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The psychology of paranormal beliefs

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Summary. Investigation of paranormal claims has failed to find any repeatable paranormal phenomena, yet beliefs in such phenomena are extremely prevalent. Some of the psychological mechanisms which support these beliefs are described. Mental imagery, subjective validation, coincidence, hidden causes, and fraud all contribute to the folklore in this field. Magical thinking is as evident today as it ever has been. Recent research suggests that increased skepticism concerning paranormal claims can result from special educational procedures which emphasize critical thinking rather than learning scientific facts.
Key words. Psychology; paranormal beliefs; motivation; mental imagery; coincidence; hidden causes; subjective validation; fraud; education; hoax-dehoax procedure.

Introduction

After a century of serious research, investigations of the paranormal have failed to produce a single repeatable finding. Thousands of articles and books have described evidence of all levels of quality ranging from the purely anecdotal to elaborately designed laboratory experiments. Not a single claim of the paranormal has been confirmed by independent, impartial investigators. Even more disillusioning is the fact that the field is rife with fraud, trickery, illusion and error. Yet beliefs in the reality of paranormal phenomena continue to be a popular and a central theme in our cultural ethos even among the highly educated, academics and scientists. How can the widespread belief in the paranormal, on the one hand, and the dearth of scientific evidence, on the other, be reconciled? Apart from the obvious cultural transmission of paranormal beliefs, to what extent do the less obvious factors of self-deception, fraud, illusion, and error contribute to the formation of such beliefs?

Firstly, how prevalent are paranormal beliefs? Wagner and Monnet[30] reported that 65% of U.S. professors believe that ESP is a likely possibility or established fact. Significant differences were apparent between disciplines however[21]. Positive response rates to the questions 'Do you consider ESP a likely possibility?' or 'Do you consider ESP an established fact?' were as follows: humanities, arts, education,

Table 1. Percentages of introductory psychology students claiming paranormal abilities

	1972 (N = 522) (%)	1986 (N = 306) (%)
Ability to cast horoscopes	1	8
Ability to tell people's fortunes by cards, reading palms, tea-leaves, or other methods	3	8
Ability to perceive events which will happen in the future by premonition, dreams or other methods	26	50
Ability to communicate with the deceased through seance or any other methods	6	10
Ability to perceive objects by extrasensory perception	8	14
Ability to call forth supernatural forces (other than God) to affect you or others	2	7
Ability to affect others through personal power which does not involve any type of direct communication with them	11	24
Ability to communicate through mental telepathy with others	14	20

73–79%; social science, excluding psychologists, 66%; natural science, 55%; psychologists, 34%. Some of the factors of a psychological nature which strengthen paranormal beliefs but which lead to a relatively high degree of skepticism among psychologists are the subject of this article.

Figures obtained for other groups show very high rates of belief, and there is a trend for an increase in beliefs rather than a decrease [3, 24]. Table 1 shows the percentages of believers in various paranormal effects among New Zealand psychology students for the years 1972 and 1986. These figures show the percentages of students who believe that they personally possess each of the abilities listed.

Of particular significance are the large percentages of students who believe that they possess the power to foretell future events by premonition, dreams or other methods (26% increasing to 50%) or to communicate with others through mental telepathy (14% increasing to 20%). Data for students studying subjects other than psychology suggest that these figures are towards the middle of the range.

There are many psychological factors which foster paranormal beliefs and make them such a common feature of human thinking. Science and scientific thinking are a recent development in human history which has had thousands of years of magical and religious entrenchment. Beliefs in the paranormal have evolved out of magical and religious traditions which still play a major role in the human desire for transcendental states. Scientists are often poor debators when it comes to the paranormal because they are not adequately prepared with the relevant information, leaving it to journalists in the popular press, magazines, and television 'documentaries' and films to satisfy the public's thirst for mystery and magic. Perhaps scientists would gain public respect rather than lose it if they took the trouble to demystify some of the phenomena and provided alternative natural explanations of anomalous experience [24]. Contrary to popular supposition, science can provide an account of the so-called 'supernatural', especially in the psychological field.

