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EDITORIAL

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I've recently found myself discussing apparitions with some SSE members and various other correspondents. And to my dismay I've discovered that many suppose, all too readily, that when apparitional cases require paranormal explanations, they should be viewed as instances of telepathic interaction. I addressed this topic quite some time ago (Braude 1997), arguing that the telepathic interpretation of apparitions is problematical—at least as an approach to apparitions generally. And back then I expected (admittedly, rather foolishly) that my trenchant and extended analysis would settle the matter decisively. So now that I've been humbled once again by this latest indication of my lack of influence, I'd like to revisit the topic briefly and review its essentials, in the hope that some might then adopt a more sophisticated and nuanced approach.

Apparitional phenomena have intrigued me for a long time. One reason is that they reach into all corners of the human population. Even hard-nosed, otherwise outwardly skeptical academics have confided their apparitional experiences to me and acknowledged they were baffled and impressed by them. That august group even includes an ex father-in-law (an anatomist at Ohio State) and my dissertation advisor (a distinguished and suitably hard-nosed philosopher).

From the earliest days of the Society for Psychical Research (SPR), the dominant view, at least within parapsychology, has been that if apparitions aren't simply internally generated (e.g., exhaustion- or drug- or illness-induced) hallucinations, they can then be explained by appealing to various sorts of telepathic interaction. And I suspect that's still the prevailing view. So for example, according to this view we'd understand apparitions of the dead to result from telepathic interactions between a postmortem and an ante-mortem individual, and we'd explain apparitions of the living entirely in terms of ante-mortem telepathic interactions. Thus, a so-called "crisis apparition" would be understood as a kind of moment-of-death (or peril) telepathic reaching out from the agent to the percipient.

I understand why this view is seductive, but as a *general* approach to apparitions, it's simplistic, both methodologically and empirically. As I will explain below in more detail, different sorts of cases pose different sorts of theoretical problems, and explanations that work neatly for one sort may

be cumbersome or implausible when extended to another. So even initially, it's not very promising to proceed as though apparitional phenomena must be united by anything deeper than a name. The evidence for apparitions consists of cases occurring both while awake and during sleep, perceived both individually and collectively, most of them visual but others not, some suggesting the persistence of consciousness after death, others suggesting only interaction with the living, some strongly suggesting the presence of localized objective apparitional entities, and others suggesting nothing more than telepathic interaction. Like the various somatic phenomena we designate generally as pains, different apparitional phenomena may require quite different sorts of explanations. In fact, even phenomenologically similar cases might demand different explanations, just as phenomenologically similar headaches might have different kinds of causes.

The most problematic cases for the prevailing view are *collective* apparitions, experienced simultaneously by two or more individuals (including animals). Of course, I concede that individual and collective apparitions might occasionally result from similar processes, telepathic or otherwise. However, it's notable that explanations that seem plausible for individual apparitions frequently (if not usually) seem implausible in collective cases, although the converse is rarely true. So I'd like once again to focus on the important theoretical challenges posed by cases of collective apparitions. In my view, those cases seem to take us in directions many will find surprising, if not disturbing.

Theoretical Preliminaries

A striking feature of the evidence is that apparitions tend to be collectively perceived when there is more than one potential percipient present. G. N. M. Tyrrell claimed that in about one-third of the cases where there is more than one potential percipient, the apparition is experienced collectively (Tyrrell 1942/1961:23). Hornell Hart's figures (Hart 1956) are even more impressive and revealing. Whereas Tyrrell considered cases in which there was more than one potential observer "present," Hart considered cases that "reported other persons *so situated* that they would have perceived the apparition if it had been a normal person" (Tyrell 1942/1961:204, emphasis added). Therefore, Hart's case selection excludes those in which potential observers were present but asleep, or facing away from the apparition, or with their viewpoint obstructed by walls or other objects. Hart found that 46 out of 167 cases (28%) had two or more properly situated potential observers, and that 26 of those (56%) were reported as collective. So perhaps the processes at work in the collective cases are more pervasive than the small proportion of collective cases would suggest.

For present purposes, we can ignore instances where apparitions seem merely to be internally generated hallucinatory constructs and consider only those puzzling cases that seem to demand a paranormal explanation. For that residue, explanations of apparitions have traditionally divided into two main groups: *telepathic* (or subjectivist) and *objectivist*. The former treat apparitions as constructs of inner experience having an external (telepathic) cause, while the latter take them to be spatially localized entities of some sort. And as we'll see shortly, telepathic accounts seem clearly to founder when it comes to collective cases.

Nevertheless, it must be said that telepathic explanations are not entirely without merit—at least for individual cases. Generally speaking, telepathic accounts propose (i) that a mental state in agent *A* produces a mental state in apparition-percipient *B*, and (ii) that the telepathically induced mental state of *B* manifests itself as a hallucination. The reason this is at least initially plausible (as Price 1960 observes) is that telepathy is usually and reasonably considered to be at least a two-stage process. First, the agent telepathically affects the percipient; then the effect of that interaction manifests itself somehow in the percipient. And of course, this second part of the process presumably can take different forms. For example, the telepathic effect could emerge in a dream or in a waking mental state. And if the latter, it could manifest either as an image, a vague change of mood or feeling, a more precise and sudden disruption of the mental flow, an impulse to do something (e.g., "I should telephone so-and-so"), or perhaps even as automatic or semi-automatic bodily behavior (as in automatic writing and speech). As far as the topic of apparitions is concerned, a more relevant option is that the telepathic effect manifests itself as a hallucination of an external object. On the telepathic theory, then, apparitions would simply be one of the many possible effects of telepathic interaction.

The objectivist account raises different issues, and some might consider it to be far more radical than the telepathic alternative. In outline, it proposes that an apparition is a real, localized, entity, and not simply a subjective construct or hallucination of the percipient. Early proponents of telepathic explanations maintained that apparitional entities are nonphysical, although they bear certain similarities to ordinary material objects. To some extent (as we'll see), that claim rests on confusions over what physical objects are. In any case, it's not essential to the objectivist account that the apparitions be of a particular ontological kind, except for having the property of occupying a real position in space. Initially, all it must claim is that the apparition has certain properties not belonging to the material object it resembles. For example, apparitions—but not persons—are able to pass through walls and closed doors.

F. W. H. Myers and Tyrrell were among those who argued that if apparitions are objective localized entities, they're nevertheless sufficiently unlike physical objects to be classed as nonphysical. The principal points of dissimilarity, as itemized by Tyrrell (Tyrell 1942/1961:59), are: (i) apparitions appear and disappear in locked rooms, (ii) they vanish while being watched, (iii) sometimes they become transparent and fade away, (iv) they are often seen or heard only by some of those present and in a position to perceive any physical object genuinely in that location, (v) they disappear into walls and closed doors and pass through physical objects apparently in their path, (vi) hands may go through them, or people may walk through them without encountering resistance, and (vii) they leave behind no physical traces.

But as C. D. Broad correctly observed (Broad 1962:234ff), various familiar spatial *physical* objects display these and related peculiar properties. For example, a *mirror image* is a physical phenomenon located in the region of space occupied by the mirror. But (a) it's visible only to those properly situated, (b) tactile impressions of the image fail to correspond to its visual impressions, and (c) although the image appears *behind* the mirror, the mirror has no depth. Furthermore, the mirror image is *caused* to exist by an ordinary physical object, which resembles it in appearance, and which occupies a region of physical space distinct from that occupied by the image. So if apparitions are objective localized entities, they might be akin to mirror images, not only regarding their perceptible properties, but also regarding their causal dependency on ordinary physical objects. Moreover, although some physical objects, such as gases, electromagnetic fields, and rainbows, are present in or spread out in a region of space, they're more intensely localized in and perceivable only from certain locations. Indeed, they exhibit the anomalous properties of apparitions precisely because of the manner in which they're extended in space. The moral here, clearly, is that not all physical objects occupy space as a *solid* body does. Gases and rainbows have Tyrrell's properties (ii), (iii), (iv), (vi), and (vii), and electromagnetic fields have properties (i), (iv), (v), (vi), and (vii).

The initial and conspicuous advantage of the objectivist approach is that it seems to account for collective apparitions more easily than the telepathic alternative. If (as subjectivists maintain) apparitions are internally generated hallucinations created in response to a telepathic stimulus, it's not clear, first, why more than one person would *simultaneously* have such an exceptional experience, and second, why the content of the various hallucinations would correspond at all, much less in the manner of the ordinary impressions of physical objects. This issue seems especially acute when we recall that telepathy must be at least a two-stage process and that

the second stage may be both delayed and contaminated by idiosyncrasies of the percipient's psychology. (More on this shortly.)

Another problem for telepathic accounts is posed by so-called *reciprocal* cases, the prototype of which is as follows. Agent *A* experiences an OBE (out-of-body experience) in which he ostensibly "travels" to percipient *B*'s location and is subsequently able to describe features of the state of affairs there that he could not have known by normal means. *B*, meanwhile, experiences an apparition of *A* at that location. (In a few instances, others on the scene also experience *A*'s apparition.) Moreover, the details *A* describes are those that would have been visible *from the position* at which his apparition was ostensibly seen. Usually the apparition is visible only, but sometimes it's also sensed aurally and tactually.

The difficulty presented for telepathic accounts concerns the status of *A*'s apparition. That apparition seems to be where *A*'s consciousness is, because from that position one would normally see the things *A* reports seeing while ostensibly out of his body. But of course, *B* is not located at that position, although he's in the general vicinity. The problem, then, is that according to subjectivists the apparition of *A* is *B*'s hallucination. It's supposed to be something *B* creates in response to a telepathic stimulus from *A*. Therefore, it's unclear (i) why *B* should create an apparition where *A*'s consciousness seems to *A* to be, and (ii) why *A* seems to be sensorially aware of information from a position not occupied by *B* but ostensibly occupied by *A*'s consciousness (or so-called secondary or astral body). The difficulties will be further compounded in collective cases, in which more than one percipient experiences *A*'s apparition.

One last difficulty for telepathic explanations generally concerns what Broad terms "reiterative" cases, in which the apparition appears more than once in a single location occupied by a series of different individuals. Cases of this sort are frequently considered examples of *haunting*.

Collective Apparitions

Telepathic explanations of collective apparitions have taken various forms, and in all of these the explanatory hurdles mentioned briefly above emerge very clearly. One of the earliest theories was proposed by Edmund Gurney (Gurney, Myers, & Podmore 1886); I call it the *Shotgun Theory*. According to this theory, agent A telepathically influences percipients $B_1 \ldots B_n$, *each independently*, and each B_i thereafter responds to the telepathic stimulus by creating an apparition.

Gurney was quick to recognize certain outstanding problems with the Shotgun Theory (although he seemed surprisingly oblivious to their persistence in his own alternative theories). He noted that every

hallucination—whether telepathically initiated or not—is partially a construct of the individual experiencing it. When a person hallucinates, he presumably employs material from his own idiosyncratic supply of past experiences and repertoire of images and symbols. But then it seems unlikely that people simultaneously stimulated by a telepathic agent would have very similar or concordant hallucinations.

Another problem is posed by the well-known phenomenon of *telepathic deferment*. For example, cases of crisis apparitions and modern experiments in dream telepathy suggest that there may be a period of latency between the "sending" of a telepathic "message" and the subsequent telepathic experience of the percipient. In fact, the evidence suggests that the emergence into consciousness of (or the behavioral response to) a telepathic stimulus frequently occurs when that event is convenient or otherwise appropriate relative to ongoing background events or the subject's state of mind. For example, many cases indicate that the subject's response is delayed until a time of repose or relaxation, or at least to a time when surrounding events are not particularly distracting. But then it seems unlikely that different people, affected by the same telepathic stimulus, would hallucinate at the same time.

Indeed, as long as we accept the apparently plausible assumption that telepathy is at least a two-stage process, with an *interaction* (stimulus) stage preceding a *manifestation* (response) stage, the problems posed for the Shotgun Theory by simultaneous and similar experiences seem both serious and ineliminable. One would think that the experience of (or response to) any stimulus, telepathic or ordinary, permits the operation and interference of internal causal processes *independent* of those producing the stimulus—in particular, processes *idiosyncratic* to the subject.

Gurney's original alternative to the Shotgun Theory is usually called the *Infection Theory*. He suggested that agent *A* telepathically influences primary percipient B_1 (in whom he's particularly interested), and while B_1 (in response to the telepathic stimulus) creates his own apparent sensory image to himself, he in turn acts as a telepathic agent, causing others in his vicinity to have similar experiences. Thus, the principal difference between the Shotgun and Infection Theories is that in the latter the secondary percipients $B_2 \ldots B_n$ are affected telepathically by a person at their own location, rather than by a remote agent.

Of course, the spatial proximity of B_1 to $B_2 \ldots B_n$ makes it no easier to understand why the experiences of all the percipients should be simultaneous with or similar to each other. Gurney's points about the cognitive elaboration or contribution of the percipient and about telepathic deferment apply with equal force to the Infection Theory. In fact, if the

telepathic infection spreads from $B_2 \ldots B_n$, and then from B_2 to B_3, etc., the scenario envisioned in the Infection Theory seems to resemble that in which a person tells a story or phrase to another, who then repeats it to yet another, and so on. But of course, that's notoriously a process in which the story or phrase tends to change, often dramatically.

Moreover, as Myers noted, if the Infection Theory were on the right track, we'd expect to find cases of *non*-telepathic hallucinations (e.g., arising from purely intra-subjective causes) spreading by telepathic infection to others in the vicinity. But, as Myers also observed, there are no clear cases of this.

The only other major telepathic explanation is the one proposed by Tyrrell, which I've called the *Extravaganza Theory*. Tyrrell claimed that collective percipience could be accounted for in terms of requirements for *dramatic appropriateness*. He suggested that the apparitional drama is something a telepathic agent manipulates unconsciously, trying to make it as realistic as possible by having the apparition fit (or appear to fit) smoothly into the physical environment of the percipient. But of course, in some cases others are present in this environment, and accordingly they get *drawn into* the drama. More specifically, he suggested that agent *A* telepathically affects primary percipient *B*, and then *B*, in creating his apparitional experience, does whatever is necessary to render it dramatically appropriate. Moreover, since *B* is sometimes in the company of other people, it would be appropriate for at least properly situated members of that group also to experience the apparition. So *B* accordingly creates in them the appropriate apparitional experience.

There's no need here to go into further detail about this approach, because the Extravaganza Theory seems to combine elements of both the Infection and Shotgun theories and shares their inability to explain plausibly the similarity and simultaneity of the percipients' experiences. This is especially clear in light of Tyrrell's avowed sympathy with Gurney's notion of telepathic deferment. (But for a discussion of some interesting side issues that don't in any way help the Extravaganza Theory, see Braude 1997.)

The Virtues of Objectivity

The alternative approach I've argued for, particularly for collective cases, is that apparitions in these cases are products of living-agent, or possibly postmortem, PK, continuous with (if not similar to) other reported examples of ostensible materialization. Clearly, an objectivist approach handles the troublesome issues of simultaneous and concordant experiences with no strain whatever. If the various percipients are responding sensorially to an object located in the region of space apparently occupied by the apparition,

then it's easy to understand why their experiences would occur at the same time and correspond in content. After all, ordinary sensory responses to objects in one's environment seldom (if ever) display the dramatic forms of deferment noted in telepathic cases. Moreover, if the objects observed are less like solid bodies and more like colored wisps of gas, rainbows, mirages, or electromagnetic fields, it's no mystery why only some potential percipients report experiencing the apparition. The major mystery, of course, would concern the precise nature of the apparitional objects and their means of production. But since PK is no better understood than telepathy, that nagging mystery poses no problem unique to objectivist accounts.

And it's not just collective cases that may be particularly amenable to an objectivist interpretation. Reiterative cases are also easily explained in terms of the persisting presence at a location of some kind of entity. Of course, it's no easy matter to say what that entity is, and accounts may have to vary between apparent postmortem cases (i.e. ghosts) and ante-mortem cases. But if it seems unparsimonious to posit an enormously complex and arguably miraculously successful web of telepathic interactions and responses to explain why different percipients on different occasions—often independently—have similar apparitional experiences at a given location, then we may have no choice but to swallow the bitter pill and posit the existence of an appropriate entity at that location. I suppose we might find some solace in the reflection that the positing of novel entities is a familiar and thoroughly respectable move in scientific theorizing. The existence of microorganisms and carriers of hereditary organic traits were posited before they were actually detected, and theoretical physics virtually lives by its readiness to enlarge the directory of entities.

As you might expect, there are subtleties to all the issues surveyed here which go beyond the scope of this Editorial, but which I've addressed at length elsewhere (Braude 1997). For now, I hope this brief introduction to the topic encourages readers to examine the issues in greater depth.

—Stephen E. Braude

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RESEARCH ARTICLE

Imagination and Reactance in a Psi Task Using the Imagery Cultivation Model and a Fuzzy Set Encoded Target Pool

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Abstract—A psi-conducive altered state of consciousness can be induced through a shamanic-like journeying protocol in accordance with the Imagery Cultivation (IC) model proposed by Storm and Rock (2009a). Storm and Rock (2009b) found that the protocol helped *cultivate* psi-related mental *imagery*. Alternatively, it is hypothesized that individuals who do *not* believe in psi or paranormal phenomena (i.e. 'goats') are prone to so-called reactance (Brehm 1966). Reactance is a motivational state aimed at restoring one's sense of freedom when one feels threatened (Silvia 2005). A reactance treatment in the form of an opinionated communication (perceived as a threat to freedom) can raise reactance, which remains high if no outlet is provided. This induced effect can result in a noncompliant attitude and response, purely as a knee-jerk reaction to the threat. It is hypothesized that higher noncompliant behavior (e.g., psi-missing) can be induced in goats. Storm, Ertel, and Rock (2013) and Storm and Rock (2014) found support for the reactance hypothesis. IC and Reactance principles were used in the present study to manipulate psi in positive and negative directions, respectively. Four groups (total $N = 240$) were formed: (i) IC/Reactance, (ii) IC/No-Reactance; (iii) No-IC/Reactance, and (iv) No-IC/No-Reactance. The IC treatment produced a non-significant but slightly higher psi effect than the control condition. The reactance treatment had a stronger psychological effect on goats compared with sheep, indicated by a significantly greater discrepancy in goats over the opinionated communication. Significant reactance effects were not found, but specific effects were in the directions expected, with reversals of effects probably due to goats and 'indecisives' (mid-range scorers on paranormal belief) in the No-IC/Reactance group. A marginally significant sheep–goat effect was found. Replication attempts would be worthwhile that include refinements to the various IC conditions, and a less persuasive (more challenging) reactance communication.

