that the failures to obtain psi were a result of experimenter skepticism, as the same experimenters carried out the original experiment. It also cannot be said that there were any better safeguards against cheating in these experiments.

There were few differences between the original and the replication (Experiment 1). The main difference was that the ESP targets were assembled in a slightly different way to ensure that there was a better distribution of targets. This might suggest that the original result was perhaps due to a stacking effect, but close analysis revealed that this could not account for the original result (see Blackmore & Rose, 1997). Thus, the most parsimonious explanation for the original result appears to be that it was a chance effect.

Correlations With Belief

In all three experiments, and the original reported in 1997, we found no relation between the number of false memories and a participant's belief in the paranormal scores. Thus, we found no evidence for our first hypothesis that the confusion of reality and imagination leads people to misinterpret their own imagination as reality, perhaps leading them to conclude that a psychic phenomenon has occurred when in fact it has not. However, given the well-documented problems of the PBS, it may be the case that the revised Tobacyk scale is simply not a valid enough method of measuring belief to allow us to determine any relation with false memory. Although believers in the paranormal may not be more prone to false memory creation, it cannot be ruled out that the character of some of their false memories created in everyday life will involve paranormal topics.

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