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Perceptual and Memory Capabilities of Witnesses to Anomalous Visual Phenomena

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ABSTRACT: The perceptual and memory capabilities of witnesses to anomalous visual phenomena (AVP) were examined in four experiments. Experiments 1 and 2 tested witnesses' abilities to access explicit and implicit memory, Experiment 3 explored witnesses' abilities to discriminate between genuine and abstract objects, and Experiment 4 examined witnesses' propensity to misidentify fragmented objects. No differences were found between witnesses and non-witnesses on any task. Nevertheless, a number of medium- and large-sized effects emerged. Together, these suggested that had power been greater, witnesses would have been shown to (1) require less time than non-witnesses to recall specific memories, (2) be more likely to identify abstract objects as legitimate, (3) require fewer presentations to identify fragmented and ambiguous objects and (4) be more likely to misidentify these same objects. Some evidence was also produced to suggest witnesses may actually outperform non-witnesses on the implicit memory task. Overall, the findings provide weak support for the involvement of perceptual and memory variables in the perception of AVP.

INTRODUCTION

There are numerous ways in which sightings of anomalous visual phenomena (AVP) are explained, although historically the two most popular positions treat such objects as either (1) literally real (for example a ghost, lake monster or extraterrestrial spacecraft) or (2) as incidents that can be explained purely in terms of hoaxes, or known physical laws and/or psychological states.

With respect to the second position, explanations other than hoaxes can be further categorised as either *hallucinatory* or *illusionary*, depending on circumstance. The hallucinatory hypothesis considers certain witnessed

anomalous experiences to be purely subjective, despite observers being convinced of their autonomous nature. Such experiences typically involve complex encounters with entities such as UFO occupants, rather than "mere" sightings, and explanations range from common, non-pathological states such as sleep paralysis (Cheyne, Rueffer, & Newby-Clark 1999; Sherwood 2002) to more serious psychoses (Meerloo, 1968).

The illusionary hypothesis better explains mere sightings, whereby the witness claims to have seen, for example, an unusual object in the sky or an apparition peering from the window of a deserted house. This hypothesis acknowledges that the stimulus for such an experience may be objectively real, but is entirely explainable through known physical laws and properties. Often the experience may never be reported because some observers, whilst appreciating the extraordinary appearance of the phenomenon, may nonetheless accept it as "probably something normal" (Westrum, 1977). In contrast, different observers might either subjectively *interpret* the same ambiguous experience as extraordinary at the time of the sighting, or experiences later unconscious confabulation such that it subsequently evolves into an anomalous experience. Models of constructive perception (e.g., Connor, 2001) and constructive/reconstructive memory (e.g., Bahrick, 1984) are the obvious theoretical reference points for these misjudgements. Thus, regardless of whether the stimulus shares characteristics with the popular form of a ghost, monster or flying saucer (e.g., a gnarled tree or a mammatus cloud), or possesses more subtle characteristics (e.g., an indistinct light), the experience is, or becomes, as real to the witness as any other personally relevant event. For instance, to some observers the planet Venus becomes "a metallic cigar with windows through which extraterrestrial occupants can be seen" (Evans, 1986). Occasionally, the hallucinatory and illusionary hypotheses complement one another, for example when an objectively real geophysical event such as a tectonic-strain plasma is initially interpreted as an unusual object (e.g., Persinger, 1983, 1985, 1990; Persinger & Derr, 1993), and simultaneously disrupts consciousness due to alterations in central nervous system (CNS) function in ostensibly "normal" individuals. It is these changes in consciousness that initiate the more complex encounter scenario, with the Virgin Mary, Angels, UFOnauts, or other entity-types potentially disgorged from the energy source.

A further development of the illusionary hypothesis suggests witnesses of AVP *are* witnesses simply because they possess inherent characteristics which positively correlate with the frequency and depth of their observations. The association between paranormal belief and inherent characteristics, such as personality and cognitive function (particularly reasoning ability) has previously been examined (e.g., Wolfradt, Oubaid,

