Psychological aspects of the alien contact experience

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Abstract

Previous research has shown that people reporting contact with aliens, known as "experiencers", appear to have a different psychological profile compared to control participants. They show higher levels of dissociativity, absorption, paranormal belief and experience, and possibly fantasy proneness. They also appear to show greater susceptibility to false memories as assessed using the Deese/Roediger-McDermott technique. The present study reports an attempt to replicate these previous findings as well as assessing tendency to hallucinate and self-reported incidence of sleep paralysis in a sample of 19 UK-based experiencers and a control sample matched on age and gender. Experiencers were found to show higher levels of dissociativity, absorption, paranormal belief, paranormal experience, self-reported psychic ability, fantasy proneness, tendency to hallucinate, and self-reported incidence of sleep paralysis. No significant differences were found between the groups in terms of susceptibility to false memories. Implications of the results are discussed and suggestions are made for future avenues of research.

Introduction

Although it is hard to estimate just how many people have conscious memories of apparently being abducted by aliens (French, 2001), it is likely that the figure runs into at least several thousand worldwide. These memories often involve such elements as being taken on board spaceships and being subjected to medical examination. Several commentators have considered the psychological factors that may be relevant to understanding this phenomenon (e.g., Appelle et al., 2000; Baker, 1992; Clancy, 2005; French, 2001; Holden and French, 2002; Newman and Baumeister, 1996; Spanos, 1996).

Clancy et al. (2002) used a variant of the Deese/Roediger-McDermott (DRM) paradigm (Deese, 1959; Roediger and McDermott, 1995) to investigate this possibility. The paradigm involves the presentation of word lists to participants. Within each list, all of the words presented are associated with a single theme word, often referred to as the *critical lure,* that is itself not presented. For example, the list might include the words *sour, candy, bitter,* and *sugar,* all of which are strongly associated with the word *sweet*, although the word *sweet* would not itself be presented. On subsequent recall and recognition tests, a substantial proportion of the participants are likely to report that the word *sweet* was in fact presented. Using this technique, Clancy et al. compared three groups. The first group consisted of people with conscious (allegedly "recovered") memories of having been abducted by aliens, the second consisted of people who believed they had been abducted by aliens but had no conscious memories of the event, and the third consisted of people who did not believe that they had ever been so abducted. The groups differed in terms of their propensity to falsely recognise lure words, with the first group showing the highest susceptibility and the third group the lowest.

A great deal of indirect evidence also supports the hypothesis that those reporting memories of alien contact ("experiencers") might be more susceptible to false memories. Many of the psychological variables that appear to be correlated with susceptibility to false memories are also correlated with paranormal belief and the tendency to report anomalous experiences, including claims of alien contact (French, 2003).

For example, a number of studies have reported that susceptibility to false memories appears to be correlated with dissociativity (e.g., Eisen and Carlson, 1998; Heaps and Nash, 1999; Wilson and French, 2006; Winograd et al., 1998). Dissociation can be thought of as a lack of integration between conscious awareness and mental activity. Powers (1994) reported higher levels of dissociativity amongst experiencers than control samples.

Tellegen and Atkinson (1974) define the personality trait of absorption as "openness to absorbing and self-altering experiences, a trait related to hypnotic susceptibility". A number of studies have reported an association between susceptibility to false memories and absorption (e.g., Eisen and Carlson, 1998; Platt et al., 1998) and Clancy et al. (2002) reported that their experiencer samples had significantly higher absorption scores than the control sample.

The concept of fantasy proneness was first discussed by Wilson and Barber (1983). The fantasy prone personality has an extremely rich and vivid fantasy life, claiming that their fantasies are "as real as real". They admit that sometimes they confuse imagination and real events. They report vivid childhood memories, a wide range of ostensibly paranormal experiences, and intense religious experiences. They often believe that they themselves have strong psychic abilities, such as healing.

Differences in fantasy proneness between experiencers and non-experiencers have not previously been demonstrated using questionnaires (Rodeghier et al., 1991; Spanos et al., 1993), although it should be noted that among participants reporting UFO-related experiences, the intensity of the experience was found to correlate with fantasy proneness by Spanos et al. (1993). Retrospective biographical analyses, on the other hand, have suggested that experiencers do demonstrate features of fantasy proneness (e.g., Bartholomew et al., 1991).

