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Precognition

The Only Form of Psi?

Abstract: *Based on empirical evidence we discuss the nature of precognition, and address the questions whether retrocausation/ precognition violates causality, whether precognition implies determinism, the questions of actual or probable futures, from where does the information arise, and other observed properties of precognition. This is followed by a discussion on the primacy of precognition by examining the various categories of psi. In our analysis, precognition is most likely the only form of psi, subsuming within it clairvoyance, telepathy, micro-PK, and the survival hypothesis. In this paper, we examine the various arguments for this assertion, the primary one being that it is impossible to close the precognition door.*

Introduction

The general term *psi* encompasses a wide range of laboratory phenomena, including various forms of informational psi, i.e. extrasensory perception (e.g. clairvoyance, telepathy, and precognition), and influence psi, i.e. mind–matter interactions (a.k.a. psychokinesis). A host of other phenomena, such as survival after bodily death, mediumship, near death experiences (NDE), out of body experiences (OBE), and a wide range of activities falling into the general category of shamanism are difficult to tease into a laboratory. Although extrasensory perception is the commonly recognized term, over the years nomenclature has changed to clarify the constructs. Anomalous

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cognition (AC) is a generic term used in place of extrasensory perception, and is defined as the perception and cognition of information that emerges from a distant point in space-time, but which is blocked from the usual sensory systems by distance, shielding, or time. In this process, some individuals are able to gain access to information from events outside the range of their senses by a currently not understood mechanism (May, Utts and Spottiswoode, 1995/2014). Several synonyms for this phenomenon are in use: psi, remote viewing (RV), precognition, clairvoyance, and ESP. There is significant controversy surrounding the evidence for psi, based on sceptical positions (e.g. Kurtz, 1985; Goertzel and Goertzel, 2014), arguments from methodological procedures (e.g. Akers, 1984; Alcock, 1991), and statistical methods (e.g. Wagenmakers *et al.*, 2011; 2015). Nevertheless, researchers from a variety of disciplines from anthropology to physics have steadfastly continued to examine psi phenomena with the scientific tools of their respective disciplines (Zingrone and Alvarado, 2015).

In his essay 'ESP, Causation, and the Possibility of Precognition' philosopher Richard Corry (2015) sought to clarify the concept of ESP and examine its logical possibility. While stating that the evidence for ESP must meet a high standard, he concluded that 'there is nothing impossible about ESP, nor is it impossible that we could find good empirical reasons to believe in ESP' (*ibid.*, p. 126). Analyses of the logical possibility of precognition can also be found in Anglin (1981), Brier (1974), Brier and Schmidt-Raghavan (1982), Sheehan (2006; 2011; 2015), and Werth (1978).

Based on the evidence available in the early 1930s C.D. Broad stated, 'In my opinion the evidence, both experimental and non-experimental, for the occurrence of these kinds of super-normal cognition is adequate to establish a strong *prima facie* case, which philosophers and psychologists cannot ignore without challenging invidious comparisons to the ostrich' (Broad, 1937, p. 178). Further stating that it is worth taking the hypothesis that veridical super-normal precognition occurs '*unless* there be some logical or metaphysical impossibility in it' (*ibid.*, p. 179). As Brier stated, 'Instead of rejecting the notion of precognition out of hand for its lack of conformity, it might be more fruitful to re-examine and, in some cases, revise some aspects of our traditional world schema' (Brier, 1976/2002, p. 46).

The evidence for psi, therefore, appears solid enough to consider the potential mechanisms of the phenomena.

Based on the multiphasic model of precognition, Marwaha and May (2015a) have defined precognition as an atypical perceptual ability that allows the acquisition of non-inferential information arising from a future point in space-time; that is, not enough time has passed between their occurrences for there to exist a causal relationship. In practical laboratory terms, it requires that target stimuli are randomly generated *after* responses are collected and secured.

Meta-analyses of studies in the above areas can be found in Bem and Honorton (1994), Honorton (1985), Honorton and Ferrari (1989), May *et al.* (1989), Utts (1991), Parker and Brusewitz (2003), Radin and Nelson (2003), Steinkamp, Milton and Morris (1998), Storm (2006), Storm, Tressoldi and Di Risio (2010; 2012).

These concepts have given rise to more questions regarding this astonishing natural phenomenon. Nevertheless, based on the vast literature of a work-in-progress, we believe there is no need for further evidential studies, and the focus now needs to shift, and has shifted, to process-orientated research. Considering this database, which is well beyond the scope of this paper, we believe it is time to re-examine some of the traditional constructs. As Bernard Carr states:

> Most physicists interested in psi would probably agree that one should try to obtain as unified a description of psychic phenomena as possible, without invoking a new feature of physics for each one. Indeed, the introduction of the single term 'psi' (although loosely defined) might be thought to anticipate that. In particular, it is important to have a unified description of psi as it appears in the laboratory and in the field. (Carr, 2015, p. 23)

Raisons d'etre for the paper

As described above, the term psi, even the informational part of psi, encompasses a wide range of topics, and at first look appears to require a nearly equal number of possible theories to understand the phenomena. By addressing the theoretical and experimental considerations of precognition at a practical level, we reduce the problem space for theorists. While philosophical problems such as free will, alternative futures, and bilking still persist, we hope that rethinking the problem based on psi data and theory leads to addressing these conundrums. Towards that end, this paper posits that precognition collapses the problem space as illustrated in Table 1.

