Observational Theories of Psi

The so-called 'observational' theories offer an alternative view of how psi works, one loosely based on quantum mechanics and at odds with the conventional view held by most parapsychologists. Here, psi does not work on events directly, but rather on the invisible underworld of quantum probabilities. A feedback channel connects an external quantum system via the senses to a hypothetical quantum system (psi source) in the brain, creating a weak quantum(-like) correlation. A human must *observe* the external system in order to be able to affect it, hence 'observational'.

This explanatory framework sees psi as firmly anchored in the physical world and not as a kind of omniscience, which is the classical viewpoint associated with the school of parapsychology founded by [JB Rhine](#) in the 1930s. Another major point of divergence is that the psi source is not just the nominal subject of a psi experiment, as Rhineans believe, but rather consists of *all* the observers including the researchers themselves, leading to '[experimenter effects](#)'. Of great potential interest to parapsychologists, the observational theories also imply that some command might be gained over psi effects, by controlling the feedback to the various observers.

History

An early attempt to implicate the quantum in psi was the contribution of [Wolfgang Pauli](#) to [Carl Jung's](#) notion of 'synchronicity'.[2] In the mid 1970s, Evan Harris Walker and [Helmut Schmidt](#)began independently to explore the notion that psi might be a large-scale quantum effect, made use of by the organism. Schmidt worked initially in the aerospace sector and following the cutbacks of this period turned to parapsychology. He was not just a theorist but also a leading experimenter, who introduced the use of random generators into parapsychology. Schmidt had little interest in convincing others of his ideas: his writing was clear, but only for those with an advanced degree in physics. Walker worked at the prestigious military Aberdeen Proving Grounds and his research was at first officially supported. However, his writing was turgid, with overtones of condescension to parapsychology: his half worked-out ideas were often impossible to follow. His flamboyance naturally eclipsed the more reticent Schmidt, and he wrongly came to be seen as the leading authority.

Joop Houtkooper proposed the useful term 'observation(al)' as portmanteau designation for the common core features of the theories.[1] Millar attempted a longer commentary and exposition *The Observational Theories: A Primer*.[2] In the US, Stokes also lightly covered the OTs.[3]

The reaction of parapsychologists to the OTs was remarkable for its virtual absence. The primary comments in the parapsychology journals were made by philosophers such as Thakur. The philosopher [Stephen Braude](#) became (witting or unwitting) representative for the silent majority, with what was long taken as a proof that

retro-action/precognition is *logically* impossible – a brave attempt in the tradition of the British philosopher [CD Broad](#) and his 'basic limiting principles'[4] (Braude's position on this has changed, see [here](#)). The only parapsychologist to deal with the OTs in any detail was [John Beloff](#), who freely conceded the superiority of the OTs in a number of respects and signed the death certificate for communication theories like Rhineanism, calling for its prompt burial. Beloff's main critique was that the OTs might really be dualistic theories in disguise.

Following the deaths of Walker and Schmidt no one pursued the OTs in the US where they originated. Leadership passed briefly to the Netherlands, where Joop Houtkooper obtained his doctorate on the topic. This activity ended with the closure of the Utrecht lab, although some relevant research continued to be done by [Dick Bierman](#) in Amsterdam. The only active group remaining is [Walter von Lucadou](#)'s in Germany.

The OTs were not accepted in these years: they were presented too poorly and it was decades before many parapsychologists had the background necessary to evaluate them properly.

The aim of this article is to present the fundamental ideas clearly, as an update to Millar's *Primer*, concentrating on the more physical aspects of OT. The OTs give rise to a rich, and largely unpublished, psychology, but this lies outside the scope of the current article.

Ideas

Trans-Temporal Coupling

The Observational Theories (OTs) offer an approach to psi built on ideas from quantum mechanics (QM). This is in contrast to Rhineanism , which involves a 'transmission' model – mental radio with an unknown carrier. In this article the OTs are contrasted with the still dominant Rhinean paradigm. The orthodox view is based on a sensorimotor analogy – ESP is extrasensory *perception*: an 'astral eye' *goes out* to peek at the world. For the OTs, on the contrary, the world *comes to* the observer in the form of feedback. The key event is motivated observation by a human or organism of the outcome of an external quantum-based system. The trinity: external quantum system/feedback channel/brain quantum process is a single extended unit. In a sense, the observer takes the external (quantum) system into herself: observer and observed partly overlap, mediated by the feedback channel. The OTs are at heart physical theories, which make sense of psi effects within the quantum world-view. They must be sharply distinguished from purely philosophical theories which occasionally use the designation 'observational'.

For JB Rhine, psi was above all 'non-physical'. Whereas OT does not fit into the world-view of *classical* physics familiar to Rhine, the non-classical physics of quantum mechanics offers a more congenial niche. The kinds of physical variables envisaged by Rhine were straightforward ones, such as distance and time. More subtle factors, such as quantum probabilities, which are central to the OTs, were apparently not 'physical enough' to count.

Central to the OTs is the peculiar temporal ordering seen in precognition. Because the events 'influenced' are generated *before* the moment of feedback it looks superficially as if the future affects the past, instead of the other way round. But the basic psi effect is not causation, nor is it backward causation: it is something else, something otherwise unknown in the macroscopic world. Here it is called 'Trans-Temporal Coupling' (earlier 'Walker-Schmidt (WS) coupling'): a *correlation* occurs between regions of space-time, which there was no prior reason to think might be connected in any way. The OTs take the position that trans-temporal coupling is the single psi effect which actually exists and that this underlies all diverse appearances. This bears a family resemblance to May and Marwaha's MMCP in which psi is based on precognition alone (see below).

Trans-temporal coupling is logically quite different to 'retro-PK', which is arguably an oversimplified and misleading term . Retro-PK seems to imply that event B, in the future, causes event A, in the past – a time reversed analogue of normal causation. Consider a straight-forward example of PK on a QM-based random generator (RG). The retro-PK story goes that every time a '1' (or its display representation) appears the participant experiences a psychological 'kick' which fires her internal quantum system (psi source) and the firing has a small biasing effect on the sense-coupled external system. The participant 'reaches back though time' and pokes the external random system – a strange sort of reversed causation in which the future 'causes' the past. If followed to its logical conclusion, this tale boils down to: 'The participant gets a hit/miss, because she gets a hit/miss, which is no explanation at all.

