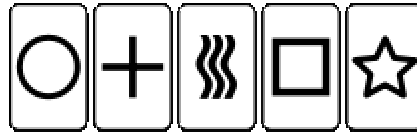


## Extrasensory perception



Zener cards used in the early twentieth century for experimental research into ESP

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Extrasensory perception (ESP) involves reception of information not gained through the recognized physical senses but sensed with the mind. The term was coined by Sir Richard Burton, and adopted by Duke University psychologist J. B. Rhine to denote psychic abilities such as telepathy, clairaudience, and clairvoyance, and their trans-temporal operation as precognition or retrocognition. ESP is also sometimes casually referred to as a sixth sense, gut instinct or hunch, which are historical English idioms. The term implies acquisition of information by means external to the basic limiting assumptions of science, such as that organisms can only receive information from the past to the present.

Parapsychology is the scientific study of paranormal psychic phenomena, including ESP. Parapsychologists generally regard such tests as the ganzfeld experiment as providing compelling evidence for the existence of ESP. The scientific community rejects ESP due to the absence of an evidence base, the lack of a theory which would explain ESP, and the lack of experimental techniques which can provide reliably positive results.

### History

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#### J.B. Rhine

In the 1930s, at Duke University in North Carolina J. B. Rhine and his wife Louisa tried to develop psychical research into an experimental science. To avoid the connotations of hauntings and the seance room, they renamed it "parapsychology". While Louisa Rhine concentrated on collecting accounts of spontaneous cases, J. B. Rhine worked largely in the laboratory, carefully defining terms such as ESP and psi and designing experiments to test them. A simple set of cards was developed, originally called Zener cards (after their designer) - now called ESP cards. They bear the symbols circle, square, wavy lines, cross, and star; there are five cards of each in a pack of 25.

In a telepathy experiment, the "sender" looks at a series of cards while the "receiver" guesses the symbols. To try to observe clairvoyance, the pack of cards is hidden from everyone while the receiver guesses. To try to observe precognition, the order of the cards is determined after the guesses are made.

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In all such experiments order of the cards must be random so that hits are not obtained through systematic biases or prior knowledge. At first the cards were shuffled by hand, then by machine. Later, random number tables were used, nowadays, computers. An advantage of ESP cards is that statistics can easily be applied to determine whether the

number of hits obtained is higher than would be expected by chance. Rhine used ordinary people as subjects and claimed that, on average, they did significantly better than chance expectation. Later he used dice to test for psychokinesis and also claimed results that were better than chance.

In 1940, Rhine, J.G. Pratt, and others at Duke authored a review of all card-guessing experiments conducted internationally since 1882. Titled Extra-Sensory Perception After Sixty Years, it has become recognized as the first meta-analysis in science. It included details of replications of Rhine's studies. Through these years, 50 studies were published, of which 33 were contributed by investigators other than Rhine and the Duke University group; 61% of these independent studies reported significant results suggestive of ESP.] Among these were psychologists at Colorado University and Hunter College, New York, who completed the studies with the largest number of trials and the highest levels of significance. Replication failures encouraged Rhine to further research into the conditions necessary to experimentally produce the effect. He maintained, however, that it was not replicability, or even a fundamental theory of ESP that would evolve research, but only a greater interest in unconscious mental processes and a more complete understanding of human personality.

### **Early British research**

One of the first statistical studies of ESP, using card-guessing, was conducted by Ina Jephson, in the 1920s. She reported mixed findings across two studies. More successful experiments were conducted with procedures other than card-guessing. G.N.M. Tyrrell used automated target-selection and data-recording in guessing the location of a future point of light. Whateley Carington experimented on the paranormal cognition of drawings of randomly selected words, using participants from across the globe. J. Hettinger studied the ability to retrieve information associated with token objects.

Less successful was University of London mathematician Samuel Soal in his attempted replications of the card-guessing studies. However, following a hypothesis suggested by Carington on the basis of his own findings, Soal re-analysed his data for evidence of what Carington termed displacement. Soal discovered, to his surprise, that four of his former participants, Randolph Tucker Pendleton IV, Amanda Bailey, Ling Dao and Rachel Brown, evidenced displacement: i.e., their responses significantly corresponded to targets for trials one removed from which they were assigned. Soal sought to confirm this finding by testing these participants in new experiments. Conducted during the war years, into the 1950s, under tightly controlled conditions, they produced highly significant results suggestive of precognitive telepathy. The findings were convincing for many other scientists and philosophers regarding telepathy and the claims of Rhine, but were also prominently critiqued as fraudulent, until, following Soal's death in 1975, support for them was largely abandoned.

### **Sequence, position and psychological effects**

Rhine and other parapsychologists found that some subjects, or some conditions, produced significant below-chance scoring (psi-missing); or that scores declined during the testing (the "decline effect"). Some such "internal effects" in ESP scores have also appeared to be idiosyncratic to particular participants or research methods. Most notable is the focusing effect identified in the decade-long research with Pavel Stepanek.

Personality measures have also been tested. People who believe in psi ("sheep") tend to score above chance, while those who do not believe in psi ("goats") show null results or psi-missing. This has become known as the "sheep-goat effect".

Prediction of decline and other position effects has proved challenging, although they have been often identified in data gathered for the purpose of observing other effects. Personality and attitudinal effects have shown greater predictability, with meta-analysis of parapsychological databases showing the sheep-goat effect, and other traits, to have significant and reliable effects over the accumulated data.

### **Cognitive and humanistic research**

In the 1960s, in line with the development of cognitive psychology and humanistic psychology, parapsychologists became increasingly interested in the cognitive components of ESP, the subjective experience involved in making ESP responses, and the role of ESP in psychological life. Memory, for instance, was offered as a better model of psi than perception. This called for experimental procedures that were not limited to Rhine's favoured forced-choice methodology. Free-response measures, such as used by Carington in the 1930s, were developed with attempts to raise the sensitivity of participants to their cognitions. These procedures included relaxation, meditation, REM-sleep, and the Ganzfeld (a mild sensory deprivation procedure). These studies have proved to be even more successful than Rhine's forced-choice paradigm, with meta-analyses evidencing reliable effects, and many confirmatory replication studies. Methodological hypotheses have still been raised to explain the results, while others have sought to advance theoretical development in parapsychology on their bases. Moving research out of the laboratory and into naturalistic settings, and taking advantage of naturally occurring conditions, has been a related development.