Keywords: imagery cultivation—paranormal belief—reactance—psi—precognition—sheep–goat effect

Introduction

The psi-conduciveness of an altered state of consciousness known as imagery cultivation (IC) needs validation through further testing. This IC state is induced through a shamanic-like journeying protocol which, in this planned study, is a modified form of the standard protocol advanced by Storm and Rock (2009a) in their IC model. The protocol is designed to facilitate and stimulate the imagination, thereby encouraging and cultivating the production of images from the unconscious, said to be the source of psi images. In two studies (Rock, Storm, Harris, & Friedman 2012, Storm & Rock 2009b), psi (clairvoyance) effects above mean chance expectation (MCE) were produced following the IC treatment, whereas control hit rates were at chance. In fact, IC is argued to be suitable for facilitating any kind of ESP effect including precognition and, insofar as a participant is engaged in a psi task requiring (in this planned study) the paranormal identification of a future target image, it is theorized that real-time cultivated images correlate with their respective future target images to a degree greater than MCE.

It is also theorized that sheep comply with experimenter's instructions, whereas goats do not, which is why psi believers ('sheep') and skeptics ('goats') tend to psi-hit and psi-miss, respectively. Noncompliance from goats may explain psi-missing as a so-called 'boomerang effect' which is a form of 'reactance'. According to Reactance Theory (Brehm 1966), an individual's freedom, if threatened by coercion by way of a reactance prime, may result in reactance, which is "a motivational state aimed at restoring the threatened freedom" (Silvia 2005:277). The reactance prime is a persuasive, vaguely threatening communication or message (see Silvia 2005) presented surreptitiously as basic information about a relevant task. The threatening messages usually take the form of statements such as ". . . when you think about it you are really forced to agree with me because this is a universal student issue" (Silvia 2006:676).

Storm, Ertel, and Rock (2013) were the first to explore reactance effects in parapsychology. In a forced-choice study, they found that the psi performance of reactance-treated goats was significantly worse than control goats. Storm and Rock (2014) replicated the effect in an *I Ching* study using an RNG–PK task. In addition, Storm and Rock (2014) and Storm (2016) have found that trait reactance tends to moderate the relationship between paranormal belief and psi. Reactance effects, however, have not been tested in a free-response design.

In this present study, the positive effects of imagery cultivation on psi performance, and the negative effects of reactance on psi performance, were sought in a precognitive picture identification task, which required

participants to identify future target pictures, after being randomly administered (or not) the shamanic-like journeying protocol (i.e. imagery cultivation treatment) and/or a reactance treatment. That is, in a 2 × 2 factorial design, it was planned that participants would be randomly assigned to one of four groups: (1) IC/Reactance; (2) IC/No-Reactance, (3) No-IC/Reactance, or (4) No-IC/No-Reactance (controls). All participants would complete a precognition trial with success indicated by a direct hit (where the randomly generated future target picture is ranked #1 by the participant). Participants in the IC group should perform the best; and participants in the Reactance group should perform the worst. Sheep–goat effects are also hypothesized.

The present study uses a target pool of 300 pictures compiled by May (2007; see also, May et al. 2012). May et al. (2012) argued that a quantitative description of imprecise (conceptually vague or 'fuzzy') target material is possible by applying a mathematical analysis to analysts' ratings of photographic images. The images were encoded on a range of descriptive elements, and then cluster analysis was used to make sure images fell into distinctive categories. Categories within a group are orthogonal to (independent of) each other, so that each target set comprises five pictures that bear virtually no similarity to each other, yet pictures within a category are strongly related. If, for example, the randomly selected target picture is one of five pictures from the Canyons Category (Category 2, Group 1), then each of four decoys (for a "$k = 5$" design) must be randomly drawn from each of the four remaining categories in Group 1 (i.e. Bridges, Cities, Oriental Structures, and Waterfalls). Thus, orthogonality facilitates the judging and ranking processes by eliminating the idiosyncrasies present in conventional target sets which complicate the judging and ranking processes.

The Imagery Cultivation Model

Shamanic-like journeying treatments may facilitate a creative process in the unconscious—arguably a reservoir of psi images. Following that principle, the imagery cultivation (IC) protocol (Storm & Rock 2009a) encourages cognitive activity in the form of generating visual images. In two clairvoyance studies (Rock, Storm, Harris, & Friedman 2012, Storm & Rock 2009b), psi effects above MCE have been produced using the protocol, whereas control hit rates were at chance. The psi test in both studies was a picture-identification task featuring simple hand-drawn images first used by Thalbourne (1981). It is noted, too, that Rock, Storm, Harris, and Friedman (2012) made variations to the protocol that initially featured voiced instructions plus a shamanic-drumming component and relaxation. The two

modified IC treatments were voiced instructions without drumming, and drumming without voiced instructions. These two variations also yielded psi responses above chance.

The closest current parapsychological procedure that is methodologically comparable to IC is the Ganzfeld procedure (Storm, Tressoldi, & Di Risio 2010), and psi effects in both designs are comparable in strength (see Rock, Storm, Harris, & Friedman 2012, Storm & Rock 2009b). However, there are theoretical divergences (e.g., ganzfeld is a cognitively passive process, whereas IC is a cognitively active process). Also, IC is more cost-effective and less labor-intensive to implement in the laboratory.

The Sheep–Goat Effect

Schmeidler (1945) proposed that participants in psi experiments either believed in the demonstrability of ESP (so-called 'sheep'), or they rejected the possibility (so-called 'goats')—'sheep' tend to psi-hit; 'goats' tend to psi-miss (see the meta-analysis by Storm & Tressoldi 2017, for evidence of such effects; see also Palmer 1971, 1977). Although Storm (2003, 2006, 2008) also found significant sheep–goat effects with the Rasch-scaled version of the Australian Sheep–Goat Scale (RASGS; Lange & Thalbourne 2002, Thalbourne 1995), it is a mostly untested assumption that psi-missing is the product of goats attempting to disprove the psi hypothesis by avoiding the psi target. Parapsychologists agree that sheep tend to comply with the experimenter's instructions and thus seek to psi hit, but psi studies are not designed to elicit the worst possible performances from goats because experimenters never ask goats *not* to comply (they merely expect it). The disadvantage to parapsychological knowledge is that the sheep–goat effect is never demonstrated to its full effect.

The issue that then arises from this disparity has been pointed out by Steinkamp (2005) who wondered whether the sheep–goat effect could be attributed to "goats tending to perform significantly badly, with sheep scoring at chance, or to sheep performing significantly well with goats scoring at chance (or something in between these two alternatives)" (pp. 152–153). If the experimenter seeks to measure psi-hitting in sheep and *psi-missing in goats*, the experimenter must refrain from using biased protocols that only encourage sheep to perform in the direction of psi-hitting, but do nothing to push goats' psi-performance in the direction of psi-missing. Until that is done, experimenters will draw false conclusions about goats' psi performance based on studies clearly designed to get the best out of sheep.

Evidence that goats can be manipulated into changing their psi performance comes from a study by Storm and Thalbourne (2005). They found that goats who adopted a newfound belief in psi produced a shift from

chance scoring to psi-hitting. Conversely, a way to test psi-missing in goats would be to manipulate reactance (discussed next). If this manipulation is successful, then the assumption is supported that goats have a motive that is antithetical to that of sheep.

Reactance Theory and Goats' Behavior

It is found that if attitudinal or behavioral freedom is threatened or reduced, a person becomes motivationally aroused (Kraus 1995, Smith 1978, Worchel & Brehm 1970, Wright 1986). This arousal generates psychological reactance where the individual adopts a noncompliant attitude, or engages in noncompliant behavior on the assumption that freedom will be restored (Brehm 1966, Brehm & Brehm 1981, Dillard & Shen 2005, Miller et al. 2006, 2007, Silvia 2005, 2006). Silvia (2005) showed that reactance was highest in the group that felt the most threatened by the content of an opinionated communication (i.e. a reactance prime). Silvia (2006) then found that disagreement directly motivated by a threat declined when the threat was removed.

To test reactance theory on goats, parapsychologists will also need a reactance treatment (i.e. reactance prime) in the form of an opinionated communication. According to reactance theory, the treatment will raise reactance, which will remain high if no outlet is provided, and since there is a relationship between attitude and behavior (Ajzen 1985, Kraus 1995), we can expect increased noncompliant behavior in goats under threat due to a change in attitude toward psi, which may thus yield increased target avoidance and therefore shifts from chance hitting to psi-missing.

Storm, Ertel, and Rock (2013) and Storm and Rock (2014) found support for their hypothesis: A reactance treatment, which is a priming communication read by participants before psi testing, brought about a significant reactance effect—reactants scored significantly lower than controls on a psi test (also, reactant goats generally scored lower than control goats, control sheep, and reactant sheep).

The same free-response procedure used by Rock, Storm, Harris, & Friedman (2012) and Storm and Rock (2009b) will be followed in this planned study, but the target pool created by May et al. (2012) will be used (see also May 2007). Also, the IC procedure will include the vocal treatment only (no drumming; also known as 'sonic driving'), since it was found that voiced instructions (also known as 'guided imagery') produced the strongest psi effects. Meditative musical tonalities will also be featured as background to the voiced instructions.

Hypotheses

Hypothesis 1. There is (i) an IC Main Effect (i.e. IC-treated individuals score higher than No-IC–treated individuals on Direct Hitting, which is the Dependent Variable [DV]); (ii) a Reactance Main Effect (i.e. reactance-treated individuals score lower than no-reactance–treated individuals on the DV); (iii) a Sheep–Goat Main Effect (i.e. sheep score higher than goats on the DV); and (iv) a Discrepancy Main Effect (i.e. 'Discrepants' score lower than 'non-discrepants' on the DV). (Trait Reactance is controlled as a covariate in a Univariate ANCOVA test.)[1]

Hypothesis 2. There is a positive relationship between psi scoring and RASGS scores (data tested using Pearson's *r*).

Methods

Participants

First-year psychology students, who signed up online, were tested, and they received credit for participation as part of their curriculum program (the recruitment method used is the Research Participation System set up by the School of Psychology, University of Adelaide).

There were a number of participants who became aware of the project through online advertisements on various university websites. They contacted the principal investigator (L.S.) via SMS or email so that a suitable day and time for testing could be arranged.

Also, a 'ballot box' and invitation letters were placed in various locations on the University of Adelaide campus. Participants dropped contact slips into the box, and L.S. collected these slips on a daily basis. The study was approved by the School of Psychology Human Ethics Subcommittee (Approval Code Number 16/96).

Median score was used to demarcate the 'goats' group from the 'sheep' group. Reactants and Controls were randomly assigned (see ***Procedure*** section for details).

Measures

(1) Australian Sheep–Goat Scale (Thalbourne 1995): An 18-item scale measuring belief and alleged experience of paranormal phenomena. Each item scores: 0 points = False, or 1 point = Uncertain, or 2 points = True (Raw Range is 0 to 36; Raw Mean = 18). The ASGS data are then top-down purified (two items are removed; items #9 and #10) to eliminate age and gender bias from the scale (Lange & Thalbourne 2002), and this procedure alters the scoring range and mean. In this study, Cronbach's alpha = 0.94.

(2) Hong's Psychological Reactance Scale (Hong & Faedda 1996): An 11-item scale measuring individual differences in reactance proneness (i.e. trait propensity to experience psychological reactance). For example, "Regulations trigger a sense of resistance in me." For each item, participants respond on a 7-point Likert scale ranging from 1 = Strongly Disagree to 7 = Strongly Agree. Hong and Faedda reported a Cronbach's alpha of 0.77. In the present study, Cronbach's alpha = 0.83.

(3) Discrepancy Scale (Smith 1978): A single-item, "Which position best reflects your position on the previous statement", scored on a 31-point scale, ranging from Strongly Agree = 0 [least discrepant] to Strongly Disagree = 31 [most discrepant]). The score indicates the degree to which a percipient's initial attitude is discrepant from the recommended position regarding the threatening communication.

Materials

Computer program containing the following pages: (1) Instruction page; (2) Consent page; (3) Demographics page; (4) Australian Sheep–Goat Scale (ASGS); (5) Hong Psychological Reactance Scale (HPRS); (6) Short Communication (two versions: Reactance condition and No-Reactance condition—only one is displayed randomly per participant, plus the Discrepancy Scale at the bottom of the page; and (7) Page for five photographs with rank scoring boxes for each photo (see Step 4 in *Procedure* below). Pages (4) and (5) are presented randomly.

Apparatus

(1) A gallery of 300 photographs compiled by May (2007) from the Corel Stock Photo Library of Professional Photographs. The picture set consists of 12 Groups × 5 Categories × 5 photographs = 300 photographs;

(2) A true-noise Random Number Generator (Schmidt 1970, 1992). The RNG was purpose-built by Helmut Schmidt (dimensions: 25 × 30 × 7.5 cm). On the face side are 12 green lamps in a circular array and a red LED score-display in the centre.

Procedure

Step 1 (all 240 participants): Instructions outlining the experiment were presented onscreen, and if participants chose to participate they moved to another page that listed a series of consent statements. Participants then completed the ASGS and the HPRS.[2]

Reactance Stage (all 240 participants): Participants read the onscreen communication (see Storm, Ertel, & Rock 2013). This communication is a modified version used by Silvia (2005), and was presented surreptitiously as basic information about participating in a psi study:

> This short communication was written by a university professor: This Picture ID Task has been developed in parapsychology over many decades and I claim that it is the best of all procedures that have hitherto been applied in parapsychology. I am utterly convinced that psi exists and that participants cannot avoid letting their psi power come to the fore when they correctly predict a randomly generated target picture. Every person, I claim, is expected to display such power. *I know I have persuaded you about this. I know you agree with my opinion. In fact, you're really forced to agree because university students can't have differing opinions on this issue.*

The additional italicized sentences are the threatening elements; they were not italicized in the study, and were only presented in the reactance condition (n = 120). All 240 participants rated their reactions to the communication by completing the Discrepancy Scale.

IC Stage (all 240 participants): Via on-screen message, 120 participants were (i) informed that they would undergo the IC visualisation procedure (duration: 9½ minutes; the 120 participants who did not go through the IC treatment went straight to Step 2); (ii) instructed to wear an eye mask and recline in their chair; and (iii) listened to pre-recorded instructions on CD adapted from Harner (1990:32)—e.g.,

> You are now reaching the end of the Tunnel . . . you will see a set of doors . . . now visualise the doors in front of you . . . Now push open the doors . . . Now visualise the future target photograph before you . . . Study the photograph in all its detail . . . Remember this information for later.

After the IC procedure, via an onscreen message, participants were instructed to make notes (mentation) about their impressions of the future target. Of course, at this stage, neither the participant, nor L.S., knew what the target was since it had not yet been generated.

Step 2 (all 240 participants): This procedure encouraged direct conscious participant interaction using a Schmidt RNG to generate target sets and targets. While ostensibly precognitive (target selection came before target generation) and not overtly psychokinetic, operationalizing the task this way encouraged crossover psi effects where "precognition could actually be psychokinesis" (Millar 2015:165, see also Storm & Rock

2014). The design may therefore be more facilitative of psi compared to conventional psi tasks.

The target set was generated using the RNG in "Roulette Mode" (i.e. the green lights switch from 'on' to 'off' in a clockwise motion, and randomly stop on a number, thus mimicking the movement of a roulette wheel). The selection procedure followed May et al.'s (2012) recommendation. The RNG was used to select randomly one group of twelve, followed by one photo from each of five categories in that group, from the fuzzy set encoded target pool totaling 300 photographs (May et al. 2012). The RNG lights were numbered G1 to G12 for Group, two rounds of C1 to C5 for Category (only RNG outcomes between C1 and C5 inclusive were used for Category, so some participants had to repeat the run as two of the 12 lights were necessarily excluded and said "Spin Again"). In total, six randomly generated numbers (G + C1 + C2 + C3 + C4 + C5) were entered into the computer, thus identifying the target set of five photos for automatic onscreen presentation for participants to rank (target selection was not performed until Step 4).

Step 3 (all 240 participants): Ranking—once the set of five photos appeared onscreen, the experimenter instructed the participant to rank the five photographs from 1 to 5 (#1 = 'most likely' photo the RNG will select, to #5 = 'least likely' photo the RNG will select). Those in the IC-procedure ranked photos according to how well they matched the mentation; participants were permitted to re-read their mentation, in order to prompt their memory, thereby assisting them in the ranking. The experimenter (L.S.) did not offer personal interpretations of the mentation as this might have misled participants. The experimenter made sure that the participant typed the respective rank number under each of the five photos.

Step 4 (all 240 participants): The target photograph was generated using the "C1 to C5" procedure again on the RNG to generate an RNG light number (between 1 and 5 inclusive). This target was one of the five already selected and ranked (MCE = 20%). The RNG light number was typed into the computer. The computer found the associated rank number for that photo, and automatically presented it as feedback to the participant (if the photo was ranked #1, it was a Direct Hit). The participant was debriefed.

Results

The planned sample of 240 participants had a mean age of 25 years (*SD* = 11 years); 93 males; 147 females. The group divisions were:

- IC condition = 120 participants (61 in the Reactance treatment; 59 in the No-Reactance treatment);
- No-IC condition = 120 participants (60 in Reactance; 60 in No-Reactance).

Hit rates for the four groups in percent where Mean Chance Expectation (MCE) = 20%:

- IC + Reactance ($n = 61$): Direct hit rate = 18.0% (11 hits, $z = -0.22$, $p = .413$);
- IC + No-Reactance ($n = 59$): Direct hit rate = 23.7% (14 hits, $z = 0.55$, $p = .291$);
- No-IC + Reactance ($n = 60$): Direct hit rate = 26.7% (16 hits, $z = 1.13$, $p = .129$);
- No-IC + No-Reactance ($n = 60$): Direct hit rate = 15.0% (9 hits, $z = -0.81$, $p = .209$).

These results are included only for interest as all four groups are relatively small, so the power to produce significant outcomes is greatly reduced, given that effect sizes in psi experiments tend to be weak.

Statistics for the three measures are as follows:

- Australian Sheep–Goat Scale (Rasch-scaled) Mean score = 22.13 (*SD* = 6.35); minimum = 8.13 (which matches the theoretical minimum); maximum = 39.55 (theoretical max. = 43.39). The distribution was normal. Median score = 22.44; used to determine 'goats' group (≤22.44; $n = 118$) and 'sheep' group (>22.44; $n = 122$);
- Hong's Psychological Reactance Scale: Mean score = 32.93 (*SD* = 6.24); min. = 12 (theoretical min. = 11); max. = 47 (theoretical maximum = 55). The distribution was normal. Pre-experimentally, trait reactance was significantly higher for sheep (33.89) than goats (31.73), $t(2.70) = p = .007$ (two-tailed). This result contrasts with Storm's (2016) finding that goats were higher on trait reactance;
- Discrepancy Scale: Mean score = 20.03 (*SD* = 8.30), min. = 0.31 (theoretical min. 0.00); max. = 31.00 (theoretical max. = 31.00). The distribution was significantly right-skewed. Goats (mean score = 23.92) expressed significantly greater discrepancy (i.e. stronger disagreement) with the reactance message than sheep (mean score = 16.00), $t(238) = 8.40$, $p < .001$ (two-tailed).

Planned Analyses

Hypothesis 1. There is (i) an IC Main Effect; (ii) a Reactance Main Effect; (iii) a Sheep–Goat Main Effect; and (iv) a Discrepancy Main Effect. (Data tested with a Univariate ANCOVA test.)