Dissociativity, absorption and fantasy proneness are overlapping concepts and all three inter-correlate significantly (e.g., Glicksohn and Barrett, 2003). The association between such variables and susceptibility to false memories is often discussed within the framework of models of reality monitoring (e.g., Johnson and Raye, 1981). Any factor which makes it more difficult to distinguish between past mental events that were internally generated (as a result of imagination, dreams, fantasy, and so on) and those which are based upon memories for objective events will heighten susceptibility to false memories. If a general problem in reality monitoring underlies this type of psychological profile, one would expect that similar problems would arise in the perceptual domain; that is to say, such individuals might also be expected to be more prone to hallucinations. This does indeed appear to be the case (e.g., Glicksohn and Barrett, 2003).

Recent systematic research by Basterfield and Thalbourne (2002) has confirmed anecdotal reports (e.g., Basterfield, 2001; Bullard, 1987; Druffel and Rogo, 1980; Evans, 1983, 1998; Gotlib, 1994; Mack, 1994; Randles, 1988; Schwarz, 1983; Spencer, 1994; Vallee, 1977) of higher levels of paranormal belief and reports of ostensibly paranormal experiences among those claiming alien contact. The current project attempted to replicate this basic finding.

Many commentators believe that the experience of sleep paralysis is one of the triggers that lead some people to develop the belief that they have been abducted by aliens (e.g., Holden and French, 2002; McNally and Clancy, 2005). Sleep paralysis is a common but frightening experience that takes place in the state between sleep and wakefulness (French and Santomauro, 2007). During sleep paralysis, sufferers become aware of the fact that they cannot move and the general cognitive state of the sufferer appears to be a blend of normal waking consciousness and dream mentation. Sleep paralysis is often associated with a strong sense of presence, visual and auditory hallucinations, intense fear, difficulty breathing, and anomalous sensations such as out-of-body experiences (e.g., Cheyne and Girard, this issue; Easton et al., this issue; Terhune, this issue). It is a common belief among ufologists that these symptoms are indicators of probable alien abduction even though the sufferer may initially have no actual memories of aliens whatsoever. Anyone encountering such claims who had suffered from sleep paralysis would therefore run the risk of accepting this apparent explanation for their own puzzling experiences, possibly ultimately resulting in a detailed false memory of alien contact if techniques are employed, such as hypnosis or guided imagery, to "recover" the memory that the individual now feels must have been repressed.

A number of specific hypotheses were therefore tested in this project: (a) experiencers would be more susceptible to false memories than an age- and gender-matched control group in terms of false recall and false recognition on a version of the DRM task; (b) experiencers would have higher scores on various questionnaire measures assessing the psychological factors described above and (c) experiencers would report higher levels of the incidence of sleep paralysis.

Method

Participants

The experiencer category included anyone who claimed to have had extraterrestrial contact. These reported experiences included UFO sightings (repeatedly over many years in most cases), with the age of the first sighting varying from four years old or less to the late twenties. Most experiencers reported direct contact with a variety of alien life-forms as well as telepathic communication with aliens. Of the 19 experiencers who took part in the study, many reported experiences which reflect common themes in the UFO literature. For example, six reported believing that the aliens had implanted some device in their bodies, one believed that his terrestrial parents were not his real parents (his real parents being extraterrestrials), two reported finding marks on their bodies caused by the aliens, one reported ‘missing time’ experiences, and three reported believing that aliens had removed foetuses from them or caused them to have miscarriages. A wide variety of other alien-related memories were also reported.

Participants were recruited via newspaper and radio publicity of the project, web site appeals and word of mouth. The experiencer and control groups were matched on age and gender and each consisted of 19 participants, 8 male and 11 female. The mean age of the experiencers was 45.0 years (SD = 13.7), ranging from 23 to 72 years. The mean age of the control group was 45.5 years (SD = 14.5), ranging from 21 to 74 years. Participants came from a wide range of backgrounds. They were tested either at Goldsmiths College, another educational institution, or in their own homes. They received travelling expenses and a small payment (typically £10) in return for their participation.