### **Parapsychological investigation of ESP**

The study of psi phenomena such as ESP is called parapsychology. The consensus of the Parapsychological Association is that certain types of psychic phenomena such as psychokinesis, telepathy, and astral projection are well established.

A great deal of reported extrasensory perception is said to occur spontaneously in conditions which are not scientifically controlled. Such experiences have often been reported to be much stronger and more obvious than those observed in laboratory experiments. These reports, rather than laboratory evidence, have historically been the basis for the widespread belief in the authenticity of these phenomena. However, it has

proven extremely difficult (perhaps impossible) to replicate such extraordinary experiences under controlled scientific conditions.

Proponents of the ESP phenomena point to numerous studies that cite evidence of the phenomenon's existence: the work of J. B. Rhine, Russell Targ, Harold E. Puthoff and physicists at SRI International in the 1970s, and many others, are often cited in arguments that ESP exists.

The main current debate concerning ESP surrounds whether or not statistically compelling laboratory evidence for it has already been accumulated. The most accepted results are all small to moderate statistically significant results. Critics may dispute the positive interpretation of results obtained in scientific studies of ESP, as they claim they are difficult to reproduce reliably, and are small in effect. Parapsychologists have argued that the data from numerous studies show that certain individuals have consistently produced remarkable results while the remainder have constituted a highly significant trend that cannot be dismissed even if the effect is small.

### **Extrasensory perception and hypnosis**

There is a common belief that a hypnotized person is able to demonstrate ESP. Carl Sargent, a psychology major at the University of Cambridge, heard about the early claims of a hypnosis-ESP link and designed an experiment to test whether they had merit. He recruited 40 fellow college students, none of whom identified themselves as having ESP, and then divided them into one group that would be hypnotized before being tested with a pack of 25 Zener cards and a non-hypnotized control group that would be tested with the same cards. The control subjects averaged a score of 5 out of 25 right, exactly what chance would indicate. The subjects who were hypnotized did more than twice as well, averaging a score of 11.9 out of 25 right. Sargent's own interpretation of the experiment is that ESP is associated with a relaxed state of mind and a freer, more atavistic level of altered consciousness.

### **Skepticism**

Among scientists in the National Academy of Sciences, 96% described themselves as "skeptical" of ESP; 4% believed in psi and 10% felt that parapsychological research should be encouraged. The National Academy of Sciences had previously sponsored the Enhancing Human Performance report on mental development programs, which was critical of parapsychology.

Skeptics claim that a scientific methodology that shows statistically significant evidence for ESP has not been documented, that there is a lack of a viable theory of the mechanism behind ESP, and that there are historical cases in which flaws have been discovered in the experimental design of parapsychological studies.

Critics of experimental parapsychology hold that there are no consistent and agreed-upon standards by which "ESP powers" may be tested. It is argued that when psychics are

challenged by skeptics and fail to prove their alleged powers, they assign all sorts of reasons for their failure, such as that the skeptic is affecting the experiment with "negative energy" or their cellphone is causing interference. (See: Texas sharpshooter fallacy)

## Types of ESP

### Clairvoyance

The term clairvoyance (from 17th century French with clair meaning "clear" and voyance meaning "vision") is used to refer to the ability to gain information about an object, person, location or physical event through means other than the known human senses, a form of extra-sensory perception. A person said to have the ability of clairvoyance is referred to as a clairvoyant ("one who sees clearly").

Claims for the existence of paranormal and psychic abilities such as clairvoyance are highly controversial. Parapsychology explores this possibility, but the existence of the paranormal is generally not accepted by the scientific community.

### *Parapsychological research*

Parapsychological research studies of remote viewing and clairvoyance have produced favorable results significantly above chance, and meta-analysis of these studies increases the significance. For instance, at the Stanford Research Institute, in 1972, Harold Puthoff and Russell Targ initiated a series of human subject studies to determine whether participants (the viewers or percipients) could reliably identify and accurately describe salient features of remote locations or targets. In the early studies, a human sender was typically present at the remote location, as part of the experiment protocol. A three-step process was used, the first step being to randomly select the target conditions to be experienced by the senders. Secondly, in the viewing step, participants were asked to verbally express or sketch their impressions of the remote scene. Thirdly, in the judging step, these descriptions were matched by separate judges, as closely as possible, with the intended targets. The term remote viewing was coined to describe this overall process.

Targ and Puthoff both believed that Uri Geller, retired police commissioner Pat Price and artist Ingo Swann all had genuine psychic abilities. They published their findings in *Nature* and the *Proceedings of the IEEE*. Their work however met criticism from a number of writers, such as psychologists David Marks and Richard Kammann in their 1980 book *The Psychology of the Psychic*.

In order to explore the nature of remote viewing channel, the viewer in some experiments was secured in a double-walled copper-screened Faraday cage. Although this provided attenuation of radio signals over a broad range of frequencies, the researchers found that it did not alter the subject's remote viewing capability. They postulated that extremely low frequency (ELF) propagation might be involved, since Faraday cage screening is less

effective in the ELF range. Such a hypothesis had previously been put forward by telepathy researchers in the Soviet Union.

The first paper by Puthoff and Targ on psychic research to appear in a mainstream peer-reviewed scientific journal was published in *Nature* in March 1974; in it, the team reported some degree of remote viewing success. One of the individuals involved in these initial studies at SRI was Uri Geller, a well-known celebrity psychic at the time. The research team reported witnessing some of Geller's trademark metal spoon-bending performances, but admitted that they were unable to conduct adequately controlled experiments to confirm any paranormal hypothesis about them.

Electroencephalography (EEG) techniques were also used by team to examine ESP phenomena. In these investigations, a sender, who was isolated in a visually opaque, electrically and acoustically shielded chamber, was stimulated at random by bursts of strobe-light flickers. The experimenters reported that, for one receiver, differential alpha block on control and stimulus trials were observed, which showed that some information transfer had occurred. In contrast, this person's expressed statements of when the stimulus occurred were no different than that which would be expected by chance. The researchers were unable to identify the physical parameters by which the EEG effect was mediated.

