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Seeing Things: Visual Recognition and Belief in the Paranormal

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Abstract: Evidence is reviewed suggesting differences in cognitive style between sheep (believers in the paranormal) and goats (non-believers). It is suggested that belief in the paranormal can be increased when people misinterpret chance events as requiring an explanation, or think they see something in noisy stimuli. Accordingly believers would be expected to be more prone to identifying objects in noisy stimuli. Thirty participants completed a Paranormal Belief Scale, a False Identification Question (asking about misidentifications of people in everyday life) and a visual identification task. Stimuli were twelve sets of four pictures each, progressively degraded by the addition of computer generated noise. Belief in the paranormal was correlated with a greater tendency to make positive identifications or guesses and fewer correct identifications. Higher belief also correlated with claims of more frequent misidentifications of people. This confirms previous findings of differences in cognitive style between believers and non-believers.

Introduction

A recent poll of 1236 adult Americans (Gallup & Newport, 1991) reported that one in four people believed that they have had a telepathic experience, and one in six that they had been in touch with someone who had died. A quarter believed in ghosts and three quarters at least occasionally read their horoscopes. Personal experience is often cited as a reason for belief in the paranormal (Blackmore, 1984; Palmer, 1979). These high levels of paranormal belief contrast with the scientific evidence for paranormal phenomena which is at best controversial (Broughton, 1991) and at worst, non-existent (Kurtz, 1986). Why do so many people believe passionately in something which might not exist?

The answer may be that their belief is not the result of any scientific analysis of evidence, but is due to their personal experiences, possibly supported by the views of others and the general cultural acceptance of the paranormal. The question then becomes how psychic experiences can occur if paranormal phenomena are non-existent or extremely weak.

We shall use the term 'psychic experience' to refer to any experience that is interpreted by the person concerned as psychic, and 'psychic (or paranormal) phenomena' to refer to genuinely psychic events. This allows us to discuss the experiences without having to decide whether they are or are not 'really' paranormal. Believers in the paranormal are referred to as 'sheep' and non-believers as 'goats'.

One possibility is that psychic experiences are comparable to visual illusions. For example, normal or chance events might be misinterpreted as paranormal. In this case the experience would be perfectly real to the person undergoing it, but its 'paranormality' would be derived from the individual's cognitive processes, not from the external world. Imagine that two individuals, one a sheep and one a goat, expe-

rience the same event. The sheep might perceive it as paranormal and try to explain it in terms of ESP or psychokinesis, while the goat will perceive the same event as due to pure chance or as having a normal explanation. Each would in this way be building up a collection of experiences apparently supporting prior beliefs, whether the actual event was paranormal or not.

We might therefore expect people with different cognitive styles to evaluate similar experiences in different ways (Alcock, 1981; Hines, 1988; Zusne & Jones, 1982). Some possibly relevant differences between sheep and goats have been documented. These include personality differences (see Thalbourne, 1981; Zusne & Jones, 1982, for reviews), greater fantasy proneness in sheep (Pekala, Kumar & Cummings, 1992) and a tendency for sheep to warp presented information so that it is supportive of the opinion they already hold (Russell & Jones, 1980). Alcock & Otis (1980) reported less critical thinking in sheep than goats and Wierzbicki (1985) found more errors in syllogistic reasoning, although Irwin (1991) has disputed this finding.

Believers have also been found to be more prone to response biases (Grimmer & White, 1986; Marks & Kammann, 1980; Rigby, 1989) although attempts to identify these biases have come up with conflicting results (Rigby, 1989; French, 1992).

The study reported here takes a different approach, based on the idea that sheep should be more prone to psychic illusions than goats. That is, they should have cognitive styles that lead them more often to misinterpret normal events as paranormal. Five types of psychic illusion have been distinguished (Blackmore, 1992; Blackmore, Galaud & Walker, in press).