In the remainder of this article, some of the psychological processes and mechanisms promoting paranormal beliefs and skeptical thinking will be reviewed.

Mental imagery

Mental images are quasi-perceptual experiences occurring in the absence of part or all of the sensory object. Mental images take many different forms, occur in several states of arousal from waking to sleep, and appear with wide-ranging individual differences. Images which have the potential for supernatural interpretation include after-imagery, eidetic imagery, hypnagogic and hypnopompic imagery, dreams, pseudohallucination, hallucinations, out-of-the-body experiences, synaesthesias, drug-and fever-induced images, and various other unbidden images which may occur in delirium, psychosis, or mystical states. While all of these phenomena can vary in their subjective clarity or vividness, many have an autonomous, unpredictable quality which tends to surprise or interest the subject giving a dramatic quality to the experience. They may give the impression that the images are not generated from within the self but that some external agency may be involved. This produces a state of dissociation in which different parts of the self seem to be divided in consciousness [7].

Ghosts, spirits, visions, and apparitions can all be the end-result of mental images of various kinds. Such interpretations of what is essentially vivid fantasy are particularly probable in the context of culturally acquired beliefs of a superstitious kind. Spirit mediumship and religious visions may consist of hallucinated voices or entities over which the percipient has little or no control. The lucidity of the imager concerning these various experiences can vary enormously and many sincere believers in paranormal phenomena appear to base their beliefs on autonomous, vivid, hallucinatory images of a non-lucid kind [15].

Table 2 presents a comparison of imagery types in terms of their qualities and characteristics. All of these imagery types have the potential for paranormal interpretation especially among persons who have a conducive mental set.

Individual differences in the above phenomena, measured in terms of frequency and awareness, have been investigated since the early research of Galton over a century ago [4]. Galton concluded that "in sane and healthy" individuals there is "continuity between all the forms of visualization, beginning with an almost total absence of it, and ending with a complete hallucination". Recent research has been conducted on individuals with particularly well-developed eidetic ability who have been compared with control subjects in a number of experiential factors. Table 3 presents a summary of these

Table 2. Comparison of various imagery types with a potential for paranormal interpretation (after Marks & McKellar [15])

Characteristic	Eidetic	Hypnagogic	Dream	Hallucination	Pseudo-hallucination	Hallucinogen-induced	Sensory deprivation
Vivid	usually	yes	yes	yes	can be	yes	yes
Projected	yes	yes	yes	yes	can be	yes	yes
Arousal level	high	probably low	low	varies	high	varies	varies
Autonomy	yes	yes	yes	yes	yes	yes	yes
Compatible with good mental health?	yes	yes	yes	yes, if infrequent	yes	yes	yes
Constructive	yes	yes	yes	yes	yes	yes	yes
In any modality?	yes	yes	yes	yes	yes	yes	yes
Lucid	yes	usually	can be	no	yes	usually	usually

Table 3. Characteristics of fantasy-prone and non-fantasy-prone individuals (from Wilson & Barber, 1983)

Characteristic	Fantasy-prone (n = 26) (%)	Non fantasy-prone (n = 25) (%)
Extensive and vivid fantasy more than 50% of the time	92	0
Hallucinatory fantasies (fantasies 'as real as real')	65	0
Confuse memories of fantasies with memories of real events	85	24
Autonomous, self-propelling, involuntary fantasies	100	0
Pretend to be somebody else with total absorption	64	16
Vivid sensory experiences	85	44
Physical effects associated with fantasies	92	8
Telepathic or precognitive experiences	92	16
Out-of-the-body experiences	88	8
Automatic writing (guided from outside the self)	50	8
Religious visions	23	0
Healing powers	69	0
Experiences with apparitions (spirits or ghosts)	73	16
Hypnagogic imagery	64	8

comparisons which are drawn from the investigation of Wilson and Barber [31].