Straube, Bischoff & Mischo, 1999: Gianotti, Mohr, Pizzagalli, Lehman, & Brugger, 2001). However, very little research has focused on actual anomalous experience, and of this almost exclusive attention has been directed towards the relationship between cases of personal contact and/or abduction by extraterrestrial-type entities and such variables as psychopathology (Clancy, McNally, Schacter, Lenzenweger, & Pitman; 2002), fantasy-prone personality (Bartholomew, Basterfield, & Howard, 1991; Day 2000) and escape-from-self (Newman & Baumeister, 1996; Newman, 1997). Little is known about the variables associated with anomalous sightings independent of contact, although the witnessing and reporting of UFOs has been associated with prior UFO belief (Spanos, Cross, Dickson, & DuBreuil, 1993; Paltry & Pelletier, 2001; Chequers, Joseph & Diduca 1997), which may not only determine the nature of the interpretation, but is also linked with cognitive deficiencies and atypical personality traits such as schizotypy (Chequers et al., 1997). Thus a subtle association between these types of observations and psychopathology can be discerned in the literature. Countering this, no major differences in personality variables between UFO witnesses and non-witnesses have been identified (Zimmer, 1984), although witnesses who experienced communication with the phenomenon, or whose encounters could be considered "intense", do show moderately altered personality profiles compared to non-witnesses (Parnell, 1988; Spanos et al., 1993).

From this short review it is apparent that the study of personality constructs has dominated psychological investigation of anomalous perception, to the neglect of factors such as perceptual and cognitive ability. As suggested previously, simple "misinterpretation" has been identified in very general terms as an explanation for experiences. It might therefore be proposed that AVP are more likely to be seen by individuals with a reduced ability to recognise familiar objects in normal and unusual contexts, a predisposition to identify meaningless (abstract) objects as legitimate, and an enhanced creativity when interpreting an ambiguous scene. Whilst allusions to such deficits in witnesses have been made in the non-scientific literature (e.g., Kottmeyer, 2001), these possibilities have received very little empirical attention with respect to AVP. According to such a hypothesis, sightings of ghosts, monsters or flying saucers may be confined to individuals with one or more perceptual deficits compared with non-witnesses. Alternatively, non-confirmatory findings would suggest that individuals who witness AVP lack neither the recognition nor memory skills possessed by non-witnesses, and would compliment previous studies which have shown that personality variables play no major causal role in initiating such experiences.

The aim of the present study was therefore to determine whether witnesses of AVP are impaired with respect to non-witnesses in general perceptual and memory function. Naturally, if no differences are found between witnesses and non-witnesses then the relevance of the illusionary hypothesis would not be undermined, since there remains the possibility that sightings of AVP by *any* individual are based on a variety of misperceptions. Nevertheless, such findings would counter claims that individuals who witness phenomena of an extraordinary nature must do so because of inherent psychological deficiencies.

GENERAL METHODS

Participants

Thirty-eight participants volunteered for the study and were allocated to either the witness or non-witness group. These participants were recruited from the undergraduate psychology cohort studying at the University of Western Sydney and from the wider community. Participants remained anonymous, participation was voluntary and students received course credit for their involvement. Following stratification of the initial sample, the witness group contained 19 participants, (9 males and 10 females, age range 18 to 52 years) and the non-witness control group contained 19 participants (7 males and 12 females, age range 19 to 56 years). In recruiting participants for the witness group, a deliberate effort was made to obtain individuals who had had frequent experiences with a variety of AVP (e.g., several encounters with "spirits") so as to accentuate potential group differences. With the exception of two participants, those in the witness group reported having observed AVP in considerable detail on multiple occasions. The two that reported a single event were included because their experiences were particularly salient; for instance, one participant reported having seen a bright yellowish object flying in the night sky, which had 'strange physics', moving back and forth a number of times in all directions before taking off at enormous speed and vanishing. All participants in the witness group interpreted their experiences as anomalous, however there were no reports of incidents of an "intense" nature (e.g., personal interaction with the AVP), justifying the group label of "mere witness". The non-witness group contained individuals who reported never to have had an AVP experience. The study involved four experiments, which were undertaken in the same order by all participants.

Materials

A qualitative survey composed of three sections was administered at the completion of the study to identify those participants who were AVP

witnesses. The first item of the first section inquired as to whether the participants had ever seen lights or objects in the sky that seemed strange and which they could not explain in a conventional way. The first item of the second section was similar, but inquired as to whether they have seen such lights or objects on or near the ground. The first item of the third section concerned lights or objects observed inside a house or building. If the participants indicated "yes" to one (or more) of these items they were directed to specify the number of times this type of light or object had been observed and when they were observed. Regarding their most recent experience, participants were required to state whether they were alone, what emotions they felt at the time and what they thought the lights or objects were. There were also items asking the participants to provide detailed descriptions of their experiences, particularly noting colour, movement and duration. Those indicating that they had not experienced, for instance, lights or objects in the sky, were directed to an item asking them to create a sensible story involving such lights or objects. This was to dissuade participants from stating that they had never perceived an AVP to avoid or minimise participation. In creating their stories, participants responded to the same items as they would have had they actually perceived such lights or objects. Individuals who responded in this way to all three sections were included in the non-witness group. Statistical analyses were conducted using SPSS version 12 for the 4 experiments and, where not provided by SPSS, effect sizes were calculated using the methodology of Francis (2004) and power derived from Faul and Erdfelder's (1992) GPower program.