(i) The direct hit rate for the IC group was 21.0% which is higher than the hit rate of 20.7% for the No-IC group. These percentages are in the directions expected. However, the IC effect only approached significance, $F(1, 223) = 1.29$, $p = .128$ (one-tailed).

(ii) The direct hit rate for the Reactance group was 22.3% which is higher than the hit rate of 19.3% for the No-Reactance group. These percentages are *not* in the directions expected (see ***Post Hoc Analysis*** section which looks at possible sources of the disparity). The difference is not significant, $F(1, 223) = 1.84$, $p = .176$ (two-tailed).

(iii) The direct hit rate for sheep was 22.0% (above MCE), which is higher than the hit rate of 19.7% (below MCE) for goats. These percentages are in the directions expected. However, the sheep–goat effect is not significant, $F(1, 223) = 0.10$, $p = .376$ (one-tailed).

(iv) The direct hit rate for 'discrepants' was 16.8% which is lower than the hit rate of 24.8% for 'non-discrepants'. These percentages are in the directions expected. The difference is marginally significant, $F(1, 223) = 2.27$, $p = .067$ (one-tailed).

Hypothesis 2. There is a positive relationship between psi scoring and RASGS scores (data tested using Pearson's r). For the whole sample, the relationship was positive, but weak and only marginally significant, $r(238) = .10$, $p = .069$ (one-tailed).

Post Hoc Analysis

Storm and Rock (2014) and Storm (2016) have found that mid-range scorers on paranormal belief (measured on the RASGS), also referred to as 'indecisives', perform differently under the reactance treatment compared with sheep and goats condition. Sometimes indecisives even score better than sheep on psi tasks, and this difference is shown again in the present study (see dotted line in Figure 1 below).

Having midway paranormal belief scores, indecisives are undecided about their beliefs, which may be reflected in their psi performance, and

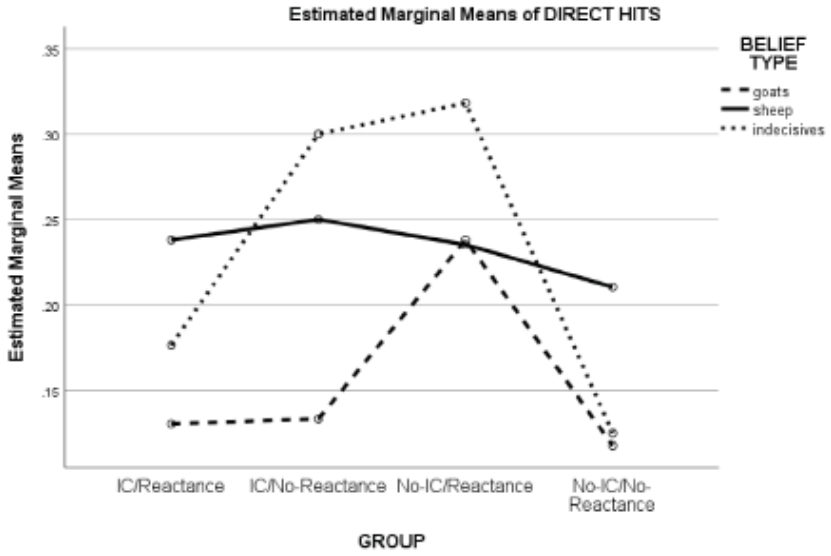

Figure 1. Direct hits rates for the four groups: (i) Imagery Cultivation (IC) + Reactance; (ii) IC/No-Reactance; (iii) No-IC/Reactance; and (iv) No-IC/No-Reactance.

how they respond to the reactance treatment—it is as if they are easily persuaded by a threatening message when we might expect that they would reject it. We see too that the IC treatment on its own (and no reactance treatment) appears to be effective for indecisives. In other words, the persuasive effect of the reactance treatment seems to be canceled out when IC is introduced. In future studies, it may be necessary to reword the message in the reactance treatment so that it is less persuasive, and more of a threat to freedom. Indeed, Wright (1986) introduced low-threat and high-threat communications to participants who originally expressed partial or full agreement with an attitudinal position, but only those participants who expressed full agreement, *and were in the high-threat condition*, indicated a reactance effect (i.e. negative attitude change).

Discussion

Using a Picture Identification Task, and the shamanic-like journeying protocol that accords with Storm and Rock's (2009a) Imagery Cultivation Model, and following the principles of reactance theory (Brehm 1966), this study sought insight into two factors: (i) the psi-enhancing effects of Imagery Cultivation; and (ii) the detrimental effects of Reactance on psi

performance (with special focus on goats). Hypothetically, participants who express extreme disagreement (Smith 1978) with a reactance prime should shift against the position advocated in a threatening message, so it was necessary to introduce another measure—discrepancy—in order to ascertain (by way of a self-report measure) the degree to which participants were affected by the reactance manipulation. It was also necessary to measure and control trait reactance using Hong's Psychological Reactance Scale (Hong & Faedda 1996), as trait reactance can vary significantly between sheep and goats.

Test results for Hypothesis 1 are mostly encouraging—three of the four effects are in the directions expected. Two effects ('Imagery Cultivation' and 'Discrepancy') are in the direction hypothesized and can be said to be approaching significance given that the groups are not large. Time constraints limited testing to 60 participants per group. Interestingly, a preliminary finding showed the reactance treatment had a stronger psychological effect on goats than on sheep, indicated by greater disagreement (bigger discrepancy) for goats. Thus, the discrepancy measure can indicate degree to which the reactance treatment affected psi—if the threatening message does not bother participants, they tend to perform significantly better. Even so, the reactance treatment showed a reversal in this study (not so in past studies; see Storm, Ertel, & Rock 2013, Storm & Rock 2014). The reversal is likely due mainly to indecisives and goats in the No-IC/Reactance group.

The IC treatment produced a slightly higher psi effect, but it was not strong enough to be significant. It cannot be ascertained at this stage whether the change in the protocol (shortening the duration of the treatment from 19 minutes to 9½ minutes, slight changes to the instructions, relaxing meditative musical tonalities, and deletion of the drumming component) had an adverse effect on psi performance. Comparisons of the two treatments should be undertaken in a future study.

The result for Hypothesis 2 suggests that the sheep–goat effect, though it is positive and marginally significant, is weaker than might be expected. It is noted that the corresponding sheep–goat difference reported in the results for Hypothesis 1(iii) was expected, but the effect was not significantly different. However, a salient sheep–goat effect is illustrated in Figure 1, mostly following expectations, particularly with regard to the two treatments. Sheep generally perform better than goats on the psi task. Also, the reactance treatment generally affects goats but not sheep whose psi performance is fairly consistent across treatment regimes.

It would be worthwhile to conduct a replication study that includes: (i) repeated-measures testing with at least two imagery cultivation conditions counterbalanced (including the one used in this study, and the one used

by Storm & Rock 2009b); (ii) a revision of the 'threatening' reactance communication so that it is less persuasive (more threatening); and (iii) more precise measures of reactance.

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Notes

[1] There is some evidence that goats may be more pre-experimentally reactive (Storm 2016), so trait reactance was controlled as a covariate. In the present study, trait reactance is measured using the Hong Psychological Reactance Scale (Hong & Faedda 1996).

[2] Other scales were administered for a later study: two versions of the Spiritual Emergency Scale—'forced-choice' (yes/no; Goretzki, Storm, & Thalbourne 2014) and 'Likert scale' (Storm & Goretzki 2016)—for psychometric purposes, and the Reality Testing subscale of the *Inventory of Personality Organization* (IPO-RT; Lenzenweger, Clarkin, Kernberg, & Foelsch 2001).

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RESEARCH ARTICLE

Homeopathy and the Action of Meaning: A Theoretical Approach

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Abstract—The purpose of this paper is a theoretical one. It does not enter the debate of evidence-based medicine (EBM) about the validity of meta-analyses including pooled data from placebo-controlled clinical trials of homeopathy and the result of epidemiological clinical studies about the success of homeopathic treatments. The paper tries to answer the question of why extremely highly diluted substances may be able to result in a medical reaction in a patient even if no single molecule of the used substance is present in the medicament. This paper describes the Model of Pragmatic Information (MPI) and the Generalized Quantum Theory (GQT) and how they can be applied to describe properties of homeopathic treatment. From the point of view of the MPI and the GQT, homeopathic treatment and medicaments are "pseudo-machines." The Model of Pseudo-Machines (MPM) includes sociological, psychological, physical, and causal—as well as non-causal (entanglement) processes that are relevant for the (homeopathic) treatment. This means that the properties of pseudo-machines can clearly be distinguished from placebos. In terms of MPM, placebos can be considered as a specific form of pseudo-machine. On the other hand, MPM is able to explain the limitation of double-blind, placebo-controlled studies in medicine, complementary medicine (CM), and elsewhere. Finally, the paper describes an experimental method (the Correlation Matrix Method, CMM), a way that the operation of pseudo-machines can be tested empirically. Furthermore, this method allows the distinguishing of causal and non-causal processes in medical treatments in general and is not limited to homeopathy but could serve as a new approach in EBM.

Keywords: Evidence-based medicine—complementary medicine—self-organization—NT axiom—Model of Pragmatic Information—macroscopic entanglement—Generalized Quantum Theory —pseudo-signals—pseudo-machines—homeopathy—Correlation Matrix Method —complementarity—organizational closure

Introduction

The controversy about homeopathy and other methods of complementary medicine (CM) is highly emotional and suffers from a strongly biased presentation in public mass media from both proponents and skeptics (Lucadou 1992a). It is obvious that this controversy goes far beyond the usual scientific debates about alleged anomalies and unconventional scientific claims because of ethical and commercial implications. Homeopathy is widely used not only by naturopaths but also by professional medical doctors and is accepted by many patients, as the Homeopathy Product Market report maintains (Transparency Market Research 2016). Usually it is argued that studies that fulfill the standards of Evidence Based Medicine (EBM) could not demonstrate a clinical effect of homeopathic treatment that goes beyond placebo effects. However, it is far beyond the scope of this paper to give an adequate overview about the state of the ongoing controversy. At least some authors (from mainstream science) argue that the presentation of homeopathy in mainstream medical journals suffers from data selection and is highly biased and unfair (e.g., see Hahn 2013). These authors concede that some clinical homeopathy studies show at least small but statistically significant specific treatment effects. (e.g., see Mathie et al. 2014, Milgrom & Chatfield 2012, Walach, Michael, & Schlett 2018).

In any case, these findings seem to be in contrast to individual reports of patients who present dramatic healing successes through homeopathic treatment after being given up on by conventional medicine. They usually deny possible suggestion effects or placebo effects. The following statement by a patient may serve as a typical example:

> More than 20 years ago, severe pain led me to visit a naturopathic cure. Beforehand I had a conventional medical treatment for several months, which had no effect. After taking a few granules, the pain was gone permanently. (Stieler 2018)

In this paper we do not enter the debate of EBM about the validity of meta-analyses including pooled data from placebo-controlled clinical trials of homeopathy and the result of epidemiological clinical studies about the success of homeopathic treatments. This paper tries to answer the question of why extremely highly diluted substances may be able to result in a medical reaction in a patient even if no single molecule of the used substance is present in the medicament. The crucial question is: Can the model explain why medical treatment "with nothing" in it produces such specific clinical effects and why the discrepancy between individual cases and placebo-controlled clinical studies is so large? Finally the model

should explain why replication studies often show a dramatic decline (or even a reverse) of the effect size.

The situation of homeopathy is in some respects comparable with the situation in parapsychology (Bauer & Lucadou 1988, Lucadou 1995b, 2000b, 2001a) where the claims of "mental action at a distance" such as "telepathy" and "psycho-kinesis" (PK) are investigated. The reports on individual spontaneous experiences show impressive effects (Lucadou 2003, 2010, Lucadou & Zahradnik 2004, Lucadou & Wald 2014), while the results of meta-analyses of experimental studies show often robust, but inconsistent and very small effect sizes (Radin & Nelson 1989, 2000, Bösch, Steinkamp, & Boller 2006, Beutler et al. 1987, Walach et al. 2000, 2004, Walach, Michael, & Schlett 2018, Witt et al. 2005).

In both homeopathy and parapsychology many theoretical approaches start from the assumption that a hitherto unknown process or signal causes the phenomena or effects. In parapsychology, researchers try to rule out any known and possible causal influence in order to find the alleged "psi signal" (May 1984, Lucadou 1986a,b). In homeopathy, however, only very high dilutions treat "with nothing," whereas low dilutions may have a real causal pharmaceutical effect (for instance on the immune system). This is an important difference (see below). Furthermore, homeopathic treatment—if applied "*lege artis*"—is a very individual treatment for each single patient, which cannot be blinded out as is required in EBM.

In contrast to these "signal" approaches, the present theoretical model which is used to describe the disturbing phenomenology of parapsychology and homeopathic treatment and its results (and possibly many other forms of CM) abandons the idea that special (but unknown) causal processes or signals may be responsible for the empirical results (Lucadou 1984, Walach 2002, 2003). It is based on ideas and concepts that have been developed in physics and biology from a system-theoretical perspective (Kornwachs & Lucadou 1975, 1977, 1979, 1982, 1984, 1985, Lucadou 1989a, Lucadou & Kornwachs 1975, 1977, 1980, 1983a,b). Insofar as it is not the aim of the model to deliver a "bottom-up" and reductionistic "explanation" of homeopathy, the model gives a theoretical and phenomenological description of the underlying processes using some concepts that are compatible with normal science and which already have been successfully applied in conventional issues. The model avoids specific ad hoc concepts and tries to find conclusions that can be tested experimentally.

The model we present here is called the Model of Pseudo-Machines (MPM) (Lucadou & Grösser 1998, Lucadou 2002a,b, 2009). It consists of two approaches, namely the Model of Pragmatic Information (MPI), which is an information-theoretical one, and the Generalized Quantum

Theory (GQT), which is a system-theoretical generalization of the structure of quantum theory in physics. The MPI (Lucadou 1974, 1987a, 1989b, 1995a,b) had been developed prior to the GQT and can be considered as a special case of GQT (Atmanspacher, Römer, & Walach 2002). The advantage of the MPM is that it can be applied both to artificial settings such as experimental and epidemiological studies as well as to spontaneous cases and individual medical histories.

Finally, the MPM can be examined by several experimental approaches. The Correlation Matrix Method (CMM) (Lucadou 2015a) which was developed on the basis of the MPI and the GQT has already been applied successfully in psychology and parapsychology. It seems that the CMM fits ideally in clinical tests in CM and EBM, because it allows the distinguishing of causal and non-causal processes in medical treatments.

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

Both models, MPI and GQT, are not completely independent and can be united to describe somewhat different aspects of the same situation. They both can be applied in normal psychology and in many other fields (Atmanspacher, Filk, & Römer 2004).

The basic assumption of both models stipulates that any description of nature must have a structure, which is isomorphic to the axiomatic structure of quantum theory.

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. Further, they hold from microscopic to macroscopic and even cosmological dimensions and also to any sort of physical observables regardless of which special field (electromagnetism, elementary particles, solid state physics, etc.) is considered. Furthermore, it can be shown that these axioms describe in a very general way how information (under the categories of space and time) can be obtained from any system if the interaction within the "measurement process" is not neglected. However, this does not necessarily imply that we can transpose without further assumptions the detailed structure of a special quantum physical system to another field as is done in some reductionistic models (e.g., Walker 1975, 1977, 1979, Mattuck & Walker 1979, Hameroff 1994).

The initial idea of GQT was described by the author in 1972 (Lucadou 1974, 1991a, 1998). A mathematical formulation of GQT was given by Hartmann Römer, Harald Atmanspacher, and Harald Walach in 2002

(Walach & Römer 2000, Atmanspacher, Römer, & Walach 2002, Filk & Römer 2010, Walach, Lucadou, & Römer 2014).

In GQT, the fundamental notions of *system*, *state*, and *observable* are taken over from ordinary quantum theory:

A *system* Σ 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.

A system is assumed to have the capacity to reside in different *states*. The notion of state also has an epistemic side, reflecting the degree of knowledge an observer has about the system. Unlike in ordinary quantum mechanics, the set $\boldsymbol{Z}$ of states is not assumed necessarily to have an underlying linear Hilbert space structure.

An *observable A* of a system Σ is any feature of Σ that can be investigated in a (more or less) meaningful way. Let $\boldsymbol{A}$ denote the set of observables. Just as in ordinary quantum mechanics, observables $A \in \boldsymbol{A}$ can be identified with functions on the set of states: Any observable A associates to every state $z \in \boldsymbol{Z}$ another state $A(z) \in \boldsymbol{Z}$. As functions on the set of states, observables A and B can be composed by applying A after B. The composed map AB defined as $AB(z) = A(B(z))$ is also assumed to be an observable. Observables A and B are called *compatible* or *commensurable* if they commute, i.e. if $AB = BA$. Non-commuting observables with $AB \neq BA$ are called *complementary* or *incompatible*. In ordinary quantum theory, observables can also be added, multiplied by complex numbers, and conjugated, and the set of observables is endowed with a rich structure called C^*-algebra structure. In GQT, observables can be multiplied only by the above composition. In Atmanspacher, Römer, and Walach (2002), GQT is characterized by a list of axioms.[1]

The most important aspect of the MPI (Lucadou 1984, 1987a,b,c, 1998, 1995, 2001b, 2002b, Kornwachs & Lucadou 1985) is the so-called "NT axiom" (Lucadou, Römer, & Walach 2007). It assumes that the origin of paranormal phenomena are not signals, but macroscopic entanglement (ME) correlations, which are created by the "meaning" (pragmatic information) of the situation. Further, the MPI and the GQT assume that these entanglement correlations cannot be used as signal transfers or causal influences. This axiom leads to a naturalistic explanation of decline effects and the displacement effects in parapsychology, psychology, and therapy research (Lucadou 1983, 1989b, 1990, 1991b, 2000b, 2001a). Lucadou, Römer, and Walach (2007) argue that the MPI is a subclass of the GQT.[2] In agreement with GQT, the MPI assumes that structure S and function F of a system are complementary observables. Formally, we can write the commutator:

$$[S*F - F*S] \neq 0 \text{ or } S*F \neq F*S \quad (1)$$

Which means that we will get different results in a measurement if we first measure the structure and then the function or vice verse (the character * means product). To any biologist who wants to investigate the behavior (function) or the anatomy (structure) of an animal, this statement sounds trivial.

The key concepts in the MPI are: pragmatic information, novelty, confirmation, autonomy, reliability, temporal dimensionality, and minimum action.