Illusions of control

Langer & Roth (1975) demonstrated a tendency for random processes to be perceived as being under people's control. This might give rise to belief in psychokinesis (PK), or mind over matter. The illusion of control has been shown to be greater in believers (Ayeroff & Abelson, 1976; Benassi, Sweeney & Drevno, 1979; Blum & Blum, 1974; Jahoda, 1969; Jones, Russell & Nickel, 1977), even in tasks not perceived as involving psi (Blackmore & Troscianko, 1985). If people believe they have greater control than they actually have, apparent evidence of the paranormal may be unintentionally provided.

Misjudgements of probability

Humans are notoriously bad at estimating probabilities (Kahneman, Slovic & Tversky, 1982). This seems to be even more pronounced in believers, who consistently underestimate the frequency of chance occurrences (Blackmore & Troscianko, 1985). This implies that when chance coincidences occur, believers are more likely to seek an explanation and, if no other explanation is available, to opt for a paranormal one. In this way, chance events would apparently provide further evidence for their prior beliefs.

Misjudgements of randomness

As well as being poor probability judges, people are poor at assessing randomness. This is often examined using a Subjective Random Generation (SRG) task, in which a subject has to generate a series of random numbers. Typically, repetitions are greatly underestimated (Budescu, 1987; Wagenaar, 1972) and sheep underestimate more than goats (Blackmore & Kahn, in press; Brugger, Landis & Regard, 1990). This might have implications for the generation or maintenance of belief. When patterns, such as repetition, are encountered within random events (as would be expected, statistically), believers would be more inclined to search for a cause for these ordinary occurrences, and to turn to a paranormal explanation when a normal one could not be found.

Illusions of Memory

Selective memory may exaggerate the apparent frequency of occurrence of coin-

cidences. Hintzman, Asher & Stern (1978) demonstrated selective remembering of meaningfully related events. Fischhoff & Beyth (1975) showed that people misremember their previous predictions to conform to what actually happened afterwards. Comparisons of believers and non-believers have not been made but we would predict more selective memory among believers.

Illusions of Form

Seeing ghosts or apparitions might also entail the misinterpretation of normal events, in this case object recognition when there is no object there, or detection of a pattern in a random display. In signal detection terms, believers and non-believers would differ in terms of their criterion and also, but not necessarily, in terms of accuracy. For example, believers might use a looser criterion for seeing pattern in noisy displays and so be more likely to 'see' something there.

Walker (1991; Blackmore *et al.*, in press) gave 50 subjects the Belief in the Paranormal Scale (BPS) (Jones *et al.*, 1977) and an object identification task consisting of four series of successively more easily identifiable shapes, tachistoscopically presented. BPS scores did not correlate with the number of pictures correctly identified but did correlate with the number of incorrect identifications. In other words, believers were more likely to make wrong guesses. They were also more likely to say that they saw an identifiable shape early in the series. This suggests a difference in criterion but not in accuracy.

There were a number of problems with this experiment. The BPS includes many questions that are not directly relevant to the paranormal (concerning UFOs and extraordinary life forms, for example) and dividing subjects into two groups about the mean wastes information, compared with correlating belief scores with other variables. However, the most important problem was that the stimuli were hand drawn. Their identifiability was not controlled and the differences between them not measurable. It would be preferable to use stimuli to which a measurable amount of noise is added.

This was the aim of the present experiment. Pictures were photographs of everyday objects with graded amounts of computer generated noise added. A Paranormal Belief Scale was created, based on previous scales, to contain only questions directly relevant to the paranormal. An additional question about misidentifications in everyday life was also asked.

Hypotheses were (1) that stronger belief would correlate with greater willingness to make identifications, (2) that stronger belief would be positively correlated with the number of errors in identification and (3) that stronger belief would be positively correlated with more frequent misidentifications of people in everyday life.

Pilot Studies: Generation of Targets.

Twelve everyday objects were photographed. Ten undergraduates (five male, five female) were given each picture to examine in their own time, and asked to identify each object. All twelve were unambiguously and correctly named by all subjects as; Horse, Socks, Keys, Telephone, Pineapple, Flowers, Pegs, Fish, Sheep, Bicycle, Pencils and Butterfly.