Materials

Participants completed the following paper-based questionnaires:

Anomalous Experiences Inventory (AEI; Kumar et al., 1994): This is a 70-item true-false inventory examining self-reports of beliefs and experiences of paranormal phenomena. It consists of various sub-scales: paranormal belief (Belief, 12 items, e.g., "I believe that mind can control matter"), anomalous/paranormal experiences (Experience, 29 items, e.g., "I often seem to become aware of events before they happen"), paranormal ability (Ability, 16 items, e.g., "I can influence or change an event by concentrating on that event"), fear of the paranormal (Fear, 6 items, e.g., "Hearing about the paranormal or psychic experiences is very scary"), and use of drugs and alcohol (Drugs, 7 items, e.g., "I have tried mind-altering substances"). The scale is acceptable in terms of its psychometric properties (Gallagher et al., 1994).

Wilson-Barber Inventory of Childhood Memories and Imaginings: Children's Form (ICMIC, Myers, 1983): This is a 48-item true-false inventory that examines memory for imaginative activities and fantasies from childhood and how childhood imaginings affect adult experiences or remain a part of adult functioning (e.g., "When I was younger, I enjoyed fairytales", "Now, I still live in a make-believe world some of the time"). It is the most widely used questionnaire measure of fantasy proneness and has satisfactory reliability and validity (Myers, 1983).

Launay-Slade Hallucination Scale (LSHS: Launay and Slade, 1981): This scale consists of 12 true-false items measuring predisposition to hallucinations. The items include questions about vivid or intrusive thoughts (e.g., "Sometimes a passing thought will seem so real that it frightens me"), vivid daydreams (e.g., "The sounds I hear in my daydreams are generally clear and distinct"), overt auditory hallucinations (e.g., "I often hear a voice speaking my thoughts aloud") and overt visual hallucinations ("On occasions I have seen a person's face in front of me when no-one was in fact there"). The scale has been shown to be reliable (e.g., Bentall and Slade, 1985) and valid (e.g., Serper et al., 2005).

Tellegen's Absorption Scale (TAS; Tellegen and Atkinson, 1974): A 35-item true-false scale comprising measures of openness to experience cognitive-affective alterations across a range of situations, with good levels of validity and reliability (e.g., Glicksohn and Barrett, 2003).

Australian Sheep-Goat Scale (ASGS; Thalbourne, 1995): The 18-item true-false version of this scale measures various aspects of belief in and experience of the paranormal. Items relate to the three core concepts of the paranormal: extrasensory perception (e.g., "I believe in the existence of ESP"), psychokinesis (e.g., "I believe I have personally exerted PK on at least one occasion"), and life after death (e.g., "I believe in life after death"). The scale is widely used and has proven validity and reliability (Thalbourne, 1995; Thalbourne and Delin, 1993).

Curious Experiences Survey (CES; Goldberg, 1999): This 31-item measure is a revised version of the Dissociative Experiences Scale (Bernstein and Putnam, 1986) including three new items and a more user-friendly 5-option response format. Respondents are asked to indicate how often they have had various experiences (such as "found myself dressed in clothes I didn't remember putting on" and "felt like I was dreaming when I was awake"). Psychometric properties of the scale are satisfactory (Goldberg, 1999).

Nocturnal Experiences Questionnaire (NEC; French et al., 2002): This scale assesses the self-reported incidence of episodes of sleep paralysis as well as details of typical episodes. The only response analysed for this report relates to self-reported incidence. Participants responded to the following question: "Have you ever had the experience as you were going to sleep, or perhaps as you were waking up, of feeling paralysed, as if you could not move your arms or legs and could not speak or cry out?" Response options were "Never", "Once", "Two to five times" and "More than five times".

