Multiphasic Model of Informational Psi

A Signal-Based Process-Oriented Model

| *by SONALI BHATT MARWAHA*

Introduction

A review of the US government sponsored Star Gate applied psi research program has revealed that in a total of 504 separate operational, intelligence-collection missions from 1972-1995, remote viewing (RV) produced actionable intelligence, prompting 17 of the 19 tasking agencies to return with additional missions. In addition to the laboratory-based studies, the Star Gate data indicate that informational psi (IΨ) is a scientifically valid phenomenon. These data have led to the development of a physics and neuroscience based testable model for the underlying mechanism, which considers IΨ as a normal, albeit atypical, phenomenon.

Born of critical thinking, the multiphasic model of precognition/informational psi addresses the question, "How does psi happen?" In the process of re-visiting RV data that included individual responses, Edwin May and I asked the question, "What process would be necessary for a remote viewer to produce a response?" We used examples from laboratory-based RV experiments and operational/applied RV to explore how such a response would be possible via psi. We looked at the problem from the viewpoint of our respective expertise—physics and psychology—and we were able to see psi as a process rather than an event. Ideas that I as a psychologist floated, such as EM waves as a possible carrier of psi information, were rejected as they were simply against the data leading to the known physical laws and principles. Nevertheless, after much arguing in support of our respective views such that they found support across the disciplines, we were able to lay out a signal-based, process-oriented model that might explain the psi data, and raise bigger questions that need to be explained. This article briefly lays out the theoretical advances leading to and emanating from the development of this model. As

this article will illustrate, this is a science-in-progress, challenging scientific researchers and theorists across disciplines.

Basic principles

In Marwaha and May (2016, in-press) we defined precognition as an atypical perceptual ability that allows the acquisition of non-inferential information arising from a distant point in spacetime. This definition primarily addresses the person-centric perspective of psi phenomenon. We have since expanded on this definition to incorporate the information-centric perspective to provide a definition for informational psi (IΨ).

> *Informational psi (IΨ) is defined as the transfer of information, which is based on entropic considerations, arising from a distant point in spacetime leading to the local acquisition of non-inferential information by an atypical perceptual ability.*

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Although the term IΨ has been in use for a long time, we bring it to the forefront as *information is at the core of the psi experience*. That it is precognitive is determined by the experimental protocol—the target is generated *after* the response is secured, i.e., the target information is distant in time. In real-time protocols (across town, cities, country, continent) although the target is generated *before* the response is secured, the target is still at a distant point in time. However, in this case, it is difficult to determine whether the psi-adept percipient obtained the information in the here and now, i.e. at this moment, or whether the information was acquired precognitively; this is reflected in spontaneous psi experiences. This implies that the experimental setup provides the ritual to note down the response. This is one of the biggest challenges in psi research—determining when and where was the psi information obtained.

Considering the validity of precognition, the psi information "answer book" is potentially existing in the future. This answer book is available whether one is engaged in a telepathy or a mediumship experiment making it difficult to determine the source of the psi information. These and other such issues are discussed in Marwaha and May (2016, in-press).

This greater clarity on psi is a step forward as we refine the core concept based on an increasing understanding of the nature of the phenomenon and its experience. Based on this, we *rename the multiphasic model of precognition to the multiphasic model of informational psi* (MMIΨ), without any alterations to the structure and content of the model. While the details of the model can be found in Marwaha and May (2015a,b,c) and May and Depp (2015b), in this article the key features of the model are presented, as summarized in Figure 1.

Basic premises and postulates

As discussed in Marwaha and May (2016, in-press), arguments against the telepathy, psychokinesis, and survival hypotheses lead to the conclusion that psi is an informational process, and the *apparently* different classes of psi phenomena are different expressions of the underlying perception and cognition of information from an external source. Psi experiences are thus collapsed into a single phenomenon, informational psi (IΨ).

Any model of psi must address the source, transmission, and detection of information. While the question of source of infor-

mation is difficult to address, or even comprehend at this stage, transmission and detection of information are relatively easier to address. The rationale for the basic premise of the MMIΨ can be laid out as follows:

- As information from the external world comes to the sensory systems, all perceptions are local, even though the object of perception is at a distant point. Thus, *IΨ is a local phenomenon*, i.e., here and now, as putative psi signals from a distant spacetime point come to the "vicinity" of the sensory system, as do signals to other senses.
- Since all our sensory systems are information processors, there is no reason why psi should be any different. Sensory systems are change detectors, a feature that is found to be prevalent even in psi targets (May, 2011). This suggests that *psi functions as a normal sensory system*. However, as the distribution of psi ability in selected normal populations is about 1%, *IΨ is considered to be an atypical ability*.
- This implies that *psi is an inherent ability that cannot be acquired by training*. A psi-adept person can only be taught the *methods* of the procedure or protocol e.g., remote viewing method, necessary for an experimental setup. The expression of the acquired psi information occurs in idiosyncratic ways.

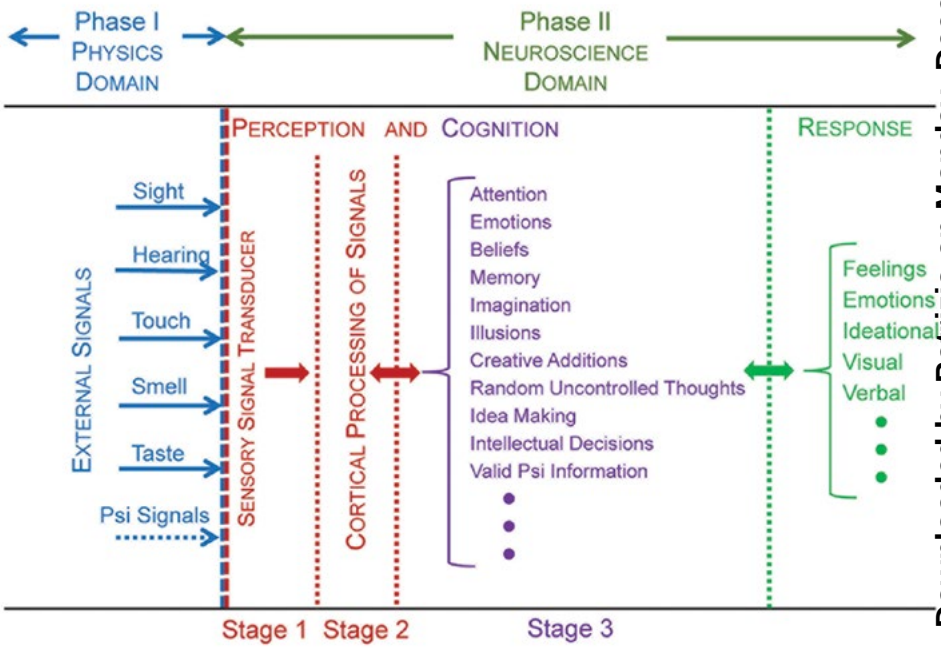
As the psi experience is a process rather than a singular event, we have divided the problem-space into two phases: the information-centric physics domain, and the person-centric neuroscience domain (Figure 1).