- 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 that is completely new for the receiving system.
- Confirmation (B): Aspect of pragmatic information that is already known by the receiving system.
- Autonomy (A): Behavior of a system that cannot be predicted.
- Reliability (R): Behavior of a system that 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 that cannot be avoided during a measurement or observation.[3]

The concept of pragmatic information has been developed to quantify the meaning of given information. It is assumed that the (potential) action that meaningful information exerts on a system can be used for such quantification. E. von Weizsäcker (1974)[4] proposed that pragmatic information could be written as a product of two observables that he called "Erstmaligkeit" E (novelty) and "Bestätigung" B (confirmation).[5]

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 that cannot be understood would not cause anybody to laugh (no confirmation), and a joke of yesterday would not do so either (no novelty). This includes the idea that pragmatic information is not a static, but a highly dynamic, process. The changes in the system are measured in terms of changes of complexity $\Delta C/\Delta t$ of the system (Kornwachs & Lucadou 1975, 1977, 1979):

$$I = R * A = E * B;\ I = f(C; \Delta C/\Delta t) \quad (2)$$

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. The value of i depends on the system and does not need to be a universal constant (like ħ in QT). This presupposes that systems have boundaries that define the "inside" and the "outside" of a system, the "endo-system" and the "exo-system." The exo–endo distinction was introduced by Hans Primas (1990, 1992) with respect to physical systems. The exo-perspective is the perspective of the experimenter or the critical observer in relation to the "object" that has to be observed or measured. The endo-system is, in contrast, the "real nature" in its ontic existence. He states: "Experimentally inaccessible ontic states are not meaningless . . . "

A concept to describe the boundaries of natural systems was introduced by Maturana and Varela (1981) and is called "organizational closure" (OC). Varela (1981) states:

> An organizationally closed unity is defined as a composite unity by a network of interactions of components that (i) through their interactions recursively generate the network of interactions that produce them, and (ii) realize the network as a unity in the space in which the components exist by constituting and specifying the unity's boundaries as a cleavage from the background.

It is interesting to remark that the concept of OC makes no sense from inside the (endo-) system. A necessary condition of OC is the self-organization of the system and a consequence is that OC is a self-stabilizing property (conservation of entanglement, see third law of MPI).

The most important difference between parapsychological experiments (such as "psycho-kinesis" PK-experiments) and experiments in other fields of science is that, due to the definition of parapsychological effects, any "normal causal" links between subject and target have to be ruled out, whereas in "normal" science the structure of such "normal causal" links is investigated. This is also the case in homeopathy if high dilutions are applied, since no causal effects of the applied substance can be expected. Of course, this definition is highly problematic, and it seems that most researchers in the field are beginning to share a common minimum consensus that paranormal effects (psi) could positively be defined as "meaningful non-local and non-causal ME correlations" between a living system and other (causally) separated systems (Lucadou 1984, 1991b).

Entanglement correlations are pattern matches within organizationally closed systems, measured from outside the system, and which are created by the relevant pragmatic information. The term non-locality / non-local means that an observable does not explicitly depend on time and distance (e.g., the importance of a personal relationship). Thus, one could redefine parapsychology—and to some extent homeopathy—as the investigation of "non-local effects in entangled living systems." The term "non-local" or "entanglement," however, is not just a new word for "something unknown" but has a quite definite meaning in the context of the axiomatic structure of GQT. It is important to notice that "non-locality" is nothing principally different from all the other physical interactions. But to isolate it for investigations, causal interactions have to be ruled out. In physics, entanglement can be considered as a more or less well-established fact. However, most researchers doubt that it plays a role in living systems.

Since such non-local effects of a system (with a certain reliability R and certain autonomy A) can be regarded as something "exceptional," within MPI this means novelty E. This is especially the case in spontaneous cases where paranormal events or healing normally occur unexpectedly. We can also say that the pragmatic information that describes the entanglement correlation is mainly represented by novelty E. Implicitly this means that there is not much confirmation B present (due to the NT axiom, see below). Since, according to Equation (2) pragmatic information is the product of novelty E and confirmation B, the same amount of pragmatic information can be expressed either as much novelty and little confirmation or vice versa. However, if the total amount of pragmatic information is limited, it follows immediately that events containing much novelty E (unexpected events) cannot occur very often (much confirmation B).

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.

Assuming psi would be a time-independent effect (as in precognition or backward causation) and it would lead to a real physical effect, this would enable us to build an "oracle" which could be used to create an intervention paradox (Lucadou 1988, 1992b):

The "oracle" (E) would produce a significant deviation of a random sequence (effect) from the null-hypothesis (H0) in a psi experiment (S) which operationalizes "backward causation." If the criterion C (C: $Z > Z_{crit}$, Z is the number of standard deviations of the effect in relation to H0) is fulfilled, it is decided by a "preinspector" (for instance by a computer) that the random sequence (S) will not be used for the future subject. This is of course paradoxical because, in this case, the future subject will not be able to exert an influence on the sequence, which however was the reason for the selection.

The MPI makes the assumption that nature does not allow (intervention) paradoxes. This holds even for classical systems, where a "time traveler" is not allowed to kill his grandfather.[6] However, in GQT this statement is much more strict and powerful: Situations in which the "time traveler" could potentially kill his grandfather do not occur!

This is the "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 (e.g., the effect may show up in a different variable, which was not considered beforehand, known as "displacement effect").

Above we said that the partitioning of pragmatic information into novelty and confirmation depends on the measurement we apply to get the information I from the system. Thus, the experimental conditions mainly determine whether we get mainly novelty or confirmation or both from an organizationally closed system. Assuming we could perform two ME experiments where all conditions except the number of trials could be kept equal (practically this would of course be very difficult), and assuming further that the Z-score of our ME experiment is a good measure for the entanglement correlation, we could then conclude that the effect size ES depends on the run length (n) in the following way:

$$ES(n) = c / \sqrt{(n)} \quad (3)$$

The value of c is a constant that depends on the design and setting of the experiment. It is a limit for the maximum of ES for a single trial (or a single experiment in a meta-analysis). This limiting principle is a result of the NT axiom (NT = Non Transmission) (Lucadou, Römer, & Walach 2007): In QT it can be proven that entanglement correlations cannot be used for any signal transfer or causal link. In general systems, this has to be accepted as an axiom.

It can be concluded that natural systems themselves may produce larger

fluctuations if they are not observed (in quantum physics this is known as the "Quantum Zeno effect" (Atmanspacher, Filk, & Römer 2004). It is a fundamental assumption of the MPI that observation and also negative-result observation (Renninger 1960) are different preparations of the system. This idea can also be found in folkloristic reports that spooky events seem to happen at unobserved places, for instance abandoned houses crumble more rapidly than inhabited ones even when natural explanations like lack of ventilation and heating, lack of care, etc., are taken into account.

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 (exchange forces, Chaudhury et. al. 2009) 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 well!

This feature is expressed in the "third law of the MPI" (Lucadou 2017); it a result of both theoretical considerations and empirical findings:

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, organizationally closed system is in a steady state with its environment. Potential causal links are causal processes that are not actualized, but which could potentially play a role in the organizationally closed system (see example below, or for example in physics entanglement leads to so-called "exchange forces" which are necessary for instance to stabilize molecules).

How Large Can Macroscopic Entanglement Effects Become According to the MPI?

Why are spontaneous paranormal and healing experiences much more impressive and larger than the very small (yet highly significant) deviations that can be obtained in experiments (Lucadou 2000a, 2001a)?

The concept of the Hausdorff dimension of paranormal events and developments (Lucadou 2000b) may give us 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. In homeopathy the first step of treatment after the diagnosis is to find out which substances (nosodes) create certain symptoms within the patient. This includes "life events."

Normally, natural time-ordered events (for instance a random sequence) cannot be "enlarged" like a film in slow motion. However, this becomes possible to some extent if one does not consider singular events themselves, but their transition matrices.

Random events are single events that are isolated in space–time, they have no history. This is not the case with a biological system. Their main property is development and they create histories. History instead means—statistically speaking—that events are correlated sequentially with each other. At least one PK experiment (Lucadou 1986a) has clearly demonstrated that correlated random events (Markov chains) as PK targets yield stronger psycho–physical effects. In some PK experiments, a Brownian random walk was used with great success (Peoc'h 1995).

Brownian motion can also be considered as an observable "with history." Starting from this idea, a measure for the "historical meaning" of events was developed. It is called the "dimensionality of temporal events" or "temporal dimensionality" (D). Mathematically, it is defined as a "Hausdorff dimension" of a fractal structure in time.

Similar to the geometrical case, the Hausdorff dimension for temporal events tells us how many temporal sub-elements are needed to create a new "enlarged" unity, which creates a history. This means that the transition matrix $\mathbf{M}_{i,j}$ for example of a Markov sequence is "compared" with the transition matrix $\mathbf{M}_0$ of a random sequence (for details see Lucadou 2000b).

A possible interpretation of the definition of D is that every singular event is not an independent event that counts for its own value, but is only a "partial" event. For a normal binary random sequence, each "singular event" is independent: D = 1. Thus one could also say that a singular event in a sequence with D > 1 is only "a fractal part (namely 1/D) of an event." If such a sequence is the target of a psi effect, obviously such "partial events" do not fully contribute to the limitations that are induced by the second law. Therefore, we can reformulate the limiting formula Equation (3) in the simplest case by the following expression:

$$ES = c/\sqrt{(n/D)};\ D = D(n) \tag{4}$$

If D is large enough, quite large effect sizes ES may occur.

In principle this can be applied for experiments. First of all, it seems not useful to work with "ideal" REGs (random event generators) anymore. One could speculate whether the decline effect observed in meta-analyses

may partly be a result of using increasingly "better" REGs. Of course one has to avoid statistical artefacts. A possible solution to this problem could be the use of Markov REGs. A further experimental requirement from our consideration is that very long runs are not really helpful, because due to the limiting relations, the psi effect would be blurred out. This could also be part of the observed decline, especially in PK research, where the run length has become abundantly large during the last decade (see Lucadou 2001a).

If we have a normal binary random sequence, the ME effect has—so to speak—no "working surface" or in computer terms no "user surface." In contrast to ME experiments, homeopathic treatments, for instance, have a large working surface or an effective user surface. The "therapeutic ritual" has a high dimensionality D, at least as far as it is not "blinded out" by double-blind conditions (Römer 2014, Walach & Römer 2016).

One could also say that dependent singular events are better targets for non-local effects. Further it is to be expected that the first singular events show the highest effect size. This could give a natural explanation for the fact that spontaneous events seem to have a much higher effect size than experimental events. 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 laws do not apply because the events are spontaneous, or of short duration, or of poor documentation quality, and mainly elusive (see Lucadou 1983, 1989b, 2000b).

The assumptions and predictions of the MPI are summarized (for details see Lucadou 1984, 2015b) in Table 1.

Pseudosignals

The "impression" of many observers and operators of ME effects that there is a "real force" working should not be laid aside as a mere illusion. From the point of view of the observer in an ME experiment (i.e. from her or his endo-perspective, see below), she or he is "influencing" the observed random sequence according to the instruction. Since this leads to many typical misunderstandings, with respect to a proper distinction of endo- and exo-descriptions of a system, it is useful to introduce the specific notion of a pseudo-signal in order to characterize non-local correlations as they arise within an endo-description of the system. Internally, pseudo-signals appear to be deterministic "signals." However, from the point of view of the exo-description of the system they are nothing but non-local correlations. Pseudo-signals are experimentally inaccessible.

Concerning the psychology of the observer, it becomes obvious that the description of such inaccessible ontic states is not meaningless since the

TABLE 1
Assumptions and Predictions of the MPI

Potentiality	No subjectivism, even potential actions induce system changes
Entanglement, no Signal	Psycho–physical correlation (1st Law of MPI)
Complementarity	$[F,S] \neq 0$; F = Function, S = Structure
Dimension of Action	Dim (I) = MLL/T; M = Mass (Meaning), I = Pragmatic information L = Length (Distance), T = Time (Rate)
Dimensionality	D = f(F, S, t, n); (complexity), f = function of, t = time
Least Action	$I = n \cdot i$, i = f(D); f = function of, I = least action, $n \in IN$ (natural number, repetitions), I = Pragmatic Information
Novelty, Confirmation	$E \cdot B = I$
Autonomy, Reliability	$A \cdot R = E \cdot B$
Uncertainty	$E \cdot G \leq$ Entanglement; G = Goodness of Documentation (2nd Law of MPI)
Conservation of	Entanglement during changes within the system (3rd Law of MPI)
Minimal Divergence	$\|ext\| / (\|int\| + \|ext\|) << 1$ int, ext = internal, external
Displacement	Esi (t) = Esj (t + Δt), ΣEsi = f(D), ES = Effect size (2nd Law of MPI)
Decline: Effect size	$ES \leq (E \cdot D) / G \cdot \sqrt{(n/D)}$

"impression" (of signals) of the observer is necessary to create (in the endo-system) the pragmatic information, which produces the OC of the psycho–physical system as a whole and thus the ME correlations and psi effects. Without these "illusionary impressions," psycho–physical entanglement correlations could not emerge. Or to put it in metaphorical language: As long as the subject is able to stay in the "heaven of the endo-system," she or he is "part" of universal laws of nature and thus interconnected with everybody and everything that has "meaning" for her or him.

On the other hand, it is an illusion to believe that pseudo-signals can be used to transfer information. Information transfer requires a real measurement which is not possible inside the endo-system—an "impression" is not operationalization. But it is also impossible to transfer information by pseudo-signals in the exo-system, where "impressions" might be operationalized (e.g., by measuring actions). In the exo-system, a pseudo-signal is not a signal but just a non-local correlation (see also Primas 1996).

Again, in metaphorical language: If the subject leaves the "paradise of unintentional, holistic interconnectivity" and enters the "hell of observer experiments," she or he is no more able to use the non-local correlations in

a definite way because they are cut off by the separation of the observer and the observed in the exo-system. There may remain "patterns" as a vague "memory of the paradise," but in most cases these patterns have lost their meaning. If we detect by normal signal transfer that such a pattern fits with a pattern in the exo-world, we call this a "hit" or "clairvoyance."

In psychological systems, however, one might think of a conversion from a given exo-system into an endo-system, for instance by introducing a meta-description in such a way that the meta-level becomes a new exo-system and hence the original level can be regarded as a corresponding endo-system. In experiments this can be done, for instance, by measuring the "motivation," "absorption," or "creativity," the "awareness of impressions" or "awareness of emotions" of the subjects (see Lucadou 2006). In this case, the "awareness of impressions," etc., can be regarded as an exo-system and the system of "impressions" as an endo-system. It is important to realize that the concept of "awareness of impressions" cannot be applied to the level of "impressions" themselves, but often such different levels of description are not clearly distinguished.

In general it is not always easy to avoid the illusion that psi is a kind of influence of the "mind over matter." It seems plausible that this misunderstanding is one of the reasons (in terms of sociology of science) why observer effects have been overlooked for such a long time in both physics and psychology.

From this point of view there seems to be no hope that a post-Cartesian science (Primas 1990) could ever enable us to heal the Cartesian cut by consciously sending real signals from "mind to matter." The "reunification of the world" or a "reentry into paradise" can only occur on a subconscious (dream-like) level. For this kind of "perception" the term "entanglement perception" (Lucadou 2014) seems to be appropriate. It can be considered as the "forgotten" category in the sense of the German philosopher Imanuel Kant, who described the perception of space and time and causality as fundamental categories of human perception. But in spite of the impossibility of conscious operationalization, psi effects demonstrate that the Cartesian separation between mind (*res cogitans*) and matter (*res extensa*) is less fundamental than we have been taught to believe.

The Model of Pseudo-Machines (MPM)

Another important application of the MPI is the description of the so-called man–machine interface. The issue is how psychological variables can be taken into account when a human user works with technical devices. The problem of the adequate "user surface" has a growing practical relevance. As an example, "homeopathic treatment" in medicine can be considered

as a technical process or as a kind of "machine"—in a very general sense, which we will call a "pseudo-machine." In this case the user surface is the homeopathic treatment or ritual (Lucadou 2002a,b, Lucadou & Grösser 1998). The MPM includes sociological, psychological, physical, and causal—as well as non-causal (ME)—processes that are relevant for the (homeopathic) treatment.

Definition: *"Real machines" are technical gadgets or devices and/ or related technical manuals that have a clearly defined aim. They can be regarded as "amplifiers" or at least as "converters."*

Thus a block and tackle serves as amplifier and transformer of a force. A microscope is an optical amplifier. A hairdryer amplifies the property of air to dry the hair. A medicament is a machine to amplify the healing capacity of organisms. Only a few machines such as a computer are "universal." One could call it an amplifier for the velocity and rate of formal operations.

The aim of a machine needs not necessarily be of a technical nature. It can also be used for entertainment, healthcare, or education. An effective drug is in this sense a real machine, as is a musical instrument.

Definition: *"Pseudo-machines" are defined as technical gadgets and/ or related technical manuals or rituals that are assumed to operate in an objective, purely physical way. Closer consideration, however, reveals that pseudo-machines refer to psycho–physical systems and contain hidden subjective, psychological components.*

Definition: *"Classical pseudo-machines" allow a clear-cut distinction between physical and psychological effects and are separable in this respect. "Non classical pseudo-machines" do not allow a separation between physical and psychological effects; both are entangled.*

As examples of classical pseudo-machines, most superstition instructions may serve: They only work psychologically, they include charms, astrology, precious stone therapy, consecrated, magnetized, or levitated water, the pyramid force, or tachyonic therapy. With aura photography, Kirlian diagnosis, magnetic and copper bracelets, there may be an underlying real physiological part. In general, however, such procedures are not sufficiently investigated or are too complex, so that a careful investigation seems hopeless (Federspiel & Herbst 1994). The underlying psychological mechanism of attribution cannot be recognized by the persons concerned and thus plays an important role with many classical pseudo-machines.

Examples of non-classical pseudo-machines can be found in the area of medicine and in border areas, so-called alternative medicine or complementary medicine. These include acupuncture, homeopathy, bio-resonance, and last but not least so-called spiritual healing. It is astonishing

that these methods, in spite of being discussed extremely controversially in conventional medicine due to their insufficient scientific foundation, are widely used by an increasing number of practicing physicians.

Within conventional medicine, several clinical studies have been started to investigate the action of these methods. The main issue is whether the method under study produces an "objective effect" that cannot be explained on the basis of suggestion, which is how placebos are explained. These studies are double-blind studies as well as epidemiological studies and also meta-analyses that allow comparison and summaries of different studies. The results are astonishing: Generally speaking, the studies show that the methods really work and that significant differences exist between the experimental and the control groups. They show that the results cannot be explained as a placebo effect, but are robust effects with a high statistical significance[7] (e.g., the study about paranormal healing by Beutler et al. 1987, the homeopathy study of Taylor et al. 2000, and the meta-analyses of "spiritual healing" by Roe, Sonnex, & Roxburgh 2015, Mathie et al. 2014). The main problem with these studies, however, seems to be their lack of repeatability.

For the authors of these studies, a simple theoretical explanation—in the sense of a causal mechanism—is out of sight; this becomes most obvious in the case of the homeopathy studies and the studies about spiritual healing. In both cases one is inclined to assume that a hitherto unknown physical effect leads to a measurable healing success without any conventional medical explanation.