Informational Psi and Current Hypotheses	Issues with the Evidence	Alternative Hypothesis for Same Data
Telepathy (mind-to-mind communication)	No definitive target stimulus such as an encrypted photo-graph in a computer.	Precognition
Clairvoyance (object-to-mind communication in real time)	No distinction in nature of signals depending on their temporal origins.	
Survival hypothesis	Insufficient evidence for post-mortem survival of conscious-ness/mind without a super-psi equivalent explanation.	
Micro-PK (mind-to-object influence)	No evidence for signals emerging from the brain that 'can do work'.	

Table 1. Alternative Hypotheses for Psi Data.

A theoretical model

As psi is a process rather than a singular event, multiple theoretical frameworks ranging from hyperdimensional models to entropic and quantum mechanical considerations to neuroscientific and psychological considerations have been put forth to examine various points in the process (see May and Marwaha, 2015b, for detailed theories).

In our signal-based multiphasic model of precognition, we have divided the problem space into the physics and neuroscience domains (Marwaha and May, 2015a,b). The physics domain (PD) addresses the question of how it is possible that information that can be used can go between two space-time points, especially if the two points are acausally separated. It is related to how information is carried from an external source, which is distant in time and space, to the percipient. This domain addresses the problem of retrocausation; that is, how is it possible that some future action can affect the present? Retrocausation is the 'proposition that the future affects the present. Indeed, all fundamental questions in physics are time-symmetric (more properly, CPT [charge, parity, and time] invariant), admitting both time-forward and time-reverse solutions; thus, retrocausation is mathematically allowable' (Sheehan, 2011, p. 1). In the context of psi experience, it is an information-centric perspective. It is advantageous to break up the theoretical psi problem into separate and mostly non-overlapping domains. The physics that addresses the major problem in the PD has

nothing whatsoever do with the human percipient. Therefore, otherwise important issues such as personality, physiology, and psychology of the percipient are irrelevant in the PD.

The neuroscience domain (ND) addresses the experiential part of the problem, that is, how is the information acquired by a putative sensory system, how is this information processed in the brain, and how is it expressed? This domain addresses the problem of precognition, which is a person-centric perspective.

These issues are independent of the physics in the PD but with one important exception. Regardless of how the information traverses space-time, no matter what will comprise the energy carrier of this information, there must be some kind of a transducer that converts the incoming energy to electrochemical impulses that the central nervous system (CNS) can understand. Consider this, by analogy, as a 'psychic' retina.

The basic premise of this model is that retrocausal signals emerging from a distant space-time point impinge on an atypical sensory process, and are then cognized in the manner of other sensory inputs. The biggest challenge in the physics domain is determining the nature of a retrocausal-signal carrier that propagates backward in time. Experimental and theoretical considerations have shown that the retrocausal-signal carrier may not be mediated by electromagnetic waves (Targ *et al.*, 1976). This division of the problem space permits us to examine the process of precognition from their specific disciplines.

In this paper, we examine the nature of precognition and discuss the proposition that *precognition is the only form of psi*. If this contention were true, then there would be a number of immediate benefits. First, it would substantially reduce the problem space. As we will show below, we then can ignore some of the traditional phenomena associated with ESP such as telepathy and clairvoyance and even the interesting concept and research into survival (i.e. some aspect of the human being survives bodily death). Even micro-psychokinesis that uses statistical inference for its observations vanishes as a mechanism.

Another benefit is that theorists and experimentalists could focus their work more sharply to understand the very nature of retrocausation/precognition. While retrocausation/precognition itself poses daunting problems, at least there is only one with which to enquire rather than a separate mechanism for each observable — the current approach in the literature.

The Nature of Precognition

Precognition is a person-centred perspective that generally refers to information perceived about future events, where the information could not be inferred by ordinary means. Or more formally, Marwaha and May (2015a,b) recently defined precognition as *an atypical perceptual ability that allows the acquisition of non-inferential information arising from a future point in space-time.* Procedurally in anomalous cognition experiments, it means that target stimuli are randomly generated *after* data collection is complete. Associated concepts include rectrocausation, remote viewing, presentiment and prestimulus response — physiological responses *before* random stimuli — and precognitive dreams.