Specific predictions and laws

Phase I: The Physics Domain (PD), addresses the question of how information is carried from an external source, which is acausally separated, i.e., distant in time and space, from the percipient. The entropy hypothesis for IΨ was derived from several studies carried out at SRI-SAIC (May & Depp, 2015b), and was subsequently specifically examined, yielding supportive results (May, Hawley, & Marwaha, 2017). The biggest challenge however, is determining the nature of the information signal emerging from a distant spacetime point—the psi signal—and the carrier that propagates backward in time. Questions such as whether the signals are from an actual or probable future are presently difficult to address as experimental data support both possibilities.

Intrinsically dependent on the carrier is the nature of the psi signal transducer that can convert energy from the carrier into a form that can be processed by the central nervous system. While the answers to these questions are not immediately forthcoming, in

Figure 1. The multiphasic model of informational psi.



The MMIΨ stands on the advances in the various related disciplines and an understanding of psi research literature. Our review of the entire database of the Star Gate program—both experimental and applied psi—forms the basis on which this model rest.

our view, understanding the neuroscience domain will eventually lead to clues for understanding the physics domain.

Phase II: The Neuroscience Domain (ND), addresses the acquisition and interpretation of psi signals. We propose that this occurs across three testable stages:

- *Stage 1*: *Perception of psi signals*. We hypothesize that psychophysical variability in a putative signal transducer permits the perception of psi signals. Since the visual system is a major means of acquiring information from the external world, we propose that persons who are *outliers* in the normal visual bandwidth—400-700 nm—may be psi adepts.
- *Stage 2*: *Cortical processing of psi signals*. Since we have to account for a possible difference in the nature of the psi signal and limited population distribution of psi adepts, we have to propose a process that can account for this. In order to do so, we propose that the processing of psi signals is mediated by a cortical hyper-associative mechanism.
- *Stage 3*: *Cognition, mediated by normal cognitive processes*, leading to a response based on psi information. Once the information is on board, we propose that the psi signals are acted upon in the same manner as are signals to other sensory systems. This stage is addressed by the field of cognitive psychology and associated disciplines, and hence does not require further elaboration. Psi research has, thus far, focused primarily on this stage, and various aspects of it are testable.

While the two phases across the PD and ND, and the three stages within the ND form the structure of the model, and are testable, there is ample scope for introducing additional hypotheses for each domain and stage, thus making this an evolving model open for contributions from other scientists across disciplines.

Applications

The MMIΨ stands on the advances in the various related disciplines and an understanding of psi research literature. Our review of the entire database of the Star Gate program—both experimental and applied psi—forms the basis on which this model rest. One of the key features of the Star Gate program was that it was primarily an IΨ program. Further, based on experimental work with high precision engineering equipment, it rejected the causal psi (psychokinesis) hypothesis due to weak statistical evidence and on the formulations of a heuristic model, the decision augmentation theory (DAT). DAT enabled researchers to determine whether the observed results in statistically based micro-PK studies was indeed mind-over-matter, or IΨ on the part of the percipient. The data are in favor of IΨ rather than causal psi (CΨ), eventually leading to the view that informational processes underlie CΨ experiences (Marwaha & May, 2016, in-press).

From its inception, the SRI-SAIC Star Gate program has taken a physicalist position in the exploration of psi—primarily a physics, engineering, and cognitive science approach. Although the SRI team explored psychological correlates such as personality (which did not lead them far), there is absolutely *no* mention of terms such as consciousness, non-local consciousness, spiri-

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tuality, dualism, or religion as a basis for psi phenomenon in the SRI/SAIC reports.

The SRI team worked on the assumption that IΨ is real, and how best can it be applied to problems of intelligence collection. They were not hindered by the academic approach of first assure proof-of-principle. They developed the remote viewing (RV) protocols, a free-response method, in their investigation and application of precognition and real-time IΨ. The basic question for the intelligence community was, if it is true that the Russians have advanced psi technology how can we best develop it at home and develop countermeasures to protect against it. Final experimental and theoretical reports on RV and psychokinesis, analysis of operational RV, government reports and reviews of the program can be found in Volumes 1-4 of the Star Gate Archives (May & Marwaha, 2018a,b, in-print a,b).

As illustrated in Figure 2, the MMIΨ has enabled us to analyze the different psi phenomena in terms of the structure of the model. Irrespective of the specifics of the PD and ND, the phases and stages are, in our view, immutable. Thus, the crux of psi phenomenon is information from a future point in time perceived in the here and now.

Differentiating from other models of psi

Since the MMIΨ is primarily a signal-based process-oriented structure, it is difficult to compare with other models of psi. However, other models can be incorporated within it under the domain/stage that they address, as illustrated in Figure 3.

An important feature of this model is that researchers can work synergistically by examining various aspects of the process in the physics and neuroscience domains, by focusing on aspects of the process that are within their area of expertise. Physicists can thus concentrate on issues such as the nature of a signal carrier that travels backward in time, the nature of time and information;

Figure 2. Collapsing the problem space of psi phenomena.

Informational Psi (IΨ)

Precognition / Real-time Information from a Distant Spacetime Point

- Clairvoyance
- Telepathy
- Dream ESP
- Presentiment/Pre-stimulus Response/Predictive Anticipatory Activity

Informational Psi (IΨ) as Causal Psi (CΨ)

- Random Number Generators (RNG)
- Distant Mental Influence on Living Systems (DMILS)
- Global Consciousness Project (GCP)
- Psychic Collapse of Interference in Double-slit Experiments

Informational Psi (IΨ) as Survival Hypothesis

- Reincarnation Field Studies
- Mediumship Research

Explanatory Domains

Physics Domain (PD) and Neuroscience Domain (ND)

psychologists and neuroscientists can concentrate on the perception and cognition of the IΨ signals, without concerning themselves with how the information got there; geneticists can explore the genetic basis of a psi ability, primarily the factors that lead to variations in ND stages 1 and 2. Thus scientists can address the specific questions related to their area of expertise. Several of the questions plaguing psi researchers are probably already being addressed by researchers in other disciplines; the structure of MMIΨ may encourage them to apply their expertise to the IΨ data.

Future research

The scope of the MMIΨ is briefly listed here:

- The ND of the MMIΨ, particularly Stages 1 and 2, provide a bottom up approach to investigating the larger questions of the nature of psi signals. Examining the ND may yield information on the nature of psi signals, providing data for the PD to explore.
- This opens the door to understanding the fundamental questions that the experience of IΨ has raised—the nature of time, causality, and information.
- The MMIΨ thus naturalizes the supernatural.
- In the PD and ND there is scope for developing additional hypotheses.
- Each aspect of the model, particularly in the ND, is testable, requiring multidisciplinary expertise.
- The two domains and the three stages provides a language with which to analyze any psi phenomenon.

A signal-based approach makes the seemingly difficult problems of the psi experience become relatively easy to explore. To exam-

Figure 3. The multiphasic model of informational psi (MMIΨ) and other models.