For each picture, a series of four stimuli was produced with gradually increasing amounts of computer generated noise. Eight different undergraduates (four male, four female) were shown three sets in order from most to least noisy, tachistoscopically exposed for 15, 20, 25 or 30 milliseconds. Subjects described each stimulus as either an unidentifiable shape or a recognisable object. On this basis, 25 ms was chosen for the main study.

Method

Participants

Participants were 30 undergraduates at the University of Bristol who were not involved in the pilot studies. There were 20 males and 10 females.

Apparatus

Using a tachistoscope, the stimulus was exposed for 25ms. Otherwise - all the rest of the time - it was a distractor slide of computer-generated random noise in black and white.

Stimuli

Stimuli[1] were twelve sets of four black and white pictures each. Each set of four consisted of the original picture and three further pictures increasingly distorted with predetermined levels of computer-generated random noise. Each image consisted of a visual signal (the original, clear picture of the object) and additive, normally-distributed noise of specified standard deviations of 0%, 7.8%, 19.6% and 27.5% of the total dynamic range (0 to 32). These percentages corresponded to noise levels of 0, 20, 50 and 70, respectively. The dimensions of each image measured 183 by 122 pixels (see Appendix for examples of images).

Questionnaires

The Paranormal Belief Scale consisted of ten statements about the paranormal, such as 'ESP exists' or 'I have had at least one experience of telepathy between myself and another person' (see Appendix). Participants were asked to rate each item on a five point scale from 'Definitely True' to 'Definitely False'. A lower score indicated a greater belief in the paranormal.

The False Identification Question described a scene in which a person acknowledges someone on the street but then realises that they are a stranger. Participants were asked whether this happened to them (1) daily, (2) weekly, (3) monthly, (4) yearly or (5) never.

Procedure

Subjects were read a set of instructions requiring them to say, after each stimulus was displayed, whether they could recognise and identify what they saw. They were shown the 48 slides, beginning with the 12 least distinguishable (noise level 70), and ending with the most clearly defined (noise level 0). The order of presentation of each picture in the group of 12 was randomised before each trial. The answers given by subjects were recorded immediately on their response.

Half of the subjects completed the Paranormal Belief Scale and the False Identification Question after the visual identification task, and the other half did so beforehand to control for order effects.

Results

Scores on the Paranormal Belief Scale (PBS) were normally distributed about a mean of 31.63 (SD=7.72).

(1) There was a positive, but non-significant, correlation between PBS scores and the number of non-identifications (r = .308, 28 d.f.), in other words a tendency for sheep to be more willing to say they could identify the object.

This can be broken down for the different noise levels as follows:

noise level	***r* (28 d.f.)**
70	.339
50	.551
20	.089
0	.196

At noise level 50, r is significant ($p < .01$, two-tailed). This shows that at this intermediate noise level, believers were more willing to say they could see an identifiable object in the stimulus.

(2) There was a positive, though not significant, correlation between PBS score and the total number of correct responses in the visual identification task (r = .331, 28 d.f.), in other words, non-believers tended to be more accurate.

This can be broken down for the different noise levels as follows:

[1] We would like to thank Dr Gavin Brelstaff, University of Bristol, for preparing the stimuli.

noise level	*r* (28 d.f.)
70	.096
50	.321
20	.303
0	.268

(3) The False Identification Question was included as a possible measure of greater ecological validity. It correlated highly with PBS scores (r = .606, 28 d.f., $p < .001$, two-tailed). Those with stronger belief in the paranormal claimed more often to make false identifications of people in their everyday lives. There were only small correlations between the FIQ and the main task [r = .117 (correct responses) and r = .142 (non-guesses)].