The practitioner who applies homeopathy will discover that she or he is really successful in a great percentage of cases. Furthermore, since low dilutions in homeopathy may include causal effects, it can be expected from the third law of the MPI that this non-classical pseudo-machine creates large effects in real-life situations. Of course the practitioner does not measure this success according to the criteria that are necessary for a double-blind study. Those criteria are rigid but on the other hand rather secure methods to prove assumed causal relationships. If, however, feedback plays an important role in a treatment, then difficulties arise. During a homeopathic treatment, it is maintained that the physician observes the reaction of the patient and prepares his treatment and medication according to his observation. But this procedure is not possible in double-blind studies. With ME effects the same restrictions are valid, although due to different reasons. In this case the blind condition must be considered as a part of the system, and its influence on the whole system cannot be compensated. In the extreme, double-blind studies cannot be carried out without suspending the whole system. This means that the term "placebo" needs special consideration (Finniss et al.

2010): The clinical group as well as the "placebo" group may include both causal and entanglement processes that depend on the design (setting) and environment of a study.

Thus it is not a mistake to consider homeopathic treatment as a complex communication process among the physician, the patient, and the medicine, which cannot be separated into parts. This has been pointed out by Lionel Milgrom (2002, 2003).

Some theoretical models of homeopathy assume that the information of the effective substance is stored in the solvent—a hypothesis which is, from the point of view of physics, actually difficult to prove; there have been many attempts and they are theoretically possible, but very often not empirically viable—and can be described as an attempt to make the psycho–physical system separable. The MPI says that this is not only not helpful, but really hopeless.

From the viewpoint of the MPI the therapeutic ritual is of utmost importance and has to be considered as a relevant total system (Benedetti 2012). From this point of view there is a difference whether the medicine is produced in a lengthy production process (e.g., the homeopathic succussion) or a simple placebo is given. The production process and the whole treatment are essential parts of the pseudo-machines and they work—so to speak—as a "vessel" for ME. Again, we can recognize that a non-classical pseudo-machine shows a real effect but that the underlying mechanism is different from what the constructor of the machine believes it will be.[8]

This is quite an important condition, because it prevents the user from understanding the real working mechanism. The user starts from local effects, which means causal relationships able to be demonstrated in double-blind studies, but in this case the above-mentioned elusiveness will produce a decline of the desired effect. However, if this misjudgment prevents the user from misusing the ME correlation for a signal transfer, the second law of the MPI cannot be violated and the function of the pseudo-machines is optimal. This works rather well in homeopathic practice; however, it is not the case in replications of double-blind studies. In a replication study, it could be possible to use the knowledge that was received from the previous experiment to code a signal, for instance: recovery = medicament = 1 and no recovery = placebo = 0.

Therefore it is clear that pseudo-machines are not guaranteed to be long-lasting. The lifespan of classical pseudo-machines depends mainly on the psychological conditions and variables. The main factor is the slackening of fascination. However, it is possible that a sudden collapse of the system occurs if the function of the pseudo-machines is seen through by its user. In this case, the psychological conditions change instantaneously and the

function of the machine is reduced to its pure physical part.

Classical pseudo-machines are therefore reliable as long as the mechanism is not revealed and the psychological conditions are not changed. The exposure changes the psychological variables drastically but they can also change slowly if attention to and fascination with the assumed physical mechanism cease.

In contrast to classical pseudo-machines, non-classical ones are not reliable even if the apparatus, the setting, and psychological conditions do not change (decline and displacement effects). In this case, the exposure does not necessarily change the psychological variables if the OC of the whole system is not abolished. It would be a mistake to believe that skeptical persons would not be successful with psi experiments or would not have paranormal experiences, or, respectively, that homeopathy would not work for them. Very often the reverse is the case. The user who has no expectations that the machine will work is less able to violate the second law, because he or she does not really try to test the effect. He or she will not use the non-local ME correlations for a signal transfer. It is an essential condition, however, that the pseudo-machine is at least subconsciously fascinating for the user in order to establish the necessary OC.

As we have already described above, this means that the effect size of the pseudo-machines is a function (f) of the following systemic variables (device-specific variables are not under consideration here): the quality of documentation G, the number of repetitions N, the change of the procedure (novelty E), and "involvement" (dimensionality D). The effect size decreases if G and N increase and increases if E and D increase. It is important to note here that D depends on causal and potentially causal processes (Third Law of MPI). Since in homeopathy with low dilutions, causal medical effects (e.g., on the immune system)[9] may play a potential role, D may become very large and thus would lead to strong healing effects (see Table 1):

$$\text{Effect size} = f(G, N, E, D) \tag{5}$$

As a first approach, one could try the following attempt (theoretical estimate):

$$\text{Effect size} = E * \sqrt{(D)} \setminus G * \sqrt{(N)} \tag{6}$$

In general, experimental tests prepare the system to exhibit causal relations of (mainly) physical variables. As a result, the studies which test pseudo-machines are not independent from each other and thus a different experimental approach would be necessary.

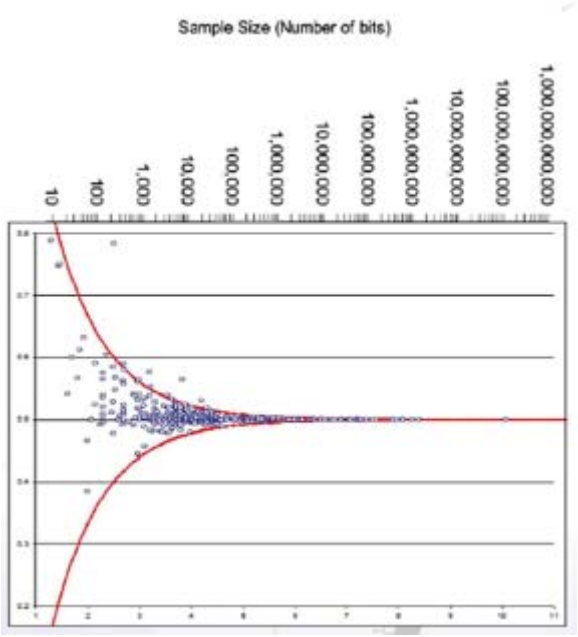


Figure 1. Funnel plot of 357 PK experiments and the predicted decline. Effect size ES 0.2–0.8 versus number of trials N (logarithmic scale).

Decline Effects

Whenever one deals with events or systems containing non-classical pseudo-machines or ME effects, the empirical results behave according to Equation (3) or (5). This means that decline and displacement effects will occur if the same situation or the same setting is being used in an attempt to replicate the previous results.[10] In parapsychology, the role of decline effects is a well-established fact. One could even say that it is the quintessence of all studies of a whole century of investigation (Lucadou 2001a).

The large database of published PK experiments (Bösch, Steinkamp, & Boller 2006) allows testing of the predictions of the MPI. From Equation (3) one can conclude that the accumulated deviation from the statistical expectation of a PK run must decline with the run length. Here we have made the assumption that the Z-score is a meaningful measure for the ME effect which means that it is used as a criterion for the experimental effect. Other criteria would of course yield different functional dependences in Equation (3).

A meta-analysis of 380 ME experiments (PK experiments, Bösch, Steinkamp, & Boller 2006) corroborates this prediction (Table 2). The

TABLE 2
Results of Meta-Analysis for FEM and MPI Theoretical Models

Method N = 380 studies, m trials	Weight of Effect Size	Z* (p, one-tailed)	Z** (correction for selective publication)
FEM (Fixed Effects Model) (Bösch, Steinkamp, & Boller 2006)	G0 = n = N xm	−3.67 (.9999)	Not significant
MPI (Model of Pragmatic Information)	G1 = √n = √(N xm)	13,1 (10^{-38})	10,5 (10^{-25})

funnel plot (Figure 1) shows overwhelming evidence for the decline of the effect size with the number of trials (c = 1.32 gives a good approximation in Equation (3), red curve in Figure 1).

Under the assumption that PK is a "signal," a "real deviation from expectation value" called "Fixed Effects Model (FEM)," the data do not show a significant effect (Timm 2007).[11] However, if the MPI model is taken into account by a weight of √n in the statistical analysis of the above-mentioned meta-analysis, then the data show a highly significant effect ($p < 10^{-38}$).

The most impressive example of the decline effect after a strict replication is the replication study of the Princeton (PEAR) PK studies (Jahn 1981, Jahn et al. 2000). The authors write:

> A consortium of research groups at Freiburg, Giessen, and Princeton was formed in 1996 to pursue multidisciplinary studies of mind/machine interaction anomalies. The first collaborative project undertaken was an attempted replication of prior Princeton experiments that had demonstrated anomalous deviations of the outputs of electronic random event generators in correlation with prestated intentions of human operators. For this replication, each of the three participating laboratories collected data from 250 × 3000-trial × 200-binary–sample experimental sessions, generated by 227 human operators. Identical noise-source equipment was used throughout, and essentially similar protocols and data analysis procedures were followed. Data were binned in terms of operator intention to increase the mean of the 200-binary sample distributions (HI); to decrease the mean (LO); or not to attempt any influence (BL). Contiguous unattended calibrations were carried forward throughout. The agreed-upon primary criterion for the anomalous effect was the magnitude of the HI–LO data separation, but data also were collected on a number of secondary correlates. The pri-

TABLE 3
Effect Size of the PEAR Experiments and Its Replications
(numbers are from the figures in the references)
Effect size is defined as: $E_{hi-lo} = (T_{hi} - T_{lo})/n$, T = number of hits, n = Number of trials

First PEAR(1981) report	$E_{hi-lo} = 6000/13050$	$= 0.46$
All PEAR studies before replication	$E_{hi-lo} = 35000/834000$	$= 0.042$
Replication (2000) study	$E_{hi-lo} = 7070/750000$	$= 0.0094$

> mary result of this replication effort was that whereas the overall HI–LO mean separations proceeded in the intended direction at all three laboratories, the overall sizes of these deviations failed by an order of magnitude to attain that of the prior experiments, or to achieve any persuasive level of statistical significance. (Jahn et al. 2000:499)

If the results are compared with the first study of the Princeton group, which was published in 1981 (Jahn 1981), a strong decline of the effect size can be observed (Table 3).

It is evident that the effect size declines continuously with each replication. However, the "psi effect" does not disappear completely; it shows up in other variables in the post hoc evaluation. The authors state:

> However, various portions of the data displayed a substantial number of interior structural anomalies in such features as a reduction in trial-level standard deviations; irregular series-position patterns; and differential dependencies on various secondary parameters, such as feedback type or experimental run length, to a composite extent well beyond chance expectation. (Jahn et al. 2000:499)

See also Pallikari and Boller (1999), Pallikari (2001), Atmanspacher and Scheingraber (2000). This feature can also be found in a recent PK study (Maier, Deschamps, & Pflitsch 2018) with 12,571 participants where no PK effect could be found, but instead a difference between experimental and control data of fitted oscillator frequencies.

It should be mentioned here that on the basis of the MPI, a clear-cut prediction about the outcome of the replication study was made in advance (Lucadou 1987d). It was kept in the minutes before the final evaluation began, but, unfortunately, it is not mentioned in the final research report.

It had been objected that the review of the chronological sequence of the PEAR REG data (Jahn et al. 2000, figure 12 and associated discussion) shows a strong early effect, a decline to null performance, followed by an increase to strong effects again, which seems to be in stark contradiction to the assumption in Equation (3). In contrast, this is what is to be expected from the MPI and the GQT. 'No signal' does not mean that an extra-chance effect cannot occur, but the data must behave in such a way that they cannot be used to 'reconstruct' the initial conditions (HI, LO, BASELINE) on the basis of the random data alone. If in the second epoch (see figure 12 in Jahn et al. 2000) the data would have been the same as in the first epoch, an identification of the three conditions would have been possible. Therefore a return to a zero effect has to be expected by the NT axiom. As a result, in the third epoch such a criterion is missing and thus allows a "recovery effect."[12] And even a weaker criterion that would be available by combining the first two epochs is ruled out by the fact that in epoch three, the BASELINE condition cannot be distinguished from the HI condition. From this consideration it is clear that the given Equation (3) holds only for very simple situations. In real studies, it can be used only as a rule of thumb, which, however, fits astonishingly well. To make a more precise prediction, it would be necessary to know the history of each experiment and the development of the signal criteria, which can be derived from the data. This also includes changes in the setting during the experiment.

From the MPI perspective, both REG data—experimental and control (BASELINE)—differ 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!). This means that there are two different so-called WIENER processes that are affected in different ways by the NT axiom. Or psychologically speaking: There is a "meaningful" difference between an individual and a collective setting (embodiment) of the used random processes (see also Figure 3 below).

In homeopathy decline effects can also be observed (Walach et al. 2004, Walach, Michael, & Schlett 2018:202), and it is reported that the clinical effect changes to the placebo group in a replication study (Walach et al. 2000). An obvious example is presented in Figure 2: In four comparable replication studies, mainly two dependent variables can be used to measure the therapeutic effect: 1) The subjective visual analogue scale, and 2) Different objective measures such as histamine concentrations and nasal

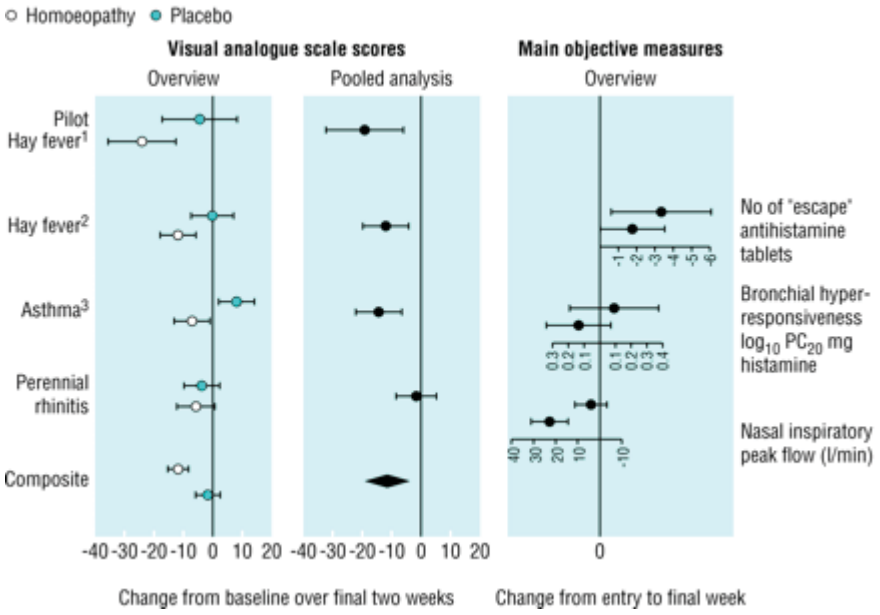


Figure 2. Decline and displacement effects in homeopathy (2000, *BMJ*, *321*, 471).

inspiratory peak flow. From a theoretical point of view, it is important that for all studies variables have been used that are comparable with each other and, alternatively, also non-comparable variables. If the model is correct that non-local ME correlation plays an important role, the MPI makes the following prediction (Lucadou 2001b). Due to the homogeneity of the studies it can be assumed that the OC of the whole system and herewith its non-local ME stays constant over the four studies.

1. *Decline effect*: The therapeutic effect measured with a comparable variable will decline during the replication studies in the same way that the statistic reliability of this variable rises due to the increasing number of cases (n).

2. *Displacement effect*: The therapeutic effect measured with non-comparable variables will rise and so to speak compensate for the decline of the effect size of the comparable variables—according to the third law of

the MPI—because the certainty to make a prediction in future studies does not increase with n for non-comparable variables, as the direction of the effect is unknown.

In general, the question arises whether decline and displacement effects may be nothing but random variations. Indeed, they look very similar; however, they are "stronger" (e.g., $c > 1$ in Equation 3), which means that they exhibit significant deviations "more often" than expected (see the Correlation Matrix Method, CMM, below). One could describe them as properties of "super-fluctuations."

Is Homeopathy Nothing but a Placebo Effect?

The usual opinion of skeptics about pseudo-machines is that they are nothing but swindle and deception and that in the interest of consumer ethics and protection one should debunk them. This position might be understandable as far as the providers maintain that a causal mechanism is responsible for the desired and promised effect of the pseudo-machine, because the promised effect is not reliable and will decline and finally disappear in any case; however, many inventors and producers of pseudo-machines behave honorably, in my experience, because they do not understand the real mechanism of pseudo-machines. And they are firmly convinced that they have invented a good product. Empirical studies, double-blind studies, and epidemiological investigations and meta-analyses are expensive and troublesome, and also experts make mistakes. One should be critical about pseudo-machines, but one should not make a claim of fraud against the producer. Fraud may also happen with real machines (e.g., diesel cars) and in this case there exists consumer protection. For non-classical pseudo-machines things are more complicated. There exist at least on the part of classical science massive prejudices, which brings many users into deep conflicts (Lucadou 1992a).

Usually they find out that the machines really work even under objective tests; on the other hand they do not understand why such strange displacement and decline effects as described above occur. This leads to so-called "rat-catching" (Lucadou 1994a). The concerned person cannot help but consent to the claimed "miraculous forces," which, however, have strange properties, such as one has to believe or one has to be gifted, or has to obey certain rules. Such arguments are often used by sects or cults and used as a self-immunizing strategy: If the machine does not work, the user has "blocked it mentally."

The important point is that non-classical pseudo-machines compared with normal machines work with quite different principles, namely

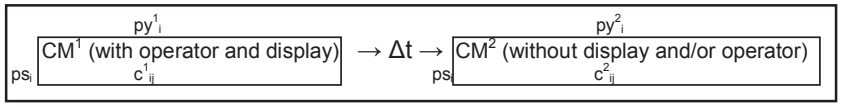
synergistic, collective, non-local, and holistic ME processes which are not worthless but which, however, cannot be described on the basis of classical stimulus–reaction chains. Often specific side effects occur which are still unexplored (Lucadou 2002a). From the viewpoint of the MPM, there are a lot of arguments to systematically investigate the application of non-classical pseudo-machines that may offer new possibilities. In any case it would be a mistake to believe that the small effect size that has been found in studies up to now would remain small if the mutual reinforcement of causal and entanglement processes were to be taken into account in future studies (Lucadou 2000b). The following paragraph may be regarded as a proposal on how causal and entanglement processes can be investigated with a combined method.

The Correlation Matrix Method (CMM)

The Correlation Matrix Method derives from the Brunswik's lens model (1956), where many psychological or physiological variables are measured and compared with many variables of behavior, in order to allow predictions of human behavior in psychology.

Similarly with CMM, many psychological variables are measured simultaneously before or during a PK experiment has started, and correlated afterward with many physical variables of a physical (random) process, which are also measured simultaneously during the PK experiment. This is done in two different settings, namely with and without feedback (control).

Only the number of significant correlations (due to a predefined criterion p) between psychological variables and physical variables of the PK experiment are counted and compared with controls (runs without feedback or runs without subjects). This can be described by the following schematic:



CM^1, CM^2 are the correlation matrices of a set of psychological variables ps_i and a set of physical variables py^1, respectively py^2 (same physical variables under condition CM^2). For CM^2 the same set of psychological variables ps_i is used as in CM^1. Δt is the experimental time interval between experiment and control.