Phase	Theories
PHASE I: PHYSICS DOMAIN	Hyperdimensions (Carr*) ★ MMIΨ Entropy (May & Depp*) Approaches based on quantum mechanics*
PHASE II: NEUROSCIENCE DOMAIN	Evolutionary approach (Broughton**)
Stage 1: Transducer	★ MMIΨ
Stage 2: Cortical Signal Processing	★ MMIΨ
Stage 3: Cognitive Processing	★ Consciousness induced restoration of time symmetry (Bierman*) – IΨ ⅄ Consciousness-quantum mechanics based approaches – IΨ and CΨ ★ First Sight model (Carpenter*) – IΨ ⅄ Non-local consciousness approach – IΨ
	Heuristic models ★ Psi-mediated instrumental response (Stanford) – IΨ ★ Decision augmentation theory (May, Utts & Spottiswoode*) – IΨ ⅄ Model of pragmatic information (von Lucadou*) – macro-PK
★ = testable; ⅄ = untestable	* May and Marwaha (2015); ** Broughton (2015)

ine the suggested hypotheses, we need a truly interdisciplinary team. Further, many elements of our questions may already be available in other disciplines. If we want to solve this riddle, we need to view psi as an atypical ability, rather than a spiritual, supernatural, or paranormal ability. The final theatre of this experience rests in the information-centric perspective, that is, in the physics domain.

To summarize, the MMIΨ addresses both the physics and neuroscience domains by considering the well-established laws of the physical world and what we currently know—and will know—about brain–behavior relationships. Thus, the MMIΨ is a coherent assimilation of existing concepts that we believe can lead to understanding the *process* of IΨ—from the point of information origin to cognition. The model is comprehensive, brain-based, and provides a new direction for research requiring multidisciplinary expertise.

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The Thermodynamic Retrocausal (TDRC) Model of Precognition

| *by D.P. SHEEHAN, University of San Diego*

| *by P.C. CYRUS, Siemens Corp, Orlando*

Introduction

Our model concerns how precognition might be explained using two central concepts of modern physics: time symmetry (TS) and the second law of thermodynamics (SLTD). We'll call this the thermodynamic retrocausal (TDRC) model of precognition.

All the fundamental equations of physics exhibit the property of time symmetry; that is, if in these equations one replaces the time variable that propagates from past to present (as in ordinary experience) with a time variable that propagates backwards from future to present, the equations remain valid; in fact, this symmetry is mathematically demanded.

Most physicists reflexively throw away the future-to-present solutions to these equations (advanced solutions), keeping only past-to-present solutions (retarded solutions) because the latter correspond to what is normally observed in Nature—but not always! It is the exceptional cases that seem to matter in precognition.

The second law of thermodynamics - the law that states that the entropy of the universe tends to increase toward the future - provides a mechanism for the forward direction to the arrow of time that we observe in everyday life. The basic physical processes underlying it, however, are still time-symmetric; thus the time directionally associated with the second law is not physical per se; rather, it is statistical. That is, time progresses from past to future because it is statistically more likely to progress in this direction rather than backward. Under everyday thermodynamic processes, the forwardly directed arrow of time is exquisitely pointed, however, when subtle quantum processes come into play this need not be the case. Time can lose its way.

Our theory proposes temporal bidirectionality to the second law such that, under non-equilibrium quantum circumstances, correlations from a future event can initiate entropy-generating events in the past, consistent with the SLTD. These could be precognitive experiences. The special circumstances required are that the quantum wavefunction corresponding to a future conscious state be sufficiently unique that the advanced wave emanating from it is not absorbed by any temporally intervening wavefunctions within its environ-

ment. When this condition is met, it appears possible for the future to stimulate non-equilibrium processes in the past (e.g., precognitive experiences).

Intellectual history and ancestry

Each of us, having had personal precognitive experiences, was interested in the phenomenon, but we were dissatisfied with standard explanations. This model attempts a more satisfying explanation, one which draws from our scientific training as well as our personal experiences.

Preliminary versions of the TDRC model were developed by us independently over the last 30 years. In the last five years we collaborated to develop it into its current form. One of us (Cyrus), a recognized remote viewer, termed the mechanism underlying precognition "telekkos," suggesting a telepathic self-echoing system, which intuitively captures the phenomenon. The other (Sheehan) pursued precognition starting from established physical models, specifically, within time-symmetric interpretations of quantum mechanics (e.g., the Two-State Vector Formalism (TSVF) pioneered by Aharonov, et al., and the Transactional Interpretation proposed by Cramer. In these quantum interpretations, advanced correlations from a future wavefunction (e.g., a human subject) interacts with the past one (e.g., the same, but earlier, human subject). The thermodynamics concerning these multi-particle processes is informed by Sheehan's long-standing research into the foundations of the SLTD.

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Basic premises and postulates

1. The time-symmetry inherent in physical equations should be taken seriously, dictating that time-forward (retarded) and time-reversed (advanced) solutions for physical systems both equally affect the present; in other words, both causation and retrocausation operate in the world. (One might say that the present is a handshake agreement between the future and the past.)
2. Building on the above, the second law of thermodynamics operates in both temporal directions. (The time-forward SLTD is overwhelmingly observed under normal circumstances but it also operates in a time-reversed direction under certain circumstances, like precognition.)
3. Conscious experiences have unique quantum correlates (e.g., wavefunctions) that can self-interact through time without environmental interference (decoherence).

These premises honor physical theory as it appears formally in its equations but not as it is typically handled in practice. Advanced solutions to physical systems are routinely "thrown out" by appealing to causation (but not recognizing the possibility of retrocausation). The second law is presumed to operate only in the time-forward direction for the same reason, ignoring the possibility that it should operate retrocausally as well. Conscious experiences (and the mind) are generally not conceived in quantum terms because the brain is thought to be too large, too warm, too complex, and too well connected to the classical world to harbor quantum processes.

Specific predictions and laws

Our TDRC model of precognition makes several predictions, including:

a. Under appropriate quantum-thermodynamic conditions (see above), future events can affect past (and present) ones.

b. Precognition should be found across the animal kingdom, down to levels at which quantum correlations can be maintained long enough in the nervous and sensory systems to affect behavior, perhaps down to microbial life.

c. In principle, precognitive events should be demonstrable with non-sentient, inanimate systems (perhaps complex quantum circuits), if the necessary quantum and thermodynamic conditions are met (see above).

Applications

The most striking evidence for retrocausation and the quantum nature of consciousness is found in the various forms of human precognition, especially remote viewing and presentiment, that have been investigated over the last 40 years. Interested readers should refer to work by D. Bem, D. Radin, D. Bierman, E. May, D. Graff, J. Mossbridge, H. Puthoff, R. Targ, and others for details.

Other examples of documents, supportive evidence

Quantum retrocausation: Several types of well-accepted quantum experiments can be interpreted in terms of retrocausation. Perhaps the most famous is the Wheeler delayed choice experiment in which a two-slit interference pattern is changed to a one-slit pattern by changing the slit pattern after the quantum particle (e.g., photon, electron) has passed through the slit. Some interpretations of quantum mechanics explain this paradoxical result in terms of retrocausation. In fact, many of the most notorious quantum paradoxes (e.g., Einstein's bubble, EPR, quantum eraser, interaction-free measurements, Afshar and Dopfer experiments) can be straightforwardly explained away by taking retrocausation seriously. These experiments are typically conducted using individual quantum particles, while precognition by definition requires complex multi-particle quantum systems (e.g., neurons, brains).