These results suggest that there is a group of extremely suggestible persons within whom many supposed psychic or paranormal phenomena tend to be focussed. Such individuals may well be over-represented among mediums, psychics, and religious visionaries, as Wilson and Barber point out. Many well-known personalities in the history of the occult appear to have been highly fantasy-prone (e.g. Madame Blavatsky, Mrs. Leonard, Eileen Garrett) and religious visionaries have probably belonged to the same group (e.g. Joan of Arc, Joseph Smith, and the recent group of visionaries in Medjugorje, Yugoslavia). Wilson and Barber's fantasy-prone subjects were selected from a group of exceptionally good hypnotic responders and fantasy-proneness and high suggestibility are generally correlated, although by no means perfectly. There can be little doubt that the psychological investigation of mental imagery has an important role in gaining a better understanding of paranormal claims.

Subjective validation

Human perception and cognition are not simple copying processes which reproduce experiences in memory. They are best characterised as selective, constructive processes operating in a 'top-down' rather than 'bottom-up' fashion in which there is a striving or 'effort after meaning' [1]. Our experiences tend to provide a confirmation of what we already believe or 'know' rather than new evidence with which the current world-view can be updated or tested. Beliefs have an active life of their own and stability is tenaciously adhered to, especially when the beliefs occupy a core rather than a peripheral position in the subject's cognitive structures.

Expectancy effects enter into paranormal investigation in a large number of different ways. One of the major expectancy phenomena has been termed 'subjective validation' [14]. In this, evidence is selectively perceived such that it appears to support one's beliefs. Subjective validation occurs whenever a person misreads unfavourable or neutral evidence as giving positive support to his/her beliefs. Classic demonstrations of this phenomenon are the prophecies of the Delphic Oracle and Nostradamus, the discovery of 'N-rays', phlogiston, the planet Vulcan, canals on Mars, flying saucers, faith-healing, and psychic phenomena. Scientific methodology tries to avoid the problem of subjective validation by using controls such as placebos in double-blind experiments or simulator controls in hypnosis research. Even in these cases the situation is made complicated by the numerous cues that exist in any social interaction between subject and experimenter allowing transmission of the experimenter's hypotheses in the form of demand characteristics.

All of the various forms of psychic phenomena contain plenty of room for subjective validation to operate, whether in spontaneous occurrences or in the laboratory. Having a 'precognitive' dream and then noticing some matching events is a classic example. The subject only remembers such dreams if they correspond with events and the multitude of unmatched dreams are simply ignored. Recent experiments on remote viewing provide further evidence, not of ESP, but of our infinite creativity for selective perception [26, 27]. The remote viewer describes or draws a distant location which is being visited by a team of human 'beacons' or senders (see the article by C. Scott in this review). The beacons wander around a complex target site such as a large shopping precinct or a park or playground leaving the specific, elements to, be transmitted to the remote subject undefined. At the end of the experiment, the subject is taken to the target site and given feedback concerning his/her performance. At this stage the beacons and remote viewer exchange information and literally look for correspondences between elements in the subject's description and aspects of the target environment. This procedure cannot fail to present a powerful cognitive illusion of ESP among those who are already believers. In many experiments, the investigators actually took photographs of the matching aspects of the targets after seeing the subject's descriptions and published them in their 'scientific' report. For these reasons, beliefs in the paranormal tend to be self-perpetuating.