Procedure

Participants first completed the pencil-and-paper tests described above, without any imposed time limit (they typically took about 20 minutes). They then completed a computerised version of the Deese/Roediger-McDermott (DRM) task. The version used was based closely upon Experiment 1 of Robinson and Roediger's (1997) study. The twenty-four 15-word study lists and the accompanying critical lures that were used in Robinson and Roediger's Experiment 1, Clancy et al.'s (2002) experiment and Roediger and McDermott's (1995) Experiment 2 were modified for use in this experiment (e.g., by Anglicising some of the more American words). Randomised word sequences were matched between participants in the control group and the experiencer group. Twenty lists were presented in total, four lists each of 3, 6, 9, 12 and 15 words. Participants studied the first 3, 6, 9, 12 or 15 words from each list as they appeared in the appendix of Roediger and McDermott (1995). The order in which the lists were presented was chosen randomly for each participant (but matched between groups). All words were presented on a computer screen in white on a black background.

Participants were instructed to pay close attention to the words presented to them because they would be asked to recall them later. The words from the first randomly chosen list was presented to the participant in a continuous sequence in the centre of the computer screen for 2 seconds each. Then a distractor task was given which consisted of four 2-digit addition sums that were presented on the screen and participants were instructed to complete these sums on paper. The participants had 30 seconds in which to do this.

Participants were asked to recall and write down on paper as many of the presented words as they could remember from the each list. They were asked not to guess any words. Robinson and Roediger (1997) reported that "casual observation revealed that most subjects completed recalling well before the end of the recall period" which in their experiment was 1.5 minutes. We chose to allow 6 seconds per word studied for the recall task. This procedure was repeated for all lists.

After all 20 of the lists of words had been presented a recognition task was given. This consisted of 80 words being presented one at a time on the computer screen with participants responding using the Y (yes) and N (no) keys on the keyboard. The 80 words comprised: the 24 critical lures, 8 unrelated filler items, 2 words each from the 20 presented lists (these 2 words were randomly selected from the first 3 words on each of the 20 lists) and 2 words each from each of the 4 lists that were not presented (again these 2 words were randomly selected from the first 3 words on each of the 4 lists).

Participants then completed some computerised tests of psychic functioning and finally a semi-structured interview about their experiences and general background (only the results of the pencil-and-paper tests and the memory tests will be reported here). All participants were fully debriefed following the completion of data collection.

Results

Considering first the results of the computerised memory tests, separate ANOVAs were carried out on the false recall and false recognition data, each with list length (3, 6, 9, 12, and 15 semantic associates) as a repeated measures factor and participant group (experiencer vs. control) as a between-group factor (recognition data for one experiencer were lost due to technical problems). A summary of these data is presented in Table 1. List length was included as a factor in the analysis as previous research (e.g., Robinson and Roediger, 1997; Clancy et al., 2002) has shown that false recall and false recognition rates increase as a function of the number of semantic associates presented. These findings were replicated in the present study with significant main effects for list length with respect to both recall ($F(4, 144) = 22.03$, $p < .001$, partial $\eta^2 = .38$) and recognition ($F(4, 140) = 8.86$, $p < .001$, partial $\eta^2 = .20$). However, no significant effect of participant group was found ($F(1, 36) = .01$, partial $\eta^2 =$

.00, for recall; $F(1, 35) = 1.88$, partial $\eta^2 = .05$, for recognition), despite the fact that the experiencer group showed higher levels of false recognition at all list lengths (see Table 1). The interaction between participant group and list length was also non-significant in both analyses ($F(4, 144) = .01$, partial $\eta^2 = .01$, for recall; $F(4, 140) = .50$, partial $\eta^2 = .01$, for recognition).

---- Insert Table 1 about here ----

Questionnaire scores of the experiencer and control group participants were compared using unrelated t-tests (two-tailed). A summary of the results of these analyses is presented in Table 2. Significant differences were found between the groups for all measures except AEI (Fear), AEI (Drugs and Alcohol Use) and scores on the ICMIC, with the difference in scores on the latter approaching statistical significance. Non-parametric analysis of the single item relating to incidence of sleep paralysis from the Nocturnal Experiences Questionnaire (French et al., 2002) revealed that the self-reported incidence of sleep paralysis was higher in the experiencers than the control group (Mann Whitney U = 83, $p = .002$).

