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THE NATURE OF PRECOGNITION[1]

By Jon Taylor

ABSTRACT: This paper describes a theory explaining precognition literally as the "pre-cognition" of information contained within the percipient's brain in the future—a link with his or her future experience of the event. The theory is based on the block universe model, in which past and future events already exist in the space-time continuum, as required by the special theory of relativity. Bohm's theory of the implicate order is compatible with such a model, and it suggests that if similar structures are created at different locations in space and time, the structures resonate with a tendency to become more similar to one another. The principles are applied to the neuronal spatiotemporal patterns that are activated in the brain. Precognition is considered to be the fundamental phenomenon of ESP and manifests as information transfer from the brain in the future to the same brain in the present. The model allows also for the possibility of contacts with other brains, and these contacts would occur either in real-time or at different times. However, direct contacts with external objects or events are considered not to occur at all. The mechanism is applied to experiments in precognition, and it explains the apparent anomalies found in the results.

Keywords: precognition, intuition, block universe, implicate order, intervention paradox

Many attempts to explain extrasensory perception have focussed on the phenomenon of precognition, which may be defined as the supposed ability to obtain cognitive information about a future event that could not otherwise be anticipated through any known inferential process. Precognition is often considered more problematical than real-time ESP, because it requires that information somehow has to be transferred backwards in time. Nonetheless, there is considerable evidence for its occurrence.

A meta-analysis published by Honorton and Ferrari (1989) covers all the forced-choice precognition experiments carried out from 1935–1987. The data base includes 309 series of experiments with over 50,000 participants and a total of nearly 2 million trials. A small but reliable effect was found (effect size $r = .01$, Stouffer $Z = 6.02$, $p = 1.1 \times 10^{-9}$). A more recent meta-analysis (Storm, Tressoldi, & Di Risio, 2013) included a further 33 precognition studies carried out from 1987–2010. A comparison of these meta-analyses shows no decrease in effect size over the entire survey period, during which the research quality improved considerably. It suggests that the early results could not have been artifacts of poor design.

Because the targets used in the experiments were not selected until *after* the participants had made their guesses, the results give outstanding evidence for contacts with *something* in the future. However, the experiments do not tell us with what the contact is made. Is it direct contact with the inanimate target object or someone else's mental impression of that target? This is the alternative currently preferred by the majority of parapsychologists. Or is the contact with the participant's own future knowledge of the target, knowledge obtained when the participant receives feedback of the target information? This is the alternative I am proposing.

Existing theories have already been reviewed (e.g., Carr, 2008; Rush, 1986; Stokes, 2007) and need not be further discussed here. However, several of the theories invoke the influence of a nonphysical consciousness, an interpretation which a majority of mainstream scientists would reject. The present theory adopts the materialist view in which conscious awareness is considered to occur only as an epiphenomenon of the neural processes involved.

The theory explains precognition as information transfer from the brain in the future to the same brain in the present. The theory is based on the block universe model and on David Bohm's theory of the implicate order. It suggests that if similar structures are created at different places and different times, the structures may be said to "resonate," with a tendency to become more closely similar to one another. The principles are applied to the

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neuronal spatiotemporal patterns that are activated in the brain, to show how information transfer could be produced. For example, a pre-cognition would occur if 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 could enable the level of activation of the present pattern to build up to the threshold at which it produces the conscious awareness of an event similar to the event that will be experienced in the future.

Thus, precognition is explained as a connection with the percipient's own brain in the future (a link with his or her future experience of the event), and telepathy might similarly be explained as a link with the brain of another person. This simplifies the concept of ESP considerably, because it eliminates the need for direct "clairvoyant" contact with the event itself. Furthermore, the theory explains the results of micro-PK experiments in terms of precognition, so that the theory may be considered to offer an explanation for most classes of psi phenomena.

The present paper clarifies several of the issues raised in my earlier paper (Taylor, 2007), in which I attempted to show that retrieval from the past (ordinary memory) and retrieval from the future (precognition) may occur in much the same way.

The Block Universe Model

Contact with an event in the future suggests that the future event must already exist in some sense (Broad, 1978, p. 305). This conforms to the block universe model, in which past and future events already exist in the space-time continuum, in accordance with the special theory of relativity. The model combines the three coordinates of space with one coordinate of time to create a frozen-block universe of four-dimensional Minkowski space-time. Such a universe could provide the information base necessary for precognition to occur (Werth, 1978, p. 54).

People often object to the fatalistic implications of a determined universe. However, a number of physicists and philosophers have argued strongly in its support (e.g., Petkov, 2004; Putnam, 1967; Rietdijk, 1966). Paul Davies (2002) reviews current thinking and suggests that "physicists think of time as being laid out in its entirety—a timescape, analogous to a landscape—with all the past and future events located there together" (p. 42).

There would appear to be little room for free will within such a model. However, in an article in *Nature*, Kerri Smith (2011) suggests that conscious free will may be just an illusion. The article reviews a number of experiments which show that the outcome of a voluntary decision can be encoded in brain activity up to several seconds *before* the decision enters conscious awareness (e.g., Fried, Mukamel, & Kreiman, 2011; Libet, Gleason, Wright, & Pearl, 1983; Soon, Brass, Heinze, & Haynes, 2008). Smith points out that some philosophers have objected that the experiments refer only to simple decisions, and a project financed by the Templeton Foundation has been set up to resolve this question. Further arguments against free will are given by neuroscientist Sam Harris (2012), and physicist Jean Burns (1999) discusses the difficulties that would be involved in adapting current physical law to accommodate free will. The consensus is beginning to support Baruch Spinoza's (1677) conjecture that "Men believe themselves to be free, simply because they are conscious of their actions, and unconscious of the causes whereby those actions are determined".

One apparent difficulty with the block universe model is that it seems to be incompatible with the ability of the brain to make decisions that affect the future. To illustrate this point, we shall look at a simplified model in three dimensions. We omit one of the coordinates of space to show the coordinate of time. Figure 1 (see next page) shows a block with the dimensions 10,000 km x 5 km x 80 years. The scale chosen for each of the coordinates is arbitrary and, for simplicity, the movement and curvature of the Earth are ignored. Space and time are shown as fixed extensions; there is no flow of time within the block itself. According to Einstein, the flow of time is a psychological effect due to the movement of a person's consciousness through the block.

We now look inside the block and introduce a person, Harry. We suppose that Harry lives for 80 years: He is born at point A (a village in England, say) and 80 years later he dies at the same place, at point A´. We can show Harry's movements in two dimensions of space, for example, from side-to-side (East-West) as well as up and down, as he travels forwards through time. We'll suppose that when he is 20 years old Harry climbs a nearby mountain (point X), and when he is 60 he makes another journey, first to the West (point Y) and then to the East (point Z). Finally, Harry dies when he reaches point A´. The zigzag line represents Harry's *worldline* through space-time.

We shall assume that Harry's present lies within a plane, such as PQRS, which represents an infinitesimally thin slice of space-time—an approximation because relativity theory allows simultaneity at different points in space only for observers in the same frame of reference (Burns, 1999; Carr, 2008, p. 60). The plane travels through the block as shown by the arrows; it has in front the events that occur in the future, and it leaves behind the events that have occurred in the past.