The PK effect (entanglement correlation) shows up in the difference of number (and strength) of the correlations (CM^1–CM^2):

$$D = CM^1 - CM^2 = \Sigma m^1_{ij} - \Sigma m^2_{ij} >> 0 \text{ (significantly)} \quad (7)$$

$m^{1,2}_{ij}$ = 0, 1: "1" means significant correlation $c^{1,2}_{ij}$ of the matrix cell (ij) according to pre-specified criteria: p (significance level of c^1_{ij}, c^2_{ij}, Spearman's ρ); n (number of runs/subjects). The matrix cell (ij) contains the correlation value c^1_{ij} of Spearman's ρ between the psychological variable ps_i and the physical variable py^1_j for all n experimental runs or operators, respectively. The same holds for the control data c^2_{ij}.

Since no signals are involved in the case of entanglement correlations, it is important to realize that both CM^1 and CM^2 can be "affected" by PK and thus they don't need to fit with the "theoretical" expectation values. For instance, it may well be that CM^2 (the so-called "control") shows smaller values than theoretically expected. Both CM^1 and CM^2 belong—so to speak—to the experimental setting and thus to the OC of the system. The maximal difference Dmax between both cumulative distributions of $CM^1(p)$ and $CM^2(p)$ for all $\rho \in \{0,1\}$ (of Spearman's ρ) gives an impression of the consistency of the effect.

Dmax can be used to compare different experiments (replications), with CM^1 denoting the number of significant experimental correlations, CM^2 the number of significant control correlations, and NC the total number of correlations in the matrix.[13] It has been proposed by Hartmut Grote (Grote 2015, 2017) to evaluate the α-error (H0/H1) with a Monte-Carlo simulation (MC). MC permutes the physical data for each experimental session and calculates the correlation value (Spearman's ρ) with the non-permuted psychological data for all permutations. The position of the experimental number of correlations CM1 in the distribution of CM^1 for all permutations gives the α-error (H0/H1) of MC. This method, however, may be useful for causal correlations but may underestimate H1 in the case of entanglement correlations. Due to the NT axiom, they create additional internal correlations (between the experimental sessions), which cannot be truncated by MC. Furthermore, MC may create additional spurious correlations: While the experimental data may not reach the so-called Van der Waerden limit (a measure for the appearance of regular patterns in a random sequence, see Calude & Longo 2016), it may well be that the MC data surmount it. In addition, the spurious correlations are stable, while this is not the case with entanglement correlations, but the latter cannot be distinguished algorithmically from the others. Thus, MC could lead to an overestimation of the α-error because entanglement correlations also contribute to the distribution of H0.

The cumulative distributions of $CM^1(p)$ and $CM^2(p)$ for all $p \in \{0,1\}$ can be regarded as a kind of "Bell's theorem"–shaped curve with two fixed

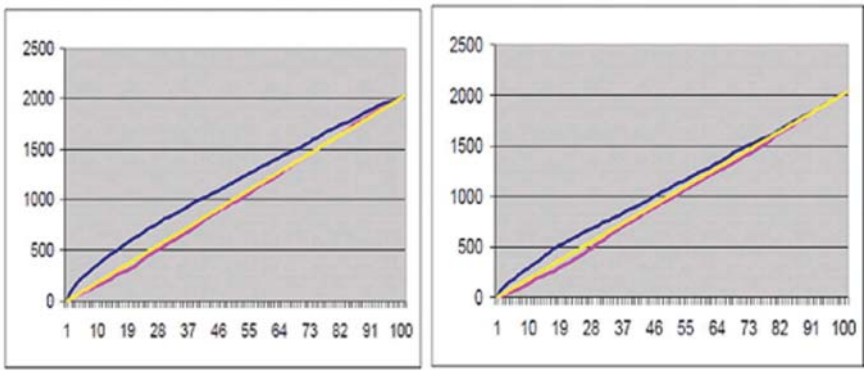


Figure 3. The cumulative distributions of $CM^1(p)$ (blue, top line), $CM^2(p)$ (pink, bottom line), and CME(p) (yellow, middle line) of two subsequent experiments with identical settings showing decline and displacement. It shows that the control data CM^2 can exhibit fewer correlations CME than expected after an identical replication. x-axis: $p \in \{0,1\}$ (of Spearman's ρ , in percent); y-axis: number of significant correlations (of NC = 2025 possible correlations).

points, (0,0) and (1, number of all correlations), which allows us to see the effect of entanglement on both the experimental matrix as well as on the control matrix in comparison with the expected curve CME(p) for H0. In Figure 3 two identical replication studies are shown: It can be seen clearly that in the second study $CM^1(p)$ is smaller than in the first study (decline) and due to the NT axiom $CM^2(p)$ is smaller than CME(p), which means that in the control matrix there are fewer correlations than expected by chance (H0) (displacement), while Dmax between $CM^1(p)$ and $CM^2(p)$ remains almost the same as in the first study.

It is very important, though, to understand that the CMM precludes the interpretation of these effects as causal correlations or signals. Rather, they should be understood as non-local, generalized entanglement correlations, following the model of GQT. The necessary framework conditions can be construed as follows: There is a connection between physical and psychological or intentional systems, or the random process and the human operator. Both are joined together in the systemic OC in the sense of Varela (1981) of the experimental setting. The latter is created by the experimental instruction, by the participant consenting to take part, and the physical process that is attributed to by the meaning of the instruction. The matrix describes the correlations of the psychological variables of the experimental runs with the physical variables of these runs (see Figure 4). Theoretically,

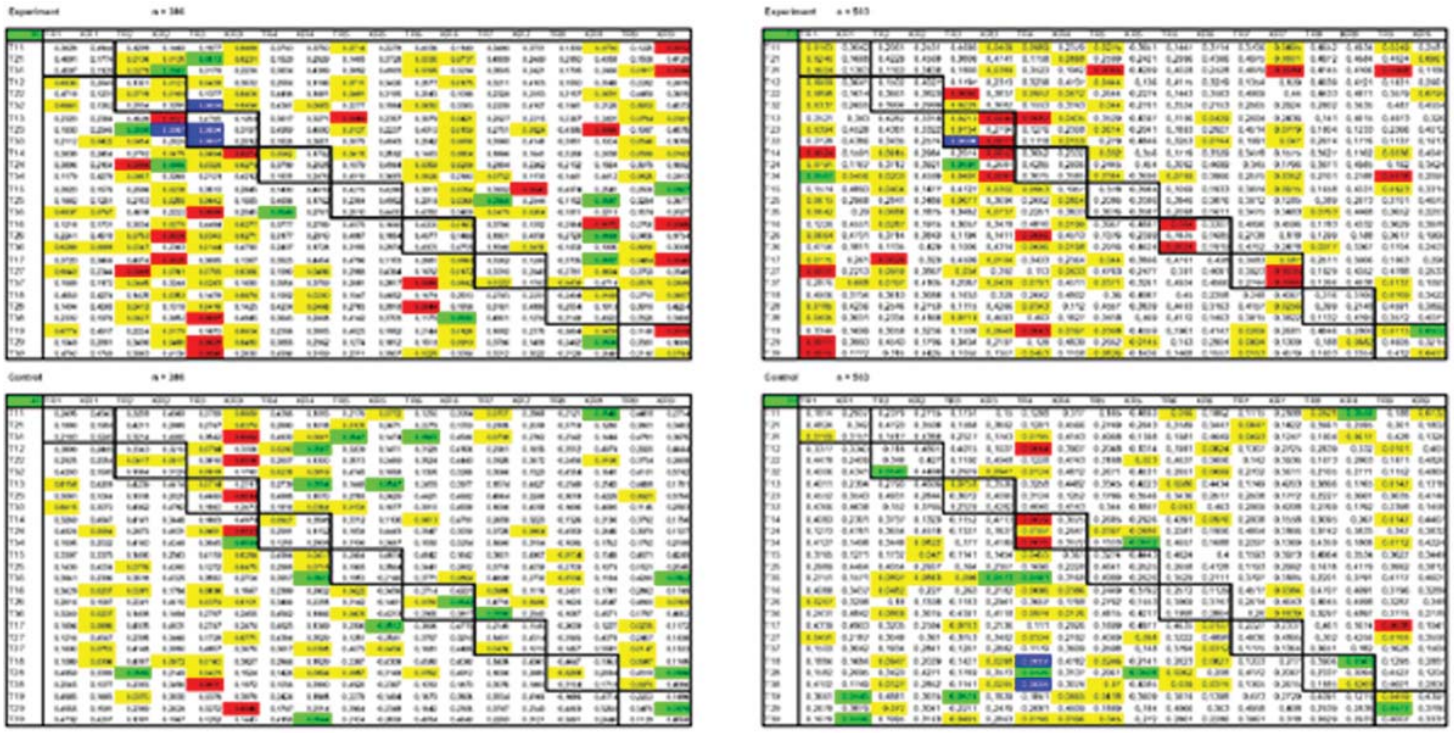


Figure 4. Identical replication of a PK experiment (Lucadou 2006). The upper right experimental matrix CM1 shows the significant correlations between psychological variables (rows) and physical variables (columns). The lower right matrix CM2 shows the same for the control condition. The left two matrices show the same variables of a replication study (part of Walach et al. 2016, 27 variables excluded) for comparison.

these correlations could be of causal (local) origin. This, however, is impossible due to the physical separation of the subject and the shielded random event generator. It is not to be expected that a kind of "psi signal" (tracer) can be isolated (Lucadou 1986a,b, 1987b,c). However, it cannot be excluded that under certain conditions a kind of "pseudo-signal" could be found (Lucadou 1989a).

One can clearly see that the significant cells of the matrices (indicated by colors) change their position in the matrix with the identical replication of the experiment. A split, half-evaluation (see below) of each study shows that no signals or causal links could be found in either study. However, in both studies "psychological variables" button-pushes during the course of the 9 runs were used (for details see Lucadou 1986a,b). This leads to the possibility that subjects may be able to memorize the previous trials in order to achieve more hits. Although this possibility is rather unlikely and no indication could be found in the data,[14] this could be considered as a "potential causal link" in the sense of the third law of MPI. Therefore it can be expected that the diagonal of the experimental matrices (and to some extent the cells below the diagonal) show more and higher correlations than the upper part (above the diagonal) of the matrix. It can clearly be seen in Figure 4 that indeed this part of the matrix shows more and higher correlations. Only the upper part (above the diagonal) can be considered as a proof for ME correlations. But since no indication for real causal signals could be found, this can be interpreted as the amplifying effect of potential causal links for entanglement as predicted by the third law of MPI. This is exactly the situation homeopathy has to deal with.

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 c^1_{ij} (matrix cell) cannot be maintained but must change if and only if it shows up to hit the predefined significance criterion ρ. Since the overall matrix entanglement does not disappear, the significant correlation has to show up at a different matrix cell c^1_{kl} in such a way that the number (and strength) of all significant matrix cells is preserved, $CM^1 = \Sigma m^1_{ij} = \text{const}$.

In order to minimize the variance of the investigated correlations, classical experiments with many psychological (and physical) variables aimed to use only factorized (orthogonal) variables. This, however, does not hold for non-local entanglement correlations.[15] In this case, using "superpositions" of variables (non-orthogonal variables) is of advantage, because only then can a difference between a local and a non-local correlation be measured. In other words: The Bell inequality in physics is only meaningful for correlated and not for orthogonal variables as

orthogonal variables are by definition unrelated. This means in the context of the CMM: If the psychological (and physical) variables with the CMM are dependent on each other, it is easier for the NT axiom to shift the correlation from one matrix cell (ij) to a different one (kl):

ps_i not orthogonal with ps_j
py^1_i not orthogonal with py^1_j

ps_i (respectively py^1_i) is correlated with ps_j (respectively py^1_j) to allow a shift due to the NT axiom in order to maintain:

$$\Sigma m^1_{ij} >> \Sigma m^2_{ij} \quad (8)$$

As a consequence, the use of orthogonal factors fs^1_i and fy^1_i derived from the psychological variables ps_i and the physical variables py^1_i would lead to a much smaller difference Dmax of number (and strength) of the correlations ($CM^1 - CM^2$).

This can be used to test for non-local entanglement correlations, because the signal model of psi would predict a larger difference due to a reduction of variance. Furthermore, the displacement of non-local entanglement correlations with any identical replication of an experiment and the fact that even rather strongly correlated variables do not exhibit the same entanglement correlations leads to a different understanding of the term "correlation" in this context: ME correlations do not primarily exhibit "dependencies" and "processes," but rather "patterns" and "fluctuations" within the organizationally closed system.

This might sound as if the MPI predicts that repeatable psi experiments or homeopathy studies are not possible at all, because they violate the second law in any case. However, that would mean "throwing out the baby with the bathwater." On the contrary, the decline effect is at least partially avoided by circumventing the NT axiom, but a certain elusiveness cannot be avoided in principle.

In Table 4, all experiments where CMM was applied are presented. The psychological variables (Lucadou 1986a,b, 1993, 1994a,b, 2006, 2011, Lucadou, Lay, & Kunzmann 1987, Radin 1993) were measured before the PK experiments (Lucadou 1986a,b, 1991c) by standard personality questionnaires. Only in the last two studies (Lucadou 2006 A,B in Table 4) were the psychological variables behavioral variables (pressing of buttons, for details see Lucadou 2006). The physical variables were several statistical test values, which describe properties (such as mean value, variance, autocorrelation, etc.) of a binary random sequence (Markov chain) produced

TABLE 4
Results of All Correlation Studies

Publication	Subjects	Psych	Phys	N_{cor}	N_{sig}	N_{cont}	N_{expt}	D_{max}
Lucadou 1986a,b Markov	299	24	23	552	34	11	55	23
Lucadou 1986a,b Schmidt	299	24	22	528	11	4	53	7
Lucadou 1986a,b Reanalysis	299	63	32	2016	1413	1322	1371	91
Lucadou 1991a,b	307	16	8	128	28	13	13	15
Lucadou 1991a,b Reanalysis	307	43	56	2408	2019	1937	1999	82
Radin 1993	1	16	23	368	32	17	37	15
Lucadou 2006 A	386	27	18	486	161	105	49	56
Lucadou 2006 B	386	27	18	486	42	40	49	2
Braeunig & Faul 2010	22	24	9	216	17	10	22	7
Walach et. al. 2016*	503	45	45	2025		249		101
Grote 2017	20	6	5	30	6	1	3	5
Jolij 2016	105	10	60	600	82	52	60	30
Flores 2017, 2018*	213	45	45	2025		340		269
Flores, Watt, & Tierney 2017*	200	45	45	2025		254		224
Flores, Tierney, & Watt 2018*	201	45	45	2025		371		198
Kirmse 2018	64	45	45	2025	907	805	830	102

Psych = number of psychological variables, Phys = number of physical variables,
N_{cor} = number of correlations, N_{sig} = number of significant correlations (p = 0,1),
N_{cont} = number of significant correlations in control experiment (p = 0,1),
N_{expt} = number of expected correlations (p = 0,1), D_{max} = max Difference;
* The details are hidden, because these studies are still unpublished.
The overall significance for all studies is rather high: $(CM^1 - CM^2) < 0{,}0001$.

by a quantum physical random event generator. The physical random event generator was carefully shielded against any physical influence on the subjects.

It turned out that in all studies, the overall distribution of the physical variables showed no deviation from the theoretical expectation values for both experimental and control conditions. Several techniques were applied to find a PK signal (tracer) within the experimental random sequences, but none was found. This is a strong argument for the assumption that

indeed no signal transfer between the observing subject and the random event generator was involved. Nevertheless, the number of (significant) correlations between the psychological and physical variables is increased for the experimental runs, compared with the number of correlations of the control runs.

Dmax depends primarily on the OC of the system. This can mainly be seen in two experiments (Lucadou 2006 B in Table 4). Both studies had an identical design and were carried out in parallel. The latter (2006 B), which was not significant, was performed by unselected subjects with low motivation (during an exhibition), whereas all significant studies (Lucadou 2006A) were performed by highly motivated subjects, who came to the lab because they were interested in taking part in a parapsychological experiment. A more detailed analysis shows, however, that the unselected subjects (2006 B) were not completely unsuccessful. A subgroup, which showed more innovative behavior, had an increase in correlations. The studies by Walach (2014), Walach et al. (2016), and Walach and Horan (2014), and the three unpublished studies by Flores et al. in 2016, 2017, and 2018 that are direct replications of the Lucadou (2006) study.

Although no "PK signal" could be found in individual random sequences, the excess of experimental correlations in Table 4 seems to constitute a "signal" at first glance. One could, for instance, use the difference D to code a signal by repeated studies. This would, of course, be very difficult, but cannot be excluded completely.[16] However, this argument is only true if, and only if, the individual correlations between a given psychological and a given physical variable were stable when the experiment is repeated. But in accordance with the MPI, this is obviously not the case (e.g., see Figure 4). The "signal" is only a pseudo-signal. This fact, however, does not exclude the possibility that certain pairs of psychological and physical variables show stronger correlations which occur more frequently with replications. This means that certain regions in the correlation matrix may show a somewhat predominant structure, indicating certain characteristics of the psycho–physical system in question, but it does not mean that a signal is hidden in the matrix.

Conclusions

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 organizationally closed systems (third law of MPI), and this mixture has of course the a priori structure of making it impossible to use entanglement correlations separately and only for potential signal coding. In parapsychology one tries to isolate entanglement

processes in order to prove a "psi effect." In homeopathy and CM such an approach of isolating entanglement is counterproductive. But CMM gives us the opportunity to separate the causal correlations from the entanglement correlations.[17] Whereas the causal correlations in the experimental matrix remain stable at the same place and strength in the matrix, the entanglement correlations change their place (variables) and/or strength. For this reason one could even set aside control experiments.

For homeopathy studies, CMM can easily be adapted: The psychological variables (usually considered as "independent") will be replaced by "treatment" variables, such as type of diseases, of medicaments, dilution, doses, duration and frequency of application, therapeutic conditions, expectation, attitude and compliance of the patient, expectation and attitude of the therapist, and so on. The physical variables (usually considered as "dependent") will be replaced by all clinical variables that may be a measure of the success of the treatment. Figure 2 may serve as an example: The treatment variables would be "hay fever," "asthma," "perennial rhinitis," "dose of remedies," and the clinical variables would be "escape of antihistamine tablets," "bronchial hyper-responsiveness Log_{10} PC_{20} mg histamine," "nasal inspiratory peakflow(l/min)," etc.

It is obvious that this will abandon the traditional experimental strategies of parapsychological studies because "normal" processes are not excluded, and of clinical studies because entanglement processes are included. In historical, qualitative, naturalistic experiments in parapsychology, "cues" and "flaws" were difficult to rule out, but to some extent they provided "big" effects. In homeopathy and CM it is obvious that causal processes cannot be ruled out, but with CMM they can be separated from the entanglement correlations. 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. These are the causal correlations.

Notes

[1] Meanwhile the theory has been further generalized and simplified (Filk & Römer 2010). Observables can be reduced to complete spectral families of compatible propositions. There is no need to define an action of observables on states, defining an action of propositions suffices.

[2] For this purpose it would be necessary to show that for instance the observables "novelty" and "confirmation" are complementary, or for example the pair "magical belief" and "embodiment" (see below).