Retro-PK is imagined as a discrete effect in which current event affects past event. Trans-temporal coupling, on the contrary is conceived as a diffuse probability-based phenomenon akin to Einstein's 'spooky action at a distance'. Its nature is further examined throughout this article.

Trans-temporal coupling resembles many effects known in QM, such as Wheeler's delayed choice experiment. It is a commonplace of QM that the outcome of measurement of a quantum system depends on *how* it is measured: famously it may manifest as either a wave or a particle depending on the apparatus chosen. Wheeler asked what happens when such a wavicle is aimed towards a detector and the detector is changed mid-flight. This arbitrary decision does affect the outcome: It is as if the wavicle 'knows' what kind of detector it is going to encounter, before it actually 'meets' it.[5]

On the Rhinean signal-based notion, an experiment is complete when the guesses (and/or RG outputs) are registered: anything after that is irrelevant. But for the quantum correlation of OT, the Rhinean experiment is a mere 'front-end' – a prelude to the critical psi action. For the Rhinean conducting a telepathy experiment, information flows from sender (psi waves?) to the receiver – a real-time system. For OT, the crucial point is not at guessing but instead at future feedback.

In the Rhinean world-view psi involves largely the nominal subject only: for OT many (future) observers may be implicated. Repetitions of the identical experiment may consequently be expected to yield different results each time depending on

differing future psi contributions. Psi is uniquely subject to *future-based interference*. The Rhinean concentrates exclusively on step one and ignores all potentially critical variables farther down the time line.

For 'retro-PK' experiments many pay lip service to the notion that the future can 'influence' the past. The OTs take this to heart – it lies at the core of *all* psi. Similar effects should be found at the level of whole studies. Do future observers, *outside the formal experiment*, affect the outcome of prior *experiments*? Common sense boggles at such a preposterous notion, but what does Nature have to say?

Carry out some standard psi experiment, experimenter and other conditions chosen to optimize psi. Randomly split the data unseen in two – experimental and control. The experimental data are then viewed (feedback) by a large number, say 50-100 people, whereas the control is not. The control is a model of a typical study, with few internal observers. The 'multiple-viewed' experimental group is the same except the results are subsequently disseminated to a large group. For the OTs it is irrelevant that the group observation is later, just so long as it is certain: the situation is the same as if the original subjects had a hundred people directly looking over their shoulders. If some kind of averaging rule applies to multiple observations by different people then, for a large enough unmotivated group, hitters tend to cancel out missers leaving little or no psi over. For OT the later addition of a group of many unselected observers changes the overall psi strength to average and dilute ('damp out') any psi which would otherwise manifest.

Nature of Probability

Classical physics is all about events, which follow in a strictly deterministic way: A > B > C. While probabilities can be calculated from events, such a representation contains nothing new: it is a mere statistical summary, the frequentist view of probability that cannot 'do' anything.

QM is different in that an element comes into play that is not present in classical physics – pure chance. QM calculations result in probabilities, not certain events. Many of the interpretations of QM concern the nature of quantum probability. One of the most popular is [Many Worlds](#), which states that throughout the universe innumerable quantum events happen every instant and that with every single one, the whole universe splits apart into ever-after isolated branches, each representing one possible outcome. Many Worlds is basically an attempt to reduce quantum probability to an odd kind of frequentism: observable events are replaced by a practical infinity of unobservable universes.

Central to the math of QM is the 'wave function' or 'state vector'. Most physicists view the wave function as physically real and regard its attendant probabilities as secondary. But some consider the wave function to be a mathematical encoding of quantum probabilities: for them QM is a special kind of probability calculus. A few consider only the quantum to be real and the phenomenal world a mere shadow (eidolon).

The specific kind of probability associated with quantum effects has properties over and above ordinary (frequentist) probabilities. Within the framework of QM it is by

no means an absurd category error to assert that the special (quantum) probability associated with wave functions might be affected directly (non-locally) by psi. Non-local effects, such as entanglement display quantum-weird properties such as independence of distance.

Of particular interest to parapsychology is the measurement problem of QM. Where should the line be drawn between the micro and macro worlds: where does QM stop and classical physics begin? If the OTs are to be believed, for psi effects the quantum description may intrude into the human-size world. On a large scale the quantum properties of the fundamental constituents tend to cancel out and classical physics rules supreme. There are, however phenomena, such as superconductivity, which give the quantum game away by displaying no resistance at all to the flow of electricity, at low temperature. The (quantum-based) energy band-structure of solids underlies the operation of modern electronic devices. The macro-world looks, on the surface, almost entirely classical, but quantum effects can be revealed by close prying. Academic investigations can lead to deliberate large-scale engineering of quantum effects, such as quantum encryption with associated world-straddling satellite networks. The peculiarity of psi effects is perhaps not so much that they appear in the everyday world but that they appear in such an unashamedly naked form.

The OTs (apart from the German school) require at least some low-level quantum processing in the brain. The majority opinion has long been that this just does not exist: the brain is far too 'warm and wet' to maintain a coherent quantum state, which therefore can never survive long enough to achieve anything. If, however, it were evolutionarily advantageous for brains to perform quantum processing, Nature surely had ample resources to implement this over the aeons. Recently a mechanism has been proposed involving a calcium phosphate in solution, which is calculated to be extraordinarily resistant to decoherence. However, while this is sound so far as it goes, it remains almost entirely speculative.

The classical physicist predicts future events starting from the current state of a system. The quantum physicist can do no better than predict future probabilities starting from the probabilities at the beginning of the experiment: preparation of the initial state is distinguished from the experiment proper. The OTs follow the same road. The initial probabilities are specified or measured before the experiment is begun: the experimental system, for instance randomness tests, with associated detailed protocol is formally equivalent to the quantum physicist's preparation of the system. Predictions can then be made for the posterior probabilities in experiments.