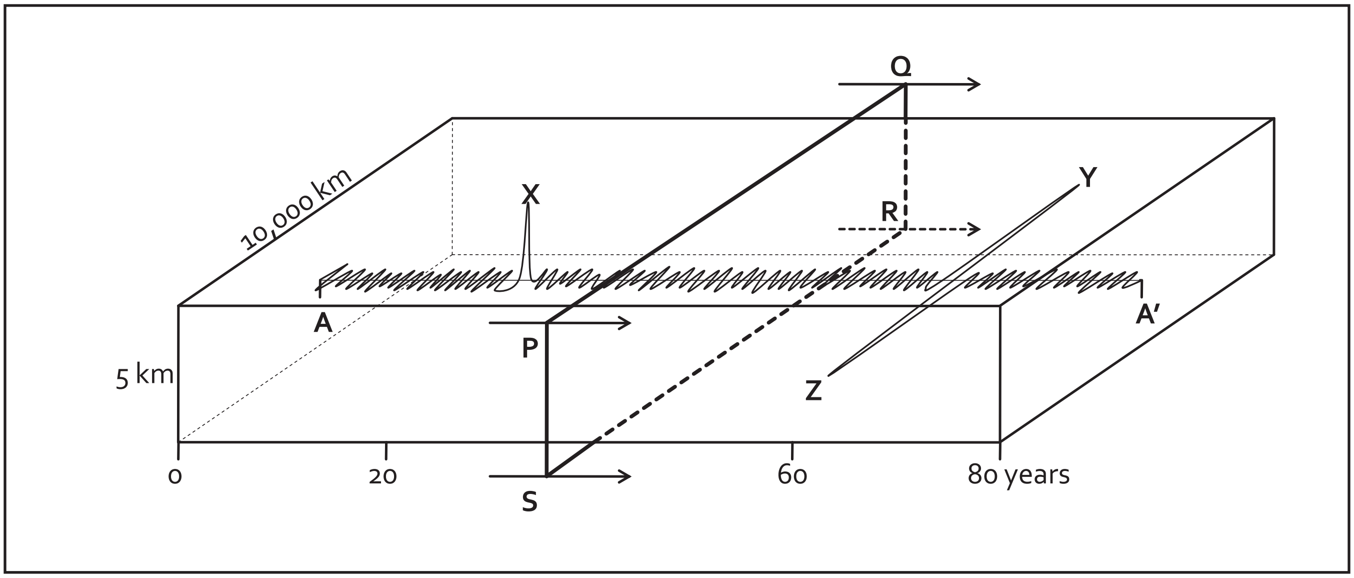

Figure 1. The block universe.

Now, if we look from the moment of the "present", we can see how the events in Harry's "past" (such as climbing the mountain) are events that resulted from decisions made at that time in his brain. Similarly, the events in his "future" (such as the journey) are events that will result from future decisions. But these events already exist in space-time; they cannot be changed. Harry cannot take a shortcut through time and influence either the past or the future. He can only influence each moment as it becomes the "present," and the diagram *already* shows what his brain decides to do at each moment. Thus, as the physicist D. F. Lawden (1999) puts it: "We act as we choose, but what we choose is rigidly determined" (p.184).

This overcomes the objection that the block universe is not compatible with the possibility of influencing future events. The difficulty seems to arise because we imagine that we can influence a future event by acting in the present. Instead, the influence is produced only at a later moment, when the "future" becomes the "present."

Notice, however, that if we look from *outside* the block, we see that Harry doesn't actually make a decision; instead, he becomes aware of the decisions and decision-making processes that are laid out along the coordinate of time. Each of the decisions is determined by chains of neuronal activation which carry information received from his senses and from the activation of his memories. The major challenge for physicists relates to the flow of time. The contents of the block are fixed, and it is only our conscious experience that changes as the experience moves towards the future (e.g., Penrose, 1995, p. 384; Smythies, 2003, pp. 52–55; Werth, 1978, p. 53). We shall return to this point in the next section.

Interpretations of Quantum Mechanics

The concept of a determined universe does, however, conflict with the orthodox version of quantum mechanics. According to this version, the future outcome of a quantum process is probabilistic, so that it is impossible to know the nature of the outcome until *after* that outcome has been produced. Some theorists have used this to try to "explain away" true precognition as being due to contacts with what will be probable, rather than actual futures (see Radin, 1988). However, forced-choice target-guessing experiments are normally designed to ensure that targets are selected with equal probability, so that the positive results do not necessarily require an *a priori* knowledge of options that are more likely to be selected.

Both David Bohm and Yakir Aharonov have proposed that the future outcome *appears* to be uncertain only because we do not have access to the information necessary to deduce what that outcome will be. For example, Bohm suggests that there is a hidden order at work behind the apparently indeterminate nature of matter as described by the orthodox version (Albert, 1994; Bohm, 1957, 1983). He proposes that behind the quantum-mechanical processes, which obey statistical laws, there is a deeper level of activity involving sub-quantum-mechanical entities that are subject to their own laws. Bohm (1951) calls these entities and their laws *hidden variables*, which some physicists consider controversial. The hidden variables influence the collapse of the wave function and determine which of the potential outcomes (represented by the Schrödinger equation) will become the actual outcome.

Bohm's theory simplifies quantum mechanics, even though it involves the concept of hidden variables. However, Carr (2008, p. 29) points out that whilst experiments have refuted some models which use hidden variables, they have not refuted Bohm's model. In fact, Musser (2004) discusses an approach which specifically involves influences coming from the future. He suggests that quantum mechanics seems odd, because we assume that only the past affects the present; but if the future does too, then the probabilistic aspect of quantum mechanics could be explained because we don't know what will occur in the future. Musser refers to Hadley (1997), who points out that according to relativity theory, past and future already exist; thus, it would be natural for both to affect the present.

Aharonov and colleagues have taken this a step further. In their paper "A time-symmetric formulation of quantum mechanics", Aharonov, Popescu, and Tollaksen (2010) propose that there are two wave functions: one that propagates forwards in time, and another that propagates backwards in time. They suggest that the apparently random events in quantum mechanics are caused by events in the future, and that the wave function coming from the future is what carries the missing information. Furthermore, they successfully carried out what they called "weak measurements" to show that a future cause can lead to a present effect (Aharonov, Albert, & Vaidman, 1988; Aharonov et al., 2010).

The interpretations proposed by Bohm and Aharonov are both deterministic and allow for a backwards transfer of information through time. However, Bohm has developed his ideas to include the wider concept of an *implicate order*, which is based on the zero-point (vacuum energy) field that extends throughout space and time. It is from within the implicate order that the hidden variables exert their influence on the wave function to create the manifest universe. Bohm suggests that the implicate order constantly unfolds to create the successive instances of the manifest universe—the explicate order—and that these instances are immediately re-enfolded back into the implicate order. The notion of continuity of existence is given by "the rapid recurrence of similar forms" (Bohm, 1995, p.183). It is rather like the frames of a film projected onto the screen in a cinema; the individual frames give rise to a continuous image in which there is a smooth transition from one frame to another.

This can be visualized by referring to the block universe model (Fig.1). The implicate order is spread throughout all space and all time (e.g., throughout the block). It is constantly unfolding, along with consciousness, into the plane PQRS, thus creating the successive slices of space-time. The process of unfoldment and re-enfoldment is therefore considered to be fundamental (Bohm, 1995, p.185; Peat, 1987), and such a process leaves behind the structure that we call the block universe.

Bohm's theory suggests a way information could be transferred, because it proposes that *similar* structures resonate within the implicate order and tend to unfold in a form which makes them increasingly similar to one another (Bohm, 1990, p. 93; Bohm & Weber, 1982, p. 36). The term "resonance" here refers to a kind of mutual attraction between the structures, and it should not be confused with the term normally used in physics.

Notice, however, that all structures might resonate to some extent, and not only those which are similar. Nonetheless, the effect of the resonance could be stronger in the case of similar structures. This would overcome Susan Blackmore's (1985) criticism relating to Rupert Sheldrake's (2009) morphic resonance on the grounds that morphic resonance leads to a "causation loop": the structural similarities cause the resonance, and the resonance causes the similarities. The present theory overcomes this problem because the resonance occurs *anyway*, regardless of the degree of similarity.

Bohm suggests that influences coming from past forms enable the past forms to be replicated or repeated in the present—thus leading to the formation of relatively stable structures. But he doesn't mention the possibility that future forms might influence present forms. His concern was that the orthodox version of quantum mechanics fails to account for the notion of temporal process and repetition of form, and he introduced the concept of resonance to show how a fixed disposition can be established as the forms are successively unfolded. However, when referring to the implicate order, he says that "Since no space and time are relevant there, all things of a similar nature might get connected together or resonate in the totality" (Bohm, 1990, p. 93).

Therefore, let us suppose that two forms, A and B, are unfolded at different times. If the forms resonate in the implicate order, then A influences B just as B influences A, regardless of which one unfolds in the future. The forms mutually influence each other, and this influence represents an exchange of information between them.

The Mechanism of Information Transfer

The forms that resonate in the implicate order correspond to *processes* in which events cause one another to occur in our manifest universe of space-time events. When activity in the environment is perceived by our senses, the perceptual information is represented by a spatiotemporal pattern of activation in the brain. If similar patterns are activated at different places and different times, the patterns resonate in the implicate order with a tendency to unfold in a form in which they are more similar to one another.