Thus, the 'pre' in precognition refers to the possible existence of a target or event in the future. We make this distinction because once information from a future point propagates to 'the vicinity' of the percipient, the perception of the retrocausal information is occurring in close to real time.

Does retrocausation/precognition violate causality?

Retrocausation in physics poses an interesting question: is it possible for some action in the future to influence the present? There is considerable theoretical discussion (Sheehan, 2006; 2011; 2015) on this notion; however, at this stage the only data in support of retrocausation might be the data from psi research. That said, one thing is clear: the present cannot influence the past. That is, history is history and no matter what we do today, it cannot change history. As discussed by Steinkamp (1997), 'affecting the past will also be impossible because there are no such things as unactualized past events (the past is closed). That is, there are no past events whose outcome we can alter from the present and it would be inconsistent of us to think that we could alter such events'.

One way to think of this apparent contradiction is this. 'Today' represents the 'future' for some time in the past. The distinction is that retrocausation only applies to systems 'in the past' that have yet to be determined. For example, last Tuesday someone flipped a coin. Once determined that it landed heads that outcome cannot then be changed into tails. But retrocausation suggests that maybe while the coin is in the air retrocausal influences could bias the coin more often (multiple flips) to land heads.

Figure 1 graphically demonstrates the difference between retrocausation and precognition.

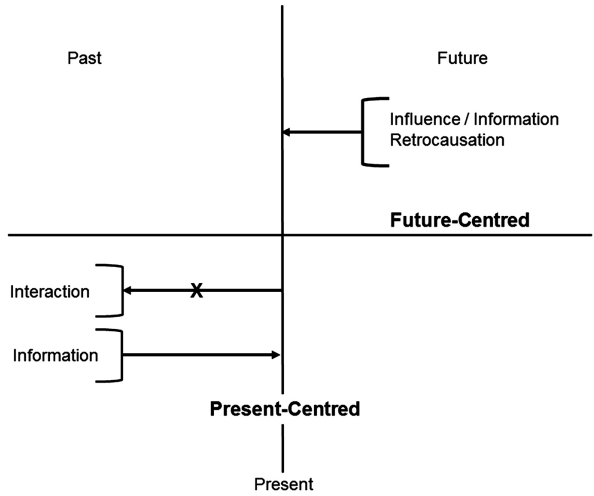

Figure 1. The prefix *retro* means action or information from the future affecting the present.

The short answer to the question posed is that retrocausation/ precognition appears to violate macroscopic causality. In simple terms, causality is the notion that things can only happen when the things that cause them to happen happen first. For example, my pen cannot drop to the floor until I open my fingers and not before. The key feature in retrocausation/precognition is that retrocausal signals emerge from a distant space-time point. This counter-intuitive feature — information from the future — lends itself to being considered as logically impossible. How can information about a future event — for instance, a train accident — be obtained one week prior to the event? While it is easy — but not sufficient — to state that we do not know everything about the physical world, and dismiss any instances of causality violation as a logical impossibility, it is necessary to consider the possibility of such violations based on the precognition data and anecdotal reports — at least in the current context of space-time.

The issue of causality violation is strictly confined to the physics domain. From the person-centred perspective, as stated earlier, once information from a future point arrives 'in the vicinity' of the

percipient, the perception of the retrocausal information is occurring in close to real time. As Sheehan states, 'So long as the psychological arrow [of time] is aligned with the external *local* arrow (e.g. thermodynamic, radiation, quantum), regardless of the direction of the overall *global* arrow, the world will be perceived (psychologically) as unfolding in the normal time-forward fashion' (Sheehan, 2015, p. 101).

From this perspective, precognition does not violate causality. With this in view, seeking answers in the neuroscience domain does not have to contend with the causality violation, which is a problem only for the physics domain.

Does precognition imply determinism?

The question of determinism versus free will has been the subject of intense scrutiny through the ages, and a discussion on the preceding arguments is well beyond the scope of this paper. Nevertheless, we state our view on this matter with specific reference to precognition. As a general note, we think that the construct of free will is paradoxical as, on the one hand, we are bound by cultural constraints imposed on us as social beings, and, on the other hand, we do make independent choices. The possibility of precognition adds a different dimension to this debate as it implies that an event or information is existing in the future.

However, *a future event is deterministic only when there is a single outcome of an event.* For example, a two-headed coin will always land heads; however, a normal, but biased, coin with 90% chance of landing heads is not deterministic because even though it is *likely* to land heads there is a 10% chance that it will not. All real life experiences *always* have possibilities of having multiple outcomes due to the vagaries of the human condition. Retrocausal information of a future event may not be deterministic as there are likely to be more than one outcome to an event. In precognition, the viewer may have access to a multitude of possible but unrealized futures. We will consider this point in detail below.

In real-time remote viewing for intelligence collection, which was carried out at Ft. Meade, Maryland, USA, for example, when the target stimulus turned out to be a submarine base in Severodvinsk in the Northern part of the Soviet Union, the viewer appeared to access information from an actualized event in real time (McMoneagle, 2015).