Directed Probability Shifting

The concept of directed probability shifting is used in heavy theoretical physics, for instance Maxwell's Demon, and has even found expression in fiction such as the *Hitchhikers' Guide to the Galaxy.* Directed probability shifting is a core element in the OTs, though not of a simple contemporaneous kind. We may look in vain in the OTs for discussion of psi at the level of events. Schmidt began by proposing an equation for how a chance probability p is changed by psi into a psi-influenced probability p'. He treats the probabilities themselves as 'things': what they

represent in the world is not relevant. Walker casts his equations in the form of information, which is just probability in another form. The visible effect of psi is to change a prior probability distribution into a posterior (often shifted) distribution, as shown in Figure 1.
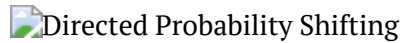
Directed Probability Shifting

Figure 1. Physical Basis of Psi: Directed Probability Shifting

To ask *how* the probability is changed may be demanding too much for a quantum(-like) effect. One can explain how a clock works – this wheel rotates that one, and so on – but for quantum effects this kind of causal explanation breaks down; despite a great deal of effort no intuitively satisfying 'how' stories have yet been invented for QM, and may never be. One eventually just gets used to the brute fact that, for example, entangled particles affect each other and then one goes on to calculate details from the mathematical formalism (many quantum physicists adopt this 'shut up and calculate' approach).

What practical difference does it make if psi works on quantum probabilities rather than events? They involve quite different underlying logical schemes: events are discrete, whereas quantum probabilities are 'fuzzy'. For example, the discrete Rhinean wants to know who is the source of psi? The OTs ask instead how much of psi is due to different observers – nominal subject, experimenter, data checker, lab cat, journal-reader. This fuzziness also applies to the question, much debated by Rhineans, of whether the mechanism behind an effect is classical ESP or PK. For the OTs, much of this is mere 'sound and fury': it may be six of one and half a dozen of the other and all at the same time.

For the OTs, psi influence lies on a continuum with miracles, which change an impossible prior probability (p = 0) to a definite happening (p' = 1). Next are ordinary 'signs and wonders' and very near the world of common experience we reach the domain of nearly negligible laboratory psi (perhaps p = 0.5 to p' = 0.52). According to the OTs, psi is inherently statistical: a Lady Luck which sticks for some time with particular groups of individuals.

The movie cliché of magicians dueling with thunderbolts dramatically illustrates the philosophical divide between probabilistic OT and discrete Rhinean theory. According to the OTs, each magician doesn't care how he vanquishes the other. In a thunderstorm the probability of a bolt striking the enemy magus might be increased sufficiently to fry him. But spontaneous heart attacks are more common than deaths by lightning and OT-psi favours the easiest, most probable path. Under storm-free conditions it is more likely that the evil magician dies unobtrusively of a heart attack.

Affecting global probabilities looks much the same as influencing individual events, but under particular circumstances the two can be distinguished. Consider a random generator (RG) – a device often used in psi experiments – which has been

set to deliver an electric shock to a participant when a '1' is generated, while a '0' delivers no shock. The OTs imply that, if the chance probability is sufficiently low and the psychic is strong enough, she likely gets no shocks whatever during a test period. In this case a significant negative deviation can be obtained when there are no feedback shock-events at all, only a global probability.

A more practical set-up might use twinned random generators. For every bit generated by RG 1 a corresponding bit is produced by RG 2. Which of the two is displayed on each trial is decided by an auxiliary random generator. If psi depends on feedback *events* then only the RG 1 or 2 actually displayed on each trial should register psi-scoring – the other remains uninfluenced at chance level. But according to the OTs, it is the *probability* of observing A or B that counts and *both* RGs (1 *and* 2) should register psi, regardless of whether that RG was actually selected or not on that trial. In other words the OTs predict psi-leakage between such twinned RGs. The experiment seems not yet to have been performed.

Scientists like to push theories to their farthest limits and beyond, even though the consequences may at first sight seem ridiculous – as was the case when general relativity spawned the 'absurdity' of black holes. Consider a super-PK subject who is incinerated by a lightning bolt just before a test: how does the later automated test session turn out? OT suggests that the scores could be nearly as good after death, without needing a 'ghost' to explain it. Whereas there is no actual observer and no actual feedback, these were overwhelmingly *probable* before the freak event derailed things. The OTs suggest a strikingly novel manifestation of psi may occur – the 'potential observer' effect. Practical experiments can be constructed to measure the effect of highly probable observers who do not in fact get feedback. If the potential observer effect is experimentally confirmed then it will be necessary to modify absolute statements such as 'feedback is necessary for psi' to accommodate such fringe cases.

Noise

According to the OTs, an observer with an inbuilt psi-source can affect only quantum systems. But how does it get from the micro to the macro-worlds? Uncertainty is as ubiquitous in human experience as 'noise'. (A substantial part of the 'snow' interference on an old fashioned TV screen is due to noise left over from the big bang in which the universe was born.) There are two kinds of noise: deterministic (pseudo-random) and quantum-based (true-random), embodied respectively in computer-generated pseudo-random number series and quantum-based RG devices. According to the OTs, psi influence can be exerted on a quantum-RG but not on a pseudo-random generator, which is impervious to psi, save for the 'seed' or entry point. For the OTs, noise is essential – no noise means no psi. Quantum noise is the necessary carrier for psi.

The systems traditionally used in psi experiments, like well-shaken dice or thoroughly shuffled cards, likely involve a mixture of deterministic and quantum noise. What effect on psi a given amount of quantum noise has when added to a deterministic series remains largely unexplored experimentally. Calculations performed by Schmidt on the basis of his model suggest that adding just a pinch of true quantum randomness may greatly increase susceptibility to psi.

The OT pioneers clearly recognized, but did not name, the notion that disparate physical systems (such as dice, RGs or icebergs) respond to PK/psi influence to different degrees. This is here called *psiability*. Psychological factors must be held constant to measure physical psiability. If psi works on quantum probabilities directly, rather than on the particular piece of apparatus which produces them, it follows that all physical systems which give rise to the same output probability distribution can be affected by psi to the same degree. When the entire works of a RG machine are gutted and replaced with completely different circuitry, this makes no difference whatever to the psi result, if only the output display randomness remains the same. Conversely, the psiability of any physical system is determined by the level of noise it manifests - the quantum chance probability distribution. And if the empirical distribution is composed of quantum and deterministic components the empirical noise level may be taken as an upper limit. The noisier the system the more it can be perturbed by psi.