However, it is unnecessary for the entire patterns to be similar. An association between any pair of networks represents a process in which the activation of one network causes the activation of the other. Thus, if the same pair of networks is activated on different occasions, the replication tendency will affect that pair of networks. It will enable a transfer of information. The important point here is that the transfer refers to the *association* between the elements of information represented in the two networks, and not to the discrete elements of information represented in either network on its own. As we shall see later, this is necessary to avoid a confrontation with the intervention paradox.

Notice that the resonance does not produce changes in a pattern *after* it has been unfolded; the pattern is unfolded in a form in which it has already been affected by the resonance. Thus, for precognition to occur, the brain has to detect the fact that the pattern has unfolded in a form which is slightly different from that in which it would have unfolded if it hadn't been affected by a resonance. Any transferred information is already inherent in the structure that is unfolded, and there is no *transmission* of information through time.

The theory contrasts with some dualistic theories that involve consciousness as the medium for the information transfer. For example, John Palmer (1995) proposes a theory which is similar in some ways to the present one, as it requires that the brains are in similar states and it rejects clairvoyance. Palmer proposes a two-way interaction between brain and consciousness, which allows them to form a closed system which is also compatible with a determined universe. However, the information transfer takes place via consciousness, whereas the present theory proposes a direct transfer of information between the resonating neural structures.

Long-Term Memory

To understand how information is retrieved, either from the past or from the future, we need to consider briefly some aspects of the long-term memory system. Memories about events, about ourselves, and about our previous experiences with the events are stored in neuronal networks. When (internal) stimuli arrive at the networks, chains of impulses travel along various pathways and trace out a highly complex pattern that has extension in space and duration in time—a *spatiotemporal pattern* of neuronal activation. If the pattern is activated repeatedly and the degree of activation reaches a certain threshold, it may give rise to conscious awareness of the information contained in some of the networks (Taylor, 2007, pp. 556–559).

When we experience an event through the senses, stimuli from the sensory areas are applied to the memory networks. According to the representative theory of perception (e.g., Smythies, 2003; Smythies & Ramachandran, 1998) the brain activates an *existing* network that represents the experience. The perceptual stimuli are matched to the network because similar stimuli have contributed to its formation on previous occasions. However, with elements of new experience, new associations are created which are added to the existing networks.

The incoming stimuli activate both the networks corresponding to the event and networks corresponding to one's previous experiences of similar events. An *appraisal* may be carried out if the event is significant (i.e., beneficial or harmful) to one's personal well-being.

Neurophysiologist Joseph LeDoux gives as an example the evaluation and appraisal of the experience of "seeing a snake" (see Figure 2). The incoming stimuli activate the networks representing the snake and networks representing one's previous experience with snakes. Because the experience refers to a potentially harmful event, the outgoing stimuli trigger the appraisal networks in the amygdala. The appraisal leads to an emotional feeling of fear, and it may lead to a physiological response, such as jumping away from the snake. The amygdala is connected, via re-entry circuits, back to the memory networks, and this can lead to many more reactivations of the pattern produced (LeDoux, 1993, 1998, pp. 283–296).

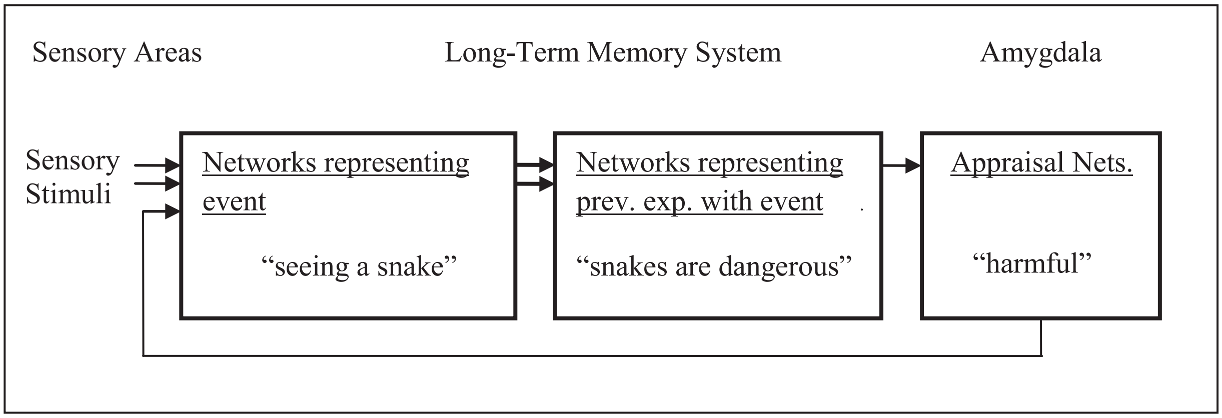

Figure 2. Experience of an event and creation of an emotion (simplified).

When a memory is retrieved, the neural impulses follow similar pathways and activate a pattern that is similar to the pattern activated at the time of the initial experience. The fundamental question is how do the impulses "know" which pathways to take through the networks on retrieval? My theory suggests that various patterns are activated until one of them matches and resonates with the pattern activated at the time of the initial experience (Taylor, 2007, pp. 559–562). Such an experience can take place either in the past or in the future, so that past and future memories may be retrieved in a similar way. C. D. Broad (1978, pp. 289–296) discusses the close relationship that exists between memory and precognition when considered from a philosophical point of view. In the present paper, I am concerned specifically with the precognition of future events, and I shall classify the events according to whether they are caused by outside circumstances, or by the percipients themselves.

Future Events Caused by Outside Circumstances

Let us consider a simple case of precognition. We will suppose that a percipient, Tom, experiences an emotional event when it occurs tomorrow (see Figure 3). During tomorrow's experience, he activates a pattern which includes networks representing the event and networks representing his previous experiences with similar events. The pattern is activated repeatedly, and re-entrant stimuli from the appraisal networks lead to further reactivations. Apart from consolidating the memories being formed, these repeated activations contribute to the formation of a stronger field which, in turn, influences any similar pattern that is independently activated elsewhere in space and time.

In fact, Bohm suggests that "formative fields" may be associated with the structures in the implicate order, and that the fields resonate and produce a tendency towards replication between the structures as they are unfolded. For example, when referring to Rupert Sheldrake's morphic resonance, Bohm (1990) says that "You could picture a formative or morphic field as a very subtle aspect of the implicate order that would impress itself on the denser and explicate energies" (p. 99). Sheldrake (2009, 2012) uses these principles in his theory of morphic resonance, in which he suggests that past forms tend to be replicated or repeated in the present.

Thus, for Tom to precognize the event today, the neural impulses may have to follow various pathways through the networks until a pattern is activated that is similar to the one which will be activated tomorrow. A resonance is produced, and according to Bohm's theory, the synapses forming today's pattern unfold in a form in which they are more similar to those forming tomorrow's pattern.

However, when tomorrow's pattern is activated, the continuing flow of impulses through the networks causes the synapses to be strengthened (over a period of time) and this facilitates the flow of further impulses. The weaker synapses forming *today's* pattern are also strengthened (in this case due to the resonance) and this also facilitates the flow of impulses. It may result in the flow of a few *extra* impulses, which lead to stronger output stimuli being produced. These stimuli go back to the networks via re-entry circuits that go through the *working memory system*. If stronger stimuli are applied to the working memory cells, these cells can sustain their activation, and this may overcome the effects of inhibition and lead to a sustained activation of the networks concerned (Fuster, 2003, pp. 155–164; Taylor, 2007, pp.558–559). A precognition occurs if the threshold is reached at which the activation of the networks is sufficient for Tom to become consciously aware of the information represented by these networks. Tom is actually recalling today the "memory" of an event that he will experience tomorrow.