Sex Differences

There was no significant difference between males and females in PBS score (t = 0.21) or the number of correct responses in the visual identification task (t = -1.36) but there was a difference in the mean number of non-guesses (males, 10.55; females, 15.50; $t(30)$= -2.08, $p < .05$, two-tailed), indicating that males were more willing than females to attempt to identify visual patterns, or females were more cautious. Since there is no sex difference in PBS scores, sex differences cannot account for the main findings presented here.

Discussion

The results suggest that those with a greater belief in the paranormal are more willing to say they can identify something in a noisy visual image, confirming the hypothesis of a laxer criterion among believers. It is not clear whether this is due to cognitive or social factors. For example, sheep might be less socially restrained and more willing to make a guess for that reason. Interestingly, this effect is larger for the more noisy stimuli, suggesting that believers would be most likely to make false identifications under the most uncertain conditions. Arguably these might be just those in which ghosts and apparitions are typically seen, such as at night or in dim light.

Correlations with accuracy of perception were not significant, as was found in Walker's study. However, the correlations are positive and in the expected direction, suggesting that believers might more often misidentify objects, perhaps seeing paranormal events in normal ones.

The strong correlation between the FIQ and PBS suggests that believers in the paranormal are more likely to make false identifications of people, although this finding is of limited generalisability because only one question was asked. It is perhaps odd that the FIQ and visual identification task are not highly correlated since both purport to measure a similar tendency. However, responses to the FIQ would be affected by many other variables such as social confidence, number of friends, lifestyle and memory for distant events. Sheep might simply be more willing to speak to someone in the street. It would be interesting to explore differences between believers and non-believers in the way they recognise and respond to people and events in the course of their ordinary lives. This clearly requires further research before any firm conclusions can be drawn.

Some problems arose in the visual identification testing. For example, comments made by several subjects suggested they held unfounded expectations about psychological testing. Some assumed that a complete personality analysis would be made according to the responses they gave. This lead to one (male) subject identifying an image of a sheep as 'a naked woman'. Some showed embarrassment in identifying the butterfly image as such, apparently as a result of their belief that all visual recognition tasks use butterfly-shaped stimuli. The high public profile of the Rorschach ink-blot test seems to be to blame for this.

Subjects frequently realised that each object was presented four times, which might mean that they would stick with a wrong identification once made. However, occasionally people made a correct identification and then later gave an incorrect identification of the clearer image.

Some pictures invited more guesses than others. Population stereotyping occurs with various number patterns and geometric forms (Grimmer & White, 1986; Marks & Kammann, 1980) and has been shown to be more prevalent in believers (Rigby, 1989), although this finding has been contradicted by French (1992). Bearing this in mind, population stereotypes might enhance or reduce the performance of believers relative to non-believers, depending upon the popularity of the 12 objects used as stimuli. To control for this, a set of images previously standardised for population stereotyping should be used.

To continue research along similar lines, it would be preferable to eliminate the problems encountered in the present study and to test the reliability and validity of the belief scale. A related approach would be to look at processing of different types of perceptual information, such as auditory information. A similar method could be used, involving subjects identifying verbal messages within varying degrees of white noise. Such a procedure is similar to that used by Bentall & Slade (1985) who, in investigating schizophrenic auditory hallucinations, tested subjects for their ability to distinguish a verbal message from white noise. They found that subjects who were more prone to hallucinating were more likely to extract a message from the white noise, even when no message was presented. It would be interesting to correlate belief scores with this variable. Would believers tend to score highly on the hallucinatory scale used by Bentall & Slade (1985) also? If so, this would add further to our understanding of the correlates of belief in the paranormal.

Conclusions

The results of the present study contribute further evidence of a difference in cognitive styles between believers and non-believers in the paranormal. They show that believers are more likely to identify objects in noisy stimuli, suggesting that they may do the same in other situations and hence may think they have seen ghosts or experienced apparitions.