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Quantum Biology: In recent years it has become apparent that life makes use of quantum process beyond the rudimentary ones associated with atomic and molecular structure and bonding (i.e., biochemistry). Quantum correlations in the photosynthetic complex provide efficient conversion of photonic energy to electronic-chemical energy. It is quite likely that magnetoreception in some animals is linked to quantum magnetically-linked electron pairs in the molecule cryptochrome. A possible model for olfaction (Turin) involves quantum tunneling and correlations between olfactory receptor molecules and the molecule being smelled. Quantum tunneling has long been known to affect biochemical reactions. The operating temperatures of these systems is often greater than the limits presumed for quantum behavior.

It has long been assumed that the biologic neural systems are 'too warm and too wet' to demonstrate quantum behavior, because their decoherence times (the time it takes the quantum correlations of a system to bleed irreversibly into the environment and thus be lost) should be quite short; however, intriguing counter-arguments have been made, particularly by those advocating for role

of microtubules in consciousness (Hameroff and Penrose). Nature may be exploiting various tricks to maintain the brain's "quantumness", including so-called decoherence-free subspaces, quantum error correction, and non-equilibrium driving. It is reasonable that, through natural selection, the neural systems would exploit these tricks if quantum behaviors (like precognition) gave them a competitive advantage.

Application to non-parapsychological phenomena and mainstream domains

The best evidence that the mind (or consciousness) is at least partially quantum mechanical in character is the well-documented evidence for precognition. There are no plausible classical mechanisms by which information can be transferred from the future into the past, but in principle, quantum mechanisms could allow for it. Precognition, therefore, illuminates both the nature of physical law as well as the nature of consciousness.

If an inanimate version of precognition could be realized, it might be possible to construct an 'oracle' of sorts, that is, a device capable of sending information from its future self back to a past version of itself. Such a technology could be an instrument of great good or mischief. For instance, one might signal oneself from the future with plans for a time machine and then create the time machine using those plans. Closed time loops like this are acceptable in physics, but considered practical only for single or small numbers of particles (for reasons associated with the SLTD). Precognition, however, stands as a clear counter-example to this prohibition.

Future research and applications

We recommend four types of studies that could shed light on this model:

1. Theory: A primary litmus test for the TDRC model is whether it can reproduce the normal time asymmetry observed in the world (the normal arrow of time), while still admitting rare precognitive events. This will involve complex theoretical analysis (and perhaps numerics) in quantum thermodynamics and biology. This project has begun.
2. Experiment: Conventional precognition experiments should be conducted that focus on distinctive aspects of the TDRC model. Remote viewing experiments often have interesting side-effects such as the viewer gaining access to additional information that wasn't present in the original target. This is comfortably explained within the TDRC model because whatever the future self comes to know - even additional information not present in the original target - can be transferred to the past. One of us (Cyrus) has found a correlation between how assiduously she reviews her target in the future and how well she receives the information in the past. This echoes some of the experimental results by Bem concerning precognitive 'priming.' The TDRC model predicts that remote viewers should improve their performances by enthusiastically studying their targets after they are revealed; after all, they are effectively sending information back to themselves. Or, if this post-review is deliberately 'contaminated' with ancillary information, this should reveal itself.
3. Experiment: If precognition is indeed materially based, that is, does not require mind as a separate substance apart from matter (e.g., dualism or idealism), then it is plausible that inanimate systems should be able to demonstrate the effect. We believe it is possible to create a such a precognitive device, and we have rudimentary plans for its construction (while we await more detailed instructions from our future selves). Such a device could allow system-

atic studies of precognition by being able to vary critical physical parameters, for instance, signal strengths, systems complexities, delays, and duration.

4. Experiment: The TDRC model predicts that precognition should be widespread in the animal kingdom. It would be useful to find a simple and reliable animal model to test theoretical predictions. It might be possible to breed strains of animals (e.g., sowbugs) that perform at higher precognitive levels by putting selection pressure on this trait.

Differentiating from other models of psi

The TDRC model stands out among other physical models of precognition for several reasons. First, it does not invoke any non-physical assumptions and, in fact, takes the time symmetry inherent in physical law more seriously than most physicists do. Second, the model is based on very few assumptions (see above) and its conclusions follow naturally from these. Third, it explains the majority of features associated with precognition in a straightforward way, including some side-effects that confound other models. For comparison, precognition models that rely on energy transfer from the future to the past are unphysical, and energy signatures for such transfers are absent. Invoking new or subatomic particles (e.g., tachyons or neutrinos) as a communication channel is also unphysical, lacking both mechanism or experimental signatures. Models that assume a disembodied mind roaming about in time or space to gain access to the target likewise lack physical mechanism. The TDRC model does not invoke any new physics or particles beyond what is currently and formally accepted in physics; what it does do is to apply this physics at face value rather than selectively, as is currently done.

In summary, it is our belief that, compared with other psi models, the TDRC model best explains the breadth of precognition phenomenon and does so with the fewest number of physical assumptions. It does not violate any physical laws, but rather, takes physical law seriously, perhaps more so than does the general physics community. The model is experimentally testable and appears to permits the construction of precognitive devices.

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Consciousness-Induced Restoration of Time-Symmetry (CIRTS)

| *by DICK J. BIERMAN, University Groningen, Netherlands*

Introduction

In the 1970s, an observational theory predicted a previously unobserved psi phenomenon, namely psychokinesis (PK) on prerecorded targets (Walker, 1973; Millar, 1978). Most psychology-oriented parapsychologists thought the notion of "influencing the past" was preposterous and physically impossible, but PK on prerecorded targets was confirmed experimentally shortly thereafter (Bierman & Houtkooper, 1975). That was a defining moment for parapsychology because it was the the moment when parapsychology seemed to enter the world of real science. There was finally a theory that showed a prediction of something new rather than offered only an explanation post hoc. (For a review of these retrocausal studies see https://www.fourmilab.ch/rpkp/bierman-metaanalysis.html)

However, a major objection against observational theories was that they could be supported but not falsified. After all, experimentation without observations doesn't happen. A total rejection of a theory by a decisive experiment hardly occurs in actual practice because the conflict between data and theory is often resolved by adapting the theory. Observational theory formalized (for the first time) the idea that retro-causation is an intrinsic part of psi. The CIRTS theory discussed in this article extends the role of retro-causation to cover all psi phenomena and not just PK (Bierman, 2010; Bierman, 2015).

Basic Principles

CIRTS theory does not use the idea that all the information the cosmos holds must be scanned (as was thought to happen in Rhinean accounts of psi); only retrocausal effects of your own future brain state are accessed. CIRTS theory is local (in spatial terms).

ESP trials use the feedback (received after the trial) to correlate backward in time (when you guessed the target) with the current brain state. Dunne's early precognitive dream research suggested you can only "foresee" your own future (Dunne, 1929). The role of feedback in CIRTS is akin to the role of feedback in the observational theories. However, the physical basis in the observational theories is *quantum physics* while in CIRTS no reference to quantum physics is made; the justification of CIRTS is based on the time-symmetry in *electro-magnetism*.

Time-symmetry is not observed in physics, but this fundamental symmetry is still important. Wheeler and Feynman have tried to explain the fact that this fundamental aspect of physics is not observed in electro-magnetism (Wheeler & Feynman, 1945). They posited that the loss of time-symmetry is due to initial conditions and boundary conditions on a global scale (it actually concerns charge, parity, and time reversal (CPT)-symmetry; see https://en.wikipedia.org/wiki/CPT_symmetry).