The difficult question is from which time frame did the viewer access the information? If the information that was perceived came directly from the submarine's construction in 'real' time, then that stimulus is time-like separated from the viewer, similar to all other perceptions. However, if the information was perceived from some later time such as the eventual feedback of the event 100 days later, then it is an example of precognition. Moreover, predictions based on these perceptions may be based on retrocausal signals or on inference from the already acquired retrocausal information. The challenge, of course, is to learn from which time frame the information arose. Either way, from the person-centric perspective, the information signals are present in real time. Nevertheless, we continue using the term 'precognition' because of its operational definition (target generated *after* the response), and for historical continuity of the term.

This leads to the big question: if you can see the future via precognition, are you condemned to experience that future? If you have a precognitive dream that you will be hit by a truck on the way to work, can you avoid it by simply staying in bed for the day? Since it appears that we have access to probable futures then in the most likely future you would have gone to work, but you also then can stay at home (Radin, 1987). Steinkamp (1997) has extensively discussed the problems and paradoxes of retrocausation and the intervention paradox.

As these examples indicate, precognition does *not* imply determinism. The percipient is privy to probable futures of a single event or is acquiring information from one of many actualized events. What determines which of the probable futures becomes an actualized event is a moot point. This issue needs extensive discussion and is beyond the scope of the present paper.

Actual or probable futures?

We illustrate this notion with a laboratory anecdote. During the US Star Gate era, researchers applied a psi technique, called associational remote viewing, to attempt to win money at a horse race. The day before the 6-horse race, an assistant randomly assigned each horse to a separate site from a set-orthogonal physical location in the San Francisco Bay area. For example horse 1 might be assigned to a park, but horse 2 to a gas station, and so on. Then a monitor and a participant, who are both blind to the location site assignments, address the following tasking. The monitor says, 'Please access and describe the place I will escort you to tomorrow at 16:00 hours'. The participant

responds with the usual words and drawings — the participant remains blind to the site locations. Afterwards, the monitor analyses the response against the six sites. If one of the sites appears to be a high quality match to the participant's response, the plan is to bet on the horse associated with that site. For example, if the response best matches the gas station site, which is associated with horse 2, then the bet is that that horse will win the race the next day. Regardless of which horse actually wins the next day, the winning horse will determine where the participant will be escorted to. This worked and the team walked away with $300 profit. So, the following day at 16:00 the investigators told the participant to get ready to visit the chosen location. The participant responded, 'Hell no. Give me my share of the winnings; I am watching a football game just now.' So, the research team divided up the winnings and left.

This anecdote demonstrates that the most likely future — escorting the participant to the gas station — did not actually happen; but, if the participant followed the tasking exactly, why did he not perceive the couch and the television set instead — the actual future? In the absence of free will, he would have been compelled to go to the gas station. However, by using his free will, he remained at home, instead of actualizing a probable future. In other words, the participant bilked his future! In this case, the experimenter too could have bilked the future by forcefully taking him to a third location. A detailed discussion on this perplexing issue is beyond the scope of this paper.

From where does the information arise — from an event or from later feedback?

According to the multiphasic model of precognition, the physics domain is independent of the neuroscience domain. This is analogous to the notion that photons coming from the sunset know nothing about the individuals viewing the sunset nor anything about their potential experiences of it. However, the neuroscience domain is somewhat dependent on the physics domain, because a putative transducer between the two domains will depend upon the energy propagation. However, experimental situations are loaded in favour of the neuroscience domain. The assumption being, information already exists in the physics domain, and the experiment tasking focuses attention on the target stimulus. Nevertheless, the question arises: from where does the percipient obtain the information — is it from the distant event or is it from the feedback that is provided post-session or an event much

later? This has been one of the most intriguing questions for psi researchers for a long time (e.g. May, Lantz and Piantineda, 1996/2014; Schmeidler and Lewis, 1968; Tart, Palmer and Redington, 1979).

This leads us to two of the biggest challenges of precognition research that influences replicability: when and where does psi happen? Experiment participants tell us that they do not have control over when they are 'psychic'. Suppose, for example — and a real case in one of the SRI International EEG studies (May, Spottiswoode and Faith, 2005/2014) — a well-designed experiment requires the participant to exhibit psi when, and only when (1) their EEG is monitored and (2) the effort protocol is in force and *not* the control protocol. As an example of (1), maybe a 'psychic' hit happened as that participant was in the parking lot before coming into the laboratory. Joe McMoneagle, one of the leading remote viewers for the Star Gate programme, has expressed this well:

> I have so much difficulty in determining when psi is taking place; e.g., when the experimenter says something like 'Joe, come prepared on Monday morning for good RV, because we are beginning a new series.' Over the next couple of hundred milliseconds, unconsciously I've already collected sufficient data to spend the next couple of days trying to analyze and break down what my impressions might actually mean in terms of data. If I'm lucky, I will probably begin to remember on Monday morning something of significance. I find it very difficult to equate a specific time in time/space where the perception of the data actually took place. (McMoneagle, personal communication, 2014)

To the degree to which that is true, it renders void all the details of the experiment and might even negate the entire complex protocol. This brings us to the question, why do we need to engage in the experimental exercise and create a target stimulus as, in principle, the target is independent of time of generation? At best, we can state that the purpose of generating a target for an experiment is to initiate intention and attention towards the task. It would be akin to clapping your hands to draw someone's attention to an activity.