According to the OTs, some aspects of a thunderstorm or a volcanic eruption can be just as susceptible to psi as falling dice. Psi can act on just about any system, with the proviso that it involves sufficient quantum-based noise. It does not matter how complicated it is, or how much energy it would take, or how many steps are needed to accomplish this in a conventional way. Psi interactions are based on probabilities (or information/entropy) and are distinct from the energetic interactions of most classical physics.

In the Rhinean scheme, noise is universally bad, because it corrupts the 'psi signal'. For OT, quantum noise in the target system is *indispensable*. But the *feedback* can also be corrupted and this leads to loss of psi effect. If noise is in at the birth of psi, noise or equivalent losses eventually kills it off again. Because psi influence cannot cross a noise barrier sufficient to garble feedback, it tends to concentrate within localized pockets in space-time. Without such local differences psi might well be undetectable.

The statistics used in parapsychology are typically some kind of deviation divided by a measure of noise-level: in card guessing *z* is the number of hits away from chance expectation divided by the standard deviation. This is routinely calculated in the course of determining the significance of the result. However, in the light of OT this may be seen as a rough way of eliminating dependence on noise, in which it is implicitly assumed that deviation is proportional to noise-level. Typically the statistic (*z*, *t*, *F,* etc) is published but not frequently the estimate of noise level which was used to calculate it. Often, however, this can be calculated back from other data such as hit rate, which are given. In this way a substantial body of empirical data bearing on the dependence of psi-scoring on noise level might be amassed from the existing literature.

Psychological measures, such as questionnaires, are seldom a pure measure of trait/state but contain an appreciable amount of noise. It would be interesting to carry out a meta-analysis of the relevant literature. Does the level of the correlation with psi scoring go up as the test becomes better (high reliability) as expected for a real psychological correlate? If, on the contrary, the correlation improves as the test gets worse (low reliability) this may suggest that the correlation is not genuine but rather that the psychological test scores themselves are being affected by psi on the

noise component. A psi-gifted experimenter who passionately believes in the reality of some particular correlation might be expected unconsciously to do just that.

Many consider free-floating states such as dreams or ganzfeld to be particularly conducive to psi. From the OT perspective, might this be because more noise, in the form of fantasy elements, is produced for psi to work on – a noise enhancement effect? The Rhinean idea is the opposite: noise reduction, which is perfectly appropriate for a 'signal'. Entropy measures of mentation reports might help decide which of these opposing ideas is correct.

A computer/RG system can be used to simulate different physical systems, with different kinds and levels of noise. If this is used in PK studies, with one standard display for all, then the effect of noise might be explored experimentally in detail.

Is Psi Differential?

Schmidt's mathematical model implies that every quantum probability whatever can be influenced by psi. However, many decline to follow him here. The gist of the objection is that on this basis psi can do unrealistically much. If psi can influence any probability, then we have good reason to be nervous if rogue nations start recruiting psychics to detonate our nuclear stockpiles in their silos (this was apparently considered a serious possibility by Ron Robertson of the Atomic Energy Commission).[6]

Many consider that psi affects only a specific type of quantum probability, the one associated with correlation. Psi influence fundamentally involves two quantum-based systems which become correlated. Consider a psychokinesis experiment using a quantum-based RG. Schmidt's original design used a 'tick' from a radiation detector to stop a 'clock' which switches, say, a million times per second between a '0' and a '1' state – a QM-based coin-flipper. For an excess of '1's, the clock and the detection must be synchronized to better than a microsecond. Correlation psi does not control gross radioactive decay, nor does it directly influence the clock: it acts by synchronising a pair of quantum systems. Psi sneaks in at the gaps and achieves a desired goal with the minimal disturbance. Correlation-psi is differential rather than single-ended, maintaining overall balance in the world.

There is another reason to prefer the correlation account: a fundamental feature of QM is entanglement (sometimes called EPR after Einstein, Podolsky and Rosen, who described it).[7] Following certain kinds of interaction two quantum particles can behave as a single entity, described by a single quantum state manifesting at two physical locations. Whatever is done to one of the pair is correlated with the other one – even if they are half the universe apart (non-local). It has been suggested that the basic psi interaction is essentially a time-reversed version of entanglement in which an interaction in the future (with the psi source) results in a correlation at earlier times.

Feedback Channel

The psi interaction may be considered to consist of two parts: a standard information channel which carries feedback about the state of the quantum system to the psi-source, forward in time; and the non-local coupling which gives the appearance of a backward-in-time influence of the observer on the earlier random generation. The feedback channel is not just a classical one-way street in which the external quantum state determines the observation: the quantum state and the observation are holistically coupled so that the observation has a tiny 'influence' on the quantum state.

For the psychologist, feedback typically describes a correction process. More generally, feedback is said to occur in any system whatever in which the output, in its turn, affects the input. Shannon's Information Theory (IT) is a standard part of the psychology module on communication and this lies in the background of parapsychologists' ideas about information processing in psi.[4] In order to model noisy communication the channel is formalized in terms of probabilities, just what is needed for OT. The fundamental physical requirement for psi may be concisely stated – *provision of a feedback channel*. A channel may exist even when no events are signalled using it.

Just why does OT insist on the very limiting condition of a feedback channel for psi functioning? Of most importance to parapsychology is that it deals elegantly with the knotty problem of selectivity: of all the things in the world, near or far, past present or future, just what can be seen or affected by psi? The Rhinean idea about selectivity is that psi can potentially access any information whatever: the only limitation is psychological, making it a kind of omniscience (Stanford coined the term 'psi-scanning' of all space and time for anything relevant).[8]

Many Rhineans start with the notion that psi has no limits and then add psychological speculations about why those manifestations are so circumscribed in practice. In contrast, the OTs have *built-in* limitations. Essential is the future presentation of the right (or wrong) answer to the participant: in common-sense terms it looks like the origin of the 'psi-signal' is the future feedback. The trans-temporal coupling of the OTs is tightly limited: psi cannot strike anytime, anywhere out of the blue. What can be affected/seen by psi is curtailed to the feedback available.

A further advantage of the OT feedback limitation is that the past and future cannot get out of step. Because a past state is connected to the psi source via the feedback channel the past cannot be *changed* by psi: what is done is done – effectively graven in stone. There is no possibility of killing off one's own grandfather before one's conception by retro-PK.