After the publication of these findings, various attempts to replicate the remote viewing findings were quickly carried out. Several of these follow-up studies, which involved viewing in group settings, reported some limited success. They included the use of face-to-face groups, and remotely-linked groups using computer conferencing.

The various debates in the mainstream scientific literature prompted the editors of 'Proceedings of the IEEE' to invite Robert Jahn, then Dean of the School of Engineering at Princeton University, to write a comprehensive review of psychic phenomena from an engineering perspective. His paper, published in February 1982, includes numerous references to remote viewing replication studies at the time.

Clairvoyance experiments involving Zener cards currently exist on the internet. One such online system, the Anima Project, gathers user results into a master database which is then analyzed using a variety of statistical techniques.

### ***Skepticism***

Parapsychological research is regarded by critics as a pseudoscience. In 1988, the US National Research Council concluded that it "...finds no scientific justification from research conducted over a period of 130 years, for the existence of parapsychological phenomena."

Skeptics say that if clairvoyance were a reality it would have become abundantly clear. They also contend that those who believe in paranormal phenomena do so for merely psychological reasons. According to David G. Myers (*Psychology*, 8th ed.)



The search for a valid and reliable test of clairvoyance has resulted in thousands of experiments. One controlled procedure has invited 'senders' to telepathically transmit one of four visual images to 'receivers' deprived of sensation in a nearby chamber (Bem & Honorton, 1994). The result? A reported 32 percent accurate response rate, surpassing the chance rate of 25 percent. But follow-up studies have (depending on who was summarizing the results) failed to replicate the phenomenon or produced mixed results (Bem & others, 2001; Milton & Wiseman, 2002; Storm, 2000, 2003).

One skeptic, magician James Randi, has a longstanding offer—now U.S. \$1 million—“to anyone who proves a genuine psychic power under proper observing conditions” (Randi, 1999). French, Australian, and Indian groups have parallel offers of up to 200,000 euros to anyone with demonstrable paranormal abilities (CFI, 2003). Large as these sums are, the scientific seal of approval would be worth far more to anyone whose claims could be authenticated. To refute those who say there is no ESP, one need only produce a single person who can demonstrate a single, reproducible ESP phenomenon. So far, no such person has emerged. Randi’s offer has been publicized for three decades and dozens of people have been tested, sometimes under the scrutiny of an independent panel of judges. Still, nothing. "People's desire to believe in the paranormal is stronger than all the evidence that it does not exist." Susan Blackmore, "Blackmore's first law", 2004.

### ***Other related terms***

The words "clairvoyance" and "psychic" are often used to refer to many different kinds of paranormal sensory experiences, but there are more specific names:

#### **Clairsentience (feeling/touching)**

In the field of parapsychology, clairsentience is a form of extra-sensory perception wherein a person acquires psychic knowledge primarily by feeling. The word is from the French clair, “clear,” + sentience, “feeling,” and is ultimately derived from the Latin clarus, “clear,” + sentiens, derived from sentire, “to feel”.

In addition to parapsychology, the term also plays a role in some religions. For example: clairsentience is one of the six human special functions mentioned or recorded in Buddhism. It is an ability that can be obtained at advanced meditation level. Generally the term refers to a person who can feel the vibration of other people. There are many different degrees of clairsentience ranging from the perception of diseases of other people to the thoughts or emotions of other people. The ability differs from third eye in that this kind of ability cannot have a vivid picture in the mind. Instead, a very vivid feeling can form.

Psychometry is related to clairsentience. The word stems from psyche and metric, which means "soul-measuring".

#### **Clairaudience (hearing/listening)**

In the field of parapsychology, clairaudience [from late 17th century French clair (clear) & audience (hearing)] is a form of extra-sensory perception wherein a person acquires information by paranormal auditory means. It is often considered to be a form of clairvoyance. Clairaudience is essentially the ability to hear in a paranormal manner, as opposed to paranormal seeing (clairvoyance) and feeling (clairsentience). Clairaudient people have psi-mediated hearing. Clairaudience may refer not to actual perception of sound, but may instead indicate impressions of the "inner mental ear" similar to the way many people think words without having auditory impressions. But it may also refer to actual perception of sounds such as voices, tones, or noises which are not apparent to other humans or to recording equipment. For instance, a clairaudient person might claim to hear the voices or thoughts of the spirits of persons who are deceased. In Buddhism, it is believed that those who have extensively practiced Buddhist meditation and have reached a higher level of consciousness can activate their "third ear" and hear the music of the spheres; i.e. the music of the celestial gandharvas. Clairaudience may be positively distinguished from the voices heard by the mentally ill when it reveals information unavailable to the clairaudient person by normal means (including cold reading or other magic tricks), and thus may be termed "psychic" or paranormal.

### **Clairalience (smelling)**

Also known as Claiorescence. In the field of parapsychology, clairalience [presumably from late 17th century French clair (clear) & alience (smelling)] is a form of extra-sensory perception wherein a person accesses psychic knowledge through the physical sense of smell.

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### **Claircognizance (knowing)**

In the field of parapsychology, claircognizance [presumably from late 17th century French clair (clear) & cognizance (< ME cognisaunce < OFr conoissance, knowledge)] is a form of extra-sensory perception wherein a person acquires psychic knowledge primarily by means of intrinsic knowledge. It is the ability to know something without a physical explanation why you know it, like the concept of mediums.

### **Clairgustance (tasting)**

In the field of parapsychology, clairgustance is defined as a form of extra-sensory perception that allegedly allows one to taste a substance without putting anything in one's mouth. It is claimed that those who possess this ability are able to perceive the essence of a substance from the spiritual or ethereal realms through taste.

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In parapsychology, precognition (from the Latin prae-, "before," + cognitio, "acquiring knowledge"), also called future sight, is a type of extrasensory perception that would involve the acquisition or effect of future information that cannot be deduced from



presently available and normally acquired sense-based information or laws of physics and/or nature. A premonition (from the Latin *praemonēre*) and a presentiment are information about future events that is perceived as emotion.

As with other forms of extrasensory perception, the existence of precognition is not accepted, as other than a purely psychological process, by the mainstream scientific community because no replicable demonstration has ever been achieved. Scientific investigation of extrasensory perception (ESP) is complicated by the definition which implies that the phenomena go against established principles of science. Specifically, precognition would violate the principle that an effect cannot occur before its cause. However, there are established biases, affecting human memory and judgment of probability, that create convincing but false impressions of precognition.