EXPERIMENT 1

When an individual attempts to consciously recognise a familiar stimulus, a representation of the stimulus is accessed from an associative memory network and the initial ambiguity is resolved (Yonelinas, Kroll, Baynes, Dobbins, Frederick, Knight, & Gazzaniga, 2001). Autobiographical memory is a specific case of this retrieval process, whereby individuals recall event-specific knowledge derived from past experience of the stimulus (Conway & Turk, 1999; Roediger & Marsh 2002). Such autobiographical memories can be further categorised as *specific*, *categoric*, or *extended* (Williams 1996). A specific memory is of a particular time and place lasting no longer than a day and explicitly involving the stimulus. Categoric memories are of repeated events involving the stimulus, while extended memories were memories of events involving the stimulus that lasted longer than a day. With regards to AVP, it is possible that witnesses are less able than non-witnesses to recognise

stimuli they may have previously experienced because of a reduced capacity to access associative networks and recall a relevant autobiographical memory. This might be of particular importance for stimuli present in the visual field for only a brief time period, such as a fast-travelling object in the sky or a moving form seen out of the "corner of the eye" on a road at dusk. Under these circumstances, witnesses might continue to search for a recognition match after the stimulus has disappeared, in turn encouraging subsequent interpretation of the encounter as something extraordinary. Experiment 1 therefore examined whether witnesses show less ability to recall autobiographical memories to pictures of common objects, compared to non-witnesses.

METHOD

Materials

Eight black and white pictures of objects were printed on white flash cards measuring 15 cm by 12.5 cm. Pictures were taken from Koutstaal, Reddy, Jackson, Prince, Cendan and Schacter (2003) and were of a *brush*, *lamp*, *key*, *belt*, *umbrella*, *apple*, *hammer* and *sunglasses*. The original pictures were converted to black and white and resized to approximately 6 cm x 5 cm. A stopwatch was used to measure reaction time (RT) in seconds (s).

Design and Procedure

Experiment 1 used the Autobiographical Memory Test methodology (Williams & Broadbent, 1986; Myers & Brewin, 1994; Watkins & Teasdale, 2001) that has been adapted in a variety of ways since its inception (e.g., Startup, Heard, Swales, Jones, Williams, & Jones, 2001; Watkins & Teasdale, 2001). Thus the substitution of neutral pictorial cues for neutral word cues in the present study was considered a justifiable modification. Participants were presented with each of the cards in series and asked to recall a specific autobiographical memory involving the object shown. They were informed that a specific autobiographical memory was a memory of something that had happened in their life at a particular time and place, and lasted no longer than a day. For the convenience of participants, only specific memories were sought because these were arguably more easy to access than either category or extended memories of the object (that is, participants were likely to possess a memory of the past use of a hammer, but not necessarily over a long period of time or even regularly). Participants were also advised that the memory recalled could be important or trivial. A test run was conducted where participants were shown an example flash card and provided an example memory for the object on that

card. Participants were then asked to recall a specific autobiographical memory involving the object. If they did not recall a specific memory, participants were advised as to how their memory could have been more specific.

During testing, flash cards were presented one at a time and remained visible until a memory was recalled, or until 30 s elapsed. Each response was transcribed and the RT taken to recall the memory recorded. This was the elapsed time between the card's presentation and the first uttered word describing the memory. If participants could not recall a memory, a time of 30 s was recorded. The same process was repeated for all eight cards and the order of presentation randomised for each participant. Unaware of group membership, two raters used definitions derived from Williams (1996) to categorise the recalled memories as *specific* (correct), *categoric*, *extended*, or *non-autobiographical*. Non-autobiographical memories were defined as memories not of a personal experience and/or not involving the object. An overall inter-rater reliability Cohen's Kappa of .90 was attained. All participants received a total score for each of the four memory categories, and RT for each memory.