In a recent study May, Hawley and Marwaha (in preparation) observed that the response of the percipient was emerging from the event rather than the computer-chosen target image. According to the experimental protocol, the participant first provided the response, following which a target stimulus was randomly generated from a target pool of five sets of five natural sites from the San Francisco Bay area. A specific photograph of each site was taken at the exact spot the

viewer would be standing during the feedback portion of the trial (May *et al.*, 2014). The images for the target pool were created on-site about nine months *before* the commencement of the experimental sessions. As per the protocol, the participant was taken blindfolded to the target site. As feedback, the blindfold was removed upon reaching the site and standing at the designated spot, so that the first thing that the participant saw was the actual site of the randomly generated target site and not as it was six months prior when the site selection photographs were obtained.

Over time, some of the sites had changed. For example, ponds had completely dried because of a drought, or construction that was underway when selecting the site for the experiment was now complete.

In one session, the target stimulus was a water tower in Hayward, CA. Figure 2a shows what the site was like prior to the start of the study, and Figure 2b is what it looked like at the time of the trial. The complete response is provided on the left side of the figure. Note that we have added the typed version of the handwriting for clarity.

What is important to note is that the participant spoke in detail about a chain linked fence that was *not* part of the original site, yet was there at the time of the feedback.

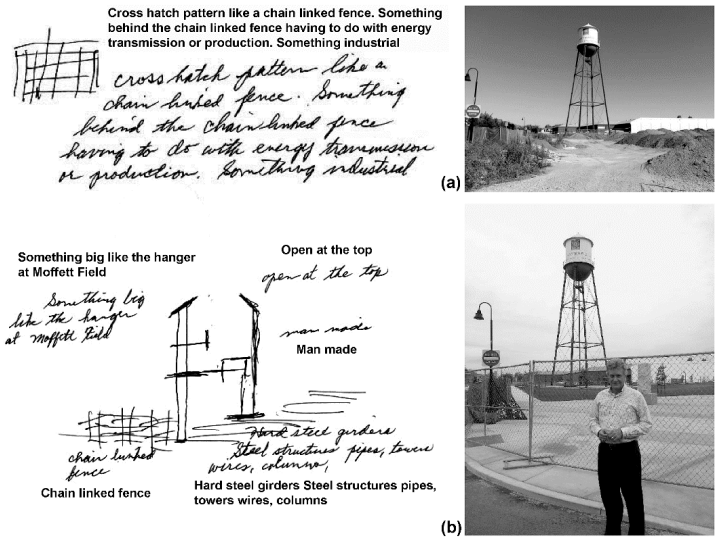

Figure 2. (a) Original site. (b) Feedback of the actual site taken approximately six months later.

Beginning in 1986, May, Lantz and Piantineda (1996/2014, p. 114) conducted a two-year investigation of the dependency of the quality of anomalous cognition on the feedback to the participant. The question of feedback or no feedback on an individual session does not matter as either way the information is coming from a future point, ten minutes later or a week later, as the instance of random target selection and provision, or not, of the feedback is *after* the response is recorded — the percipient is already in possession of the information *before* the target is generated. In this study, even though great care was taken that only the participant was exposed to the feedback using a tachistoscope, five trials for each of four participants occurred when no person ever saw the intended target, including the participant. Only the computer analysed the data and created summary results for reporting, after which the raw data was purposely destroyed. *Post hoc*, the two experienced participants performed well in these trials ($n = 10$, $z = 1.9$, $p = 0.029$, ES = 0.60). While at first glance this appears to be an example of clairvoyance (i.e. real-time) of the intended target, however, an acausally separated feedback event resides in the computer before those data were destroyed. This result agrees with Targ and Targ (1986) and Rhine and Pratt (1957) in that they found that trial-by-trial feedback was *not* necessary for significant psi. However, feedback to the percipient may be necessary for psychological reasons, such as knowing one's performance on a task.