This should not be taken as evidence that there are no paranormal phenomena. There may or may not be 'real' ghosts, in the sense of actual communications with deceased people or veridical hallucinations. However, the results suggest at least one alternative explanation for some such experiences. If people are prone to identify shapes, forms or objects in noisy stimuli they will then want to know where those objects came from. If no reasonable explanation is forthcoming they may resort to a paranormal explanation, so increasing their belief in the paranormal.

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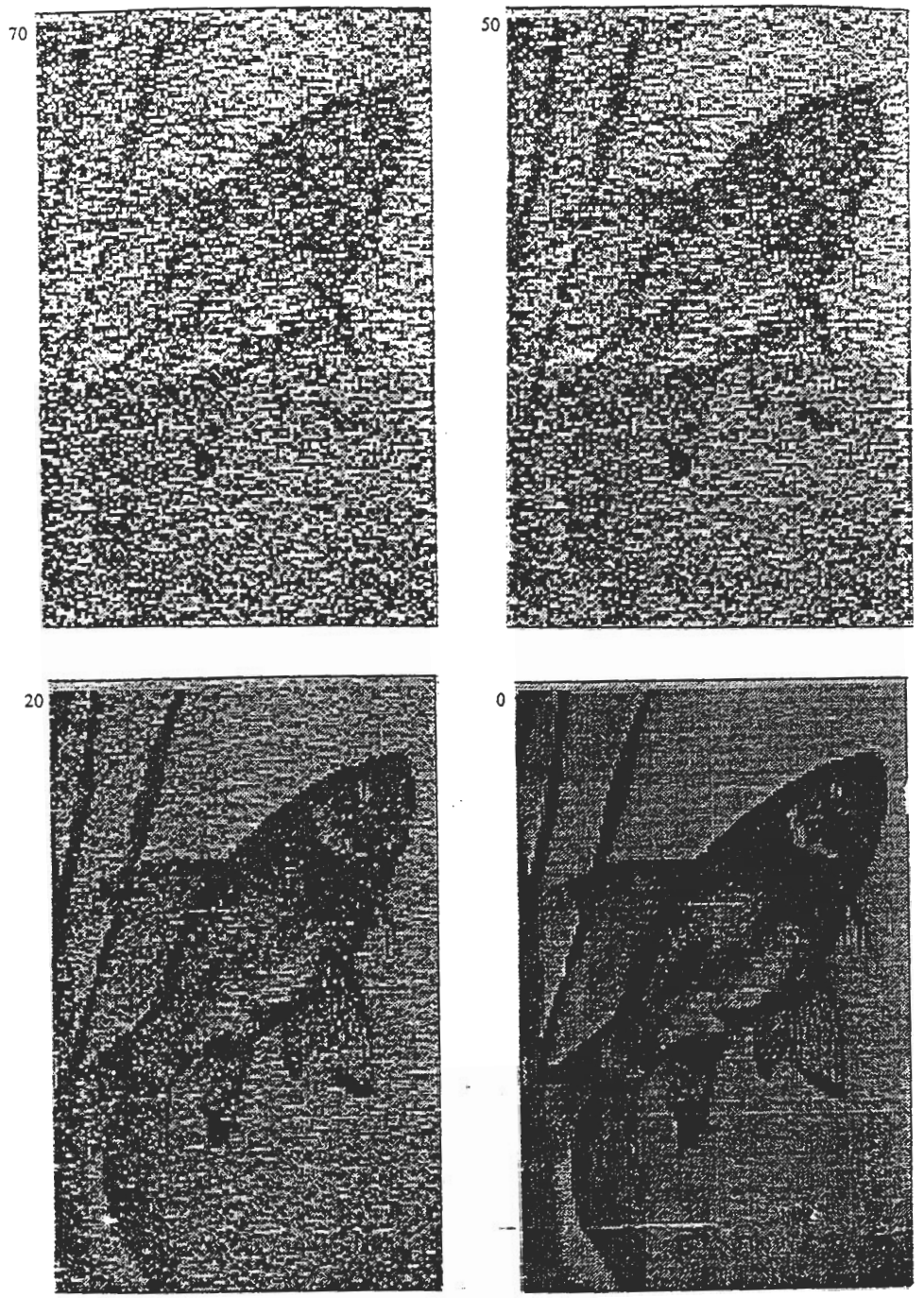
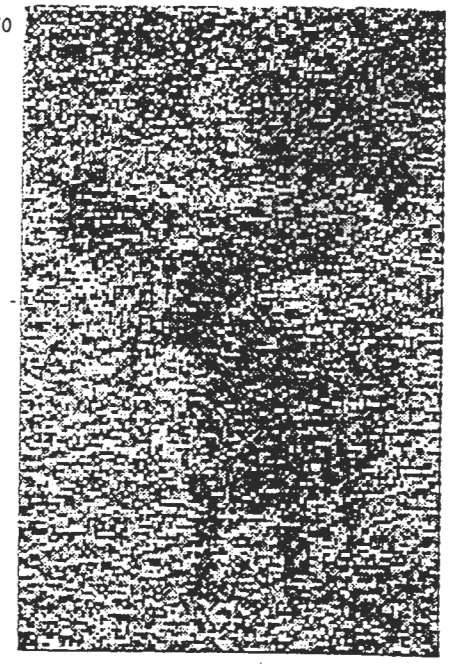
Appendix