RESULTS AND DISCUSSION

The mean numbers of specific, categoric, extended, and non-autobiographical memories recalled by each group (witnesses and non-witnesses) are displayed in Table 1.

Table 1
Descriptive statistics for Specific, Categoric, Extended and Non-autobiographical memories as a function of group

	Specific		Categoric		Extended		Non-auto-biographical	
Group[a]	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Witnesses	5.89	1.96	0.89	1.19	0.16	0.50	1.05	1.35
Non-witnesses	5.58	2.00	0.47	0.69	0.32	0.58	1.63	1.57

[a]n = 19 for each group.

The difference in the numbers of specific and categoric autobiographical memories recalled was analysed using two one-tailed, non-orthogonal independent samples *t*-tests. Extended and non-

autobiographical memories were excluded from the analyses because there were relatively few of them in total (extended) and they were not necessarily independent of the results for specific and categoric memories. That is, participants who achieved a high score on specific/categoric memories necessarily scored low on non-autobiographical memories, and vice versa. A third independent samples *t*-test examined group differences in RT for specific autobiographical memories. RTs for the three remaining memory types were excluded as there were too few values from which to derive viable means. Each group's mean RT and standard deviations for specific autobiographical memories are shown in Table 2.

Table 2
Descriptive statistics for Specific Autobiographical Memory Reaction Times (RT) as a function of group

Group[a]	*M*	*SD*
Witnesses	4.13	1.78
Non-witnesses	5.40	2.70

[a]*n* = 19 for each group.

No outliers were identified and the assumption of homogeneity of variance was satisfied for each of the analyses. The assumption of normality was met for the RT and specific autobiographical memories, but not for categoric memories. A standard square root transformation was performed on categoric memories, allowing the assumption of normality to be satisfied.

To account for familywise error, alpha was adjusted to .016 using a Bonferroni correction. No significant differences were found between witnesses and non-witnesses on specific autobiographical memories; $t(36) = 0.48$, $p = .628$, and whilst the power of this analysis to detect a significant effect was low at .028, the small Cohen's *d* (.159) suggests the analysis would still have failed to reach significance had power been greater. Similarly, no significant difference was found for categoric memories between witnesses and non-witnesses; $t(36) = 1.03$, $p = .308$. The small Cohen's *d* (.224) also suggests that the test was unlikely to reach significance despite the low power (.041). No significant group differences were found for RT to specific autobiographical memories; $t(36) = 1.70$, $p = .098$. However the low power of the analysis (.296) coupled with the medium effect size ($d = .633$) suggest that a significant difference in RT may well been found had power been greater.

Overall, these results do not support the hypothesis that witnesses are poorer than non-witnesses at recalling event-specific knowledge in the

form of specific and categoric autobiographical memories. Nevertheless, whilst failing to reach significance the medium sized effect for RT suggests that a meaningful difference might exist between the two groups had the power of the analysis been greater, for example by utilising more participants. It is intriguing to speculate that witnesses perhaps require *less* time than non-witnesses to access and recall specific autobiographical memories involving visual objects.

EXPERIMENT 2

Repeated experiences of unattended visual stimuli frequently produce visual implicit memories that unconsciously facilitate later performance on recognition tasks involving the same stimuli (Beauregard, Benhamou, Laurent & Chertkow, 1999; Yonelinas et al., 2001). Problems with such a system at either the encoding or retrieval stages would reduce the capacity of the witness to benefit from prior, unconscious encounters with visual stimuli throughout their lifetime. Applied to witnesses of AVP, it might be suggested that the stimuli which prompt their experiences are mundane and reasonably common yet have not been adequately integrated into memory when subliminally perceived on a past occasion. When consciously confronted with the same stimuli in the sky, in a lake, a house or a forest, the witness cannot draw on past knowledge and may be prone to interpreting their experience as anomalous. The aim of Experiment 2 was therefore to examine whether witnesses are inferior to non-witnesses in the generation and utilisation of implicit memories of simple visual stimuli.

METHOD

Materials

Sixteen pictures consisting of eight pairs of similar representations of the same object (target and decoy) were used in the experiment. The objects were an aeroplane, shoe, candle, duck, shell, sword, turtle and wine glass. These were taken from Koutstaal et al. (2003), but resized to approximately 6 cm by 5 cm and converted to black and white. Stimuli were presented on a Toshiba Satellite Pentium III laptop computer.