Research in cognitive psychology on biases and heuristics has focused on a range of sub-optimal tendencies in human inference and judgment [20]. Human subjective probability estimates tend to be based on simple heuristics or rules which simplify the complexities of weighing and combining all the elements of a decision task [12, 29]. In their reviews of this work as it relates to occult beliefs, Singer and Benassi [24] state: "When presented with an array of data or a sequence of events in which they are instructed to discover an underlying order, subjects show strong tendencies to perceive order and causality in random arrays, to perceive a pattern or correlation which seems a priori intuitively correct even when the actual correlation in the data is counterintuitive, to jump to conclusions about the correct hypothesis, to seek and to use only positive or confirmatory evidence, to construe evidence liberally as confirmatory, to fail to generate or to assess alternative hypotheses, and, having thus managed to expose themselves only to confirmatory instances, to be fallaciously confident of the validity of their judgments.' All of these biases place the intuitive statistician in a highly precarious position when it comes to evaluating evidence. The underlying strategy is to be theory-driven rather than data-driven and a theory with paranormal assumptions is essentially nonfalsifiable even when it is tested under experimental conditions. 'Subjective validation' is, therefore, a general term for the cognitive biases which tend to produce confirmation of one's beliefs instead of disconfirmation even when disconfirmation should realistically occur.

Coincidence

The tendency to mistake one kind of coincidence for another has led to tremendous confusion in writings on the paranormal. For the present purposes it will be useful to acknowledge three kinds of coincidence: A) ordinary joint occurrences of two similar or related events; B) striking joint occurrences which will happen from time to time purely by chance ('probability matches'); C) striking kinds of joint occurrence which seems to lack any ordinary causal or probabilistic explanation ('odd matches'). The latter kind of coincidence is often given a paranormal interpretation because of selective biases in human perception, memory and reasoning which hide the role of chance factors when considered over a long run of experiences. Hence a misclassification occurs in which pure probability matches of type B are disguised as oddmatches of type C.

Difficulty in estimating probabilities is a general problem in paranormal research. In experiments the application of statistical procedures which make valid assumptions becomes all-important in analysing the results. Thus many investigations have gone badly wrong because the randomisation procedures have been faulty[2]. The main reason for such heavy reliance being placed on probabilities is that proper experiments on psychic or other paranormal phenomena cannot be done. This is because there is no method by which a paranormal condition can be compared with a non-paranormal (normal) condition with all other variables kept constant. Nobody knows how to generate a paranormal effect and how to suppress it and so the evidence for it is always statistical, over long runs of trials, by making assumptions about what the normal or chance distribution of events should be[11].

In real life an even greater problem exists because human beings make notoriously poor intuitive statisticians[20, 29]. When confronted with a real-life anomalous event, all logic and rationality are 'thrown out of the window' and, frequently, no attempt to provide a rational analysis is made. As noted above, coincidences or odd-matches of the C-type consist of having an experience which is matched in a striking way by some other experience. Collections of such oddmatches have been published, such as Koestler's[8], and it is evident that sophisticated thinkers and writers are capable of being totally seduced by events which could easily have arisen purely by chance. 'Koestler's Fallacy' is to assume that each particular oddmatch could not have occurred by chance.

This fallacy is based upon the simple fact that a pattern of events which is highly improbable over the short run becomes highly probable over the much longer run. Marks and Kammann[14] referred to this effect as the 'short-run illusion'. To take a simple example, if five coins are tossed all at once on a single occasion the probability of obtaining five heads is 2^{-5} or 0.03125. If we repeat the coin tossing 100 times, the probability of five heads somewhere in the series is 0.96. The short-run illusion depends upon the fact that the human intuitive statistician is unable to appreciate that a particular oddmatch is merely one striking combination embedded in a much larger series.

The short-run illusion is so powerful because the world is much more complex than that of coins and roulette wheels. It is possible to calculate the total population of combinations of events from which the believer in psi can select notable oddmatches. For example, the significance of Koestler's collection of 40 anecdotes[8] should be considered in the light of the following assumptions:

1) Suppose that a typical day contains 100 distinct events (dreams, thoughts, memories, feelings, images, activities, etc.). There are $^{100}C_2$ or 4.950 pairs of events each day;
2) Oddmatches can be remembered for long periods, e.g. 10 years or 3650 days;
3) If Koestler knew at least 1000 people then he would have had access to a total of $4950 \times 3650 \times 1000$ or 1.8×10^{10} pairs of events.