Any feedback whatsoever which conveys information along the feedback channel to the human and his inbuilt psi-source may result in psi. For bit-by-bit feedback the hit rate may be psi-influenced, and for total-score feedback the total score can be affected: as far as overall deviation is concerned, they come to the same thing. Both bit-by-bit and total score are what statisticians call sufficient statistics: each encapsulates all of the information about deviation. It is grotesquely counter-intuitive that feedback of a single number, like z should have the same psiability as looking at each trial individually; but there are also marked *psychological*

differences between observing these different kinds of data. If feedback is grossly limited to a sketchy 'congratulations you did well', little if any psi effect may be expected from the nominal subject.

For OT the psi effect depends on feedback about the original external quantum system: the smaller the amount of information which a given observer has as feedback, the less her psi contribution, all else being equal. Typically, later observers get progressively less information and this implies that the psi contribution of successive observers tends to decrease over time. There are indeed some empirical indications of time attrition, particularly in spontaneous cases. Psi, for the OTs, is not space/time independent but is rather governed by engineering details of the feedback channel. It may be that in practice any psi influence is mostly limited to the first few observers.

To be effective, feedback need not come directly from the event itself but may be indirect. In experiments a computer is commonly used as intermediate channel to give feedback – computed feedback. According to the OTs, psi works by trans-temporal coupling through the feedback and what this means in the external world is determined by the feedback channel. If the computer is programmed to change from a RG in the next room to one 500 miles away, this routes the psi to that otherwise irrelevant RG instead.

The external feedback channel is not limited to computers or purely inanimate systems. A human too may act as external feedback channel if she conveys to the psychic what she has experienced, by giving feedback – as the experimenter may do. Human feedback channels are naturally more subject to distortions and errors than a well-oiled machine. For the psychic himself, the "Human Information Processing System" mediates (computer-like) between his senses and his built-in psi source. For the OTs this is an internal feedback channel; computed feedback is used to determine the effect of psi in the linked external world. The difference between the cognitive system and an external computer is that, for the human, its programming depends on the unique life experiences of the individual as well as his current set and setting. The psychology of the OTs is embodied in the workings of this internal channel, to be explored at length elsewhere.

The Rhinean considers that the effect of psi is restricted to the duo sender/receiver or PK-er/PK-ed alone. Further, the result is thought to be brought about a step at a time. The OTs, on the contrary are goal-directed: psi, being global – no 'bits and pieces' – works upon or through the observed outcome. The final outcome is determined by the whole history of events which gave rise to it. Psi is no single malt but a blend – a diffuse effect, a forest of probabilities, centred on observation of the end result. There is no question of intelligent supervision of a succession of steps but simply physical law governing the whole.

The prototype of the OT set-up, consisting of RG, feedback channel and human (with psi-source) is time displacement PK ('retro-PK'). It involves generating a sequence of bits with a RG, recording the output unseen, and later playing back to the participant, who usually believes he is trying to affect a local RG. Such a sequence of bits from a thumb drive may be sent electronically around the globe to a participant who views it while wishing for some particular outcome. It has been

objected there is no logical necessity for invoking a 'retro' influence: perhaps the experimenter affects the sequence by contemporaneous (Rhinean) PK while it is being generated. Edwin May, whose theory does not sanction PK, has a different take: the experimenter picks out by psi the few memory sticks with high scoring to be sent to participants. According to the OTs these explanations are not mutually exclusive, but simply different logical parsings of the same probabilities.

Most parapsychologists today follow the Rhinean line that feedback is not necessary for psi. Psi has time and time again been reported without trial-by-trial feedback to the nominal subjects. Often, however, partial feedback such as total score has been given instead. Furthermore, is the participant the actual source of psi? If this is instead the experimenter, then he eventually has feedback of just about everything!

Few experimenters (for instance Russell Targ, Charles Tart and Edwin May) have given any attention to the question of feedback. These studies have centred around the question of whether pure clairvoyance exists, which observational theorists insist is impossible: without feedback of the actual state of affairs there can be no psi. The majority are arguably flawed because of implicit dependence on the Rhinean discrete peak-and-poke model. In a typical study experimental manipulations ensured that 'target slides and responses were encoded so that, both before and after the experiment, no person ever knew which slides were the correct target, or how a viewer performed on a particular trial'.[9]

For the OTs these minutiae are irrelevant. If psi works on probabilities then why not just go for the *final statistic* which was the primary focus of the experimenters' attention, usually a test of the difference in scoring rate between feedback and non-feedback conditions. It is not clear whether the nominal subjects were among those who saw the final statistic: if not then they could not directly psi-affect this. Did the experimenters unwittingly 'psi it so'? For the OTs, the experiment as a whole is just a complicated RG, and it is not necessary or even useful to know details of the RG before this can be affected by psi. For the probability-based OTs a whole experiment is near equivalent to a single 'PK' hit with 20-faced (dodecahedral) dice. Throwing the 'right' face up has a probability of p=.05 (1/20), which conventionally indicates significance.

This work illustrates the stark contrast between the OT and Rhinean world-views. One of the most powerful tools of the experimental psychologist is sensory blinding. But psi is not in the least obstructed by a lead wall between sender and receiver. If the OT position is correct, blinding techniques can be applied directly to the feedback. More generally, experimental control of psi should be possible by *feedback manipulation*.

The most obvious thing to manipulate is the presentation of feedback to the subject. However, according to OT all observers of feedback may make some contribution to the psi result as discussed in the following section. It is consequently practical to choose as single subject a person whose psi source is much stronger than others involved so that his is the major psi contribution. The bottom line is, Does his psi scoring fall off smoothly when he looks at the feedback

with darker and darker glasses? The psychophysics lab offers more convenient and precise tools, such as the tachistoscope.

Feedback is the make-or-break issue for the OTs. If sufficient experiments with disparate experimenters and different expectations fail to reveal systematic decrease in psi scoring when feedback is curtailed, then the OTs must be rejected.

Experimenter Effect

A calculation that one makes on a computer in Cambridge is not necessarily done locally: in a distributed network some of it may run on hardware in Brisbane, some in Tokyo and another piece in Vladivostok – 'in the cloud'. The Rhinean likewise makes the natural assumption that the here-and-now subject is responsible for the psi activity. But according to OT she is a single terminal in the psi-cloud of all future observers: like an iceberg, most of the observers are invisible while the experiment is being run. The OTs take the view that all observers potentially have an influence on the result – some kind of weighted average. Everybody who has feedback may be involved, including the principal investigator, hands-on experimenter, participant and data-checker.