Examples of two sets of stimuli (sheep and fish, with four levels of added noise).
Set 10: Fish

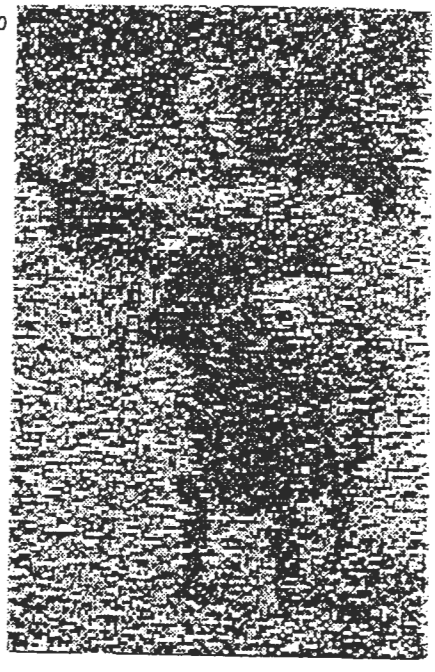


Set 5: Sheep

70



50



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PARANORMAL BELIEF SCALE

Name ..... **Age** ..... **Sex** ..... **Date** .....

This questionnaire aims to discover your opinions about various paranormal phenomena. There are no right or wrong answers, we are just interested in your views. Therefore, please answer the questions as accurately as you can. Indicate your response by circling the relevant number on the scale following each statement, as illustrated below:

1. Definitely True
2. Probably True
3. Uncertain
4. Probably False
5. Definitely False

(a) ESP (Extrasensory Perception) exists.

Definitely True 1 2 3 4 5 Definitely False

(b) I have had personal experience of ESP.

Definitely True 1 2 3 4 5 Definitely False

(c) I am psychic.

Definitely True 1 2 3 4 5 Definitely False

(d) I have had at least one hunch that turned out to be correct, and which was not just a coincidence.

Definitely True 1 2 3 4 5 Definitely False

(e) I have had at least one premonition about the future that came true, and which was not just a coincidence.

Definitely True 1 2 3 4 5 Definitely False

(f) I have dreamt at least one dream that came true and which was not just a coincidence.

Definitely True 1 2 3 4 5 Definitely False

(g) I have had at least one vision that was not just an hallucination.

Definitely True 1 2 3 4 5 Definitely False

(h) There is life after death.

Definitely True 1 2 3 4 5 Definitely False

(i) Some people can contact spirits of the dead.

Definitely True 1 2 3 4 5 Definitely False

(j) I have had at least one experience of telepathy between myself and another person.