--- Insert Table 2 about here ---

Correlations between the main psychometric measures used in this study across both participant groups combined are presented in Table 3. In line with previous studies, all of the main measures intercorrelate at a highly significant level. Table 4 presents the correlations between these measures and the total false recall and false recognition scores across all participants. No significant correlations were found for false recall scores, but false recognition scores correlated with absorption and tendency to hallucinate (although these correlations would not have remained significant had alpha levels been adjusted for multiple testing).

--- Insert Tables 3 and 4 about here ---

Discussion

Our results confirm that experiencers have a different psychological profile from non-experiencers in that they show higher levels of belief in and experience of the paranormal, self-reported paranormal abilities, tendency to hallucinate, absorption, dissociativity, and incidence of sleep paralysis. In considering the marginally significant difference between the groups on fantasy proneness, note that when these data were analysed using either a related *t*-test or a one-tailed unrelated *t*-test, both of which would be justifiable, the difference between the groups is significant. It seems reasonable to conclude therefore that our results also show higher levels of fantasy proneness in experiencers than controls.

Much current theorising and experimental work regarding susceptibility to both false memories and hallucinations is based upon the reality monitoring model proposed by Johnson and Raye (1981; see also Johnson et al., 1993). This approach proposes that hallucinations arise as a consequence of a source monitoring error whereby internally generated imagery is misattributed to an external source. Similarly, false memories may arise if memories of internally generated events such as imaginings, fantasies and dreams are wrongly interpreted as memories for events which actually took place in objective reality (French, 2003). The decision as to whether a memory refers to an internally generated mental event or an external event is based partly upon the characteristics of the memory itself (e.g., the amount of perceptual detail, with memories for external events typically having more perceptual detail and clarity than mental events). Additionally, however, the criteria used to decide whether a memory is "real" or not also depends upon the criteria used to make this decision. Individuals may vary in the degree to which they are willing to accept, say, a fleeting image as a genuine memory fragment for an event which really took place.

The reality monitoring model provides a useful framework for understanding why the psychological profile of experiencers, and believers in the paranormal in general, may be susceptible to hallucinations and false memories which may form the basis for their reports of ostensibly paranormal experiences. With respect to hallucinations, it could either be the case that reports of hallucinatory experiences reflect particularly vivid imagery or the application of lax criteria in distinguishing imagination from perception. For example, absorption, dissociation and fantasy-proneness are all correlated with hypnotic suggestibility as assessed by standard scales. In this context, a number of investigators have used the “White Christmas” test to investigate susceptibility to hallucinations in both psychotic and normal samples (e.g., Barber and Calverley, 1964; Mintz and Alpert, 1972; Young et al., 1987). These studies generally involve asking participants to imagine hearing the Bing Crosby classic although the song itself is not actually played. A substantial majority of hallucinating schizophrenic patients report hearing a clear auditory image during the test, but so do a substantial minority of non-psychotic participants, especially those scoring high on the LSHS. Some participants report believing that the record was actually being played. Such findings have been interpreted as either reflecting hallucinatory reports based upon vivid imagery (e.g., Mintz and Alpert, 1972) or lax judgement criteria (e.g., Bentall and Slade, 1985). Merckelbach and van de Ven (2001) replicated the basic effect with a sample of student participants, showing that participants who reported hearing “White Christmas” against a white noise background scored more highly on the LSHS and a measure of fantasy proneness. They proposed that another possible explanation of this phenomenon might be the tendency on the part of fantasy prone participants to endorse odd items. Clearly, none of these explanations is mutually exclusive and further research is required. However, it is worth noting that a number of investigators have presented evidence suggesting more vivid self-reported imagery in believers in the paranormal than non-believers (e.g., Diamond and Taft, 1975; Finch, 2002; Greening, 2002).