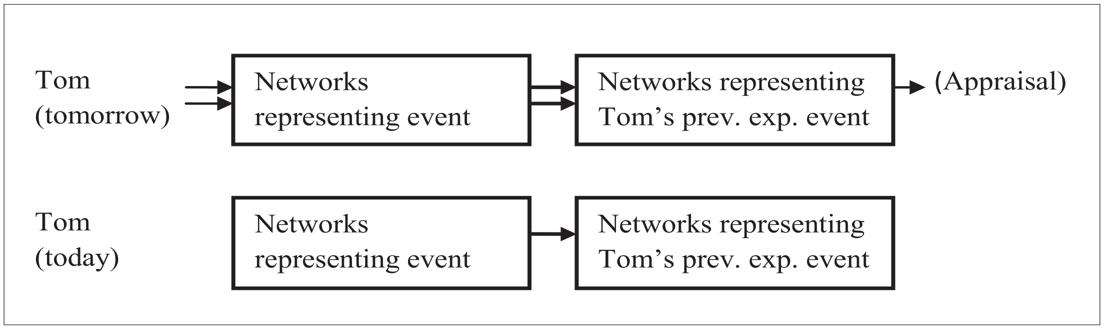

Figure 3. Precognition.

Notice that Tom associates the event with his *own* experiences of it, both in the present and in the future. This enables selectivity, because the precognition will refer to the event experienced by Tom, not to a similar event experienced by someone else. The association between the event and Tom's experiences of it may be described as an *associational link*, which connects the present and future patterns, and ensures a stronger resonance.

In fact, telepathic contacts with other people may be far more difficult to produce. For example, suppose that a sender, Mary, experiences an emotional event. Her brain activates a pattern containing a representation of the event, a representation of her previous experiences with similar events, and a representation of Mary herself (i.e., her body image). Meanwhile, Tom happens to activate a pattern corresponding to a similar event. In his case, the pattern contains a representation of the event, a representation of *Tom's previous experiences* of similar events, and a representation of *Tom himself*. The patterns do not match and any resonance between them will be much weaker. For this reason, many ostensible telepathic contacts with other people could be explained as pre-cognition of the percipient's own future knowledge of the event—knowledge he obtains when he is later informed about it. In some of the early telepathy experiments (e.g., J. B. Rhine, Pratt, Stuart, B. Smith, & Greenwood, 1966) it was found that removing the sender did not affect the results. This suggests that telepathic contacts with the sender were not being detected in these experiments.

Future Events Caused by the Percipient

Sometimes, a person will do something to cause (or allow) an event to occur. The brain activates a pattern containing the association between "something the person does" and "the effect that it produces." Again, we refer to a process in which a cause produces an effect.

Intention Fulfilled

Suppose that our percipient, Tom, is thinking about taking a train to London. He activates networks in his brain through which he associates the idea "taking the train" with the idea "arriving in London". As the degree of activation increases, it may lead to an *intention* being created to carry out the corresponding action (see Figure 4). Further activation leads to a triggering of the motor networks, so that Tom goes ahead with the intended action. We will suppose that Tom later fulfils the intention, so his future *experience* is that of taking the train and arriving in London. Because the present and future associations are similar, a resonance occurs, and Tom might be able to precognize the knowledge that he will be successful in fulfilling the intention.

However, the precognition occurs only if Tom *does* take the train, and it *does* enable him to arrive in London. The resonance is between the patterns containing the association between these two elements. For example, if Tom were to precognize his arrival only, he could then decide not to take the train and he would confront the intervention paradox. This is why I emphasized that the resonance always refers to a complete process, including *the cause and the effect*, even if the activation of one of the networks does not reach the threshold at which it produces a conscious awareness of the information represented by that network.

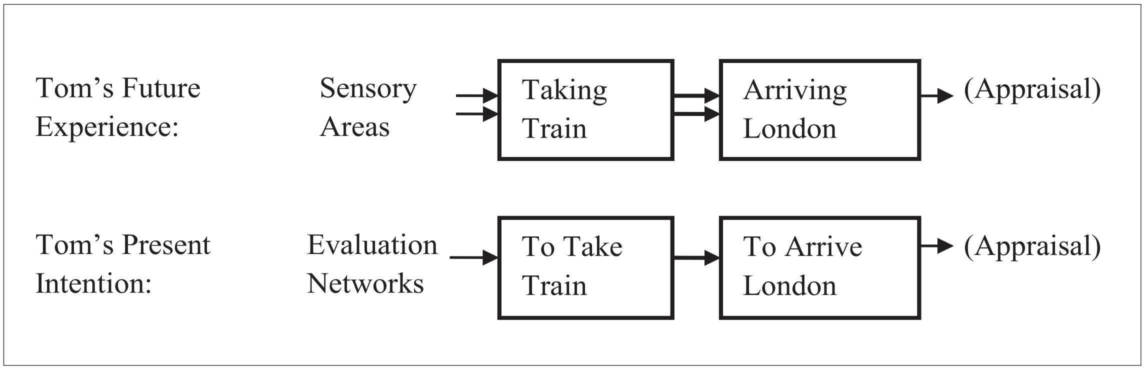

Figure 4. Intention fulfilled: Precognition occurs.

Intention Not Fulfilled

Again, we'll suppose that Tom intends to take the train to London, but on this occasion the train is destined to crash. Whilst Tom is intending to carry out the action, there is no resonance, because there will be no future experience of taking the train and arriving in London. If Tom does take the train, it will lead to him experiencing the crash (see Figure 5). The intention is therefore not fulfilled and a precognition does not occur. This detection of the absence of an intended future could form the basis of an *intuition*, in which Tom might become aware of a possible danger, perhaps without knowing exactly what the danger is. Thus, the absence of the precognition would serve as an *intuitive warning* which tells Tom that something will prevent him from fulfilling the intention. It doesn't tell him specifically that it would be due to an accident, but it might result in a feeling that "something is wrong." This enables Tom to change his intention and decide to do something else, such as staying at home.

The mechanism shows how the intervention paradox is avoided. If a percipient were to precognize an event-causing process (i.e., "scenario") that he intended to change, and then he did change the scenario (i.e., created a different scenario) he would confront the paradox. For example, in the situation depicted in Figure 5, Tom's initial intention is to take the train to London. Later, Tom does take the train and he experiences the crash. There is no resonance between the brain patterns representing the present intention and future experience because their content is different, so Tom cannot obtain any information about the crash precognitively. This was originally stated as the *principle of intentionality* (Taylor, 1995), which says that you cannot obtain a precognition about a given scenario, if the scenario is one that you intended to change.

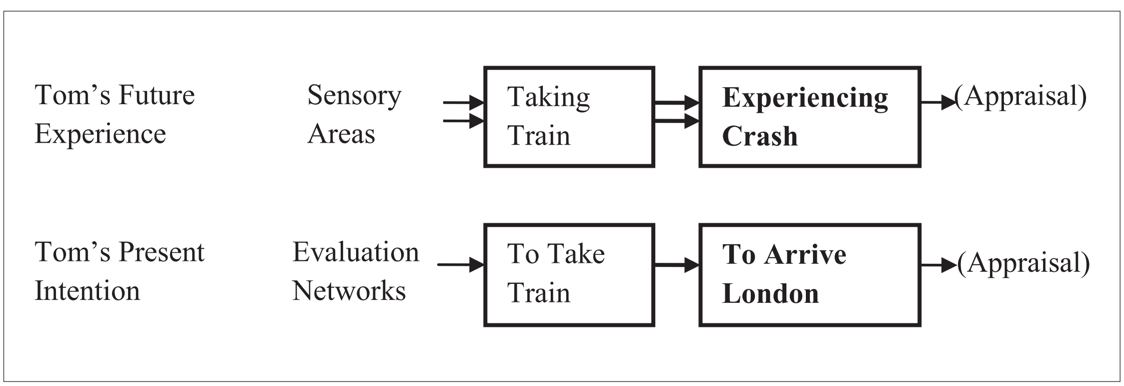

Figure 5. Intention not fulfilled: Intuitive warning produced.

Evidence that people can use intuition to avoid accidents is given by W. E. Cox (1956), who carried out a survey of passenger statistics on the U. S. rail networks. He found that significantly fewer people travelled on trains involved in accidents than on comparable trains not involved in accidents. The survey doesn't tell us what made the passengers stay off these trains, but many case histories suggest that people simply find themselves looking for something else to do, without actually being aware of the potential danger that lies ahead (Dossey, 2010, pp. 30–44).

We therefore conclude that the block universe is built up in a fully determined form, and it cannot *subsequently* be affected by intervention. Otherwise it wouldn't be a block universe.

Cases of Apparent Intervention

Cases have been reported in which it does appear that the percipient has successfully intervened to prevent a precognized event from occurring (e.g., L. E. Rhine, 1955).