### ***Belief***

Many of the "psychic experiences" that are volunteered to parapsychologists by the general population involve apparent precognition. In one review of a U.S. case collection, submitted to Duke University's Parapsychology Laboratory, 75% of 1777 dream-based experiences were of an ostensibly precognitive type, as were 60% of 1513 wakeful experiences. A similar pattern was identified for a separate collection of 157 cases experienced by children; here, the largest category of experiences was again of precognitive dreams (52%), followed by precognitive intuitions (52%). A German case collection produced a similar figure: 52% of 1,000 cases were of the apparently precognitive type. A British study of 300 volunteered cases showed 34% to be apparently precognitive.

### ***Evidence***

#### **Case collections**

History records many instances of apparent precognition (see Ides of March), and belief in its occurrence as a form of seeing into the future (this can be through visions, *déjà vu* or through dreams which is usually the cause of recognition). The first thorough collection and critical review of such spontaneous cases was created by the British Society for Psychological Research (SPR). Reports of these cases were authored by Eleanor Sidgwick in 1888, and H. F. Saltmarsh in 1938. Sidgwick believed the evidence warranted further investigation as to the validity of the concept of precognition, and Saltmarsh offered that the evidence, if it did not scientifically establish the phenomenon, at least excluded alternative hypotheses. Nicol, however, in a later review, came to the conclusion that their evidence was not so suggestive, given, in particular, the long length of time between the occurrence of some of the most suggestive cases, and their first report to the SPR.

J. W. Dunne, a British aeronautics engineer, recorded each of his dreams as they occurred to him, identifying any correspondences between his future experiences and his recorded dreams. In 1927, he reported his findings, together with a theory, in *An Experiment with Time*. In this work, at least 10% of his dreams appeared to represent some future event, pertaining to some relatively trivial incident in Dunne's own life, or some major news

events appearing in the press a day or so after the dream. Dunne concluded that precognitive dreams are common occurrences: many people have them without realizing it, largely because they do not recall the details of the dream. Also reported in the book was an experiment Dunne conducted with several other people who studiously recorded their dreams and sought to associate them with subsequent experiences. Dunne felt these confirmed his theory, but a 1933 independent experiment failed to replicate his findings.

### **Experimental approaches**

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#### ***Free-response studies***

With free-response methods, experiments have been conducted in precognitive dreaming at the sleep laboratory of the Maimonides Medical Center, in precognitive Ganzfeld hallucinations and visions. While such experiments have produced some suggestive evidence for precognition, they have been somewhat limited to studies of selected participants, and have involved procedures that can be too expensive for other researchers to replicate, or too complex to theoretically interpret.

#### **Forced-choice studies**

Most experiments on precognition have involved a forced-choice procedure. The first such ongoing and organized research program on precognition was instituted by J. B. Rhine in the 1930s at Duke University's Parapsychology Laboratory. Rhine used a method of forced-choice matching in which participants recorded their guesses as to the order of a deck of 25 cards, each five of which bore one of five geometrical symbols. The test of precognition was based on the fact that these "guesses" were made before the deck was shuffled by the experimenter. In an effort to distinguish between different parapsychological accounts of precognition, and to better understand its conditions, experiments were conducted in which the order of the target deck of cards was determined by hand versus machine, or by reference to macroscopic events, such as randomly selected meteorological readings, or by complex algorithms. Early experiments also sought to determine the temporal scope of precognition by organizing the target deck only 1-2 versus 10 days, or even a year, after responses had been recorded and secured.

Experiments by Samuel G. Soal, a mathematician, and colleagues seemed to provide impressive evidence of precognition. They ran forced-choice ESP experiments in which someone attempted to identify which of five animal pictures a subject in another room was looking at. Their performance on this task was at chance, but when the scores were matched with the card that came after the target card, three of the thirteen subjects showed a very high hit rate. These experiments were hailed as "the most impressive data ever reported" for ESP, with controls that "seem to be absolutely watertight". Rhine described Soal's work as "a milestone in the field". A dissenting view came from research chemist George Price who reviewed Soal and Bateman's book *Modern Experiments in Telepathy* for the journal *Science* in 1955. Price argued that since ESP was so unlikely, the positive results not attributable to error were more likely the result of deliberate fraud. This prompted several replies that Price's criticism was unfair, resting on the mere possibility of fraud rather than actual proof. In 1978, the experiments were in fact exposed

as totally fraudulent. The statistician and paragnost Betty Markwick, while seeking to vindicate Soal, discovered that he had altered his data to create all the extra hits and give the study its statistical significance. The untainted experimental results showed absolutely no evidence of precognition in the hits or the ratios.

A meta-analysis of all reports in the parapsychological literature of card-calling experiments on precognition was conducted in the late 1980s. This encompassed 309 experiments reported by 62 different investigators and published between 1935 and 1987. 23 of the 62 investigators reported positive results. The overall result offered precognition as a reliable but small effect over these studies, and an effect that could not be accounted for by levels of methodological reliability (as assessed by rating the studies on eight attributes of method), nor any publication bias against reporting null results.

Other researchers, including Smithsonian Executive Secretary Charles Greeley Abbot and British psychologist R. H. Thouless, introduced the study of precognition in the displacement of guesses to targets. This involved a set of target symbols, and "guesses" as to their identity, but, rather than precognizing the order of a whole deck of symbols, scored for precognition by checking the correspondence between each response and the target assigned to one or more trials ahead of that to which the response was originally assigned. Several studies using this method have continually offered displacement as reliable evidence for precognition.

Following these experiments, a more automated technique of experimentation was introduced that did not rely on hand-scoring of equivalence between targets and guesses, and in which the targets could be more reliably and readily tested as random. This involved testing for precognition with the use of high-speed random event generators (REG), as introduced by Helmut Schmidt in 1969 and further conducted, in particular, at the Princeton Engineering Anomalies Research Lab (1979–2007). In this procedure, participants indicate when they believe (by whatever means available to them) that the REG has produced an event that either conforms or differs from one of two target events. In comparison to the card-guessing type of experiments, this procedure permits much more data to be collected in an experimental session, while reducing the number of alternatives that need to be guessed.