[3] This makes the MPI—among others—a generalized quantum theory, as the impact of measurement on the measured object is both the defining

feature of a quantum system and the reason why incompatible observables are present.

[4] In the meantime, von Weizsäcker's idea of pragmatic information has had an increasing influence in many fields, as the whole issue of the journal *Mind and Matter*, Volume 4, Issue 2, 2006, demonstrates.

[5] Some critics of the MPI maintained that the concepts of the model are too vague and do not allow operationalization and falsification. Several experimental studies (Lucadou 1986a,b, 1993, 1994a,b, 2006), however, demonstrate how this can be performed in detail.

[6] This is also a limitation that may be important for the IDS model (May, Utts, & Spottiswoode 1995).

[7] This depends on criteria: If a set of multiply replicated studies of one intervention in one disease is required this condition is often not met; if just a generic study and meta-analyses across different types is taken, then it is proven.

[8] It is interesting to observe that Hahnemann, the inventor of homeopathy, seems to have sensed this as he spoke decidedly of a "geistartige Wirkung der Arznei," a "spiritlike action of the remedy."

[9] It is important to note here: Through the succussion process in glass there is always a robust amount of solutes such as silica, borate, etc., in the solution, equivalent to about 10E-6/8 which may also represent a global causal immune stimulator. This has been formulated formally into the silica hypothesis of homeopathic effects by Anick and Ives (2007).

[10] An "experiment" in this context is a situation where the comparator is generated within the experiment itself, i.e. through a control group, while in naturalistic situations or in the entanglement experiment of physics there is no comparator except either theoretical expectation or life experience. This is also the reason why naturalistic settings such as simple remote viewing studies show little or no decline.

[11] Only for the FEM is a symmetric funnel-plot to be expected, because all deviations from the assumed "real PK-effect" are statistical fluctuations. This is not the case for the MPI because there is no such "PK effect." Thus the heated rebuttal in the same journal about selective reporting is of less importance from the point of view of the MPI. With FEM one could also assume that the velocity of the trials causes a decline, but this would roughly be proportional to 1/n, if the time for a single experiment were always the same.

[12] The recovery effect and its opposite, the Meta-Analysis Demolition (MAD) effect (Houtkooper 1994), which describes the failure of replication after a meta-analysis, cannot be understood by the FEM (Table 3) unless some ad hoc assumptions about psychological factors are made.

[13] However, D_{max} cannot be used to estimate the α-error, as Hartmut Grote could show (personal communication). Therefore the difference $\alpha(CM^1 - CM^2)$ of the α-error (H0/H1) of two Monte Carlo simulations (MC) for both experimental and control data is given in Table 4.

[14] The details of all these experiments show indeed that the 9 hit variables, for which feedback is given, show rather weak correlations on and below the diagonal (backward correlations), and if they do, they are not stable. The other 4*9 physical variables are not visible for the subject and thus cannot be used to achieve causal correlations; nevertheless, they show stronger entanglement correlations.

[15] One might argue that the value of Dmax is overestimated in the case of non-orthogonal variables, for instance using the same variable several times would give an r = 1 correlation among these variables; for completely independent variables r = 0. The MPI predicts (third law) optimal values for $CM^1 - CM^2$ for variable correlations of about r = 0.5. This could be tested in future experiments. In fact, the data show that even rather strongly correlated variables do not exhibit the same ME correlations. Since only CM^1 and CM^2 are compared, any causal effect (which could surmount the shielding) will appear in both non-orthogonal variables simultaneously in CM^1 and CM^2 and thus can be identified.

[16] A possible decline would, however, be located at a meta-level and therefore its functionality could be smaller than $1/\sqrt{(n)}$. However, since no signals are involved in the case of entanglement correlations, it is important to realize that both experimental and control matrixes can be "affected" by psi and thus they don't need to fit with the "theoretical" expectation values. As shown in Figure 3, it may well be that the so-called "control" shows smaller correlation values than theoretically expected. Both belong—so to speak—to the experimental setting and thus to the OC of the system.

[17] In the two correlation matrices CM^{1a} and CM^{1b} of the split data (a, b), the number and strength of causal correlations remains stable in relation to the selected p criterion, whereas a decline can be observed with the entanglement correlations when the p criterion is sharpened. By comparing the two correlation matrices CM^{1a} and CM^{1b}, one can identify those correlations in the two matrices that are located at the same cell c^{1a}_{ij} and c^{1b}_{ij} and which do not change the correlation value of Spearman's ρ when the p value is lowered. These are the causal correlations.

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RESEARCH ARTICLE

A Camera-Based Tracking System for Ouija Research

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Abstract—For more than a century, the Ouija phenomenon has been subject to discussions about how planchette motions and resulting messages can be explained, with the majority of scientists considering the *ideomotor effect* as a sufficient explanation. Research on the Ouija board is scarce, even though in principle experiments could be done quite easily. This article presents a technical system and software used to gain detailed data about planchette motions and the sitters' interaction, while at the same time providing spelling support during the Ouija session. It uses camera-based tracking of the planchette and can be complemented by data collected with a sensor placed directly on the planchette. The data is analyzed and evaluated in various ways with regard to the planchette motions as well as the text production. The system has been used in more than 50 Ouija sessions with two to five sitters; example data is provided to show its potential to gain new insights into the Ouija phenomenon.

Introduction

The Ouija board has a history over more than a century as a widely used tool for allegedly communicating with non-physical beings. For some scientists, it is just another example of the ideomotor effect: When in the middle of the 19th century people were enthusiastically "talking to spirits," for example by doing table tipping, scientists were looking for explanations that would fit into the materialistic worldview. Carpenter (1852) proposed that an unconscious *ideomotor* effect explains these phenomena. Tiny muscular motions of the sitters are triggered by thoughts, ideas, suggestions, which the sitters do not even recognize as their own. Together with a feedback loop, this leads to physical, apparently meaningful movements, whether it is a table or a planchette that does the moving; all movements are nothing but an "automated motion" driven by the sitters. More than one and a half centuries later, this point of view is still predominant, as summarized

matter-of-factly in *Wikipedia* (2019): "The action of the board can be parsimoniously explained by unconscious movements of those controlling the pointer, a psychophysiological phenomenon known as the ideomotor effect."

That sounds like a long-established fact, and ever since the term *ideomotor response* was coined, the topic seems to be mostly ticked off on scientists' lists. Even though Ouija experiments could be done quite easily, research on it is scarce, often based on somewhat artificial laboratory settings and tasks, without looking deeper into what "ideomotor" actually means, let alone taking potential psi effects into account. But ideomotor action is, at best, only part of the explanation; it addresses how the planchette motions can be explained physically and that a sense of agency is lost. It does not offer insight into the nature of Ouija messages, their potentially surprising complexity, originality, informational content, the relation to the sitters' consciousnesses, and the speed with which messages come through, which can go much beyond what a volitional coordinated action of sitters could achieve.

Just recently, a study on Ouija appeared in the context of psychological research. Andersen et al. (2018) proposed an approach using eye-tracking to relate the planchette motion to the "predictive minds" of the sitters. Whenever the two sitters looked at a letter which was going to be hit, it was considered as evidence that they were causing or somehow "predicting" the planchette motions. While this is an interesting idea, that article has some shortcomings. First of all, it does not mention saccade motions at all: The human eye is constantly scanning the scene, with the gaze quickly fixating on points of interests, e.g., when watching a human face it wanders quickly back and forth between eyes, nose, and mouth. Andersen et al. take the fact that the gaze is directed toward the letter where the planchette is going to move as an indication that some 'prediction' is taking place. But very likely the gaze fixates also on other letters or areas, such that a meaningful criterion needs to consider if the target letter is fixated on for a significantly longer period of time than other letters are. This issue is not mentioned. No information is provided about whether the gaze path includes other letters, how long it remains at other positions, and how this is taken into account to assign the "predicted target letter" a unique role. The analysis of the eye-tracking data (which, surprisingly, was done manually, taking "around one and a half hours for the coders to annotate 1 min of video"), does not even seem to collect the required information. Thus, even if the gaze was continuously scanning the entire alphabet, the approach would count the target letter as being "predicted."

Regarding the content, the experiments were very simple. Only a

single word was spelled out in each experiment, of 5 to 11 letters, and apparently it was quite a slow process (no exact data about duration was provided, but the sessions lasted about 10 minutes). For comparison with volitional actions, the single word BALTIMORE had to be jointly spelled by the two sitters. The fact that the predefined response was required for the volitional experiments points to an important question: Why is it apparently not possible to replicate the Ouija communication by conscious, voluntary actions, i.e. by jointly spelling meaningful responses, which were not agreed upon before; what needs to be added, unconsciously or by non-normal means of information retrieval?

Anderson's approach is focused on the physical actions of the sitters, the fact that their sensorimotor system is involved in the action, and that the sitters typically deny authorship of their actions. Key terms are the *ideomotor effect*, and a good overview is provided by Stock and Stock (2004); and loss of *sense of agency*, a misattribution of actions that depends on the individual (de Bézenac et al. 2015) and is an indicator of personality traits such as sensitivity to subtle stimuli (Olson, Jeyanesan, & Raz 2017) which can also be used in hypnosis and hypnoanalysis (Shenefelt 2011).

Research that takes a closer look at the content of the communication is hard to find. A publication that stands out in that respect is Gauchou, Rensink, and Fels (2012). People who did a test with a single participant had to answer yes–no questions with the Ouija board, while the second sitter was a confederate of the research team who withdrew his finger from the planchette, unnoticed by the test person who was blindfolded. The authors conclude that the results "suggest that nonconscious knowledge can indeed be expressed through ideomotor actions, even when it cannot be accessed consciously." The possibility of non-normal access to information beyond what is hidden in the unconsious was not taken into consideration. Regarding the exploration of the full potential of Ouija communication, it would probably have been a poor setting anyway: All 27 study participants had never "played" Ouija before, and the authors stated that "response times for Ouija can sometimes require several minutes," i.e. processes were quite slow. Only yes–no questions were to be answered without emotional or personal content (such as "Is Brasilia the capital of Argentina?").

While Ouija is rarely addressed directly in publications, there is a more intense scientific discussion about *facilitated communication* (Mazerolle & Legosz 2012). This technique aims at supporting people who have limited communication skills due to disabilities. According to a given protocol, the so-called facilitator holds the hand of the client and thus helps him type letters on a keyboard. The proponents of this method claim that the resulting texts are an expression of the client and the facilitator is just helping but not

contributing to the content. Critics counter with arguments such that the resulting texts contain information only known to the facilitator (Schlosser et al. 2014).

A look into this technique and the controversy around it is instructive also with regard to Ouija. If one accepts the spiritist interpretation of Ouija board activity, the sitters at the Ouija board can be regarded as facilitators who help the 'spirit world' to bring through its messages. In both cases, the facilitators or sitters have the impression they are only following external impulses. There are similar ways of reasoning and finding evidence for or against the assumption that the communication goes beyond what the facilitators or sitters could absorb. For example, Biklen, Saha, and Kliewer (1995) list various criteria for how facilitators recognize the true authorship of their clients, such as "How Students Attend to Typing," "Communication Form, Content, and Style," "Spelling and Word Formations," and "Conveying Accurate Information Not Known to the Facilitator." All these can also be valuable for Ouija.

Facilitated communication is still subject to an ongoing scientific discussion. Saloviita (2016) even complains that recent publications mostly favor facilitated communication as a valid technique to actually communicate with the client. A typical approach from the critic's perspective is to show that the information brought through depends mostly on what the facilitators already knew. For example, Burgess et al. (1998) provided the facilitators with fictitious information about the subject, who was impersonated by a confederate of the research team and was someone without disabilities. The fact that this information later showed up during the communication (and other information did not) was regarded as evidence against facilitated communication.

This paper proposes methods to gain further insight into the Ouija board phenomenon and ideomotor action, based on precise measurements during the sitters' interaction with the planchette. The technical setup is presented in the next section. There are various ways to analyze the collected data; these are presented in the Results, Data, and Analyses section, which provides examples of the data collected in numerous Ouija sessions. The conclusions follow that in the Discussion section.

Materials and Methods

Measurement Techniques

My idea to bring in some technical devices to Ouija sessions was initially triggered by mere convenience. In the course of regular sessions, writing down letters on paper was tedious and often not fast enough. So I switched over to speech recognition. Just saying the letters using the German spelling

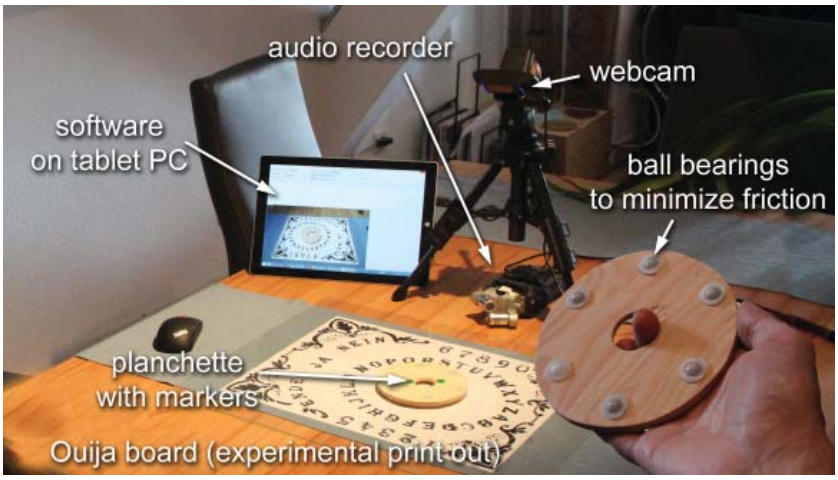

Figure 1. Experimental setup.

alphabet (analogous to Alfa, Bravo, Charlie) was quite a step forward, but still prone to errors, when speech recognition picked up questions or voices from other sitters. So, finally I developed a setup that allows complete tracking and spelling support in real time during the Ouija session.

Figure 1 gives an overview of the setup. A webcam (Logitech C920, in 720p mode) on a tripod is used to monitor the Ouija board. The planchette has two, colored, circular markers attached, which are detected by an image-processing algorithm: For the pixels of each frame coming from the camera, the distance to the (previously configured) marker color is calculated in HSL color space. Thus, binary image information is obtained, which is segmented into coherent blobs. Due to noise and depending on lighting conditions, sometimes single pixels outside the marker area are detected, but by simply taking the two largest blobs the marker areas are reliably detected.

The segment centroids are calculated in the image-coordinate system and then transformed into the coordinate system of the Ouija board using the camera parameters and relative coordinates with respect to the Ouija board. The required camera calibration is done before the session, once the board and camera have been put in place. The procedure is done automatically, typically in less than a minute, by comparing a previously stored image of the board with the incoming camera images. Starting with some default camera calibration data, the stored image is transformed into image coordinates and the difference from the incoming images is calculated. A stochastic gradient descent is done until a precise match is obtained, which can be visually checked by the user.

The markers are typically captured with an accuracy of about 1 millimeter, resulting in a similar accuracy for the position data and orientation accuracy of 2 degrees. Poor lighting conditions or high planchette velocities causing motion blur can degrade accuracy.

Letter Detection and Text Generation

The positional data of the planchette is used for real-time detection of letters during the session. For each letter, activation areas are defined, basically matching the enclosure of the symbol on the board. For yes, no, and end fields, activation areas are signifantly larger. Initially, the algorithm and its parameters needed to be refined and tuned to cope with the variety of ways the planchette is moved in different circumstances and with different sitters. For example, if the planchette slowly passes over the letters without stopping, they should not be counted as hits. On the other hand, simply requiring the planchette to stop at a letter does not work with faster spelling where the planchette immediately continues its motion in a different direction after touching a letter. Thus, both criteria are combined to register a hit. Either the planchette comes to a complete stop at least for a fraction of a second (set to 150 ms) or it abruptly changes its direction of motion with a sharp angle (smaller than 90 degrees). Before the same letter can be registered a second time, the planchette needs to move away from it. The duration, angle, and other parameters can be fine-tuned in the software code. But after initial experiments, there was no need for further adjustments, as the system performed well with different circumstances and sitters.

When a letter or symbol is registered, it is added to the protocol and an equivalent voice sample is played as feedback for the sitters. With each letter being added to the text, a dictionary (German or English) is employed to automatically identify words and insert spaces (which are not marked on the Ouija board) into the stream of letters to improve readability. Occasionally, a later manual correction may be required when there are more options of how letters can be grouped into words or if a word is not part of the dictionary or is misspelled. The motion data and the assigned letters are stored in a text file for later analysis. The system also includes the orientation of the planchette, which is not relevant for letter detection but is of interest for further analyses.

Recording a Session

In order to capture the questions and discussions of the sitters, a digital audio recorder is used to record the entire session. After the session, the software can import the audio file and align it time-synchronously with the other

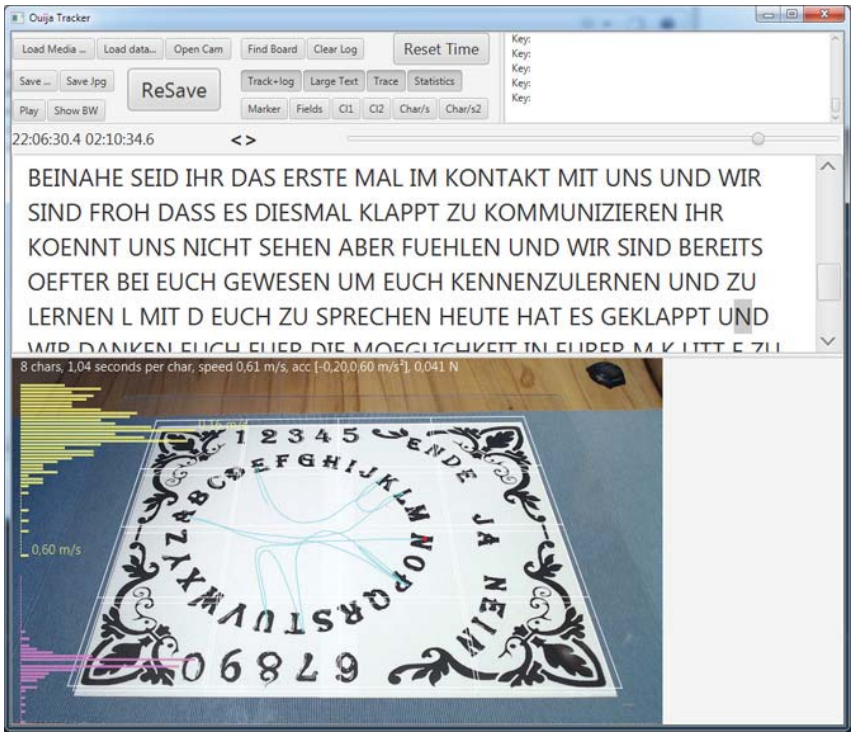

Figure 2. Screenshot of Software Used.

data of the session, such that sitters' questions, planchette motions, and the resulting text can be investigated together with precise timing information. Timer resolution is 30 Hz, based on the frame rate of the webcam (with some minimally varying lag for image processing). From the motion data, statistical analyses and graphical representations can be generated. All this is handled by software written in the Java programming language (Figure 2). The software also supports the display and integration of a session recorded on video, instead of using life data from the camera. In that case, tracking, spelling, and data evaluation can be done completely offline.