Other observed properties of precognition

Any theory that purports to understand the nature of precognition must also include concepts that address the following:

- *Bandwidth limitations.* A crude estimate of what in information theory is called channel capacity — how much information the channel can accommodate — is a few millibits per second. In a landmark study Ryzl and Otani (1967), working with Stepanek, successfully used psi to transmit three 5-decimal digits without a single error. However, the bit rate for this experiment was 0.0046 bits/s (Puthoff and Targ, 1976, p. 333). For long distance experiments Kogan (1966; 1968; 1969) found a similar channel capacity. Signal models entail a source, transmission channel, and a detector system. However, our other sensory systems are bandwidth limited at the transducer, which is the point of entry for external signals. For example, we cannot directly experience x-rays or infrared in the EM spectrum because our retina cells cannot accommodate

these frequencies. Similarly, our auditory and olfactory systems are also limited, say, compared to that of a dog, at their detection front-ends. It is, therefore, not an unreasonable guess to assume that the psi bandwidth limitation will reside in the neurostructure that constitutes the transducer — that which converts the retro-causal-signal carrier into electrochemical signals that the CNS can interpret.

- *Stochastic nature*. Even with the best-selected participants, psi appears to be non-stationary; that is, there is high and unpredictable variance in the data. As with channel capacity, we cannot yet identify the source of noise that accounts for this unpredictability.
- *Attention filters*. If, as precognition would suggest, participants appear to have access to all space-time, clearly this would overwhelm any later cognitive process. So the question is what allows the participant to focus upon the relevant information? This is analogous to what allows us to understand a dinner conversation in a very loud restaurant.

Primacy of Precognition

Forced-choice precognition (Honorton and Ferrari, 1989) and pre-stimulus response and presentiment studies, in which the stimuli are randomly generated post-response (Mossbridge, Tressoldi and Utts, 2012) have been substantially investigated and documented. Additionally, all of Bem's (2011) time-reversed traditional social psychology experiments are further examples of precognition.

It might be argued that the substantial database of experiments including ganzfeld, remote viewing, clairvoyance, and telepathy studies wherein the target stimuli are available at the time of data collection appear to provide substantial sets of data that are not precognition by definition of when the target stimulus is available. However, in these studies a participant may *still* have access to the target stimuli via precognition. Feedback — associating a given trial with a given stimulus — regardless to whom it is given — the participant, monitor, or experimenter — and when, or even exclusively stored in a computer, provides a future-orientated possible source for the psi data. No matter how clever the protocol, it appears at this point that it is difficult or, perhaps, impossible to close the future precognition door. In other words, for every experimental situation in the present, the percipient/experimenter could have had access to retro-

causal signals about the trial results prior — for instance two days ago — to the commencement of the trial.

One way to think of this assertion is that precognition conceptually allows access to a future 'answer book' in any experimental set-up. For example, in any informational psi study in which trial-by-trial feedback is provided, it is clear that feedback exists in the future before the trial begins, and, in principle, the recipient could obtain the data from that future space-time point. This notion also holds when the recipient only receives summary data. Still there is a trial-by-trial accounting (the answer book) somewhere and, again, the recipient has access to that future space-time, even before the commencement of the experiment.

Clairvoyance or precognition?

Clairvoyance generally refers to information received from a distance, beyond the reach of the ordinary senses. It refers to the anomalous cognition (AC) of objects and events as distinguished from AC of thoughts and mental states of individuals. Procedurally it means that the target stimuli in experiments are occurring in real time, and are randomly generated *before* data collection is initiated. In contrast, in a precognition protocol, the target is generated *after* data collection is complete. Using a double-blind protocol is standard for all such experiments.

When a target stimulus is generated post-response, it is a case of a future separated point in space-time and is the formal definition of precognition. When a target stimulus is generated pre-response it is available in real time — the time of the AC session. Despite these two differing conditions, we still cannot control from *when* the percipient obtains the information. In all clairvoyant cases we know of there are always two possible open channels through which the psi information may be obtained:

- In real time — the clairvoyant hypothesis.
- From the future feedback of the trial-by-trial result either to the participant, the investigator, or situated in a computer.

In a typical, real-time, laboratory-based clairvoyant protocol, the target stimulus is a photograph that is randomly chosen *before* the collection of data. The difficult question (assuming a successful trial) is, as discussed earlier, from what time frame did the experiment participant obtain the information — in real time (i.e. clairvoyance) or

from the feedback in the future either directly to the participant or to the investigator only? Is it impossible to close the precognition door in any study? As mentioned earlier, the team at SRI attempted to do so in a complex feedback investigation. In the 160 trials in that study, 20 of the trials had no feedback to anyone either in real time or in the future. To attempt to block the long-term future, the results of all individual trials, including these special 20, were permanently erased from the computer record, which, of course, had not been examined by anyone. Yet, the two most experienced participants showed no significant change of their effect size for these trials compared to those that involved feedback (May, Lantz and Piantineda, 1996/2014, p. 114). Thus, a counterargument against precognition may have been demonstrated in a laboratory study. However, there remains a future event for the participant at the time of the viewing, that being the trial feedback information embedded in the computer. While seemingly implausible, nonetheless the precognition door is wide open and cannot be ruled out.