Future Events Caused by Outside Circumstances

A person precognizes an event and then uses the information to change *another* event as a result of knowing that the precognized event will occur. An example often quoted concerns a woman who dreamed of a chandelier falling in her baby's bedroom and killing the baby (Rhine, 1961; Stokes, 2007, pp. 84–86). As a result, the woman collected the baby from the bedroom. Later the chandelier did fall, but without harming the baby. This appears to be an act of intervention.

However, the precognition itself refers only to the falling chandelier. This event was destined to occur, regardless of whether or not the woman had acted to save the baby. The woman therefore deduced that there could have been a danger to the baby, and in the way typical of dreams (e.g., J. W. Dunne, 1981), the fantasy about the baby being killed found its way into the dream narrative.

Future Events Caused by the Percipient

This kind of situation requires intuition. A person appears to intervene, but really detects the *absence* of a precognition referring to the outcome of an intention. This serves as an intuitive warning that something is wrong. Take as example passengers who feel uneasy about taking a train and decide to stay at home. Later, upon reading the news of an accident, they assume that they must have precognized their involvement in the accident, and then they intervened to avoid it.

However, the only information they obtained was the knowledge that they would be unable to fulfil an intention to do something later in the day, and that enabled them (unconsciously) to deduce the possibility of the accident happening. Thus, the percipient never intervenes to change the event precognized and the mechanism can be applied to all the cases of apparent intervention.

Laboratory Experiments

Future Events Caused by Outside Circumstances

Perhaps the best examples in this category are the pre-stimulus response experiments, in which changes in a given parameter, such as the participant's electrodermal activity, are produced prior to the delivery of an emotionally arousing stimulus. Radin (1997) performed an experiment in which a series of randomly selected images were presented to participants at intervals on a computer monitor. Highly arousing images were interspersed with emotionally neutral control images. Increased arousal was observed up to 3 sec prior to exposure to the "emotional" stimulus, but it did not occur during the same period prior to exposure to the "calm" stimulus.

The results suggest that the degree of activation of the neuronal pattern corresponding to the arousing stimulus was sufficient for it to influence similar patterns spontaneously activated prior to that stimulus. The activations of the earlier patterns were sustained to a level at which they triggered the earlier responses.

Several replications of this kind of experiment have been carried out (e.g., Bierman & Scholte, 2002; Spottiswoode & May, 2003; Tressoldi, Martinelli, Massaccesi, & Sartori, 2009). A meta-analysis of 26 studies, described in a paper by Mossbridge, Tressoldi, and Utts (2012), shows an overall small but significant effect (ES = 0.21, combined $z = 5.3$, $p = 5.7 \times 10^{-8}$). The authors also report that some of the recent experiments have shown that an increase in arousal can occur prior to exposure to an apparently calm stimulus. However, such a stimulus will still lead to an appraisal if it is *personally* significant to the individual, regardless of whether it is considered significant to others (Lazarus, 1994). For example, a picture of a red rose might, for a given individual, evoke associations that are almost as significant as those evoked by an erotic photograph.

Notice that an early *conscious* awareness of the stimulus does not seem to be produced in these experiments. Neuroscientist Joaquín Fuster (2003) suggests that there are probably two thresholds: "a threshold for the processing of information and a threshold for the conscious awareness of it" (p. 255). This suggests that a stronger stimulus may be required to elicit the conscious awareness.

In a landmark neurosurgical experiment, Libet, Wright, Feinstein, and Pearl (1979) measured the time required to produce conscious awareness in each of two conditions: first, when a stimulus was applied to a participant's hand (a pin-prick), and second, when a stimulus was applied directly to the area of the cortex involved in receiving the sensory signals from the skin. The results showed that stimulation to the cortex required approximately 0.5 sec of neuronal activity before awareness was produced. However, when the hand was stimulated, the conscious feeling of "pain" was produced at the same moment that the stimulus was applied. The results were attributed to an "antedating" of the conscious experience (see also Popper & Eccles, 1983, pp. 253–261, 364; Penrose, 1995, pp. 386–387).

The mechanism I have suggested above would explain these results. In the absence of an external stimulus, the receptor organs in the skin spontaneously fire impulses which travel along pathways to the brain. Most of the weaker excitations are filtered out *en route*, but a few survive to activate perceptual patterns corresponding to the impulses. Normally, these activations would not lead to conscious awareness. However, when the external stimulus is applied, the degree of activation of the corresponding perceptual pattern is increased to the level at which it influences the same pattern when it is activated spontaneously just before and just after the application of the stimulus. The earlier activations are thus sustained, and appraisal leads to the earlier feeling of pain. The conscious pre-perception of the stimulus therefore arises from the sustained activation of an *earlier* pattern, and not from a subjective referral of the conscious experience. In fact, the earlier sustained activations would help to speed up the processing of sensory information in the brain.

Notice that such a pre-perception is not produced when the cortex is stimulated directly. Eccles says that the perceptual experience is different, and that a "neuronal shock wave" is produced, which has "little resemblance to the pattern of neuronal activation generated by the natural input from the receptor organs" (Popper & Eccles, 1983, pp. 255–256). As the patterns do not match, there is no resonance and nothing to "antedate" the experience.

Future Events Caused by the Participant

The best examples here are the forced-choice target-guessing experiments in precognition. The participant has to guess which of a given set of options corresponds to the target that will be randomly selected in the future. We will suppose that feedback is given of the result of each trial, and that the symbol "X" is the target for a given trial.

The future experience of looking at X would seem unlikely to have much emotional impact. However, if symbol X can be associated with the idea of scoring a hit, then the association does have impact. Therefore, I suggest that the precognition refers to an association between the ideas of selecting X and scoring a hit—an association that is then appraised to produce a feeling of *satisfaction*.

The participant starts by *intending* for the selection of any one of the options to be associated with scoring a hit. However, if an incorrect option is chosen, there will be no future *experience* of scoring a hit. The patterns of activation corresponding to the present intention and future experience do not match and there is no resonance. An intuitive warning is produced.

The intuitive warning *stops* the participant from selecting that option (Taylor, 2007, pp. 558–559, 565), and he unconsciously moves on to another option and repeats the process. When he comes to the correct option, a resonance occurs and he is able to go ahead with his intention to select it. The present intention is subsequently fulfilled, as the future experience will be caused by the association between the selected option and the idea of scoring a hit, when feedback of the target information is given.

The correct option is therefore found by looking for the intuitive warnings, which enable the participant to eliminate the incorrect options. It also prevents a causal loop: a resonance causing the participant to select the correct option and selecting the correct option causing the resonance.

In neurological terms, the brain applies stimulation to the pathways corresponding to each of the target options. If an incorrect option is selected, the pathway will not be reactivated in the future and a resonance is not produced. Inhibition from working memory may then cause the activation of the pathway to cease, thus preventing the participant from registering the option. However, if the correct option is selected, a similar pathway will be activated in the future and a resonance *is* produced. The re-entry of stimulation to the working memory system prevents inhibition, and this allows activation of the pathway to be sustained until the motor networks are triggered and the participant registers the option (Taylor, 2007, p. 565).

Notice that the activation of each pathway must be allowed to build until it is close to the threshold at which the motor networks would be triggered. Only at this critical level will the inhibition be effective in preventing the activation of the motor networks in the case of an incorrect option. This suggests that participants must be in an appropriate subjective state for them to score hits. In fact, Rhea White (1964) suggests the subjective conditions necessary, and the present theory explains why these conditions should be favourable (Taylor, 2007, p. 565).

In the case of a forced-choice experiment, the best results are to be expected when feedback is given immediately after each trial (e.g., by allowing the participant to see the target). In the scenario in which he is successful, the participant is immediately able to recognize that his guess has produced the effect of scoring a hit. He is able to create the corresponding association in his brain in the future, and it is easy for this association to be identified with the earlier association created at the moment of the guess.

Suppose, on the other hand, that the participant is only given feedback of the result of a series of trials. Again, we take a "success" scenario in which a positive score is produced. For each trial, the participant tries to guess which of the response options will contribute towards producing the positive score. Then, at the moment of feedback, we'll suppose that he is able to remember, say, two of the trials in the series. Again he associates the chosen options for each of these trials with the idea of the positive score produced. However, in this case, it is more difficult for the future association to be related specifically to the two earlier associations. Furthermore, the "forgotten" trials in the series are void; the guesses are made by chance, and these trials do not contribute to the positive score produced. The significance of the final result is therefore reduced, because the participant is able to recall only a limited number of trials.