But if something gets lost then it may be restored under proper conditions. CIRTS assumes that a crucial condition for the restoration of time-symmetry is the method of information processing, that is, the way information emanating from a system is processed by an extremely coherent macroscopic multi-particle system. More specifically, it assumes that our brains, when sustaining consciousness, are coherent and large enough to qualify.

Note that therefore CIRTS, in contrast with the observational theories, does not require ANY change in physics.

But the argument for psychokinesis is more superficial. If time runs "backwards," then the logical consequence is that a system gets less random. So it is argued that retro-causality in physical systems results in structure in otherwise random systems—in other words, PK. The finding that these structures seem to arise in accordance with a conscious intent is not accounted for in CIRTS.

Intellectual history and ancestry

Between 1920 and 1970 (the Rhinean period), there were no all-encompassing theories. If anything, psi phenomena were portrayed as the result of scanning the environment by an unknown "sensory" modality. This model required very large processing capabilities because not only the "local" present but also the "remote" (the past and the future) were thought to be scanned for relevant information. In the late 1970s, an article in the *European Journal of Parapsychology* already proposed that psi was caused by so-called advance waves (waves running in the wrong time direction) in electro-magnetism (Donald & Martin, 1976). However further details were not given and the article mostly became forgotten.

CIRTS was triggered by the improbable non-local biology in the Rhinean model, as well as through the introduction of retrocausality in the observational theories, the advanced wave article, and the empirical disappointment that followed the development of an apparent robust paradigm in parapsychology (the period after a development tended to be marked by a decline or even reverse in the results).

A major constraint on any theory is the finding that psi tends to be elusive. This has been attributed (traditionally by followers of the Rhinean school) to the many uncontrolled variables in experiments. Sometimes the elusiveness flips the direction of an effect, and a few psi researchers have proposed that there is a trickster at work. But that proposition can be hardly called a theory. It doesn't explain how the data would fit into our main scientific world view. Observational theories attributed the elusiveness to the uncontrolled "future observers." This idea is testable in principle, but it requires massive experiments with well controlled observational histories.

CIRTS contains a crucial assumption that has received a lot of discussion in the field of time-travel, namely the idea that the retro-causal effects disappear if the context is such that a time-loop paradox (like the Grandfather paradox) is possible to create.

If psi effects become *reliable* in many cases, it is possible to create a scheme that allows for time-loop paradoxes and the development toward more reliable results according to this assumption will become blocked.

Additionally, generalized quantum theory (von Lucadou, Romer, & Walach, 2007) identifies psi with non-local correlations in quantum physics. This theoretical framework has a similar rule based upon the generally accepted idea that it is impossible to use non-local correlations to transmit classical signals (no signaling theorem). So in this framework, the non-local correlations disappear if one tries to use them as a classical signal. Note that this no-signal rule is slightly more stringent than the no-paradox rule of CIRTS.

Basic premises and postulates

1. Fundamental time-symmetry is restored in any system if information from that system is processed by a multi-particle coherent system, i.e., a conscious brain.
2. The more coherent the brain state, the stronger the restoration.
3. If the context is such that a time loop paradox may be created, time symmetry gets lost again.

Specific predictions and laws

1. *Individual differences:* Presentiment effects are larger for people with a more coherent brain state.
2. *Physiological Data:* Presentiment "signals" before the stimulus are "symmetric" with the response signals. This would be time-symmetric (mirrored in time) and amplitude symmetric.
3. *Context:* Enabling the potential of a paradox will result in decrease of the psi phenomenon.
4. *Matter:* It is predicted that for systems that "absorb" information and are large and coherent enough, but not biological, time-symmetry will also be restored. Thus 'presentiment' effects may also occur in physical systems. Candidates are large Bose-Einstein Condensates.

Applications

Dunne's "An experiment with time" (Dunne, 1929) discusses some of the clairvoyant dreams he recorded during his life. One is of particular interest. It concerns a dream pertaining to some disaster on an island that lacked fast news distribution. The dream gave specifics about the island and the number of casualties (say 500) the disaster would bring. A newspaper report appeared a few weeks later and confirmed the dream and also the specifics; the number 500 appeared too.

Dunne wrote his book about the event years later. He went through all his dream work to verify details and to his surprise, he found the official news documents; the actual number of casualties had been different, namely 5,000. So the dream content was not equal to the reality, but the dream was equal to the feedback that Dunne had gotten in the earlier newspaper. He concluded that his dream was precognitive *about the feedback* and not clairvoyant about what really happened. This is an example of how psi correlations can be interpreted in a retrocausal framework.

An old assumption from the lab about these retrocausal phenomena is that they are triggered by an emotional event and restricted to emotional events, but that is nonsense. You can observe these effects in a totally non-emotional situation such as in retrocausal learning or in the future stimulus dependent flipping frequency of a Necker cube. In CIRTS 'emotion' is irrelevant, and it even predicts "presentiment" effects in non-biological matter. Emotion might indirectly enter the theoretical musings because emotional responses are generally stronger than non-emotional and due to the assumed time-symmetry the anomalous'presponses' will therefore also be larger.

Other examples of documented, supportive evidence

In 2013, I was approached by a cognitive neuropsychologist (who wants to stay anonymous for career reasons) who had observed extremely strong presentiment effects for a particular patient. This observation occurred during a standard procedure when depth electrodes were in the brain, but before brain surgery on an epileptic patient. The patient had more or less continuous seizures, and the response to several emotional stimuli were being measured (to be compared later with post-

surgery brain responses). These data haven't been published, but I received permission to give an example of the very significant results.

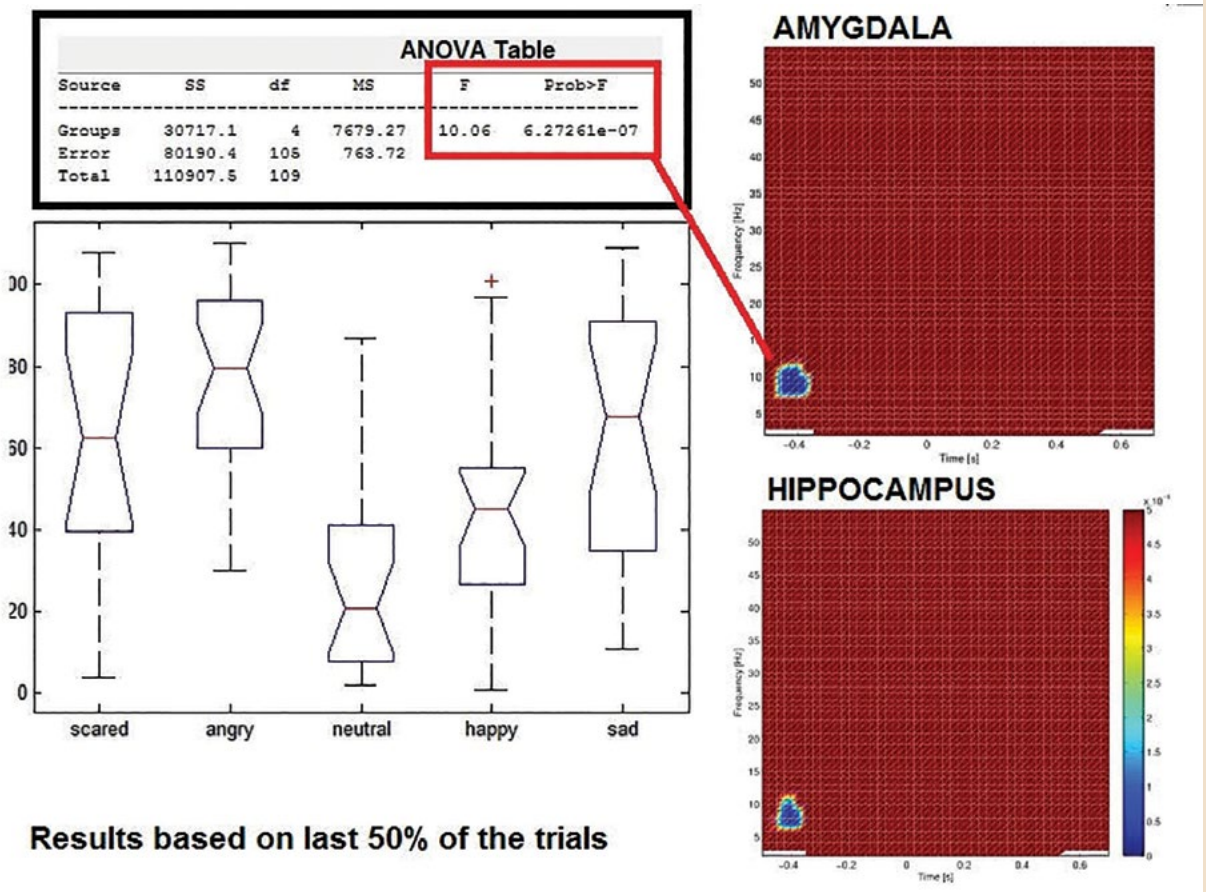
See below.