The reality monitoring framework has also been useful in interpreting findings from investigations of the neural correlates of false memory using the DRM and similar paradigms (see Schacter and Slotnick, 2004, for a review). With respect to the DRM, it is assumed that strong activation of the critical lure words is a consequence of spreading semantic activation from the associated words which are presented, i.e., it is an internally generated mental event. However, memories of the words which are actually presented would be associated with a higher level of sensory reactivation than the lure words. Early neuroimaging studies (Schacter et al., 1996; Schacter et al., 1997) demonstrated that brain areas typically involved in episodic memory processing (including dorsolateral/anterior prefrontal, medial parietal, and medial temporal regions) were preferentially activated during both true and false recognition compared to a common baseline. Subsequent fMRI research by Cabeza et al. (2001), however, showed that if the perceptual processing of stimuli was increased at the encoding phase, differences between true and false recognition in terms of brain activation did emerge. Specifically, greater activation occurred for true recognition within two regions of the medial temporal lobe, i.e., the parahippocampal gyrus and the hippocampus, suggesting greater recovery of sensory or contextual information during true than false recognition. Okado and Stark (2003) used fMRI to study brain activation during true recognition of previously perceived events and false recognition of previously imagined events. A number of regions showed relatively greater activation during true recognition, including bilateral occipital cortices and right parahippocampal gyrus. This was once again interpreted as reflecting greater activation associated with the retrieval of perceptual information for true memories.

Recent research using fMRI has even begun to distinguish between different types of false memory. Garoff-Eaton et al. (2005) used the fMRI technique to investigate neural activity associated with true recognition of abstract shapes, false memory for related abstract shapes and false memory for unrelated abstract shapes. Greater activity in the prefrontal cortex, the parietal cortex and the medial temporal lobe were associated with both true recognition and related false recognition, whereas unrelated false recognition was associated with activity in language processing regions.

A similar picture emerges when we consider the recent history of event-related potential (ERP) studies of true and false recognition, which allow for greater temporal resolution of the neural processes involved at the expense of spatial precision. Early studies (Düzel et al., 1997; Johnson et al., 1997) suggested that brain activity was very similar for both types of recognition but more recent studies (e.g., Curran et al., 2001; Fabiani et al., 2000) have revealed consistent differences between the two. Specifically, greater activation over the parietal area between 400 and 800 ms has been interpreted as a marker for sensory reactivation during true recognition.

The reality monitoring framework can also be applied to consideration of the differences in brain activation associated with false recognition in contrast to correct rejection. Gonsalves and Paller (2000) presented participants with words and instructed them to imagine the common objects to which they referred. On some trials, a photograph of the object was presented 1800 ms after the word. Recognition memory for the photographs was subsequently tested and participants sometimes indicated that a photograph had been presented when in fact the object had only been imagined. Posterior ERPs were more positive at encoding for words which subsequently produced false recognition of the associated photograph, consistent with the idea that more vivid imagery was associated with greater activation of sensory cortex at encoding. In a subsequent fMRI version of this investigation, Gonsalves et al. (2004) again found greater activation at encoding in areas associated with visual imagery and spatial attention, including precuneus and inferior parietal cortex, for false memories of imagined objects than for correct rejections. These findings support the idea that stronger visual imagery will produce more reality monitoring errors by making it more difficult to distinguish between memories for perceived and imagined events.

It is clear that our understanding of the neural underpinnings of false recognition is becoming clearer thanks to the application of modern neuroimaging techniques during performance on the DRM and similar tasks. However, no differences were found between our groups in terms of performance on the DRM task in the current study. Our failure to replicate the effects reported by Clancy et al. (2002) is puzzling. It should be noted that we used a different version of the DRM task to that used by Clancy and colleagues (e.g., we presented the word lists visually on a computer screen whereas they presented the lists on a tape recorder) but one would not anticipate that such changes in procedure would make much difference to the results if the findings reported by Clancy et al. reflected general differences between the groups in terms of susceptibility to false memories.