Design and Procedure

The methodology of Zeelenberg, Wagenmakers and Raaijmakers (2002) was used to form implicit memory for visual objects and examine this implicit memory through responses to a picture discrimination task. This methodology has been found to increase performance on a picture discrimination task through increased discriminability and not merely bias,

as has previously been argued (Ratcliff, McKoon & Verwoerd, 1989; Ratcliff & McKoon, 1996). In an initial priming session, participants were randomly presented with the sixteen pictures and told to study them closely. Participants were not informed as to why they should study these pictures. Each picture was presented for 2 s and the entire set was shown three times to participants. The test session began shortly after the priming session. In this session, participants were shown a picture (target) for 40 ms, which, after a short period of absence (2 s), would reappear adjacent to the remaining picture in the pair (decoy). Both pictures appeared together on screen for 5 s. Participants were required to identify which one of the two pictures had been originally presented. Participants were informed that, prior to the dual presentation, a line of plus (+) signs would appear to enable them to focus their attention on the future location of the pictures. This process was repeated for each of the remaining seven picture pairs, with the arrangement of the target and decoy (left/right) randomised. Each participant received a score out of eight for the task.

RESULTS AND DISCUSSION

A single, one-tailed independent samples *t*-test (alpha = 0.05) examined the mean number of pictures correctly discriminated by witnesses compared with non-witnesses. These means and their standard deviations are displayed in Table 3.

Table 3
Descriptive statistics for correctly discriminated pictures as a function of group

Group[a]	*M*	*SD*
Witnesses	7.05	0.91
Non-witnesses	6.21	1.39

[a]*n* = 19 for each group.

No outliers were present, and the assumptions of normality and homogeneity of variance were satisfactorily met. No significant one-tailed difference between witnesses and non-witnesses was found; $t(36) = 2.20$, $p > .05$. The power of this analysis to detect a significant effect was .574 and the effect size was large ($d = .716$). In fact, had a directional hypothesis not been followed it is likely that witnesses would have been shown to have

discriminated significantly more accurately than non-witnesses between the target and decoy. Under these circumstances, there appears no justification for the proposal that witnesses are less able than non-witnesses to benefit from previous exposure to visual stimuli.

EXPERIMENT 3

Experiments 1 and 2 examined explicit and implicit memory for legitimate pictorial stimuli, and found that witnesses were not deficient compared with non-witnesses in performance on the associated tasks. Applying this finding to AVP, it would suggest that an object such as an aeroplane would not necessarily be mistaken by witnesses for a "flying saucer" due to a problem with conscious or unconscious recall of a past experience of "aeroplanes". However, it is conceivable that certain AVP are truly ambiguous. That is, for whatever reason they have no easily accessible (or even obligatory) interpretation open to observers. This is not to suggest that such stimuli are necessarily anomalous. There simply may not be enough information in the context of the sighting to be able to resolve correctly what is, in essence, something quite mundane.

Under these circumstances an odd shape, glow or movement may be interpreted as an anomalous object by witnesses because these individuals are hesitant to acknowledge that there *is* no straightforward interpretation available. Such intolerance towards ambiguity has previously been shown in witnesses (Houran, 1997; Houran & Williams, 1998), and is characterised by an inclination to draw conclusions in haste and a reluctance to surrender initial solutions and calculate probabilities (Frenkel-Brunswick, 1949). Thus witnesses might possess adequate recognition skills for real stimuli (e.g., aeroplanes), yet if they are confronted with the same stimuli in a less recognisable context (such as an altered orientation), or even an abstract object which has no necessary label, they could be driven to interpret it in spite of the inherent problems this may entail. A reduced ability to reason with visual material using working memory and/or the visuo-spatial sketchpad (Baddeley & Hitch, 1994) is a potential explanation for such a tendency. Experiment 3 therefore explored whether witnesses are less able than non-witnesses to recognise genuine and commonly experienced objects in unusual contexts, and differentiate them from non-genuine (abstract) objects.

METHOD

Materials

Sixteen pictures were used in the experiment, each printed on a white flash card measuring 15 cm by 12.5 cm. Eight of the pictures were of genuine objects, while the remaining eight pictures were of similarly structured but abstract objects. All pictures were taken from Koutstaal et al. (2003), resized to approximately 6 cm by 5 cm and converted to black and white. The genuine objects were a *basket, bear, bed, cake, couch, kite, saddle* and a *slice of pie*. To alter the context, both the genuine and abstract pictures were inverted.