A similar mechanism would apply to free-response experiments, including remote viewing. For example, a participant tries to imagine some of the features that might form part of a remote scene. The participant then makes an intuitive decision to identify a combination of these features which, together, can be associated with the idea of producing a successful result. Later, the participant is taken to the location, sees the same features, and *does* associate them with the idea of the successful result produced. A resonance is thus produced between the present and future patterns of activation.

Notice that if *no* feedback is given in either kind of experiment, there will be no future experiences of the kind necessary for intuitive decisions to be made. The results will therefore be expected to show little or no significance.

Notice also that the mechanism for any intuitive decision is difficult to test because participants would not know whether the ostensibly avoided outcome would have occurred had they not acted on the intuitive warning. However, the positive results of the target-guessing experiments may be considered indicative of such a mechanism.

The Nature of Precognition

A number of observations can now be made regarding the nature of precognition. They may help explain the apparent anomalies found in the results of the experiments.

Pre-Cognition Is the Fundamental Manifestation of ESP

For many years, parapsychologists have debated whether the results of "telepathy" experiments are due to contacts with the sender or contacts made directly with the targets (Carr, 2008, p. 24; Stokes, 2007, pp.72–73). However, another interpretation is that the results could be due to precognitive contacts with the participant's own brain in the future (i.e., with his future knowledge of the target information). Misinterpretation of the nature of the contact could have led to problems of repeatability in some of these experiments.

For example, if there is to be contact with the participant's future knowledge, feedback must be given to the participant in the future, as discussed in the previous section. But this was not always done. If feedback was given, the participant could connect with his future experience of receiving it, and a positive result could be produced. If feedback was not given, the participant could not use pre-cognition, and the results would be expected to fall either to chance, or very close to chance.

Support to this conclusion is given by the Honorton and Ferrari (1989) meta-analysis, which includes a subset of experiments in which details were provided about the amount of feedback given to participants. The largest effects were shown in the studies in which trial-by-trial feedback was given, and the effect size was reduced when only run-score feedback was given. However, the authors state that none of the studies without subject feedback were statistically significant.

In some well-known telepathy experiments, such as the series conducted at the Maimonides dream laboratory (Ullman, Krippner, & Vaughan, 2002) and the ganzfeld studies (e.g., Bem & Honorton, 1994), highly significant results were obtained when feedback was given on a trial-by-trial basis.

In the remote-viewing experiments at the Stanford Research Institute (e.g., Puthoff & Targ, 1976), feedback was given by taking the participants to the target locations after the trials had been conducted. In fact, the CIA-sponsored Star Gate program (e.g., Puthoff, 1996; Targ, 1996) produced some outstanding results in field trials in which feedback was given. However, this particular technique was rarely used for intelligence gathering (May, 1996; Mumford, Rose, & Goslin, 1995), and this may have been largely due to the impracticability of taking participants to the target locations to receive feedback.

Target-guessing experiments have been carried out in which only run-score feedback was given (e.g., J. B. Rhine, 1969). Here, a *salience effect* was sometimes observed, in which a greater departure from chance expectation was found to occur at the beginning and end of a run. In this case, the target symbols corresponding to the first and last trials tend to stand out, with a better chance of being remembered in the future. Thus, intuitive decisions could be made to identify the symbols which would be associated with the idea of producing a successful result when feedback of the run score was given.

Occasionally, it has been claimed that significant results can be produced without any feedback of the target information. For example, May, Lantz, and Pantaneda (1996) performed a remote-viewing experiment in which feedback was displayed tachiscopically to participants. They found that varying the feedback intensity made no difference to the quality of what May calls "anomalous cognition" (AC). However, May assumed that if feedback is necessary, it is the feedback information *per se* that produces the AC. If so, an increase in feedback intensity should produce an increase in AC quality. In contrast, the present theory suggests that for an intuitive decision to be made, the feedback must produce a cognitive understanding in the participant's brain. May points out that the feedback intensities could have been too low for detection, and that would certainly have prevented the participants from cognitively evaluating the targets. Nonetheless, two of May's participants did produce positive results. This may have been due to them associating some of the imagery they created during the trials with the idea of obtaining a successful result. An intuitive decision could be made to find the imagery they would later associate with the successful result, when feedback of the result was received after the experiment.

In fact, as May himself points out, it is not possible to guarantee that feedback has been completely eliminated. For an experiment to be valid there must be a result, and however well the result is concealed, there is always the possibility that the participant will obtain knowledge of that result at some time in the future.

Interestingly, Steinkamp, Milton, and Morris (1998) performed a meta-analysis of forced-choice experiments comparing clairvoyance and precognition tests, finding the magnitude of the effect to be significant at approximately the same level in both. The assumption was made that direct contact was being made with the targets in each of the two modes, and the feedback issue was not considered. It is therefore possible that, in those studies where there was feedback to the participants, the significant results were really due to the participants precognizing their *future* knowledge of the target information, regardless of the mode. This suggests that there was essentially no difference between the modes, and that's what the results showed. There may have been no direct contact with the targets at all.

Notice that when cognitive feedback is given to participants, it enables them to receive and encode the target information using their normal senses. Selectivity is achieved, because the feedback information refers specifically to the target, and the participants do not have the task of trying to distinguish between the target and the decoys.

It would therefore seem important for feedback to be carefully controlled in future experiments and for details of the feedback to be specified clearly in the reports (Taylor, 2008). For example, an experiment could be designed in which trial-by-trial feedback is given to participants in a test group but not to participants in a control group. The future targets are generated for the individual trials in both groups, giving all participants the same opportunity to "clairvoyantly" detect the targets (if such a phenomenon exists). All participants would equally be subject to the possibility of a telepathic influence from the experimenter. However, if there is a *difference* between the results from the two groups favouring the test group, it can be attributed to the participants in the test group using precognition to access their future knowledge of the targets. The results of such an experiment could give strong support to the present theory.

Pre-Cognition Is More Likely to Occur When the Experience of the Event in the Future Produces a Stronger Emotional Impact

If the emotional impact is stronger, the degree of activation of the appraisal networks is increased, and the re-entry of output stimuli from the amygdala back to the networks will produce many more reactivations of the neuronal pattern involved. The reactivations may be said to produce a *concentration effect* by increasing the strength of the resonance, so that the resonance will be more likely to influence any spontaneous activations of the pattern in the present.

In the pre-stimulus response experiments discussed earlier, it was found that exposure to an emotional stimulus produces a stronger pre-response than exposure to an apparently calm stimulus. In the case of the target-guessing experiments, I suggested that the emotional feeling of satisfaction must be produced when the participants score hits or produce a successful result. For example, if they become bored with the experiment, the association between the selected target symbol and the idea of scoring a hit is no longer appraised in the future to produce the same level of satisfaction. Fewer activations of the pattern are produced, and the strength of the resonance is reduced to a level at which it is less likely to affect the pattern activated in the present. The results should therefore fall closer to chance expectation. This explains the well-known *decline effect*, in which the results do fall closer to chance expectation with repeated testing (e.g., Tart, 1966).

Notice that whilst a high degree of activation is necessary in the future, the degree of activation in the present should be as low as possible, in order for the brain to notice any additional activation which may be caused by the resonance. Excessive activation in the present (e.g., because the percipient is already thinking about the possibility of such an event occurring) will lead to a *dilution effect*, which will reduce the likelihood of the percipient noticing the precognition.

Finally, it has been recognized that extroverts tend to produce higher scores than introverts (Bem, 2011; Honorton, Ferrari, & Bem, 1998) and this is believed to be related to the fact that extroverts are susceptible to boredom and tend to seek out stimulation (Eysenck, 1966). According to my theory, this means that extroverts would actually be expected to perform less effectively in a target-guessing experiment. However, neuroscientist Susan Greenfield (2001) suggests that extroverts (and children) activate smaller neuronal patterns, because the evaluations they carry out of their previous experiences are less detailed—and this leads to stronger emotions being produced. Because the pathways through the networks are shorter, less time is required for the impulses to traverse the pathways and for the re-entry circuits to initiate further activation. This increases the rate of activation of the pathways, and it will produce a stronger emotion and stronger concentration effect, thus increasing the likelihood of extrasensory contact.