The Rhinean assumes that any psi effect is principally that of the participant. The few exceptions concern sensory-mediated social effects (Rosenthal-type) and not hard-core experimenter-psi. Within the Rhinean paradigm some effect of the hands-on experimental group seems very plausible, but not with regard to the principal investigator, whose involvement is at a distance and who leaves the actual experimental work to be carried out by assistants. That the principal investigator, isolated on the floor above or at a conference in Australia, should have the major effect in psi studies is incredible for the Rhinean, who implicitly believes that physical distance for sensory effects is of primary importance. For the OTs, by contrast, what matters is feedback – *information* distance. An overriding psi effect from the principal investigator is likely if she remains involved as a supervisor: she is strongly motivated to see experimental results that will justify her work to the scientific world.

According to the OTs, the result of a psi experiment is always due to a combination of, at least, investigator/experimenter and the participant. The entire study is the brainchild of the investigator and the very function of the experimenter is observation and control. Since both observe results and are highly motivated they are hardly to be distinguished from the nominal subject at the psi level. The investigator/experimenter is top suspect as the major source of psi. Usually no single participant scores noticeably above chance; only the grand total is statistically significant. If there is no brighter 'psi-lamp' involved then experimenter psi will tend to dominate.

On empirical grounds there is a great deal of scattered evidence that the experimenter is generally more important to the result than the nominal subjects. Palmer summarizes: 'It is widely accepted in parapsychological circles that certain researchers consistently get better results in their psi experiments than others, regardless of the topic or hypothesis tested.' The situation is more extreme than even this suggests. There are diligent researchers (notably West, Beloff, Schouten,

Millar, [Blackmore](#) and [Wiseman](#)) who have rarely, if ever, registered any psi at all in decades of experiment. HAVE and HAVE-NOT experimenters seem to live in quite separate and incompatible worlds.

After an initial period of success some researchers have unexpectedly drawn a blank in testing unselected groups: notable in this respect are Rhine's lieutenant [Gaither Pratt](#) and [Richard Broughton](#) who lost the 'Midas touch' after he began to suspect that he himself was the source of psi in his experiments. It is understandable that parapsychologists have recoiled from the issue of experimenter psi, hoping it will just go away. It would have weighty implications for the Rhinean view if psi can only be registered by certain constitutionally or psychologically endowed experimenters.

[John Beloff](#), who had the reputation of being a psi-challenged experimenter, travelled to Prague to test [Pavel Stepanek](#), the only person who at that time seemed able to score in a psi task with some consistency. Overall there was no convincing psi; only in one of several experiments was there evidence of psi missing.[10] The generally accepted view is that Stepanek was, by coincidence, in an unproductive phase when Beloff worked with him. But could it be that the experimenter plays a decisive role, even with elite special subjects?

On the basis of her extensive practical experience, [Gertrude Schmeidler](#) suggested that psi-gifted experimenters in fact transfer their own psi temporarily to the participants.[11] This is quite near the OT position: the psi-gifted experimenter uses her untalented subjects as organic RGs and psi-plays them like marionettes, in contrast to the Rhinean view of the experimenter as coach motivating her subjects. Quite distinct personality traits are involved, and these could easily be measured.

A few cases exist in which the experimenter was shown after the event to be the probable source of psi. The most recent is the [Global Consciousness Project (GCP)](#) supervised by [Roger Nelson](#). His idea was that widely shared emotional events, such as terrorist attacks, would synchronously perturb a widely separated network of random generators. Near 20 years of monitoring comprising about 500 such events produced an extremely significant deviation from chance expectancy.

[Peter Bancel](#), Nelson's erstwhile collaborator, realized that a feature of most of the RG machines used nearly rules out Nelson's hypothesis.[12] This is an XOR gate, designed to compensate machine bias: the critical side-effect is that the output from this circuit bears no simple relationship to the raw bits fed to it.

If some global biasing effect existed at the level of the primary raw bits it would be eliminated by the de-bias circuit, if the XOR worked as planned; but for proper operation the XOR mask has, for most machines, to be updated regularly from Nelson's control centre and the network timing was far too variable for this to be effective. Despite this glitch, it seems fairly clear that any psi effect is exerted upon the XOR-ed stream, not on the primary raw bits. The experimenter was the first observer of this secondary stream and was strongly motivated to see an outcome in accordance with his hypothesis.

Ad-hoc tests were sometimes carried out in addition to the routine analyses. If the result is due to experimenter psi, then only the data actually looked at by Nelson in this way would show an effect: data to which such analyses are equally applicable are expected *not* to show an effect, and this turns out to be true. The conclusive piece of evidence would be an inability by other people to replicate the GCP effect: a cell phone app being prepared independently may settle the matter definitively.

Rhineans consider such cases to be rare aberrations; however, for OT a dominant experimenter contribution may well be the rule for strong results. In practice the standard premise of experimental psychology – that the nominal subjects create the psi effects – remains deeply entrenched. On common sense grounds alone it might be expected that in critical respects psi does not behave like more mundane psychological effects: specific methodology for psi is needed to supplement that of the traditional psychological laboratory. According to the OTs, psi by the experimenter and other personnel must routinely be considered and taken into account.

Dominant experimenter psi is a possibility despised/feared by many researchers. If the experimenter often makes the largest psi-contribution to the outcome, any result may be specific to him and 'process-oriented' research becomes self-fulfilling prophecy. Experiment acts as a 'psi-mirror' in which are reflected primarily each experimenter's idiosyncratic hopes and fears, and Rhinean parapsychology becomes a mere collection of 'experimenter-specific sciences'.

It is almost paradoxical that the experimenter may use genuine psi to 'fake' the outcomes of his experiments. Stanford famously asked whether parapsychologists are scientists or shamans. The OT answer seems to be *shamans*, at least for the HAVE subset of experimenters. Though heterodox, this fits well with George Hansen's thought-provoking sociological view of psi as a great trickster, particularly when research is organised in an institutional form, such as parapsychology.13

Related Theories

Synchronicity

The German school identified Carl Jung's synchronicity as a near precursor of OT thought. His principal collaborator was pioneer quantum physicist Wolfgang Pauli, who, it was whispered by fellow physicists, had the bad habit of wrecking delicate apparatus by psychic means. Synchronicity regards the world as having both a warp and a weft. The warp represents familiar mechanical causation: the synchronicity weft, on the other hand, is physically a-causal, and its psychological nature is meaning. The causal world of classical physics is criss-crossed by intangible strings of synchronicity. Sometimes, in an emotionally charged situation, people unwittingly pluck at the strings of this web and meaning magically manifests.