Design and Procedure

Participants were serially presented with the sixteen pictures in random order, each for 5 s, and were required to indicate whether they believed the object displayed on the card was a real object or not (yes/no). They were informed that each card would only be shown for a short period of time and were advised to respond as quickly as possible. They were also informed that the genuine objects would not necessarily appear in their correct orientation on the cards. Each participant received two scores (/8) for their correct identification of genuine and abstract objects.

RESULTS AND DISCUSSION

The mean number of correct identifications made by each group (witnesses and non-witnesses) for the two stimuli (genuine and abstract) were examined using a mixed repeated measures analysis of variance (ANOVA), with *groups* the between-subjects factor and *stimuli* the within-subjects factor (alpha = 0.05). The assumptions of ANOVA were met, with no outliers and satisfactory normality. The assumption of homogeneity of variance was met for the between-subjects factor. The mean numbers of correctly identified genuine and abstract objects and their standard deviations are shown in Table 4.

A significant difference was found for the main effect of stimulus, $F(1, 36) = 27.71$, $p < .001$, $\text{eta}^2 = .435$, with genuine objects ($M = 5.45$, $SD = 1.15$) being more correctly identified as "real" than abstract objects as "not real" ($M = 3.95$, $SD = 1.37$). No significant difference was found for the between-subjects effect of group, $F(1, 36) = 3.01$, $p = .091$, $\text{eta}^2 = .077$, or the group by stimulus interaction, $F(1, 36) = 1.44$, $p = .238$, $\text{eta}^2 = .039$. However, the power for the between-subjects effect of group and the group by stimuli interaction were low (.393 and .215 respectively), hence two one-tailed post-hoc comparisons were conducted to examine the nature of the

potential, but non-significant, interaction. Neither group differed significantly for genuine objects, $t(36) = 0.41$, $p = .680$, and the low power of the analysis (.069) and small effect size ($d = .135$) indicates that the test was unlikely to have reached significance had power been higher. However, group differences approached significance for abstract objects; $t(36) = 1.96$, $p = .058$, with witnesses identifying these objects less accurately than non-witnesses. The power of this test was much higher (.480) and the large effect size ($d = .635$) suggests that significance may have been achieved had power been greater.

Table 4
Descriptive statistics for Genuine and Abstract Objects as a function of group

	Genuine		Abstract	
Group[a]	*M*	*SD*	*M*	*SD*
Witnesses	5.37	1.21	3.53	1.30
Non-witnesses	5.53	1.12	4.37	1.34

[a]$n = 19$ for each group.

The results of the experiment therefore provide some evidence that witnesses differ from non-witnesses in their capacity to identify correctly abstract objects, whilst matching non-witnesses' performance in identifying genuine objects. That is, the simple altering of context does not hinder witnesses' recognition of legitimate objects when compared to non-witnesses. This result is compatible with the findings of Experiments 1 and 2, and suggests that witnesses are no worse than non-witnesses in accessing memories for familiar objects. However, if the object is truly abstract, witnesses will perhaps have greater difficulty identifying it as *not* being legitimate. This compliments the observation that witnesses have a more lax criterion regarding what constitutes a genuine visual stimulus (Blackmore & Moore, 1994). Nevertheless, further research utilising larger sample sizes is required to substantiate this potential difference.

EXPERIMENT 4

Exploring further the putative differences between witnesses and non-witnesses found in Experiment 3 for incorrect recognition of ambiguous pictures, it may be further conjectured that witnesses are individuals who creatively superimpose legitimacy into ambiguous objects

such that they evolve into anomalous experiences. Entertaining a similar hypothesis, Blackmore and Moore (1994) examined correlations between scores on the Paranormal Belief Scale (PBS), the False Identification Questionnaire (FIQ) and performance on a visual recognition and identification task involving 'noisy' pictures which possessed a degree of ambiguity. Participants with higher scores on the PBS were more willing to say that they could perceive a recognisable object in 'noisy' stimuli, though the correlation was only significant for the moderate-to-high level of noise. A positive and significant correlation was also found between the PBS and the FIQ, indicating that those with stronger beliefs in the paranormal report more misidentifications of people in the questionnaire. However, Blackmore and Moore's study did not explicitly examine witnesses of AVP, whose experiences are, arguably, of a more perceptual nature and are more likely to be explained as visual misperception than the experiences of extrasensory perception and precognition, which these authors surveyed.