The activity in the amygdala as well as in the hippocampus alpha (~10 Hz) occurs 400 msec *before* stimulus onset. The largest effect is for the angry stimuli. This can be seen as a spontaneous case that shows the symmetry-aspect of presentiment. Post stimulus brain activity is generally maximal after 400-500 msec, and therefore the symmetry principle requires the presentiment activity to be largest at -400 msec. In a number of skin conductance presentiment studies, the maximum of the presentiment signal is around -3500 msec while the response maximum is around 4000 msec—approximately symmetric.

This case was also special because the patient reported remarkably frequent occurrences of déjà vu. That possibly supports the idea that *déjà vu* is just presentiment.

Application to non-parapsychological phenomena and mainstream domains

At the dinner banquet of the Parapsychological Association's 2002 convention in Paris, the speaker Isabelle Stengers proposed that once parapsychology contributed something to other scientific domains, it would be soon become accepted by the mainstream. Therefore, it seems that contribution to mainstream science is an important aspect of new psi theories.



Results based on last 50% of the trials

The development of *single trial analysis* in EEG presentiment experiments, as implemented at the University of Groningen, allows us to create a trial to be a paradoxical one (9). This allows us to test Kip Thorne's & collaborators main stream model of classic time travel (10) to the past. His model uses billiard balls, the classic object. Thorne et al's analysis claims that an object cannot return in its own past (in spite of theoretically allowed) because in practice there will be always chance processes that will result in disturbing the closed time loop and the object therefore will just miss itself when getting back in time. Experiments based upon CIRTS can now be run to test –model what the Thorne group proposed (which is actually a purely mathematical, physical model and has nothing to do with psi).

One mainstream physics model (postmodern quantum physics) claims to account for psi-phenomena. This model is mostly promoted by Jack Sarfatti. It is born out of the Bohm interpretation of quantum physics and uses time symmetry explicitly as THE explanation for "entanglement." The "father" of that idea has been the French theoretical physicist Costa de Beauregard with his zig-zag model. Costa de Beauregard has declared several times that psi phenomena *must* exist (de Beauregard, 1976). This post quantum model has received more acceptance because of the discovery of so-called weak measurements (the "two-state vector" model). Postmodern quantum physics says that current state of a system can be described as the product of the past and of the future state (Aharonov & Vaidman, 2008).

Future research and applications

The concept of brain coherence should be explored further. Several measures for brain coherence have been proposed.

We are also working on applications. The prediction accuracies obtained so far are too small to be useful. Also within our approach only applications can be built that do not allow for the creation of time loop paradoxes. So according to CIRTS applications are possible under certain restrictions but in generalized quantum theory applications are near impossible.

We are currently also investigating deep artificial intelligence techniques to be applied in so-called single trial analyses that will be used to predict the future stimulus condition in a single trial. We expect the accuracies of the classification of the future stimulus will be improved because this approach will add all non-linear effects in brain processing. We also explore the possibility to use these improved accuracies in applications that might warn a user for an upcoming epileptic seizure giving the patient the time to sit down.

Differentiating from other models of psi

Other psi models are either physical in nature or psychological. Among physical models there is major discrepancy on what is thought to be responsible for the difficulty to get a replicable result.

In the data augmentation theory (DAT), retro-causation is proposed as the crucial process in psi phenomena (May, Utts & Spottiswoode, 1995). However, no arguments have been provided to explain the elusiveness of psi in that theoretical approach. The theory is totally orthogonal to (for instance) general quantum theory, because DAT holds the psi correlations to be caused by a real signal.

Whereas in oberservational theories the elusiveness is contributed to uncontrolled variance due to *future observers*, in general quantum theory it is the no-signal rule. In CIRTS it is the no-paradox rule. Pallikari's balancing model (2016) holds the difficulty of getting replication to be caused by some intrinsic aspect of nature to restore temporary deviations for

the average by producing *opposite* results the next time.

Psychological theories build upon the Rhinean explanation of "too much uncontrolled variance" to account for replication problems.

CIRTS has also a psychological component but it is currently limited and is only mediated through the brain coherence. General quantum theory views psychology as hidden in the slightly fuzzy concept of organizational closure. Observational theories do not have any bearing on the psychology in parapsychology except that the role of observation is producing reality rather than neutrally registration thereof. It is therefore difficult to compare these theories with psychological models.

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The Model of Pragmatic Information (MPI) and Generalized Quantum Theory (GQT)

by WALTER VON LUCADOU, Wissenschaftliche Gesellschaft zur Förderung der Parapsychologie e. V. Parapsychologische Beratungsstelle [Scientific Society for the Promotion of Parapsychology & Parapsychological Counseling Center]

Introduction

The very basic assumption of both models says that any description of nature must have a structure, which is isomorphic (to a certain extent) to the axiomatic structure of quantum theory. Both models MPI and GQT are not completely independent, can be united, and describe somewhat different aspects of the same thing. They can both be applied in normal psychology and many other fields.

There are several arguments for this basic assumption. The simplest would be that Quantum Theory (QT) is the most successful basic description language of natural systems and hitherto no indications were found that the axioms of QT have failed. Furthermore, they hold from microscopic to macroscopic and even cosmological dimensions and also to any sort of physical observables regardless which special field (electromagnetism, elementary particles, solid state physics etc.) is considered. In addition, these axioms describe in a very general way how information can be obtained from any system if the interaction of the "measurement process" cannot be neglected. The basic concepts of GQT are: "system", "observables", "state of a system", "complementary", and "entanglement".