The standard Rhinean paradigm of parapsychology is centred on the psychology of the individual: ESP/PK is a personal biological function like any other. In contrast, synchronicity envisages a nexus outside the individual, and while humans can in rare cases affect the nexus it goes on working, human or no human. Under normal

circumstances a person interacts with this almost passively, like clouds coasting in invisible air currents. Since synchronicity is a-causal it is meaningless to ask what causes what.

Synchronicity has not been popular in parapsychology, though a few have stoutly defended its relevance. Like synchronicity, the OTs envisage 'threads' for an a-causal/non local psi connection. The OTs involve more recent QM. The OT threads are far from intangible: they are ordinary information channels working in a novel mode. Meaning is determined by the observers. For the OTs the threads are strings which seem plucked in the future.

Schmidt / Donald and Martin

The single most influential OT is Helmut Schmidt's Mathematical Model, published in a paper in the mid-1960s.[14] This is presented as a purely pragmatic/heuristic approach, eschewing appeal to QM, or to any other underlying physical theory.[15] It adopts the method used by Euclid in his classical treatment of geometry, beginning with a small number of axioms and then deducing the consequences in great detail (the same approach followed by Newton in his *Principia*). Schmidt proceeded from two simple mathematical postulates. Considering that any quantum probability whatever can be influenced by psi, the first describes how a given psi-source affects a RG with a specified chance probability, while the second deals with the combination of two or more psi-sources.

Schmidt's psi source is a purely formal unit with a constant strength. In terms of humans, who only *contain* a psi source, this means that the psychology of each observer is effectively held constant. If this can be achieved, then Schmidt's model attempts to calculate the relative susceptibilities/psiabilities of different probabilistic physical systems. Schmidt's 'psi-diagrams' specify the probabilistic history of an experiment (the method of histories is well-known in QM, where it forms, for example, the under-layer of Feynman diagrams). This approach contrasts strongly with the Rhinean model in which physical conditions are deemed irrelevant and psi differences are determined purely by individual psychology.

Schmidt was explicit in declaring that psi is the product of a complex brain using a simple physical principle. In less muted language psi is not something central to human personality but rather a peripheral device, like a 3D printer. Many have supposed that Schmidt came to his model primarily via QM; but though this played some role it seems he was at least as much influenced by statistical thermodynamics.

Schmidt had earlier published in cosmology and entropy.[16] A glimpse of his personal reflections on psi may perhaps be caught in an obscure paper by Donald and Martin titled Time-Symmetric Thermodynamics and Causality Violation. This approach is based on the thermodynamic measure of entropy (disorder) and its complement negentropy (order). Normal entropy increases relentlessly with time. Donald and Martin propose that a second variety of entropy may exist in addition to the standard kind. This 'backward' entropy increases from future to past so that effects seem to occur before their 'causes' (pre-effect). This peculiar kind of negentropy fortunately occurs in only trace amounts and causality massively

dominates. Backward negentropy is considered 'fuel for the psi motor'. Organisms take in conventional negentropy as well as energy from food and use it to build up and order their own structure as well as influence the external environment. Donald and Martin propose that organisms may have developed the analogous ability to collect and use backward-negentropy too: this confers a very slight sensitivity to the future.

Something like backward negentropy seems to have been unwittingly incorporated into Schmidt's axioms. In any case his scheme seems to violate the second law of thermodynamics: a closed system cannot become more ordered on its own and many reject the Schmidt model for this reason. Donald and Martin maintain that in a PK experiment the RG is *not* a closed system: information (negentropy) flows from the RG to the observer. The system in question is the *combination* RG/(channel)/observer and while the RG becomes more ordered, the PKer metabolizes enough glucose in his brain so that overall the entropy increases.

The axiomatic method is one of enormous power. It has disappeared from parapsychology since the time of Schmidt, though it would seem to offer considerable promise.

Evan Harris Walker

Schmidt was not given to public conjecture, but this was the forte of Evan Harris Walker, from whose fertile imagination ideas constantly erupted.[17] Walker initially embarked on a physical theory of consciousness, of which a minor consequence was that a weak coupling (psi) might be expected to occur between the brain and an external random system tied to the brain via the normal senses. In the course of time, a number of Walker's more fanciful speculations have been quietly dropped from the OTs.

Walker sketched at least one mechanism for time displacement PK. His sometime mentor, Eugene Wigner, had suggested that the wave function is ultimately collapsed by conscious observation. For Walker, then, retro-PK was simple: the external quantum system and the human observer remain in an indefinite (superposition) state until this is consolidated in the observer's consciousness. The outcome of the external quantum process is initially a kind of jelly: only when it is consciously observed does it set to a definite event. There is no question of real backward causation taking place: it just looks that way.

However, this ingenious mechanism has not been incorporated into the OTs. It is possible to calculate that for a PK experiment the jelly state (coherence) Walker imagined could not persist for more than about a millionth of a microsecond. Walker, together with May and colleagues, performed a purely physical experiment specifically to look for such an effect and found none.[18] As a result, Walker's attribution of time-displaced PK to collapse/decoherence due to consciousness is no longer tenable. But there is a germ of truth in the idea: psi works on quantum noise, which Houtkooper calls an 'extant indefinite random variable'.

Perhaps Walker's most important contribution to the OTs was his attempt to bridge the gap between the micro and the macro worlds. He proposed that a psi effect at

the quantum level can have an outcome large enough to be seen in the everyday (macro) world by way of [Edward Lorenz](#)'s 'butterfly effect' (Lorenz, the founder of modern chaos theory, asked, 'Does the flap of a butterfly's wings in Brazil set off a tornado in Texas?'). He looked in detail at Forwald's classical 'displacement' PK experiments, in which cubes were released electro-mechanically, and ran down a ramp onto a horizontal table, Forwald attempting to mentally deflect the cube trajectory left or right. Walker claimed to have equations that worked and fitted the data. But the fit between his theoretical predictions and the Forwald experiments does not depend on the initial quantum uncertainties of the cubes, which are virtually the same for all of the kinds of cubes used: the origin of the initial uncertainty might just as well be Forwald's breathing or passing traffic.