Naturally, all but 40 of these 18 billion were passed unnoticed! One can readily see how subjective validation helps to make the occasional coincidence a cause for celebration.

Hidden causes

In the sense that the laws of probability have hidden implications, the short-run illusion as it applies to coincidences can be seen as a specific instance of a more general principle, that of 'hidden causes'. Many experiences which appear odd or even 'impossible' may be generated by invisible chains of cause and effect which bias responses away from chance levels. A major category of such hidden causes is nonverbal communication or 'body-language' which automatically conveys information about another's attitudes, moods, and feelings. This is often neglected as a potential communication channel in lay appraisals of telepathy. Many reports of clever animals of the 'Clever Hans' type also fall into this category[23].

Hidden verbal cues can also be responsible for apparent telepathic effects, as in the highly publicised experiments on remote viewing conducted by Puthoff and Targ (see the article by C. Scott in this review). In these experiments[26, 27] the judges were asked to rank the subject's descriptions of remotely viewed places against the places themselves. The transcripts had been unedited and many useful references to previously visited places, times, dates, and other cues were conveyed to the judges who also had been given the target listing in the correct sequence[10, 13]. Even the supposedly 'edited' transcripts of the remote viewing experiments which were produced by Tart[28] were found to contain verbal cues[16]. When all of these cues were removed, judges were unable to correctly match the descriptions against the targets and no evidence for any special 'ESP' communications remained.

Sensory cues, verbal and non-verbal, provide the modus operandi for cold-readers who use tarot cards, crystal balls, tea leaves and other gimmicks to misdirect the subject's attention from the essential communication processes (see article by D. Dutton in this review). In some cases the reader may make use of sensory cues quite unwittingly in a self-deceiving manner. This leads to a sincere belief in special mental powers or 'psychic's delusion' which receives strong positive reinforcement from an ever-appreciative line of clients. In addition to sensory cues provided by accomplices and unwittingly by members of the audience stage mentalists can use human non-randomness to their advantage in performing feats of 'telepathy'. For example, the performer 'sends a message' to the audience by suggesting that he/she is 'thinking of a number between 1 and 50, both digits are odd, and different, so that 11 would not be any good, but 15 would be OK.' The performer concentrates for a while and then asks how many people are thinking of 37 or 35. The results usually place the performer in a highly favourable light as more than 50% of the audience can be expected to report that they, too, are thinking of 37 or 35! Controlled investigation has shown that although seven numbers are permitted by the instructions (15, 17, 19, 31, 35, 37, 39) 37 is chosen by 30–35% of the audience and 35 by 20–25% and so the performer can guarantee success by always saying something like, 'I was thinking of 35, but changed my mind to 37'[14]. Even formal experiments on ESP can go seriously wrong if the target sequence fortuitously matches the most popular response pattern. The assumption that all possible responses

are equi-probable will create the mistaken impression that the results are significantly higher than the chance level [2].

In addition to the intriguing possibility of self-deception, the history of paranormal research is littered with deliberate fraud and trickery of every conceivable kind [6]. Some of the most dramatic 'evidence' of the paranormal has, quite literally, been manufactured. While much of the fraudulent activity has occurred in the darkened seance room, there are many examples of hoaxes and tricks which have successfully fooled many of the leading scientists who have entered the field. One of the most risky assumptions for scientists to make is that one is too sophisticated as a trained observer to be fooled by a psychic or other miracle-maker. Specialised training in science provides no quarantee that one can be adequately prepared to detect trickery. Many of the scientists who have been duped were physicists who lacked the expertise necessary to detect fraud and trickery by their sometimes devious subjects. A professional magician with experience in the field of 'mental magic' should always be consulted when designing tests of psychic powers.