Definitely True 1 2 3 4 5 Definitely False

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Dinge sehen: Visuelle Wiedererkennung und Glaube an Paranormales

Zusammenfassung: Der Beitrag bietet eine Übersicht über Hinweise auf Unterschiede zwischen 'Sheep' (jenen, die an Paranormales glauben) und 'Goats' (den Nichtgläubigen) hinsichtlich ihrer jeweiligen kognitiven Verarbeitungsweisen. Es wird die Auffassung vertreten, daß der Glaube an Paranormales sich verstärken kann, wenn Menschen zufällige Ereignisse als erklärungsbedürftig fehlinterpretieren oder in diffusen, unstrukturierten Reizen etwas zu erkennen glauben. Wenn dies zutrifft, würde man erwarten, daß Gläubige stärker dazu neigen, Objekte in diffusen visuellen Stimuli zu identifizieren. Dreißig Versuchspersonen absolvierten eine 'Paranormal Belief Scale' (zur Ermittlung paranormaler Glaubensbereitschaften), eine Fehlidentifikationsfrage (über die Fehlerkennung von Personen im Alltagsleben) und einen visuellen Identifikationstest. Als Stimuli dienten zwölf Sätze von je vier Bildern, abgestuft nach ihrer Überlagerung durch computererzeugtes Rauschen. Glaube an Paranormales war korreliert mit einer größeren Neigung, positive Identifizierungen oder Rateversuche, dafür aber weniger zutreffende Identifizierungen vorzunehmen. Stärkerer Glaube korrelierte zudem auch mit der Behauptung häufigerer Fehlerkennung von Personen. Dies bestätigt frühere Ergebnisse über Unterschiede in den Kognitionen Gläubiger und Nichtgläubiger.

Ik zie wat jij niet ziet: visuele herkenning en geloof in het paranormale

Samenvatting: Er zijn aanwijzingen voor verschillen in cognitief functioneren tussen "sheep" en "goats" (resp. schapen of gelovers en bokken of niet-gelovers in het paranormale). De aanname is dat dat geloof kan worden versterkt als mensen een toevallige gebeurtenis fout interpreteren omdat ze denken dat die moet worden verklaard of als ze denken iets te herkennen in pure chaos. Op grond daarvan verwacht je dat de schapen in chaos eerder een voorwerp zullen herkennen. 30 proefpersonen vulden een test in over hun geloof in het paranormale, beantwoordden een vraag over het fout herkennen van mensen in het dagelijkse leven en deden een test over visuele herkenning. Daarbij werden 12 sets van elk 4 afbeeldingen gebruikt, die via een computer van maskerende stoorinformatie waren voorzien. Er was een positief verband tussen geloof in het paranormale en de neiging tot gokken of iets fout herkennen en een negatief verband met correct herkennen. Bovendien bleek een samenhang tussen geloof in het paranormale en vaker mensen ten onrechte herkennen. Deze resultaten bevestigen eerdere conclusies over verschillen in cognitief functioneren tussen schapen en bokken.

Vedere cose. Riconoscimento visivo e credenza nel paranormale

Sommario: Vengono presi in esame i dati che suggeriscono l'esistenza di una differenza di stile cognitivo tra 'pecore' (credenti nel paranormale) e 'capre' (scettici). Si ipotizza la possibilità che la fiducia nel paranormale aumenti in parallelo con l'opinione, erronea, che gli eventi casuali richiedano una spiegazione o con la convinzione di aver riconosciuto qualcosa di significativo negli stimoli confusi. Su questi presupposti, ci si può attendere che chi crede nel paranormale identifichi più facilmente qualcosa di significativo all'interno di stimoli indistinti. 30 soggetti

sperimentali hanno risposto alla Scala di Credenza nel Paranormale e al Questionario sull'Erronea Identificazione (riguardante le errate identificazioni di persona nella vita quotidiana), e hanno svolto un compito di identificazione visuale. Gli stimoli erano costituiti da dodici gruppi di quattro figure ciascuna; le figure erano state rese meno nette per mezzo di un disturbo generato con il computer. La credenza nel paranormale è risultata correlata a una maggior tendenza a dichiarare identificazioni o indovinamenti sicuri, ma a un numero minore di identificazioni corrette. La fiducia più ferma, inoltre, correlava con più frequenti identificazioni personali errate. Tutto ciò conferma i dati precedenti sulle differenze di stile cognitivo tra credenti e non credenti nel paranormale.