Using a design similar to that of Blackmore and Moore (1994), Experiment 4 examined differences between witnesses and non-witnesses in performance on a picture fragmentation task, whereby participants were required to identify as quickly as possible the actual (genuine) objects from which a fragmented picture was derived (Gollin, 1960; Snodgrass, Smith, Feenan, & Corwin, 1987). In common with the theme of Experiment 3, picture fragmentation tasks are frequently used to establish the efficacy of witnesses' working memory as well as their ability to organise and reason with visual material (Stewart, 1998). Therefore, the aim of Experiment 4 was to determine whether witnesses require more information than non-witnesses to identify correctly the true form of fragmented pictures, and whether their (conjectured) propensity for creative construction and misinterpretation of ambiguous objects increases the number of false identifications they make of these pictures.

METHOD

Materials

The stimuli for the experiment were black and white pictures of eight objects, printed on white flash cards measuring approximately 15 cm by 12.5 cm. The objects were from Snodgrass and Vanderwart (1980) and consisted of an aeroplane, cannon, cart, couch, gorilla, helicopter, perambulator and a watering can. Pictures were re-sized to approximately 6 cm by 5 cm and manually edited to create increasingly fragmented versions of each of the eight objects. The criteria described by Snodgrass et al. (1987) were used to choose the final series of fragmentations for each object. Each series of fragmentations had six levels, with the first level

being the most fragmented version of the object and the sixth level being the complete object.

Design and Procedure

Participants were presented with the most fragmented depiction (level 1) of each object for 5 s, and were required to identify the object depicted. If they could not, the next most fragmented version was presented (level 2) and so on until the participant successfully identified the object. Participants were asked to name the object only if they believed that they could identify it correctly. This process was repeated for all eight objects and the order in which the objects were presented was randomised for each participant.

RESULTS AND DISCUSSION

A one-tailed independent samples *t*-test compared the mean number of presentations required by the two groups (witnesses and non-witnesses) for correct identification of the fragmented objects. A second independent samples *t*-test was used to compare means of the number of misidentifications made by each group. Table 5 provides each group's mean stage of correct identification, number of misidentifications and their respective standard deviations.

Table 5
Descriptive statistics for the Mean Stage of Correct Identification and the Number of Misidentifications as a function of group

	Mean Stage of Correct Identification		Number of Misidentifications	
Group[a]	*M*	*SD*	*M*	*SD*
Witnesses	2.54	.43	1.32	1.25
Non-witnesses	2.79	.63	0.79	1.08

[a] $n = 19$ for each group.

Note. Group means for the stage of correct identification were calculated from participant's mean stage of correct identification across the eight objects, divided by eight. As such, the possible range of scores was between 1 and 6.

Assumptions were met for both analyses, with no outliers present and acceptable normality and homogeneity of variance. A Bonferroni correction (alpha = 0.025) was applied to control familywise error. No significant difference was found between the groups for correct

identification, $t(36) = 1.42$, $p = .162$. No significant difference was found for misidentifications, $t(36) = 1.38$, $p = .174$, although low power (.183) was a characteristic of the result. A medium effect size ($d = .450$) indicates that with greater power the difference might have reached significance, with witnesses perhaps more prone to misidentification of fragmented objects than non-witnesses. In broader terms, perhaps witnesses have a propensity to draw hasty conclusions about the nature of AVP, where non-witnesses are more prudent with initial identifications. This resembles the proposal by Blackmore and Moore (1994) that witnesses are less cognitively and/or socially restrained, therefore more willing to offer a label for an ambiguous object.

General Discussion

The present results do not support the hypothesis that witnesses of AVP are deficient in certain perceptual and memory capabilities compared with non-witnesses. Formal analyses showed no difference between the two groups on any task, although a number of medium and large-sized effects were found which require comment. The first of these indicated that should the power of the study be increased, there is the possibility that the access and recall of specific object-relevant autobiographical memories by witnesses will be superior to non-witnesses. The second intimates that witnesses might require fewer presentations to identify fragmented common objects. Both these findings, should they be confirmed, show that witnesses are highly capable of recognising environmental stimuli. Conversely, the remaining medium-sized effects suggested that compared with non-witnesses, witnesses of AVP might be more prone to identifying abstract objects as legitimate and misidentifying fragmented objects. When considering the difficulties inherent in establishing a group of actual witnesses of adequate size and the necessary lack of power of any associated analysis, the contribution of these non-significant but potential differences becomes important.