Intellectual history and ancestry

The initial ideas of MPI and GQT go back to Pascual Jordan (Verdrängung und Komplementarität), Wolfgang Pauli and Carl Gustav Jung (Synchronicity). Its special application to parapsychology was described by the author in 1972 (Lucadou, 1974). It was further developed in cooperation with Klaus Kornwachs using some basic ideas of Ernst von Weizsäcker and Francisco Varela. A mathematical formulation of GQT was given by Hartmann Römer in 2002 (Atmanspacher et al., 2002).

Basic principles

In GQT, the fundamental notions of *system*, *state* and *observable* are taken over from ordinary quantum theory: A *system* is any part of reality in the most general sense, which can, at least in principle, be isolated from the rest of the world and be the object of an investigation. It is assumed to have the ca-

pacity to reside in different *states*. The notion of state reflects the degree of knowledge an observer has about the system. An *observable A* of a system is any feature which can be investigated in a (more or less) meaningful way. As functions on the set of states, observables *A* and *B* can be composed by applying *A* after *B*. The composed map *AB* is also assumed to be an observable. Observables *A* and *B* are called *compatible* if $AB = BA$. Observables with $AB \neq BA$ are called *complementary*. Complementarity creates entanglement within the system.

The concept of pragmatic information has been developed to quantify the meaning of given information. The action and change, that meaningful information exerts on a system, can be used for such quantification. Von Weizsäcker (1974) proposed that pragmatic information could be written as a product of two observables which he called "Erstmaligkeit" E (novelty) and "Bestätigung" B (confirmation).

Thus, the key concepts in the MPI are the following ones:

- Pragmatic information (I): The meaning of given information. It describes its potential action on a system and is measured by the reaction of the system.
- Novelty (E): Aspect of pragmatic information which is completely new for the receiving system.
- Confirmation (B): Aspect of pragmatic information which is already known by the receiving system.
- Autonomy (A): Behaviour of a system which cannot be predicted.
- Reliability (R): Behaviour of a system which is expected.
- Temporal dimensionality (D): Measure for the interrelationship of temporal events that belong to a history.
- Minimum action (i): Smallest amount of action on a system which cannot be avoided during a measurement or observation.

The key concepts in the MPI

This approach takes into account that each piece of meaningful information must contain a certain pre-structure (confirmation) - for instance, one's native language - in order to be understood by the (receiving) system but also something new in order to produce a change ΔC in the receiving system. For instance, a joke in a foreign language which cannot be understood would not cause anybody to laugh (no confirmation), and a joke from yesterday would not do so either (no novelty). This includes the idea that pragmatic information is not static, but a highly dynamic process. The changes in the system are measured in terms of changes of complexity ΔC of the system:

$$I = R * A = E * B; I = f(C; \Delta C)$$

The model further assumes that there exists a minimum amount of pragmatic information (or action) i, which has to be exchanged if an informational exchange (measurement) with another system or between two systems takes place. This is simply another formulation of the inevitable interaction in a measurement. It is a fundamental assumption of the MPI that an observation is a preparation of the system.

A concept to describe the boundaries of natural systems was introduced by Varela (1981) and is called "organizational closure" (OC). A necessary condition of OC is the self-organization of the system and a consequence that OC is a self-stabilizing property.

Thus, one could redefine parapsychology as the investigation of "effects in entangled OC-systems".

An important aspect of the MPI is the so-called "NT-axiom" (Lucadou et al., 2007, Lucadou 2015a). It assumes that the origin of paranormal phenomena is not signals, but macroscopic entanglement (ME) - correlations. They cannot be used as signal transfers or causal influences. Assuming psi would be a time independent effect (like in precognition or backward causation) and if it would lead to a real physical effect, this would enable to create an intervention paradox. The MPI makes the assumption that nature does not allow (intervention) paradoxes. This holds even for classical systems, where a "time-traveller" is not allowed to kill his grandfather. However, in GQT

this statement is much more strict and powerful: Situations in which the "time-traveller" could *potentially* kill his grandfather do not occur!

Specific predictions and laws

The Three Laws of the MPI

In general, the model can be formulated in three main "laws":

"First law of the MPI": *"Paranormal" phenomena (psi) are non-local macroscopic entanglement (ME)-correlations in socio-psycho-physical, self-organizing, organizationally closed systems, which are induced by the pragmatic information, which creates the system.*

"Second law of the MPI": *Any attempt to use a non-local correlation as a signal transfer makes the non-local ME-correlation vanish or change the effect in an unpredictable way.* It leads to a naturalistic explanation of decline-effects and the displacement-effects in parapsychology, psychology and therapy research.

Assuming one could perform two ME-experiments where all conditions except the number of trials could be kept equal, and assuming further that the Z-score of the ME-experiment is a good measure for the entanglement correlation, then one could conclude that the effect-size declines proportional to the square root of n.

From the MPI perspective, both REG data - experimental and control - differ only by their pragmatic information. The meaning and the associated expectation (criterion of the NT axiom) are different: in the experimental situation one "wants" to get a deviation from the expected value - which, however, the NT axiom is preventing. On the other hand, one does not want to get "deviations" with the control data, but hopes that all statistical tests on randomness are passed (otherwise the REGs would be faulty!). There is a "meaningful" difference between an individual and a collective setting (embodiment) of the used random processes.

The second law does not maintain that ME-correlations need to be weak or unstable. In general (e.g. in physics) it is difficult to isolate them experimentally but they are "powerful" components of nature. In physics they are necessary to stabilize matter and in spontaneous cases in parapsychology and healing it seems that their effect can be huge. As a metaphor one can compare the causal processes in nature with a dry sponge and the entanglement-correlations with liquid water. The dry sponge alone is not very helpful for cleaning, and liquid water neither, but together they serve a lot!

This feature is expressed in the "Third law of the MPI": *Macroscopic entanglement (ME)-correlations are ecologically stable and are limited only by the NT axiom. They are formed by causal processes, which in turn stabilize them. Potential causal links amplify entanglement.*

Ecologically stable means that the self-organizing, OC-system is in a steady state with its environment. Potential causal links are causal processes which are not actualized, but could potentially play a role in the OC-system.

Applications

The model of pragmatic information (MPI) is not limited to micro-PK. It can be applied to any kind of "embodiment-effects" like RSPK phenomena and leads to several predictions:

The first prediction is that RSPK phenomena show two clusters, which can be considered as structural and functional description of RSPK. RSPK phenomena are considered a kind of "external psycho-somatic" reaction, expressing a hidden problem, which cannot be recognized by the persons concerned.

The second prediction is that the development of RSPK cases contains four phases, which are called "surprise phase", "displacement phase", "decline phase", and "suppression phase". In the surprise phase the RSPK-activity starts rapidly with strong effects, but they are not attributed to the focus person. This happens in the displacement-phase where the phenomena usually change in an

unpredictable way. In the decline-phase the "message of the poltergeist" is understood and the phenomena are expected, therefore the phenomena disappear. The final suppression phase can be understood as a kind of reaction of the society. These phases can be derived from the fundamental equation of the MPI, which describes the RSPK phenomena in complementary terms of "autonomy" and "reliability" (from the point of view of the persons concerned) and of "novelty" and "confirmation" (from the point of view of an external observer). The dynamics of RSPK are described as the dynamics of pragmatic information within a hierarchically nested system, which is created by the persons involved (focus person, naïve and critical observers) and the reaction of the society.