More recently, Burns took up the matter in a much more rigorous way.[23] She concluded that the initial Heisenberg uncertainty is not adequate to account for the several centimetre PK-deviations reported by Forwald.

There is today a broad consensus that random events in the real world may stem from 'stirring' at a quantum level. The systems used in psi research before the introduction of RG machines (typified by dice throwing) are plausible candidates. On the other hand most devices, such as computers, are purposely developed to be purely deterministic. Such perfect machines are not responsive to psi.

The German School

Walker's butterfly appeared particularly contentious to [Walter von Lucadou](#), who led a breakaway observational movement in Germany with his Model of Pragmatic Information (recently, Weak or Generalized Quantum Theory has expressed this position most clearly).[19] Those who support this theory assert one should forget what is going on at a physical level: what is important is that psi systems obey quantum-like rules and parapsychologists should concentrate on stating and testing these.

A recent development of great interest is to characterize the result of an experiment not in terms of a single variable but rather in terms of a matrix using multiple variables: according to the German school a single variable cannot be influenced other than transiently, after which decline on that variable must set in. In QM, relevant variables must be independent (orthogonal) but the German school have generally employed correlated variables and this raises statistical issues. If the utility of the matrix method were to be established this could usher in an era of psi control, with no declines. Moreover, it would solve the question of when an experiment is finished: the matrix stops all further future influence.

For the German school, the OT notion that future feedback is essential for psi has fallen away: the theory is no longer observational. If, however, observation is taken into account, the matrix method takes on quite a different light: the experimenter's goal is to influence the matrix as a whole, while the participant is concerned with the single variable. The matrix method acts as a filter to pick out the experimenter psi contribution and reject interfering participant psi. Is it really the case that the matrix method secures against future observers? Published reports inevitably give results in terms of the matrix combination and just like any other experiment (such

as extraversion/psi) the result may be re-conceptualized by future observers as part of a yet larger matrix.

MMPC

The Multiphasic Model of PreCognition (MMPC), formulated by May and Marwaha – via Decision Augmentation Theory (DAT) – is the latest theory of psi.[20] This line of thought developed from Stanford's Psi-mediated Instrumental Response (PMIR) model and is based on precognition.[21] This is not likely to emerge as anything overt: much more frequently, people just unconsciously adjust their behaviour in the present so that 'something good' happens or 'something bad' doesn't. Fay must choose between two jungle tracks (left or right) and, unknown to her, the path to the right leads to King Kong: she absent-mindedly turns left. Such unconscious, precognition-based behaviour often involves timing, so that she may start out for home only after the gorilla is recaptured, quite unaware of having done anything unusual.

MMPC is a curious mixture of old and new. The basic structure is neo-Rhinean, while the physical part explicitly involves thermodynamic factors, particularly the ongoing work of Verlinde. MMPC is signal-based – not quantum. Whereas it makes some predictions which coincide with OT, the underlying logic differs. The most striking of the commonalities is the importance of experimenter psi as compared to standard Rhineanism. In a PK experiment the experimenter, guided by unconscious precognition, switches on the RG at just the right moment that the total score is 'something good'.

In precognition, as generally conceived, the precognizer 'sees' a future event and his foretelling is an earlier event, so that the future event is part 'cause' of the earlier event. Braude has questioned the propriety of such temporal loops. The 'information-source' in MMPC lies in the future, but not necessarily at feedback, though more emphasis is placed on feedback in MMPC than in earlier writings (DAT). There remains a troublesome gap here, which would logically seem to require 'psi-scanning'. The psi-active party for MMPC is the nominal subject at the time of 'guessing', rather than the future observer of the OTs. As far as the psychology is concerned the signal-based MMPC has its own psi receptor and cognitive processing housed in the participant, just like Rhineanism.

Perspective

OT is not exclusively for nerds, nor is it loosely veiled mysticism hidden behind quantum 'woo'. The fundamental ideas are mind-stretching but the consequences are as down-to-earth as any scientific theory. Parapsychology has traditionally been presented in a dualistic context: the mind or consciousness has been supposed to be the active agent, leading critics to dismiss psi as a hangover from religion. Within the OT framework psi begins to look more like science. However, a semi-religious ideology did inspire many of parapsychology's pioneers and older researchers in particular may be unhappy with the OTs because they challenge such a world view. The parapsychological establishment may be shocked, though not

surprised, by the explicit suggestion that many 'firmly established properties' of psi can be artefactual, due instead to experimenter psi.

For the Rhinean all the answers to the conundrum of psi lie in purely *psychological* variables and *physical* experimentation is passively discouraged. Parapsychologists started with the preconception that psi is analogous to perception/motor action – 'signalling'. If it is instead a quantum(-like) *correlation*, it is little wonder that the unsupplemented methods of experimental psychology have proven largely unproductive. There is much to be learned from the Rhinean system but it has largely dried up and become fossilized. Perhaps the OTs can breathe life back into parapsychology, with a rich and novel program of investigation tailored to the quantum-like nature of the effects.

Brian Millar

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Endnotes

Footnotes

- [1.](#) Houtkooper (2006).
- [2.](#) Millar (1978).
- [3.](#) Stokes (1987).
- [4.](#) Braude (1978).
- [5.](#) Millar (2015).
- [6.](#) Wilhelm (1976).
- [7.](#) Einstein et al. (1935).
- [8.](#) Stanford (2015).
- [9.](#) Targ et al. (1985).
- [10.](#) Ryzl & Beloff (1965).
- [11.](#) Schmeidler (1997).
- [12.](#) Bancel (2016).
- [13.](#) Hansen (2001).
- [14.](#) Schmidt (1966).
- [15.](#) Schmidt (1975); Donald & Martin (1975).
- [16.](#) Schmidt (1966).
- [17.](#) Walker (1975).
- [18.](#) Walker et al. (2014).
- [19.](#) Von Lucadou et al. (2007).
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- [21.](#) Stanford (2015).