Viendo Cosas: Reconocimiento Visual y Creencia en lo Paranormal

Resúmen: Se revisa evidencia que sugiere diferencias en estilos cognoscitivos entre ovejas (creyentes en lo paranormal) y cabras (los que no creen). Se sugiere que la creencia en lo paranormal puede aumentarse cuando las personas interpretan erroneamente eventos que ocurren al azar como eventos que requiren una explicación, o creen que ven algo en estimulos confusos. De acuerdo a esto los creyentes deben estar más propicios a identificar objetos en estímulos confusos. 30 participantes llenaron la Escala de Creencias Paranormales, una Pregunta de Identificación Falsa (sobre identificaciones erróneas de personas en la vida diaria) y una tarea de identificación visual. Los estímulos consistieron en doce grupos de cuatro ilustraciones cada uno, presentados con confusiones generadas por computadora. La creencia en lo paranormal correlacionó con alta frecuencia de errores en identificar personas. Esto confirma hallazgos anteriores de diferencias en estilos cognoscitivos entre los que creen y los que no creen en lo paranormal.

Vendo Coisas: Reconhecimento Visual e Crença no Paranormal

Resumo: A evidência é revisada sugerindo diferenças no estilo cognitivo entre ovelhas (pessoas que acreditam no paranormal) e cabras (pessoas que não acreditam no paranormal). Sugere-se que a crença no paranormal pode ser aumentada quando as pessoas interpretam mal a casualidade dos eventos quando necessitam de uma explicação, ou pensam ver algo em estímulos provenientes de ruídos. Assim, seria esperado que as pessoas que acreditam no paranormal fossem mais susceptíveis à identificação de objetos em estímulos provenientes de ruídos. 30 participantes preencheram uma Escala de Crença no Paranormal, uma Questão de Falsa Identificação (perguntando sobre más interpretações das pessoas na vida cotidiana) e uma tarefa de identificação visual. Os estímulos foram vinte conjuntos de quatro imagens cada, graduados pela adição de ruído gerado por computador. A crença no paranormal foi relacionada com uma maior tendência em produzir identificações ou palpites positivos e menos identificações corretas. Maior crença tambem está correlacionada com as alegações de freqüentes más identificações pelas pessoas. Isto confirma descobertas anteriores a respeito das diferenças do estilo cognitivo entre os que acreditam no paranormal e os que não acreditam no paranormal.

Voir des choses: La reconnaissance visuelle et la croyance au paranormal

Résumé: On passe en revue l'évidence suggérant des différences dans le style cognitif entre moutons (croyants au paranormal) et les chèvres (non-croyants). On suggère que la croyance au paranormal peut être augmentée quand les gens interprètent mal les événements du hasard comme requérant une explication, ou quand ils pensent voir quelque chose dans des stimuli bruités. Ainsi on s'attend que les croyants soient plus enclins à identifier des objets dans stimuli bruités. 30 participants ont rempli l'Echelle de Croyance au Paranormal, une Question de Fausse Identification (interrogeant sur les erreurs d'identification des gens dans la vie quotidienne) et une tâche d'identification visuelle. Les stimuli furent douze séries de quatre images chacune, auxquelles un bruit généré par ordinateur a été ajouté. La croyance au paranormal a corrélé avec une plus grande tendance à faire des identifications ou devinements positifs et de moindres identifications correctes. La plus haute croyance a corrélé aussi avec les revendications de plus fréquentes erreurs d'identification des gens. Ceci confirme des découvertes antérieures de différences dans le style cognitif entre croyants et non-croyants.