Some investigators have been extremely naive. For example in 1974, *Nature* published a series of ESP experiments conducted by physicists H. Puthoff and R. Targ with the self-proclaimed 'psychic' Uri Geller [25]. For some of the experiments Geller was located inside a 'shielded' room where he could not be observed by the investigators. Although this was not mentioned in the original report, it was discovered later that the target drawings were displayed directly opposite to a cable hole which had been stuffed with cotton wool giving Geller a perfect view of the drawings if he simply removed some of the cotton wool [14]. The investigators were convinced that they had produced 'cheat-proof' experimental evidence of paranormal functioning.

Fraudulent results have also been perpetrated by the investigators themselves. One of the most significant was the experimental series conducted by mathematician, S. G. Soal, with percipient Basil Shackleton in 1940 [25]. According to the careful analysis of Betty Markwick [18] Soal must have deliberately manipulated his data sheets to enhance Shackleton's ESP scores. It took 25 years of critical appraisal before Soal's fraud was finally confirmed. Several suspicious features of the Soal-Shackleton experiments had been exposed during that period, but parapsychologists had always defended Soal even though the evidence of fraud was very strong indeed [22].

Changing paranormal beliefs

As indicated above, belief in the paranormal is certainly popular and while the psychological processes we have described may well be contributing factors, cultural, social, and educational factors must also play a significant role. It seems easier to believe than to disbelieve in the paranormal, but to what extent can education or other interventions contribute to skeptical disbelief? Obviously nobody can ever be totally immune to false beliefs, but is there a possibility that special techniques could be developed for education the critical faculties of young scientists so that they may be more resistant to illusion, error and fraud?

Several attempts at educating students in skeptical thinking have been reported in the *Skeptical Inquirer*, a journal devoted to the study of paranormal claims. Paul Kurtz has offered a course entitled 'Philosophy, Parapsychology and the Paranormal' for over 10 years at the State University of New York at Buffalo. Kurtz has observed that students attending the course show massive reversals of belief from approximately 80% believing in ESP, ghosts, levitation and related occult phenomena at the beginning of the course to lower than 20% by the end of the course [9]. Practical projects of an experimental nature are included to test paranormal claims and the results have always been negative. The dramatic changes which occur in students' beliefs suggest that new evidence does hold sway and that beliefs do change in the light of that new evidence. While most people successfully defend their beliefs against disconfirmation when this occurs in a piecemeal fashion, if the evidence is presented clearly, coherently and comprehensively, a capacity to change beliefs in a rational manner seems a real possibility.

Thomas Gray of Concordia University in Montreal, Canada, has conducted a controlled investigation on the effects of a one-semester course entitled 'The Science and Pseudoscience of Paranormal Phenomena' [5]. Lectures dealt with the methodology of paranormal research and how to collect 'good' or 'bad' evidence. Students were given skeptical literature to read, and were alerted to alternative explanations for paranormal claims, especially in regard to ESP and UFOs. A simple belief questionnaire was administered before and immediately after the course, and again one year following the course. The results showed large immediate changes towards skepticism in the experimental group and many of the changes remained significant at the one-year follow-up. However, the percentages of believers and the strength of their beliefs remained disappointingly high: 68% believed in ESP and 46% in UFOs at the one-year follow-up, as compared to 85% and 69% before the special course.