Pre-Cognition Is More Likely to Occur When the Temporal Distance to the Moment of the Future Experience Is Shorter

To obtain a strong resonance between the present and future patterns of activation, the theory suggests that the synapses forming the patterns have to match one another fairly closely. However, the structures of synapses change constantly over time due to brain plasticity, so that a closer matching is to be expected when the temporal distance between the activations is shorter.

This conclusion is supported by the results of the pre-stimulus response experiments. In Radin's (1997) experiment, the physiological response was produced 3 sec prior to the stimulus, and in some of the more recent experiments, the response was detected up to 10 sec prior to the stimulus (Mossbridge et al., 2012). On the other hand, the *conscious* pre-perception of a stimulus seems to be limited to a period of about half a second, which only compensates for the time required to process the stimulus physiologically. In the target-guessing experiments, however, significant results can be obtained over much longer temporal distances. For example, the Honorton and Ferrari (1989) meta-analysis shows that the results were highly significant for feedback delays of up to a few hundred milliseconds. For longer intervals there was a regular decline, due to a weakening of the resonance and the results became nonsignificant only when the delays were increased to more than one month.

In a study of spontaneous precognition in dreams, Nancy Sondow (1988) found that the number of events precognized declined with the passage of time. Half of the events precognized occurred within one day of the dream, and there was a steep and regular falloff in the number of events with increasing time intervals after the dream.

The limitations imposed by longer feedback delays are important for achieving selectivity in precognition. They enable us to access events in the near future and exclude any similar events that occur in the more distant future.

Once the necessity of feedback has been established, target-guessing experiments can easily be designed to test the effect of varying the feedback delay.

The Results of an Experiment Tend to Conform to Participants' Beliefs

This is the well-known *sheep-goat effect*, in which believers in ESP ("sheep") score significantly above chance, whereas nonbelievers ("goats") score significantly below chance (Schmeidler, 1945; Lawrence, 1993). To nonbelievers, misses are really hits. They make intuitive decisions to select the target options which, in the future, they will associate with the idea of scoring misses, when they are given feedback of the target information. These are the associations that are appraised to produce the feeling of satisfaction. The participants therefore score a higher proportion of misses, so that the proportion of hits falls to below chance-expectation.

Notice that Schmeidler defines sheep as people who believe that ESP will occur *in the experiment*. People who believe in the existence of ESP in the abstract sense, but who do not believe that it can be demonstrated experimentally, will therefore produce below-chance scores (Palmer, 1986, pp. 200–204). In fact, the sheep-goat effect is one that relatively few investigators seem to take into account when selecting participants. It could also be responsible for the problems of repeatability encountered when different laboratories perform the same experiment with different groups of participants.

Daryl Bem (2011) performed a series of experiments in which well-known psychological effects were time-reversed. Two experiments were designed to detect a retroactive facilitation of recall, in which participants found that it was easier to recall in the present words that they would rehearse in the future. First, a participant was asked to recall as many words as possible from a list of "stimulus words." The computer then randomly selected half the words from the list to serve as "practice words" and the participant rehearsed the practice words by performing exercises on them, such as typing them into boxes on the screen.

It is possible that the participants could have detected their future experiences of rehearsing the words. However, such experiences would have little emotional impact, and the number of reactivations of the neuronal pattern would be minimal, occurring only when the participants deliberately reread or retyped the words. Perhaps it is better to interpret the study as if it were a forced-choice target-guessing experiment, in which the stimulus words were the target options and the practice words were the actual targets. The participants could therefore make intuitive decisions to identify the words that they would later associate with the idea of scoring "hits" when they saw these words in the practice list. Although the participants were not actually told that the practice words were targets, they would still obtain emotional satisfaction when they recognized the words they remembered from the practice list. The increased number of reactivations resulting from the appraisals would lead to a concentration effect, thus increasing the likelihood of extrasensory contact.

The participants were, however, told that the experiment was to test for ESP, so that the positive results would depend on their beliefs towards obtaining such results. Participants with a neutral attitude would not appraise the idea of scoring a hit as producing satisfaction; there would be no concentration effect and a nonsignificant result would be expected. Sceptics, on the other hand, would derive satisfaction from scoring misses, and they would tend to produce significant results in the opposite direction; they would recall fewer practice words than control words.

This may have occurred when Ritchie, Wiseman, and French (2012) separately tried to replicate one of these experiments. All three investigators are well known for their scepticism towards ESP, and even if their personal interaction with participants was minimal, the laboratory environment could still have conveyed negative expectations to the participants. Two of the experiments failed to produce significant results in either direction, and the third experiment produced a significant result in the opposite direction.

However, far greater success in replication attempts has been obtained in Bem's first experiment, designed for the precognitive detection of erotic stimuli. Participants had to guess which of two curtains displayed on a computer screen hid an erotic photograph. After the participant's selection had been registered, the computer randomly assigned the photograph to one of the curtains. Following a correct guess, the curtain opened to reveal the photograph, and following an incorrect guess, the display showed a blank wall.

A recent meta-analysis (Bem, Tressoldi, Rabeyron, & Duggan, 2014) shows nonsignificant results for 27 replications of the retroactive facilitation of recall experiment, and highly significant results for the 14 replications of the precognitive detection of erotic stimuli experiment (ES = 0.14, combined $z = 4.22$, $p = 1.2 \times 10^{-5}$). The authors attribute these successful results mainly to the "fast-thinking" protocols used in the experiment which, according to Carpenter (2012), prevent conscious cognitive evaluations from interfering with the intuitive nature of psi functioning. A quick judgement by the participant would certainly be expected to minimize any dilution effect, but I suggest that the high emotional impact produced by the future experience, as well as the very short temporal distance to the moment of that experience, are probably the main factors responsible for the experiment's success.

Finally, the *displacement effect* (Crandall, 1991) may be partly attributable to the sheep-goat effect. Displacement occurs, for example, when instead of guessing the target for the trial being performed, a participant guesses the target for the next trial in the series. However, this could easily occur by chance over a number of trials, and it would induce a belief that such a displacement is a normal characteristic of ESP, assuming the participant receives trial-by-trial feedback. Participants therefore assume that they have to guess the displaced targets, and they feel they are scoring hits when they do so. These principles can be applied to any experiment in which participants believe they will select a given response option, regardless of whether that option is the target (e.g., Radin, 1988, discussed earlier).

The Results of REG Experiments May Be Due to Precognition and Not PK

Robert Jahn and Brenda Dunne carried out a program of experiments at the Princeton Engineering Anomalies Research (PEAR) laboratory to investigate the possible effects of consciousness on random event generators (REG's). The devices were used to emit data streams of 200 binary digits (zeros and ones) for each trial. Participants had to try to influence them, according to pre-stated intentions, to produce high, low, and undeviated mean values for the output distributions. The experiments produced highly significant results (Jahn, B. J. Dunne, Nelson, Dobyns, & Bradish, 1997; Jahn & B. J. Dunne, 1988, 2005).

Edwin May proposed decision augmentation theory (DAT) to explain the supposed ability to influence REG outputs (May, Utts, & Spottiswoode, 1995a, 1995b). He gave evidence to suggest that rather than a micro-PK force acting on the device, the correspondence of the output with the person's intention depends on optimum sampling of the bit stream generated by the REG.

The DAT model can be explained in terms of intuitive decisions to identify the best moments at which to press the button and initiate the sampling of the bit stream. Suppose, for example, that a participant is trying to obtain a successful result by producing a higher proportion of ones. We assume immediate feedback, and consider two scenarios: In scenario A (failure), at a certain moment, the participant "hears a sound," intending for it to be associated with the idea of producing a successful result. However, if the participant presses the button at this moment, we suppose there will be no future experience of this occurring—the bit stream will not contain a higher proportion of ones. The present and future patterns of activation do not match and a resonance does not occur. An intuitive warning prevents the participant from pressing the button.