Considering the distinct possibility of precognition, one of the biggest (amongst many others) experimental challenges in a clairvoyance experiment is determining *when* and *where* the putative retrocausal information was received by the percipient. For instance, the experimental participant may have received the information a few days before or whilst going to the laboratory for the double-blind controlled sessions — in which case, the percipient acquired the information precognitively!

Finally, Steinkamp, Milton and Morris (1998) addressed the question of clairvoyance versus precognition by conducting a meta-analysis comparing precognition studies versus clairvoyance ones from 1935–1997 and found no significant differences between them (ES = 0.01). As they concluded, ‘This database provides no evidence to support the idea that clairvoyance works better than precognition’ (*ibid.*, p. 208). They further state that ‘The results from this meta-analysis suggest that theories about parapsychological phenomena and future experimental designs should not rest on the assumption that require a difference in precognition and clairvoyance effect sizes’ (*ibid.*, p. 209). Although circumstantial, these results suggest that the precognition channel may have been operating.

Telepathy or precognition?

Telepathy generally refers to the anomalous acquisition of information concerning the thoughts, feelings, or activity of another conscious being. Procedurally, it is difficult to determine exactly what the target is, as one has to either rely on a pre-recorded note of the target stimulus (a clairvoyance condition) or rely on a post-session narration of the target stimulus (a precognition condition). As far as current neuroscience is concerned, there are no unique CNS signatures of a thought. A thought is significantly different than even an encrypted image contained in the inner workings of a computer hard drive, which could serve as a target stimulus.

Telepathy studies suffer from the same problems that clairvoyance ones do; that is, we are unable to block access to information eventually generated in the percipients' future. There is one case, however, that just might close that channel but one would never be able to verify the result. Suppose an experimenter asks some individual to 'guess' what number the experimenter has in mind. Upon hearing the guess, the experimenter passes away from a massive heart attack. The experimenter carries to his grave the outcome of that single trial. Leaving aside statistical issues (e.g. the response could have been a lucky guess devoid of psi), let's assume for the moment that survival after bodily death is possible, and a skilled medium could contact the deceased and ask whether or not that trial was successful. A procedural problem arises that opens the precognition channel. The moment the medium confirms that the number obtained from the deceased experimenter corresponded with the correct guess, then the original guesser could have had access to that future event — the medium's contact with the deceased. Thus, there appears to be no need to posit telepathy in the first place. But from where did the medium get the answer? Survival research suggests that the information came from the deceased; however, informing the guesser of the success of the trial, the medium could also obtain the data, not from the deceased, but rather from the future feedback to the guesser. This brings into question both telepathy and the survival hypothesis. Known as the super-psi hypothesis against the survivalist interpretation of mediumship research (Braude, 1989; 1992; Beischel and Rock, 2009; Sudduth, 2009), it proves to be a major challenge for mediumship researchers. As Irwin (2002) advocates, it is time to relegate 'the survival hypothesis to minor status'. To the degree this argument is true, there is no need to posit survival.

Thus, the first problem we face with telepathy is that of a questionable real-time target, as we suggested above. What exactly do we mean by a thought, considering there are no specific neural structures for a single thought? Although there have been studies where elaborate brain recordings and statistical techniques have been used to 'read' the mind (Nishimoto *et al.*, 2011; Manning *et al.*, 2012), how do we identify that a thought has occurred, and pin down a singular thought from the stream of conscious thoughts as well as myriad unconscious activities occurring during a telepathy experiment? An activity is easier to recognize, considering the possibility of precognition; similarly, an emotion is easier to recognize through precognition of non-verbal behaviour.

One can use the analogy of a computer, in that one can 'see' into its memory. For instance, in old computers, one could examine the magnetic memory core; however, in the brain what neural structures can we observe for the occurrence of a thought? This is further compounded by the fact that there are no known 'retro-corticocausal' (brain-to-environment) interactions, i.e. signals/energy flow emanating from the brain (Marwaha and May, 2015c).

These arguments do not question the validity of the telepathy data as seen in, for example, ganzfeld studies (Hyman and Honorton, 1986), as the precognition door is open to account for the response pattern in telepathy experiments. For instance, in the Sheldrake and Smart (2003) experiments in telephone telepathy, the answer book (the future noted success or failure of the trial) is indeed wide open.

Micro-psychokinesis or precognition?