A stronger intervention is the hoax-dehoax methodology described by Scot Morris [19]. A 'Survey of Controversial Issues' was constructed consisting of six ESP items, 15 supernatural or borderline-science items, and 11 natural science items, for which students were required to rate the strength of their beliefs. Two classes, A and B, observed a hoaxed 'ESP demonstration' in which a visiting lecturer performed a series of tricks which gave the appearance of ESP. The two classes then completed the 'Controversial Issues' questionnaire. One week later class A was dehoaxed, i.e. the students were told they had been duped and the various tricks were explained. Class A and class B (who had not been dehoaxed) were then combined and an anti-ESP lecture was delivered. This lecture revealed many of the tricks of the ESP trade, the difficulty of analyzing coincidences, the methodological problems of laboratory research and the lack of evidence for ESP. After the lecture, the students completed the survey for a second time. Both classes showed large decreases in their degree of beliefs in ESP but class A who had been dehoaxed showed a much larger decrease overall, dropping from 'Moderately believe' to 'Strongly disbelieve'. There were also changes in degree of belief in the supernatural items but to a much lesser extent.

While Morris' study is encouraging, it suffered from several defects. Although two control classes, C and D, who were not shown the 'ESP demonstration' were included in the study, the study remained incomplete because no measure of belief was available for classes A and B prior to the 'ESP demonstrations.' Hence a large drop in belief following the lecture and dehoaxing was bound to occur because the initial ESP belief levels, assessed immediately following the demonstration, would have been abnormally high.

Marks and Warnock combined Gray's approach with that of Morris and investigated the effect on paranormal beliefs of a short lecture course which included the hoax-dehoax procedure [17]. Prior to and following the lecture series, the experimental and control groups completed the 'Modified Clark Information Sheet' (see table 1 for the set of items) and a UFO belief questionnaire.

The four skeptical lectures covered the following material: 1) a demonstration by D.F.M. of 'telepathy', 'clairvoyance', and 'psychokinesis' based upon Kreskin's and Geller's stage routines; 2) a complete dehoaxing in which all of the above effects were explained followed by an account of cold reading, faith healers' methods, and other stage techniques; 3) an account of the flaws in recent parapsychological research;

and 4) psychological factors in belief. The control group received an alternative set of lectures which covered the following: 1) a demonstration of a mnemonic system (the method of loci) and a description of other memory aids; 2) mental imagery and perception; 3) psychological research on imagery and memory; and 4) applications of imagery techniques to therapy, skills acquisition and hypnosis.

The results provided evidence of increased skepticism in the experimental group in regard to the paranormal abilities of others. However, no significant change occurred in ratings of personal abilities. Degrees of belief concerning UFOs also failed to shift as a result of the skeptical lectures and so the effect of the lectures was highly content-specific.

The hoax-dehoax procedure often reveals some intensely resilient belief systems among committed believers. Benassi and Singer observed that many students continued to believe that the performer had psychic powers even when they were told six times that he was a magician and not a psychic[24]. I have personally had several individuals assure me after my own hoax-dehoax demonstrations that I am deluding myself and that I really do have psychic powers! A more common rationalisation is the observation that while I may cheat, Uri Geller and other psychics obviously don't need to do so because they really are psychic. No matter how hard beliefs are challenged, some believers have a remarkable ability to rationalise or explain away the evidence and their beliefs remain as strong as ever.

In spite of these resistances, there is good evidence that educational techniques which provide sustained exposure to critical argument, skeptical analysis, and controlled experimental and experiential observations decrease students' willingness to accept controversial claims.

Conclusions

Paranormal claims receive wide publicity through the media, films, magazines and books. Much of our cultural and religious heritage contains supernatural themes and assumptions. Given the cultural forces which shape human thinking it would be remarkable if anomalous experiences were not widely regarded as genuinely paranormal and highly valued as transcendental states of mind. Furthermore there are a number of psychological processes which can only reinforce and vivify pre-existing belief structures. It seems highly doubtful that human thinking will ever be free from the magical thinking which nurtures paranormal claims. There may well be deeper motivational issues in paranormal thinking, as many authors have suggested. However, psychological investigators are only beginning to develop an adequate methodology for providing this deeper analysis. There is little doubt that the fascination of this topic will compel the psychologists of future ages to continue working on the paranormal. The promotion of critical, skeptical thinking through innovative science teaching also presents exciting challenges for the future.

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