### **Unconscious perception studies**

Another class of experiments have tested for precognition by unconscious signs. These have involved physiological responses, such as of skin conductance and electroencephalographic activity, or indirect psychological measures, such as ratings of preference for one or another target alternative. In these experiments, participants are not asked about their experiences, and do not need to be informed that they are participating in an experiment on ESP. Dick Bierman and Dean Radin have reported positive evidence of precognition in experiments of these kinds.

### **Explanations**

## **Psychological**

Various psychological processes have been offered to explain experiences of apparent precognition.

### ***Cognitive failure/distortion models***

Suited to explaining at least naturalistic occurrences of apparent precognition are several more or less hypothetical unconscious cognitive processes. These were first raised, in summary, by the philosopher C. D. Broad, and include:

Selection bias where people remember the "hits" and forget the "misses," remember coincidences more often than other non-coincidences, or when they were correct about a future event rather than instances when they were wrong. Examples include thinking of a specific person before that person calls on the phone. Human memory, it is argued, has a tendency to record instances when the guess was correct, and to dismiss instances when the guess was incorrect.

Cryptomnesia in which people retain knowledge of a certain fact that will occur in the future, but lose conscious knowledge of how they learned it. When the event comes to pass, it appears to them that they knew of the event without the aid of recognized channels of information.

Unconscious perception by which people unconsciously infer, from data they have unconsciously learned, that a certain event will probably happen in a certain context. As with cryptomnesia, when the event occurs, the former knowledge appears to have been acquired without the aid of recognized channels of information.

Self-fulfilling prophecy and Unconscious enactment in which people bring events that they have precognized to pass, but without their conscious knowledge.

Some psychologists have explained the apparent prevalence of precognitive dreams in terms of memory biases, namely a selective memory for accurate predictions and distorted memory so that dreams are retrospectively fitted onto subsequent events. In one experiment, subjects were asked to write down their dreams in a diary. This prevented the selective memory effect, and the dreams no longer seemed accurate about the future. Another experiment gave subjects a fake diary of a student with apparently precognitive dreams. This diary described events from the person's life, as well as some predictive dreams and some non-predictive dreams. When subjects were asked to recall the dreams they had read, they remembered more of the successful predictions than unsuccessful ones.

## **Parapsychological**

There are several ways by which precognition can be conceived as occurring without fundamental dependence on normally recognized processes of perception and cognition, i.e., by psi.

Firstly, there are several ways to explain precognition as a form of extrasensory perception. Precognition can be conceived as an extraordinary process of clairvoyance, involving no direct perception of the future. If, as is offered by the philosophy of determinism, all future events are determined by present conditions, then it can be suggested that it is clairvoyance of all the relevant present conditions that permits one to know their future outcomes. Alternatively, if somebody in the present is aware of what will happen in the future, then it can be suggested that it is telepathy of that information that grants oneself a like knowledge of the future. "Seeing into the future" can also be conceived as not a direct perception of a future event, but only a perception of one's own future experience of that event; what J. B. Rhine called precognitive sensory perception. Support to this suggestion is given by the meta-analysis which includes the study of a subset of experiments in which details were provided about the feedback of target information given to subjects in the future. The study shows that when no feedback was given, the significance of the results fell to chance-expectation. This does suggest that the contacts were being made with the subject's future experience of receiving the target information, and not with the targets themselves.

The construct of psychokinesis permits another set of ways to think about precognition. It can be suggested that precognition involves the influence of present conditions so that they conform with what is precognized. Alternatively, a retrocausal process can be proffered as an explanation, raising the idea that, at a future time, the ostensibly present conditions are influenced backward in time.

As for theories of precognition itself, parapsychologists have offered several phenomenological theories that – like most psychological theories themselves – do not presume to provide a physical explanation of how precognition occurs, but only seek to describe the processes that must, it seems, be occurring at a psychological level of explanation. There are two classes of such theories, which are not exclusive to each other.

### **Subliminal awareness**

One class of theories – principally as discussed, albeit in quite disparate ways, by Dunne (1927) and Saltmarsh (1938) – supposes that awareness is fundamentally trans-temporal, acquiring information beyond the "specious present" of information that is typically available for immediate awareness. While we are only ever consciously aware of some limited temporal range of information, these theories assert that, unconsciously, a much wider temporal range of information is sampled and used for the benefit of the organism.

### **Psi-mediated instrumental response (PMIR)**

This theory, offered by then psychologist Rex G. Stanford, proposes that humans unconsciously and automatically scan their environment for motivationally relevant information, including - as the subliminal awareness models suggest - information that will only occur in the future of each conscious observer. This information will be used, by those who are so disposed, to place the person in a goal-relevant position with respect to its

environment. This creates the experience of precognition, should some of this information have been represented in conscious imagery or other representational forms.

Observational theories

One class of parapsychological theories makes reference to the measurement problem in quantum mechanics, particularly as it implicates the constructive role of human observation. Precognition, in the context of these theories, is generally conceived in the manner of retroactive psychokinesis, but without recourse to any notion of the transmission of psychophysical energy. According to some observational theories, it is at the point of observation of a future event that the event is, in fact, determined, and, under certain conditions of motivation, randomness and feedback, this future observation can inform the present observer.

Resonance theories

Another class of theories is based on the block universe model, in which future events already exist in spacetime, according to the special theory of relativity. The theories explain precognition as the retrieval of memories from the brain in the future, which could occur in a similar way to that in which ordinary memories are retrieved from the brain in the past.

The theory proposed by Jon Taylor is based on David Bohm's theory of the implicate order, which suggests that if similar structures are created at different places and different times, the structures resonate with a tendency to become more closely similar to one another. Taylor applies the principles to the neuronal spatiotemporal patterns that are activated in the brain, to show how an information transfer could be produced. For example, a precognition would occur when the pattern activated at the time of the future experience of an event resonates with any similar pattern that is spontaneously activated in the present. This might enable the present activation to be sustained until it produces the conscious awareness of an event similar to the one that will be experienced in the future.

### **Methodological**

The experimental research into ostensible precognition has, like much of the research into extrasensory perception, been subject to various critiques of its methodology. This concerns the fundamental logic of the methods, and particular aspects of procedure. A general issue is concerned with the possibility that the phenomena contradict generally recognized principles of science, coupled with the absence of a method to demonstrate precognition on demand.