The primacy of precognition also brings into question micro-PK (e.g. mental influence on random number generators), which require inferential statistics to observe an effect. Gertrude Schmeidler had posed the question: 'Is it proper to use psi as a general term for ESP and PK? If it is — if they are alike enough to be classed together — is there any need for the separate terms?' (Schmeidler, 1988, p. 172). As Roe and colleagues analyse, there are various positions with respect to Schmeidler's question (Roe, Davey and Stevens, 2003). These range from assuming ESP and PK to be unitary with neither primary (Schmeidler, 1994), unitary with PK as the basic phenomenon (attributed by Schmeidler, 1994, p. 229, to Helmut Schmidt), or unitary with ESP the basic phenomenon (as captured for example in decision augmentation theory by May, Utts and Spottiswoode,

1995/2014), through to a view associated with William Braud (1985) that sees ESP and PK as complementary phenomena that have quite distinct characteristics and thrive under differing conditions.

The primacy of precognition has been well established by the mathematical formalisms of decision augmentation theory (DAT; May, Spottiswoode and Utts, 1995/2014; May, Utts and Spottiswoode, 1995/2014; May and Spottiswoode, 2011/2014; May, 2015). DAT holds that humans integrate information obtained by anomalous cognition into the usual decision process. The result is that, to a statistical degree, such decisions are biased toward volitional outcomes (May, Utts and Spottiswoode, 1995/2014, p. 222). The domain in which DAT is applicable is when experimental outcomes are in a statistical regime (i.e. a few standard deviations from chance) (*ibid.*, p. 226 May, 2015).

Macro-PK refers to the influence on objects by mental means alone, and does not require inferential statistics to observe the physical effects. Precognition cannot address the process by which large objects can be influenced without the application of force (for examples see Braude, 2007). Assuming that mental activity is considered synonymous with consciousness, Marwaha and May (2015c) have argued that if consciousness is non-material it cannot interact with matter. For the mind/consciousness to be able to exert some force on an external object, it would require a 'retro-corticocausal' (brain-to-environment) interaction, i.e. signals/energy flow emanating *from* the brain that 'can do work'. So far, there is no empirical evidence in support of this concept. At present there are only four forces known in nature — strong nuclear, electromagnetic, weak nuclear, and gravity. So far, attempts at discovering others have failed (Adelberger and Nelson, 2003; Schlamminger *et al.*, 2008).

Open precognition channels, which may be impossible to close, calls into question the necessity of the concepts of clairvoyance, telepathy, micro-PK, and survival after bodily death. To reiterate, any experimental study in which some outcome is reported to anyone or exists in a computer memory and reported (on a trial-by-trial basis) to no one still creates an opening in future space-time, and at this time we do not have a mechanism by which we can shield that future time from the percipient.

Conclusion

As an atypical perceptual ability, precognition may be seen in approximately 1% of the general population (May *et al.*, 1989). As an unconscious implicit process, precognition is manifested in a variety of ways such as dreams and remote viewing — in real life and the lab — and influencing decision making in real life (Dean and Mihalasky, 1974; Carpenter, 2012).

To summarize:

1) In the absence of evidence for *distinctive mechanisms* differentiating between precognition, telepathy, clairvoyance, survival hypothesis, or micro-PK, we can state that precognition, which can be explained by the mechanism of retrocausal signals, can adequately address these phenomena.
2) The signal-based multiphasic model of precognition bifurcates the psi problem space into:
   (a) The information-centric physics domain, addresses the problem in terms of retrocausation and retrocausal signals, and, based on entropic considerations, is the mainstay of the problem of information emerging from a future point in space-time.
   (b) The person-centric neuroscience domain, deals with the acquisition, processing, and cognition of the retrocausal signals, giving rise to the subjective experiences of precognition.
3) Assuming the validity of a signal-based approach, we may consider that, while retrocausal signals are emerging from a future point in space-time, from the person-centric perspective the information signals are present in real time. This may hold the very concept of 'pre'-cognition (a person-centric perspective) redundant, and consider retrocausation as the primary factor in the entire process.
4) Clairvoyance, telepathy, and micro-PK can be subsumed within precognition, as it appears impossible to close the future door for the experimenter/percipient, as we do not know when and where the retrocausal information is acquired.
5) To date, there is no evidence for a signal/force emanating from brain-to-environment that can influence external matter (micro-PK).
6) From the perspective of the neuroscience domain, once distant-in-space-time retrocausal signals — whether emerging in real time (clairvoyance) or from the future (precognition) — have been received by the transducer, the likelihood of cortical

mechanisms being able to differentiate between the temporal origins of the signal are quite unlikely, unless we are willing to posit at this stage of the evidence that the *nature/properties* of signals varies depending on its temporal origins.

7) This implies that, from the person-centric perspective, all perception, regardless of its temporal origin, is local.
8) We continue using the term 'precognition' because of its operational definition (target generated *after* the response), and for historical continuity of the term.

Thus, based on empirical evidence, theoretical models, and arguments presented in this paper, we conclude that precognition is most likely the only form of anomalous cognition, and it is a purely local phenomenon. Taking a parsimonious approach, we have collapsed the problem space for experimental work and theory-building in search for a mechanism for retrocausation/precognition.

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