One possible reason for the apparent discrepancy between our results on the DRM task and those of Clancy et al. is the difference between our participant samples. Their study involved three different types of participant: those who had apparently “recovered” (typically as a result of hypnotic regression) once-forgotten memories of alien abduction, those who believed that they had been so abducted (typically based upon memories for sleep paralysis) but had no conscious memories of the event, and those who did not believe that they had been so abducted. The three groups all differed in their susceptibility to false memories as assessed by the DRM task. None of their participants, therefore, reported memories of alien contact that they claimed they had always been able to remember. In contrast, only six of our experiencers reported ever having been hypnotised. This does not, of course, indicate that their claims of alien contact reflected true memories as there are many ways in which false memories can occur other than the use of hypnotic regression and other so-called "memory recovery" techniques, such as the use of guided imagery. For example, it seems likely that people with an interest in UFOs would be likely to imagine what it would be like to experience alien contact as a result of media exposure to such accounts. It is well-established that simply imagining events that did not actually occur can lead susceptible individuals to believe that they did occur, an effect referred to as *imagination inflation* (e.g., Garry et al., 1996).

Given the psychological profile of our sample of experiencers, it seems plausible that a greater susceptibility to false memories might be demonstrated in such participants if a different technique were used to measure this susceptibility. Misremembering words from lists is intuitively quite different from reporting detailed false memories for entire episodes and it is by no means clear at this stage that identical psychological and neuronal processes underlie the two. One obvious candidate for an alternative technique to investigate possible differences between experiencers and controls in terms of susceptibility to false memories would be the imagination inflation method referred to above. A second possibility would be the use of the so-called "crashing memories" paradigm. This involves asking participants to recall where they were, who they were with, and what they were doing when they first saw the footage of memorable events in the news. Previous research has shown that sizeable minorities of respondents will report such details even for real events that were never actually caught on camera (e.g., the crashing of an El Al Boeing 747 into a block of flats in

Amsterdam: Crombag et al., 1996; the car crash in Paris in which Princess Diana and Dodi Fayed lost their lives: Ost et al., 2002). Wilson and French (2006) recently employed this technique and demonstrated that those participants reporting false memories of non-existent footage of a bombing in a Bali nightclub scored higher than other respondents on various measures on paranormal belief and experience.

Although much has been learned regarding the patterns of brain activation associated with false recognition, considerably less research has been directed at activation patterns associated with false recall. This is mainly due to the fact that there are many experimental techniques, such as the DRM, that are suitable for use in neuroimaging studies, which require sufficient numbers of time-locked trials of different types to allow for the separation of signal from noise. Such paradigms do not currently exist with respect to the formation of false memories for entire episodes and may, arguably, be impossible to develop. However, suitable techniques that focused on other aspects of false recall might be developed for use in future neuroimaging studies. Neuroimaging approaches have great potential in terms of improving various aspects of our understanding of the neuropsychology of susceptibility to false memories such as whether individual differences reflect strength of imagery or the adoption of lax criteria.

The psychological profile of the experiencers who took part in this study appears to be simply an extreme version of the psychological profile of believers in the paranormal in general and that profile appears to be one that would be associated with greater susceptibility to hallucinations and false memories. This supports the argument that at least some reports of ostensibly paranormal experiences are likely to be based upon hallucinations and false memories (French, 2003; French and Wilson, 2006). It should be borne in mind, however, that direct personal experience of ostensibly paranormal events is only one of the factors that underlie paranormal belief. Others include acceptance of such reports from trusted others and positive media coverage of such claims. Future researchers should pay greater attention to the distinction between those who claim direct personal experience of the paranormal and those who believe for other reasons. It is only the former that we would expect to demonstrate similar (if possibly less extreme) psychological profiles to the experiencers in the current study.

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Table 1: False recall and false recognition data for each group by list type.

	Number of associates					
	3	6	9	12	15	Overall
	False recall					
Experiencers (*N* = 19)						
Prop.	.03	.18	.38	.42	.32	.27
SD	(.08)	(.20)	(.26)	(.26)	(.25)	(.15)
Controls (*N* = 19)						
Prop.	.04	.22	.34	.38	.37	.27
SD	(.09)	(.22)	(.24)	(.28)	(.29)	(.13)
	False recognition					
Experiencers (*N* = 18)						
Prop.	.40	.56	.59	.67	.74	.59
SD	(.31)	(.28)	(.34)	(.28)	(.28)	(.24)
Controls (*N* = 19)						
Prop.	.33	.43	.58	.54	.58	.49
SD	(.28)	(.26)	(.34)	(.29)	(.35)	(.21)

Table 2: Summary of unrelated *t*-test comparisons (two-tailed) between experiencers and control group on psychometric measures.