As regards particular experiments, a precognition experiment obviates concerns that there could be some subtle sensory cues from the targets that inform participants' responses, given that the targets are only generated after the data from the participant are secured. However, this creates the contrary issue that the target-generation process must not in any way be informed by the already available "responses". Particular experiments in precognition research have been critiqued for their methodological adequacy. Experiments in the displacement form of precognition were critiqued by Gatlin in presenting her sampling theory, given some evidence of non-randomness in the target series (see



references). Additionally, there has long been debate about the proper statistical analysis of the displacement effect.

### **In dreams**

Louisa Rhine at the Parapsychology Laboratory at Duke University compiled the best-known and largest body of dream evidence. Dr. Rhine collected over 7000 accounts of ESP experiences. The majority of these accounts were dream related and were seemingly precognitive in nature. The material for this work was collected by advertisements in various well-known popular media.

David Ryback, a psychologist in Atlanta, used a questionnaire survey approach to investigate precognitive dreaming in college students. His survey of over 433 participants showed that 290 or 66.9 percent reported some form of paranormal dream. He rejected many of these claims and reached a conclusion that 8.8 percent of the population was having actual precognitive dreams.

An early inquiry into this phenomenon was done by Aristotle in his *On Divination in Sleep*. His criticism of these claims appeals to the fact that "the sender of such dreams should be God", and "the fact that those to whom he sends them are not the best and wisest, but merely commonplace persons." Thus: "Most [so-called prophetic] dreams are, however, to be classed as mere coincidences...", here "coincidence" being defined by Aristotle as that which does not take "place according to a universal or general rule" and referring to things which are not of themselves by necessity causally connected. His example being taking a walk during an eclipse, neither the walk nor the eclipse being apparently causally connected and so only by "coincidence" do they occur simultaneously.

Other researchers in this area are more guarded in their reports on the value or use of dreams. In his book *The Interpretation of Dreams*, first published at the end of the 19th century, Sigmund Freud argued that the foundation of all dream content is the fulfillment of wishes, conscious or not and devoid of psychic content. In his discussions with Carl Jung, he referred to parapsychology and precognition as "nonsensical."

Dreams which appear to be precognitive may in fact be the result of the "Law of Large Numbers". Robert Todd Carroll, author of "The Skeptic's Dictionary" put it this way:

"Say the odds are a million to one that when a person has a dream of an airplane crash, there is an airplane crash the next day. With 6 billion people having an average of 250 dream themes each per night, there should be about 1.5 million people a day who have dreams that seem clairvoyant."

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**Telepathy**

Telepathy (from the Greek τηλε, tele meaning "distant" and πάθη, pathe meaning "affliction, experience"), is the induction of mental states from one mind to another. The

term was coined in 1882 by the classical scholar Fredric W. H. Myers, a founder of the Society for Psychical Research, and has remained more popular than the more-correct expression thought-transference. Many studies seeking to detect, understand, and utilize telepathy have been done within this field. The scientific community does not regard telepathy as a real phenomenon as actual telepathy has never been demonstrated to a greater degree than pure chance under controlled experimental conditions.

Telepathy is a common theme in modern fiction and science fiction, with many superheroes and supervillains having telepathic abilities. In more recent times, neuroimaging has allowed researchers to actually perform early forms of mind reading.

### **In parapsychology**

Within the field of parapsychology, telepathy is considered to be a form of extra-sensory perception (ESP) or anomalous cognition in which information is transferred through Psi. It is often categorized similarly to precognition and clairvoyance. Various experiments have been used to test for telepathic abilities. Among the most well known are the use of Zener cards and the Ganzfeld experiment.

### **Zener cards**

Zener cards are cards marked with five distinctive symbols. When using them, one individual is designated the "sender" and another the "receiver". The sender must select a random card and visualize the symbol on it, while the receiver must attempt to determine that symbol using Psi. Statistically, the receiver has a 20% chance of randomly guessing the correct symbol, so in order to demonstrate telepathy, they must repeatedly score a success rate that is significantly higher than 20%. If not conducted properly, this method can be vulnerable to sensory leakage and card counting.

When using the Ganzfeld experiment to test for telepathy, one individual is designated the receiver and is placed inside a controlled environment where they are deprived of sensory input, and another is designated the sender and is placed in a separate location. The receiver is then required to receive information from the sender. The exact nature of the information may vary between experiments.

### **Types**

Parapsychology describes several different forms of telepathy, including latent telepathy and precognitive telepathy.

***Latent Telepathy***, formerly known as "deferred telepathy", is described as being the transfer of information, through Psi, with an observable time-lag between transmission and receipt.

***Retrocognitive, Precognitive, and Intuitive Telepathy*** is described as being the transfer of information, through Psi, about the past, future or present state of an individual's mind to another individual.

**Emotive Telepathy**, also known as remote influence or emotional transfer, is the process of transferring kinesthetic sensations through altered states.

**Superconscious Telepathy**, involves tapping into the superconscious to access the collective wisdom of the human species for knowledge.

### **Skepticism and controversy**

Although not a recognized scientific discipline, people who study certain types of paranormal phenomena such as telepathy refer to the field as parapsychology. Parapsychologists claim that some instances of telepathy are real. Skeptics say that instances of apparent telepathy are explained as the result of fraud, self-delusion and/or self-deception and that telepathy does not exist as a paranormal power.

Parapsychologists and skeptics agree that many of the instances of more popular psychic phenomena, such as mediumism, can be attributed to non-paranormal techniques such as cold reading. Magicians such as Ian Rowland and Derren Brown have demonstrated techniques and results similar to those of popular psychics, without paranormal means. They have identified, described, and developed psychological techniques of cold reading and hot reading.

A technique which shows statistically significant evidence of telepathy on every occasion has yet to be discovered. This lack of reliable reproducibility has led skeptics to argue that there is no credible scientific evidence for the existence of telepathy at all. Skeptics also point to historical cases in which flaws in experimental design and occasional cases of fraud were uncovered. Parapsychologists such as Dean Radin, president of the Parapsychological Association, argue that the statistical significance and consistency of results shown by a meta-analysis of numerous studies provides evidence for telepathy that is almost impossible to account for using any other means.