The third prediction is that observers can control the RSPK activity by their observation or documentation. This is the result of the NT-axiom.

The fourth prediction is that we have to expect several types of RSPK cases according to the psychological constraints.

Other examples of documented, supportive evidence

MPI explains why spontaneous paranormal and healing experiences seem to be much more impressive and larger than the very small (yet highly significant) deviations which can be obtained in experiments.

The concept of Hausdorff-dimension of paranormal events and developments may give an answer. It takes into account that paranormal and healing experiences are embedded in "life events", which have their "history", whereas experimental trials do not show temporal correlations to previous and later events – simply due to the fact, that pure random events are used as targets. Random events are single events which are isolated in space-time, they have no history. This is not the case with any biological system. Their main property is development and they create histories. History means - statistically speaking - that events are correlated among each other. Starting from this idea, a measure for the "historical meaning" of events was developed. It is called "dimensionality of temporal events" or "temporal dimensionality" (D). Mathematically, it is defined as a "Hausdorff-dimension" of a fractal structure in time. One could also say that dependent events are better targets for non-local effects. Everyday life-events are normally dependent events, which are part of long, complicated and interwoven (personal) histories such that ME-effects have "enough possibilities to link with". Further, the limiting NT-axiom does not apply because the events are spontaneous, or of short duration, or of poor documentation quality, and mainly elusive.

Application to non-parapsychological phenomena and mainstream domains

In the mainstream, von Weizsäckers idea of pragmatic information gained increasing influence in many fields as the whole issue of the Journal "Mind and Matter", Volume 4, Issue 2, 2006 demonstrates.

Clinical Psychology and Embodiment disorder

Since paranormal phenomena always occur in organizational closed systems, of which the society can be considered as the largest one, it is useful to introduce the concept of 'embodiment', which describes the diverse and complex interaction of an individual with their surroundings. Thus, clinical paranormal experiences can be described as 'embodiment disorders'. Without discussing the details here (see Lucadou, 2010) the following list gives the names of different types of embodiment disorder:

- Hum-phenomenon
- Self-reported electromagnetic hypersensitivity
- Multiple-Chemical-Sensitivity (MCS)
- Sick-Building-Syndrome (SBS)
- Idiopathic Environmental Intolerance (IEI)

- Poltergeist (RSPK)
- Synchronistic flooding
- Possession
- Bewitchment
- Malediction, curse syndrome

Environmental illnesses

Environmental diseases or embodiment disorders, of which the existence is still very controversial, are not always contained in the usual medical classification schemes. All these syndromes are acquired disorders with multiple recurrent symptoms, associated with diverse environmental factors, tolerated by the majority of people, and not explained by any known medical or psychiatric/psychological disorder.

They show astonishing similarities with the RSPK-phenomena. The typical development of the different embodiment disorder is nearly identical to the phases of the development of poltergeist cases: Surprise-phase, Displacement-phase, Decline-phase, Petrification-phase. Only the last phase is different: instead of a disappearance of the phenomena they become petrified in spite of the absence of measurable psychical influences.

The representation of the body surface plays a predominant role because it describes the demarcation-line between a supportive function of a phenomenon and its destructive one. In the moment the phenomenon "enters" the body it becomes pathological. Therefore, it can be concluded that RSPK is the only supportive function of embodiment disorder, in spite of the strangeness of the phenomena. Interestingly enough, focus persons often report, that they do not feel fear, whilst their social environment is terrified.

The Model of Pseudo-Machines (MPM)

Another important application of the MPI is the "model of pseudo machine" (MPM). It describes the so-called man-machine-interface. If a person uses technical devices, the problem of the adequate "user surface" becomes relevant. The question of how psychological variables can be taken into account, gets a growing practical relevance. The MPM includes sociological, psychological, physical, and causal - as well as non-causal (ME) - processes which are relevant for the man-machine-interface.

Psychology of Cognition

GQT can be used to explain human probability judgment errors including the conjunction and disjunction fallacies, averaging effects, unpacking effects, and order effects on inference. GQT provides a viable and promising new way to understand human judgment and reasoning (Busemeyer et al., 2011).

Perception

GQT can also be used to model the dynamics of the bistable perception of ambiguous visual stimuli such as the Necker cube. The central idea is to treat the perception process in terms of the evolution of an unstable two-state system. This gives rise to a "Necker-Zeno" effect, in analogy to the quantum Zeno effect. A quantitative relation between the involved time scales can be derived. This relation is found to be satisfied by empirically obtained cognitive time scales relevant for bistable perception (Atmanspacher et al., 2004).

Future research and applications

The Correlation Matrix Method (CMM)

The correlation-matrix method investigates both ME and causal mechanisms relevant for the interaction of humans with their environment. Basically, it takes into account the characteristics of the NT-Axiom. For this purpose, many psychological or physiological variables of humans are measured and compared with many variables of their environment. The statistical correlation of a sample of subjects for each pair of psychological and environmental variables gives the value of a cell of the correlation matrix of all variables.

For PK-experiments the environmental variables are those of a physical (random) process. This is done in two different settings, namely with and without feedback. The psychological variables are used for both settings leading to two correlation matrixes, which can be compared.

Only the number of significant correlations (due to a predefined criterion) between psychological variables and physical variables of the PK experiment are counted and compared with controls (runs without feedback or runs without subjects). The PK effect shows up in the difference between experiment and control of the number (and strength) of the correlations in the matrixes.

A clear indication for entanglement correlations in contrast to causal correlations is a result of the NT-axiom: if the experiment is repeated under the same conditions, the value of single correlation (matrix cell) cannot be maintained, but must change. Since the overall entanglement does not disappear, the significant correlation has to show up at a different matrix cell in such a way that the number (and strength) of all significant matrix cells is preserved. Thus, with CMM the decline effect is at least partially avoided. More than a dozen independent CMM-studies have been successfully performed with an overall significance of a = 1,44E-37.

With CMM, one could even try to include causal processes within parapsychological experiments. In nature, entanglement and causal processes create and support each other in OC-systems (third law of MPI). Only in parapsychology, one tries to isolate entanglement processes in order to prove a "psi-effect". It is obvious that CMM will abandon the traditional experimental strategies of parapsychological studies because "normal" processes are not excluded. On the other hand, in clinical studies entanglement processes are usually not included. Thus, CMM can also be used as a new and efficient tool for drug testing and in therapy research: specific causal effects can be isolated from specific entanglement effects.

Differentiating from other models of psi

Since the Geneva conference on "Quantum Physics and Parapsychology" in 1974 a new area of theoretical parapsychology has developed. This does not mean that there were no theoretical approaches beforehand which would not be worthwhile to be considered as a useful model for psi phenomena. However, most of these hypotheses were proposed by some individual scientists without causing a general discussion that led to the development of research programs. In the case of the so-called observational theories, several different scientists have contributed different approaches which, however, share a common starting point, (namely QT) and which can be compared in relation to different experimental predictions. Some are reductionistic models which start from the microscopic quantum level (e.g. Walker & Mattuck, 1979; Hammerhoff, 1994). In contrast, the MPI and GQT do not start at the quantum level but on a very general level of systems theory. This means that it does not say anything about the substratum of the psi phenomena. The advantage of system theory is that it can be applied to psychological problems as well as to physical problems without tackling the problem of reductionism.

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