Although varied, the findings do not undermine the possibility that the perception of AVP is a product of a complex interaction of characteristics inherent to the witness. That is, their enhanced psycho-perceptual tendencies interact with very subtle perceptual and memory deficits, leading to the interpretation of AVP in certain circumstances as anomalous. For example, both the autobiographical memory and picture fragmentation findings could indicate that witnesses have a rapid tendency to identify pictures of objects. This idea is congruent with theories of intolerance of ambiguity (Houran, 1997; Houran & Williams, 1998), whereby individuals with high intolerance show a greater fear of ambiguous

experiences. This fear can be reduced if the experience is rationalised as something "normal", or, if necessary, paranormal (Lange & Houran 1998). A compelling drive to interpretation might therefore be expected of such individuals. Alternately, the tendency for rapid interpretation may simply be the positive manifestation of a deeper restriction on the length and depth of cognitive processing of any visual stimulus by these subjects. Other, more negative manifestations may include the propensity of witnesses to identify abstract stimuli as legitimate, and to misidentify ambiguous objects, on account of their not subjecting them to the same level of processing as non-witnesses.

The informal observation that witnesses appear to outperform non-witnesses on the implicit memory task also deserves comment. The implication is that witnesses are less likely than non-witnesses to misidentify previously experienced objects, and might be indicative of superiority in a number of processes involved in the functioning of implicit memory. Specifically, it may be that witnesses more easily form implicit memories and therefore benefit more greatly from repeated exposure to various objects throughout their lifetime. Alternately, witnesses may form more usable implicit memories at encoding and/or unconsciously make better use of implicit memories at retrieval. Interestingly, these suggestions compliment the earlier findings by Crawley, French & Yesson (2002), whereby individuals showing high transliminality were more influenced by subliminal presentation of Zener symbols in a computerised Zener card task than individuals low in transliminality. Transliminal individuals are those who display less inhibition to the flow of information to and from the external environment and supra- and subliminal states (Thalbourne, Crawley & Houran, 2003). In some, this may involve greater access to ostensibly unconscious material, such as that received subliminally in cognitive tasks. The implications of transliminality in terms of witnessed anomalous experience is that heightened access to certain types of unconscious content may help generate the characteristics of an entity encounter (Houran, Ashe & Thalbourne, 2003) or AVP. Although not formally measured, high transliminality might be predicted for the witness group in the present study. Furthermore, such putative transliminality in these participants could explain the medium-sized effect for autobiographical memory, whereby there are fewer obstacles to the retrieval of past explicit memories in these individuals compared with non-witnesses.

Acknowledging the role that complex psychological constructs such as transliminality may play in anomalous experience, it is nonetheless worth considering how the simple possession of superior implicit or autobiographical memory could increase the chance of witnessing AVP. If the assumption is made that AVP are not literally real in the sense of being

anomalous, the stimulus could be a novel or relatively common object that has been rendered ambiguous by environmental factors (e.g., change of context, diminished visibility, etc). For example, a radio tower with various coloured lights at its peak may become ambiguous at night due to diminished visibility and surrounding trees, which obscure the tower structure. Consequently, all that can be seen from a distance is a number of coloured lights above the tree line. In such circumstances, possession of a superior retrieval from memory is unlikely to facilitate recognition, as distinguishing features are absent and thus the object no longer clearly resembles its true form. In fact, in such situations proneness to rapid (mis)identification and the legitimisation of abstract objects alluded to in the present study are most likely to influence perceptual processing. Even so, should objects of a truly anomalous nature actually exist (albeit briefly) in physical space, and are of a form which is recognisable (itself an awkward claim since this surely requires some form of previous experience), then the controversial argument could be made that witnesses experience AVP simply because they can identify them more effectively than the non-witnesses!

In addition to environmental factors facilitating the appearance of ambiguity in mundane objects, psychological variables such as stress, fatigue, excitement and degree of prior belief could also impact on object recognition. Stimuli in the real world are also much more complex than the simple black and white two-dimensional pictures of static common objects used in the present study. Real-world stimuli exist in three-dimensional space, may be coloured and can incorporate motion. Arguably, the complexity of these stimuli, the presence of recognition-hindering psychological variables and ambiguity-creating environmental factors mean that the true effects of the proposed deficits and tendencies examined in the present study may be accentuated outside the laboratory. Future studies would be encouraged to investigate the conditions under which the effects of these tendencies become pronounced, for example the introduction of more complex (coloured, moving, etc.) stimuli in altered contexts and in situations which may instil a variety of emotional reactions.

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