Scale	*N* in each group	Experiencer mean (SD)	Control mean (SD)	Mean difference (SD)	95% CIs Lower	95% CIs Upper	*t*-value (df)	*p*	Omega-squared
AEI: Experience	17	17.88 (5.60)	3.65 (4.78)	14.23 (1.79)	10.60	17.87	7.97 (32)	<.001	.65
AEI: Belief	18	9.89 (1.61)	4.28 (3.32)	5.61 (.87)	3.81	7.40	6.45 (24.52)	<.001	.60
AEI: Ability	18	6.72 (3.08)	1.33 (2.35)	5.39 (.91)	3.53	7.25	5.90 (34)	<.001	.48
AEI: Fear	18	1.22 (.88)	1.22 (1.35)	.00 (.38)	-.77	.77	.00 (34)	not sig.	.00
AEI: Drugs/Alcohol	18	2.44 (1.54)	2.33 (1.61)	.11 (.53)	-.96	1.18	.21 (34)	not sig.	.00
TAS	19	20.42 (7.38)	12.89 (6.02)	7.53 (2.19)	3.10	11.96	3.45 (36)	.001	.22
LSHS	19	4.16 (2.95)	2.26 (1.97)	1.90 (.81)	.25	3.54	2.33 (36)	.026	.10
ASGS	19	28.26 (4.47)	9.42 (8.81)	18.84 (2.27)	14.25	23.44	8.32 (26.70)	<.001	.70
ICMIC	19	19.00 (8.28)	13.21 (10.16)	5.79 (3.00)	-.31	11.89	1.93 (36)	not sig. (p = .062)	.07
CES	19	56.05 (18.42)	45.47 (7.72)	10.58 (4.58)	1.29	19.87	2.31 (36)	.027	.10

Key: AEI = Anomalous Experiences Inventory; TAS = Tellegen's Absorption Scale; LSHS = Launay-Slade Hallucinations Scale; ASGS = Australian Sheep-Goat Scale; ICMIC = Inventory of Childhood Memories and Imaginings: Children's Form; CES = Curious Experiences Survey.
Note: If Levene's test showed significantly different variances, degrees of freedom were adjusted accordingly. Occasionally, participants omitted to respond to one or more items from the administered scales. When this happened, both their score and that of their matched participant were omitted from the relevant analysis.

Table 3: Pearson intercorrelations between the main psychometric measures used in this study across both participant groups combined. *N* = 38, except for AEI: Belief and AEI: Ability (*N* = 37) and AEI: Experience (N = 35), due to missing data.

	AEI:B	AEI:A	TAS	LSHS	ASGS	ICMIC	CES
AEI: Experience	.833	.904	.782	.661	.861	.718	.675
AEI: Belief		.754	.562	.498[a]	.883	.656	.541[b]
AEI: Ability			.693	.622	.854	.602	.665
TAS				.759	.543	.776	.744
LSHS					.456[c]	.561	.449[d]
ASGS						.561	.449
ICMIC							.689

Note: All two-tailed *p*-values (not corrected for multiple tests) <.001 except those marked with superscripts, which had *p*-values as follows: a = .002, b = .001, c = .004, and d = .005. Key: As for Table 2.

Table 4: Pearson correlations between the main psychometric measures used in this study and total scores for false recall and false recognition across both participant groups combined (note that some *N* values, given in italics, are less than 38 due to missing data).

	False recall	False recognition
AEI: Experience	.012	.260
N	*36*	*35*
AEI: Belief	-.043	.192
N	*37*	*36*
AEI: Ability	.015	.138
N	*37*	*36*
TAS	.002	.346[a]
N	*38*	*37*
LSHS	.173	.400[b]
N	*38*	*37*
ASGS	-.023	.198
N	*38*	*37*
ICMIC	.064	.283
N	*38*	*37*
CES	.071	.144
N	*38*	*37*

Note: All two-tailed *p*-values (not corrected for multiple tests) >.05 except those marked with superscripts, which had *p*-values as follows: a = .036 and b = .014.

Key: as for Table 2.