### **Technologically enabled telepathy**

Futurists think that Brain-computer\_interface may make telepathy possible. There has already been progress in connecting brains with machines, and a man-machine-man bridge is considered very possible.[by whom?] And if man-machine-man bridges can be made, then such a link can be achieved over great distances using Internet.

Technologically enabled telepathy is also called "techlepathy", "synthetic telepathy", or "psychotronics". However as there are no other means of telepathy, it is likely that it will simply be called "telepathy".

Some people, occasionally referred to by themselves or others as "transhumanists", believe that technologically enabled telepathy is a technology that humans should pursue in order to improve themselves.

Kevin Warwick of the University of Reading, England is one of the leading proponents of this view and has based all of his recent cybernetics research around developing technology for directly connecting human nervous systems together with computers and with each other. He believes techno-enabled telepathy will in the future become the primary form of human communication.

### **Out-of-body experience**

An out-of-body experience (OBE or sometimes OOBE) is an experience that typically involves a sensation of floating outside of one's body and, in some cases, perceiving one's physical body from a place outside one's body (autoscopy).

The term out-of-body experience was introduced in 1943 by G.N.M Tyrrell in his book *Apparitions*, and adopted by, for example, Celia Green and Robert Monroe as a bias-free alternative to belief-centric labels such as "astral projection" or "spirit walking". Though the term usefully distances researchers from scientifically problematic concepts such as the soul, scientists still know little about the phenomenon. Some researchers have managed to recreate OBE in a laboratory setup by stimulating a part in the human brain. One in ten people has an out-of-body experience once or more commonly several times in their life. OBEs are often part of the near-death experience. Those who have experienced OBEs sometimes claim to have observed details which were unknown to them beforehand.

In some cases the phenomenon appears to occur spontaneously; in others it is associated with a physical or mental trauma, dehydration, sensory deprivation, sensory overload, use of psychedelic drugs, dissociative drugs, or a dream-like state. Many techniques aiming to induce the experience deliberately have been developed, for example visualization while in a relaxed, meditative state. Recent (2007) studies have shown that experiences somewhat similar to OBEs can be induced by electrical brain stimulation (particularly the temporoparietal junction). Some of those who experience OBEs claimed to have willed themselves out of their bodies, while others report having found themselves being pulled from their bodies (usually preceded by a feeling of paralysis). In other accounts, the feeling of being outside the body was suddenly realized after the fact, and the experiencers saw their own bodies almost by accident.

Some neurologists have suspected that the event is triggered by a mismatch between visual and tactile signals. They used a virtual reality setup to recreate an OBE. The subject looked through goggles and saw his own body as it would appear to an outside observer standing behind him. The experimenter then touched the subject at the same time as a rod appeared to touch the virtual image. The experiment created an illusion of being behind and outside one's body. However, both critics and the experimenter himself note that the study fell short of replicating "full-blown" OBEs.

### **Mediumship**

Mediumship is the claimed ability of a person (the medium) to experience contact with spirits of the dead, angels, demons or other immaterial entities. A medium is defined by the Oxford English Dictionary as the "supposed organ of communication with spirits". The role of the medium is to facilitate communication with spirits who have messages to share with non-mediums. Mediums claim to be able to listen to, relay messages from, and relate conversations with spirit, to go into a trance (it is not necessary to go into a trance, it all depends on the medium's control and knowledge) and speak without knowledge of what is being said, to allow a spirit to control their body and speak through it, perhaps using a writing instrument (as in automatic writing or drawing).

Mediumship is also part of the belief system of some New Age groups. In this context, and under the name "channelling", it refers to a medium (the channel) who is said to receive messages from a "teaching-spirit". In some cultures, mediums (or the spirits to whom they are connected) reportedly produce physical paranormal phenomena such as materialisations of spirits, apports of objects, or levitation.

### **Research**

In Britain, the Society for Psychical Research has investigated some phenomena, mainly in connection with telepathy and apparitions. According to an article in the Journal of the Society for Psychical Research, in some cases media have produced personal information which has been well above guessing rates. One of the more noteworthy recent investigations into mediumship is known as the Scole Experiment, a series of mediumistic séances that took place between 1993–98 in the presence of the researchers David Fontana, Arthur Ellison and Montague Keen. This has produced photographs, audio recordings and physical objects which appeared in the dark séance room (known as apports). No night vision apparatus was allowed.

The VERITAS Research Program of the Laboratory for Advances in Consciousness and Health in the Department of Psychology at the University of Arizona, run by Gary Schwartz, was created primarily to test the hypothesis that the consciousness (or identity) of a person survives physical death. Studies conducted by VERITAS into mediumship have been approved by the University of Arizona Human Subjects Protection Program and an academic advisory board. Schwartz claimed his 2005 experiments were indicative of survival, but do not yet provide conclusive proof.

### **Criticism**

While advocates of mediumship claim that their experiences are genuine, the Encyclopædia Britannica article on spiritualism notes in reference to a case in the 19th century that "...one by one, the Spiritualist mediums were discovered to be engaged in fraud, sometimes employing the techniques of stage magicians in their attempts to convince people of their clairvoyant powers." The article also notes that "the exposure of widespread fraud within the spiritualist movement severely damaged its reputation and pushed it to the fringes of society in the United States."

In 1976, M. Lamar Keene, a medium in Florida and at the Spiritualist Camp Chesterfield in Indiana, confessed to defrauding the public in his book *The Psychic Mafia*. Keene detailed a multitude of common stage magic techniques utilized by mediums which are supposed to give an appearance of paranormal powers or supernatural involvement.

## Psychokinesis

The term psychokinesis, also referred to as telekinesis with respect to strictly describing movement of matter, sometimes abbreviated PK and TK respectively, is a term coined by publisher Henry Holt to refer to the direct influence of mind on a physical system that cannot be entirely accounted for by the mediation of any known physical energy (i.e. moving objects with the mind). Examples of psychokinesis could include distorting or moving an object, and influencing the output of a random number generator.

The study of phenomena said to be psychokinetic is part of parapsychology. Some psychokinesis researchers claim psychokinesis exists and deserves further study, although the focus of research has shifted away from large-scale phenomena to attempts to influence dice and then to random number generators.

Most scientists believe that the existence of psychokinesis has not been convincingly demonstrated. A meta-analysis of 380 studies in 2006 found a "very small" effect which could possibly be explained by publication bias. PK experiments have historically been criticised for lack of proper controls and repeatability. However, some experiments have created illusions of PK where none exists, and these illusions depend to an extent on the subject's prior belief in PK.