In scenario B (success), at another moment, the participant "notices something" and again intends for what he notices to be associated with producing a successful result. If the participant presses the button at this moment, we suppose that it will lead to a successful outcome in the future—the bit stream *will* contain a higher proportion of ones. The participant therefore presses the button and, upon receiving feedback in the future, obtains satisfaction from discovering that what was noticed can now be associated with the successful result produced. Resonance occurs between the present and future patterns of activation. The participant has thus been able to make an intuitive decision to choose scenario B, which leads to a positive score.

Notice that scenarios A and B represent response options, in the same way that the features of a remote location represent response options in a remote viewing experiment. Scenarios A and B are temporally separated, whereas the features of a location are spatially separated. But the mechanism is the same.

Notice also that a successful result doesn't depend on the participant's physiological control necessary to discriminate one out of a succession of appropriate moments at which the response can be made (May et al., 1995b;

Walker, 1987). Instead, the participant looks for a *scenario* in which the response happens to coincide with one of those moments, and leads to an appropriate sampling of the bit stream. In other words, the task is not that of "looking for" an appropriate moment in time. Instead, it is that of "selecting the scenario which contains a button press that happens to occur at an appropriate moment in time".

According to this model, the participant's intention towards the result may be irrelevant. It is the intuitive decision made by the *operator* who initiates the data-selection process which determines the result. This explains the significant results produced when ostensible participants apply the intention at remote locations, or at times before and after the bit streams are generated (B. J. Dunne & Jahn, 1992). The participants themselves do not affect the result; it is the operator who is performing the role of the participant by pressing the button himself. The mechanism also explains why significant results are produced when pseudo-REG's are used (Jahn & Dunne, 2005). Because the bit sequence is predetermined by a mathematical algorithm, it is more difficult to see how the sequence could be influenced. However, the operator can again make an intuitive decision to select an appropriate sample of the data stream to produce the desired result.

Finally, the results of the series position effect experiments (B. J. Dunne, Dobyns, Jahn, & Nelson, 1994) may have illustrated the effect of the operator's changing subjective approach as each successive experimental series was performed. The operators showed tendencies to produce better scores in the first series, which fell in the second and third series, and then recovered to an intermediate level in the fourth and fifth series. Initially, the operators would find it easy to adopt the subjective conditions necessary to produce a satisfactory result (Taylor, 2007, p. 565). However, this leads to over optimism, so they either fail to notice the intuitions, or they press the button without waiting for the intuitions to tell them the best moments to do so. The rate of scoring hits is reduced and they become disillusioned; their belief, and the results, now go in the opposite direction. Eventually, a decline effect takes over, and the significance is reduced due to boredom with the experiment.

When the results of these experiments are interpreted in terms of the present theory, they give support to DAT, whilst not supporting the observational theory (Houtkooper, 2002; Schmidt, 1975; Walker, 1974), according to which the observer's consciousness is supposed to exert a PK influence and bias the collapse of the wave-function. Observational theory has been used to support the clairvoyant interpretation of ESP experiments because it suggests that the participant's consciousness might be able to collapse the wave-function to create the target state reported.

Bohm's theory overcomes the observation problem by suggesting that the implicate order still unfolds, regardless as to whether there are observers, or, if there are, whether they are performing an act of observation (i.e., measurement) at the moment of unfoldment. His theory enables us to explain the results of the experiments without having to invoke an influence from consciousness.

Conclusion

The theory suggests that psi is manifested principally as pre-cognition of the percipient's own experience of an event in the future—a process in which information is transferred from the brain in the future to the same brain in the present. A transfer of information from a different brain is also considered possible, but is expected to be far more difficult to detect. According to the theory, the necessity of direct contacts with external objects or events is eliminated. Some of the predictions of the theory are subject to testing, and taking them into consideration may lead to improved repeatability in future experiments.

The theory also suggests that "memories" are retrieved from the future in very much the same way they are retrieved from the past, as discussed in my earlier paper (Taylor, 2007). In either case, the information retrieved seems to consist not of discrete elements of information, but instead of *relations* between the elements. Taking these various suggestions into account could also contribute towards a better understanding of long-term memory.

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Abstracts in Other Languages

German

DAS WESEN DER PRÄKOGNITION

ZUSAMMENFASSUNG: Dieser Beitrag beschreibt eine Theorie, derzufolge Präkognition wörtlich als „Prä-Kognition" der Information erklärt werden kann, die in der Zukunft im Gehirn des Perzipienten enthalten ist – eine Verbindung zu seiner oder ihrer zukünftigen Erfahrung des Ereignisses. Die Theorie basiert auf dem Modell des Block-Universums, demzufolge vergangene und zukünftige Ereignisse bereits im Raumzeitkontinuum existieren, so wie es die Spezielle Relativitätstheorie fordert. Bohms Theorie der Impliziten Ordnung lässt sich mit einem solchen Modell vereinbaren. Es schlägt vor, dass – wenn ähnliche Strukturen an unterschiedlichen Orten in Raum und Zeit entstehen --, diese Strukturen mit einer Tendenz in Resonanz treten, einander immer ähnlicher zu werden. Diese Prinzipien werden auf neuronale raumzeitliche Muster angewandt, die im Gehirn aktiviert werden. Präkognition wird als fundamentales Phänomen von ASW aufgefasst und tritt als Informationsübertragung von einem Gehirn in der Zukunft zum gleichen Gehirn in der Gegenwart in Erscheinung. Das Modell gestattet auch die Möglichkeit, mit anderen Gehirnen in Kontakt zu treten, wobei diese Kontakte in Echtzeit wie zu verschiedenen Zeiten möglich wären. Allerdings könnten direkte Kontakte mit äußeren Objekten oder Ereignissen nicht auftreten. Der Mechanismus wird auf Präkognitionsexperimente angewandt, und er erklärt die offensichtlichen Anomalien in den bisherigen Ergebnissen.

Spanish

LA NATURALEZA DE LA PRECOGNICIÓN

RESUMEN: En este trabajo se describe una teoría que explica la precognición, literalmente el “ pre-conocimiento “ de la información contenida en el cerebro del perceptor en el futuro como una relación con su futura experiencia del evento. La teoría se basa en el modelo de universo en bloque, en el que existen eventos pasados y futuros en el continuo espacio-tiempo, como es requerido por la teoría especial de la relatividad. La teoría de orden implicado de Bohm es compatible con un modelo de este tipo y sugiere que si estructuras similares se crean en diferentes lugares en el espacio y el tiempo, las estructuras resuenan con una tendencia a ser más similares entre sí. Los principios se aplican a los patrones espacio-temporales neuronales que se activan en el cerebro. Considero a la precognición como el fenómeno fundamental de ESP manifestado como la transferencia de información del cerebro en el futuro al mismo cerebro en el presente. El modelo permite también la posibilidad de contactos con otros cerebros, y estos contactos pueden producirse sincrónicamente o en momentos diferentes. Sin embargo, la teoría no admite en lo absoluto el contacto directo con objetos o acontecimientos externos. El mecanismo se aplica a los experimentos de precognición y explica las anomalías encontradas en los resultados.

French

LA NATURE DE LA PRECOGNITION

RESUME : Cet article décrit une théorie expliquant la précognition comme étant littéralement une « pré-cognition » de l’information contenue dans le cerveau du percipient dans le futur – un lien avec son expérience future de l’événement. Cette théorie est basée sur le modèle de l’univers-bloc, dans lequel les événements passés et futurs existent déjà dans un continuum espace-temps, ainsi que le requiert la théorie spéciale de la relativité. La théorie de Bohm sur l’ordre impliqué est compatible avec un tel model, et il suggère que si des structures similaires sont créées en différents lieux de l’espace et du temps, les structures résonnent l’une avec l’autre et montrent une tendance à accroître leur similitude. Les principes sont appliqués aux patterns spatio-temporels neuronaux qui sont activés dans le cerveau. La précognition est interprétée comme le phénomène fondamental de la perception extra-sensorielle. Elle se manifeste comme un transfert d’information en provenance du cerveau du futur vers le même cerveau dans le présent. Le modèle permet également la possibilité de contacts avec d’autres cerveaux, et ces contacts se produiraient soit en temps réel, soit en temps différé. Toutefois, les contacts directs avec des objets ou événements extérieurs ne sont pas intégrés dans ce modèle. Le mécanisme proposé est étayé sur les expérimentations de la précognition, et il explique les anomalies apparentes découvertes dans les résultats.