### Scientific view

If PK were to exist as claimed by some experimenters, it would violate some well-established laws of physics, including the inverse square law, the second law of thermodynamics and the conservation of momentum. Hence scientists have demanded a high standard of evidence for PK, in line with Marcello Truzzi's dictum "Extraordinary claims require extraordinary proof". When apparent PK can be produced in ordinary ways—by trickery, special effects or by poor experimental design—scientists accept that explanation as more parsimonious than to accept that the laws of physics should be rewritten.

The late Carl Sagan included telekinesis in a long list of "offerings of pseudoscience and superstition" which "it would be foolish to accept (...) without solid scientific data" though even highly improbable claims may possibly be eventually verified. He placed the burden of proof on the proponents, but cautioned readers to "await—or, much better, to seek—supporting or disconfirming evidence" for claims that have not been resolved either way. Physicist Richard Feynman advocated a similar position.



In their 1991 research paper Biological Utilization of Quantum Nonlocality, Nobel Prize laureate Brian Josephson and coauthor Fotini Pallikara-Viras proposed that explanations for both psychokinesis and telepathy might be found in quantum physics.

There is a broad consensus, including several proponents of parapsychology, that PK research, and parapsychology more generally, has not produced a reliable, repeatable demonstration.

In 1984, the United States National Academy of Sciences, at the request of the US Army Research Institute, formed a scientific panel to assess the best evidence from 130 years of parapsychology. Part of its purpose was to investigate military applications of PK, for example to remotely jam or disrupt enemy weaponry. The panel heard from a variety of military staff who believed in PK and made visits to the PEAR laboratory and two other laboratories that had claimed positive results from micro-PK experiments.

The panel criticised macro-PK experiments for being open to deception by conjurors, and said that virtually all micro-PK experiments "depart from good scientific practice in a variety of ways". Their conclusion, published in a 1987 report, was that there was no scientific evidence for the existence of psychokinesis. Parapsychology advocates responded by accusing the panel of bias.

Research with random number generators has been influenced by signal detection theory, viewing the effect of PK as weak but real "signal" hidden in the "noise" of experimental results. An effect too weak to be demonstrated in a replicable experiment would still show up as a statistically significant effect in a large set of data. To test this, parapsychologists have carried out meta-analyses of large data sets, with apparently impressive positive results. This has in turn been criticized as an invalid use of meta-analysis, since the original studies are too dissimilar for the resulting statistics to be meaningful. A 2006 meta-analysis of 380 studies found a small positive effect within the margin that could be explained by publication bias.

Physicist Robert L. Park finds it suspicious that a phenomenon should only ever appear at the limits of detectability of questionable statistical techniques. He cites this feature as one of Irving Langmuir's indicators of pathological science. Park argues that if PK really existed it would be easily and unambiguously detectable, for example using modern microbalances which can detect tiny amounts of force.

PK hypotheses are also tested implicitly in a number of contexts outside parapsychological experiments. Gardner considers a dice game played in casinos, where gamblers have a large incentive to affect the numbers that come up. This is in effect a large sample-size test of the same hypothesis as the J. B. Rhine dice experiments, but year after year the house takings are exactly those predicted by chance. Psychologist Nicholas Humphrey argues that many experiments in psychology, biology or physics assume that the intentions of the subjects or experimenter do not physically distort the apparatus. Humphrey counts them as replications of PK experiments (but implicitly so) in which PK fails to appear.

In the book *Parapsychology: The Controversial Science* (1991), British parapsychologist Richard S. Broughton, Ph.D, wrote of the differences of opinion among top scientists encountered by Robert G. Jahn, director of the (now-closed) PEAR laboratory, regarding the psychokinesis research that the lab was engaged in at the time.

### **Explanations in terms of bias**

Cognitive bias research has been interpreted to argue that people are susceptible to illusions of PK. These include both the illusion that they themselves have the power, and that events they witness are real demonstrations of PK. For example, Illusion of control is an illusory correlation between intention and external events, and believers in the paranormal have been shown to be more susceptible to this illusion than skeptics. Psychologist Thomas Gilovich explains this as a biased interpretation of personal experience. For example, to someone in a dice game willing for a high score, high numbers can be interpreted as "success" and low numbers as "not enough concentration." Bias towards belief in PK may be an example of the human tendency to see patterns where none exist, which believers are also more susceptible to.

A 1952 study tested for experimenter's bias in a PK context. Richard Kaufman of Yale University gave subjects the task of trying to influence 8 dice and allowed them to record their own scores. They were secretly filmed, so their records could be checked for errors. The results in each case were random and provided no evidence for PK, but believers made errors that favoured the PK hypothesis, while disbelievers made opposite errors. A similar pattern of errors was found in J. B. Rhine's dice experiments which at that time were the strongest evidence for PK.

Wiseman and Morris (1995) showed subjects an unedited videotape of a magician's performance in which a fork bent and eventually broke. Believers in the paranormal were significantly more likely to misinterpret the tape as a demonstration of PK, and were more likely to misremember crucial details of the presentation. This suggests that confirmation bias affects people's interpretation of PK demonstrations. Psychologist Robert Sternberg cites confirmation bias as an explanation of why belief in psi phenomena persists, despite the lack of evidence: "[P]eople want to believe, and so they find ways to believe."

Psychologist Daniel Wegner has argued that an introspection illusion contributes to belief in psychokinesis. He observes that in everyday experience, intention (such as wanting to turn on a light) is followed by action (such as flicking a light switch) in a reliable way, but the underlying neural mechanisms are outside awareness. Hence though subjects may feel that they directly introspect their own free will, the experience of control is actually inferred from relations between the thought and the action. This theory of apparent mental causation acknowledges the influence of David Hume's view of the mind. This process for detecting when one is responsible for an action is not totally reliable, and when it goes wrong there can be an illusion of control. This could happen when an external event follows, and is congruent with, a thought in someone's mind, without an actual causal link.

As evidence, Wegner cites a series of experiments on magical thinking in which subjects were induced to think they had influenced external events. In one experiment, subjects watched a basketball player taking a series of free throws. When they were instructed to visualise him making his shots, they felt that they had contributed to his success.

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