As reference and for those interested in the details of the image processing and other algorithms, the Java source code is accessible for download via the Open Science Framework (Kruse 2019). Thus, anybody with Java programming skills can validate the methods used above, including parameters and calculation details. It should be noted, however,`3.6 that the source code is not in a product-quality state. Internal

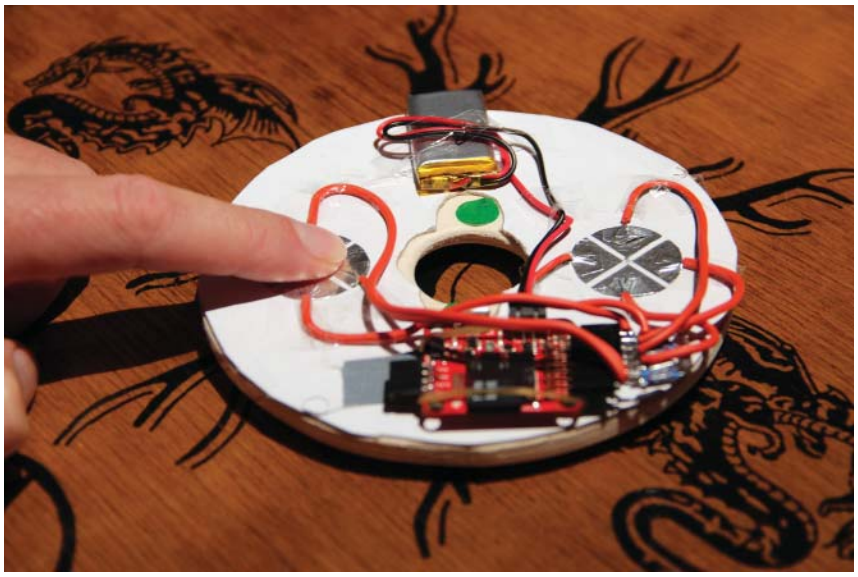

Figure 3. Planchette with additional sensors.

technical documentation is limited (as there were no other programmers involved), there is no user documentation, and the setup for an arbitrary Ouija board needs some preparatory configuration steps.

It is not within the scope of this work to provide a ready-to-use product. To build and run the program, a third-party library for webcam access is required, as well as a dictionary file, an audio file containing speech samples of the alphabet, and additional Ouija fields. A photo of the Ouija board being used needs to be prepared using a photo editing application as reference for camera calibration and definition of active areas. As these external files are subject to copyrights I do not own, they are not included in the download package.

Planchette Sensors

In addition to the above setup, a sensing device can be placed directly on the planchette (Figure 3), with a LiPo battery as power supply and a microSD card for local storage. A motion sensor (MPU-9250, InvenSense) measures acceleration, gyroscope, and magnetic compass data, each along three axes. In addition, self-made capacitive sensors were attached to the planchette, which are sensitive to touch and the pressure of fingers, as the dielectric property of a human finger changes the electrical capacity of the

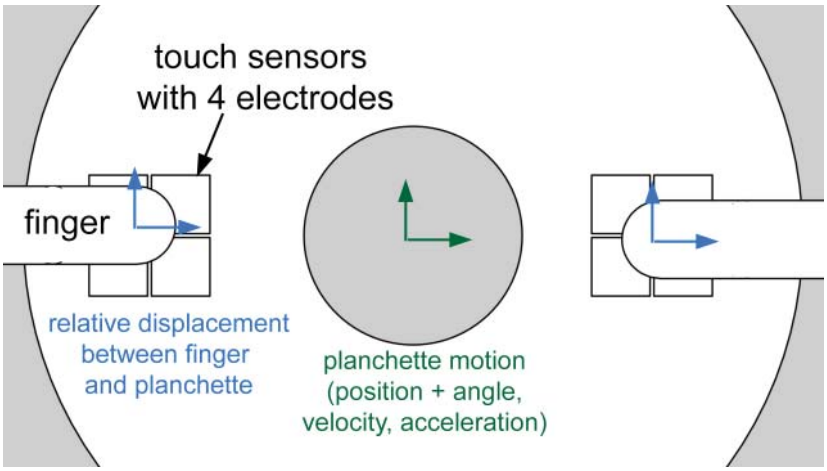

Figure 4. Principle of capacitive sensors.

electrodes. The technical setup is straightforward: Each electrode, a piece of tinfoil, is connected to a digital input pin of the board, which in addition is connected via a high Ohm resistor (2 MΩ, but others work as well) to a common digital output pin, which sends a digital pulsing signal. The RC-circuits (with C being the capacity of the electrodes) produce slight delays until the signal is detected by the corresponding input pin. The delay is a direct measure of the capacity, i.e. of the distance and/or contact area of the dieletric human body to the electrode. For simplicity in coding, Badger's Capacitive Sensing Library (Badger 2019) has been used. Readings are done with 50 Hz frequency.

Experiments have been carried out with different layouts, with two or four electrodes for each sensor, thus capturing small displacements of the sitters' finger along one or two axes (Figure 4). Typically, recommended improvements for the stability of touch sensors, such as adding a small capacitor between the input pin and ground, were not applied, as absolute real-time values are of no interest and the data can be processed and evaluated later offline. In our case the change in capacity, namely the simultaneous increase in one electrode and decrease at the opposite electrode, is the most significant value, as it indicates a (potentially even very small) displacement of the finger on the planchette. The raw data is stored in plain text files with time stamps, similar to the Ouija data format.

In addition, some preliminary experiments with myoelectric sensors (MyoWare Muscle Sensor from Sparkfun) have been done. They can

capture the electric potential and thus the contraction of the sitters' forearm muscles. When time-synchronized with the other data about planchette motions, they could potentially provide further insight into how the actual planchette motions (camera-based tracking), finger-planchette interaction (touch sensor), and the arm motions (myo-sensors) are related. However, to get reliable, meaningful signals from the MyoWare sensor turned out to require much more effort and/or better myoelectric sensors. Consequently, the measurement of the direct interaction of fingertips with the planchette so far seems to be the more promising path.

Results, Data, and Analyses

The presented measurement setup yields extensive data which can be analyzed in various ways. This section presents some of the collected data as an example and shows how different types of analyses may provide new insights into the Ouija phenomenon.

So far, this system has been used in more than 50 Ouija sessions. All of these have been 'real-life' sessions, with personal questions and answers, emotional content, and real interest from the sitters in the communication. The system was considered only as support and for collecting data, no specific research experiments were set up, the communication was an unstructured dialogue, where all sitters were allowed to ask questions. Most of the sessions were with two sitters (the author and his wife), one with three sitters, eleven with four sitters, and four with five sitters. In total, 16 different people participated in the sessions, with different backgrounds, including one person without any prior Ouija experience and two persons working professionally as mediums. Four sessions were done with native English speakers, using an English dictionary, with the whole of those sessions conducted in English.

As the communications were generally very personal, the resulting database is not intended to be published. Example excerpts of the data are available through the Open Science Framework (Kruse 2019): The text files contain a few lines of calibration data followed by motion data with one entry per line: Time code, planchette position x[cm], y[cm], rotation[degree], centroid of image coordinates, target area, detected letter. The raw data can be visualized and replayed as video (for an example see Kruse 2019).

Paths, Speed, and Spelling

The software allows precise measurements of the position and rotation of the planchette, thus the speed, acceleration, and forces required to accelerate the planchette mass also can be calculated. Figure 5 shows an example

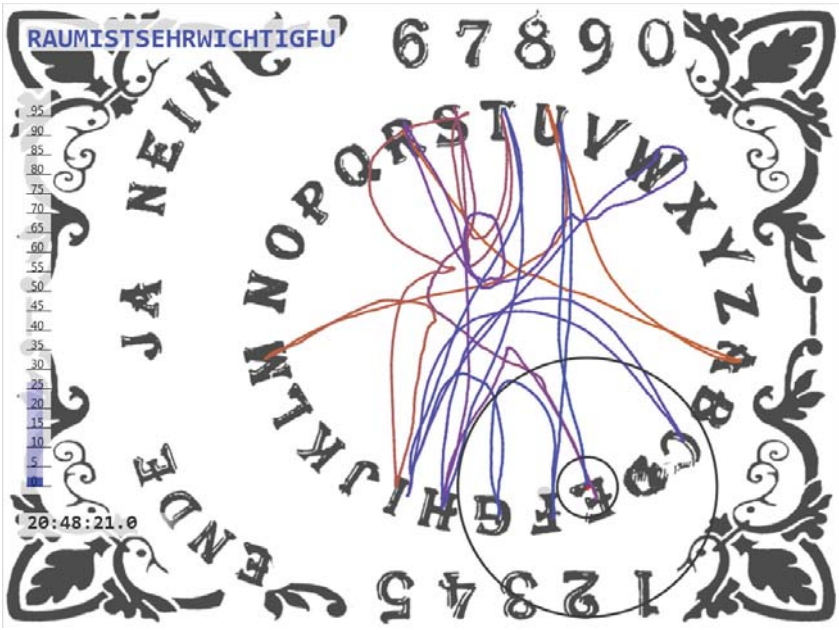

Figure 5. Planchette motions.

of the planchette path during one minute in the middle of a session. Twenty characters were spelled, on average one character every 3 seconds; the average planchette speed was 6 cm/s, maximum speed 30 cm/s, and maximum acceleration 23 cm/s^2.

The time needed for spelling a letter also is an interesting metric to describe over the course of a Ouija session. As an example, Figure 6 shows the characters per minute along the session timeline. The thick curve is the average of ten sessions, the thin curves show single sessions. Intervals when the sitters were asking questions were removed from the data. Note that it typically took about half an hour until full speed was reached. The varying individual curves show that in the course of a session there are phases when the spelling slows down or even stops for a while. This happened in the middle of a sentence or within a word, even when the next letter could have been guessed easily. On the other hand, the speed was often high when it was completely open what the next letter might be, such as at the beginning of new phrases.

With some minor manual effort, the percentage of 'wrong' letters that do not fit into correctly spelled phrases can be determined as an additional

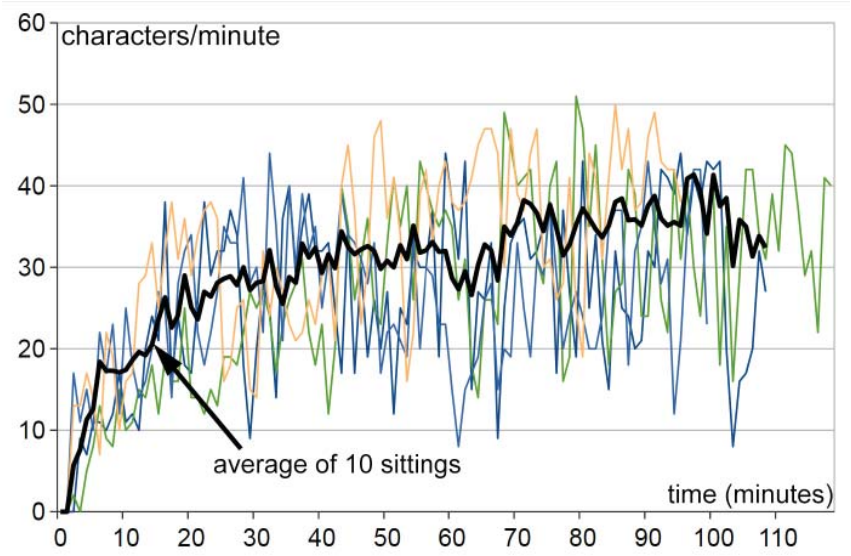

Figure 6. Spelling speed in the course of a session.

metric for spelling accuracy. Throughout the course of the recorded Ouija sessions, a development toward faster and more accurate spelling was observed. Initially, letters were frequently jumbled, focus was on yes–no answers, and total text output was limited to a few hundred characters, often with meaningless phrases. In later sessions, jumbled letters or errors of orthography were rare (typically less than one percent of the spelled characters), and total output increased. For example, a session on 2018/12/30 lasted 2 hours and 10 minutes, and yielded 4,799 characters, on average a character every 1.75 seconds. Due to pauses for questions at the beginning and end of a session, actual spelling was faster, about 1.3 to 1.5 seconds per character. Maximum speed was about 100 cm/s, with almost one character per second.

This data should give an example of how such metrics could contribute to measure and compare the dynamics of Ouija sessions, both along the course of a single session, as well as how they develop over time, for example in a regular circle of practitioners. The data also challenge prevailing assumptions regarding the ideomotor effect, such as Andersen et al.'s (2018) statement "that meaningful responses from the Ouija board may be an emergent property of interacting and predicting minds that increasingly impose structure on initially random events in Ouija sessions." If that was the case, one should expect that once "structure" is established, i.e. a

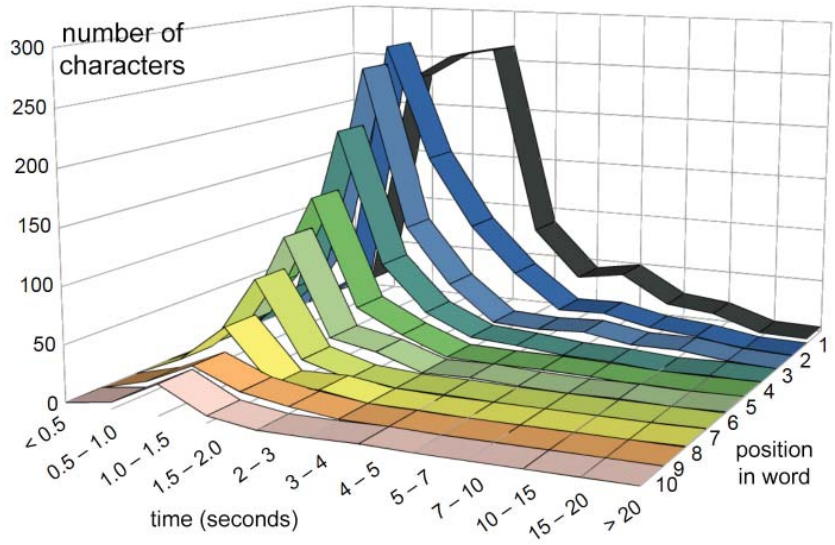

Figure 7. Histogram regarding character duration and position in word.

meaningful beginning of a word or sentence, the spelling becomes easier and quicker. Sometimes this was the case in our data, but in general there was no correlation between spelling speed and the number of meaningful letter choices, or, in other terms, the ease with which the next letter could have been guessed. Also, sessions typically started right away with clear and meaningful sentences, which do not at all appear like initial random events that are only gradually molded into German phrases.

To elaborate on this, Figure 7 shows a histogram of how the time for spelling a character depends on its position in the word (according to the subsequent grouping of characters to correct German words; data are from a session on 2018/10/28, total 3,434 characters). The x-axis represents the duration for spelling a character. The dark curve in the back shows the duration distribution of the first letter of a word, i.e. when there is typically a large choice of potential letters for starting a new word such that it would be much harder to guess or somehow (consciously or unconsciously) agree among the sitters on what letter to choose. The second to tenth letter positions are arranged from back to front, with increasingly brighter curves. After spelling several letters in a word, typically there are few options left for meaningful remaining letters. As the bigger letter positions are relevant only in longer words, the absolute values get smaller from back to front. Generally, there is a strong peak in the histogram for a duration from 1.0 to 1.5 seconds, mostly independent of the position within the word. The first letter might take longer

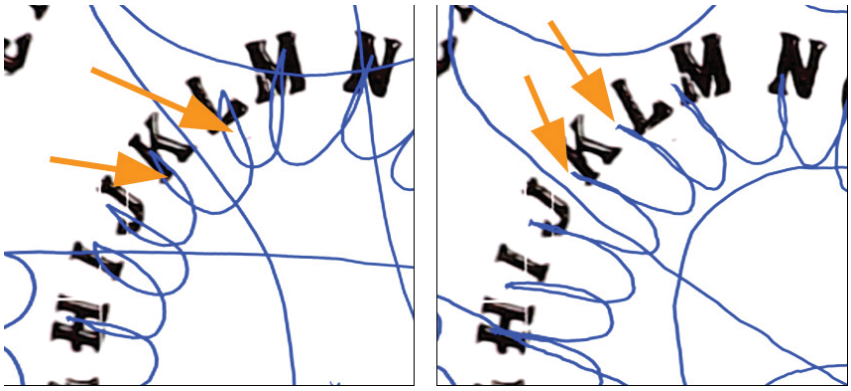

Figure 8. Left: volitional motions. Right: unconscious motions.

(in most cases still less than three seconds), but it is often spelled as fast as the subsequent letters in a word which offers much less choice.

Motion Analysis

The planchette motion data offers some hints regarding sitter interaction and the differences between volitional and unconscious motions. As a regular custom, at the beginning of each session the planchette was moved by the sitters with volitional motions to all the characters on the board. A section of such a path is shown on the left of Figure 8. With this type of motion, the sitters already know the next letters to come, a fact that sometimes shows up in a swinging motion of the planchette, as the next target is already anticipated and the motion is optimized accordingly, resulting in smooth loops along the path (indicated by the arrows).

During unconscious Ouija movements, such effects do not seem to occur. The right side of the figure shows a situation when during a Ouija communication—as a surprise to the two sitters—the complete alphabet was spelled. Even though after some letters it seemed likely that the alphabet was about to be spelled, the sitters tried to remain open-minded, without anticipating anything. Thus, after touching each letter, the next motion starts anew, without any preceding preparatory momentum. Maybe this is a characteristic of 'real' Ouija motions: At any point in time, the motion is (if at all) directed only toward the next letter to be reached, without preparation or motion optimization for spelling the letters to come. This effect needs to be further investigated under various conditions, i.e. with different sitters and more complex volitional spelling tasks for comparison. Maybe it is even

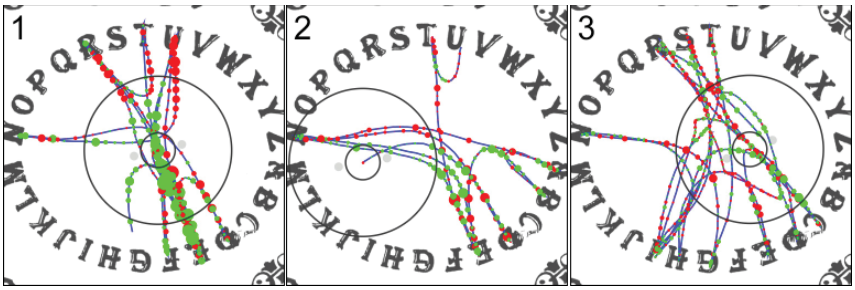

Figure 9. Planchette rotations for different conditions (see text).

possible to derive some mathematical properties of movement paths, such as continuous differentiability and cusps to find a metric which eventually might help to distinguish between volitional and unconscious motions.

Also, the small rotational movements of the planchette, even though not required for letter detection, offer interesting information. When the sitters are moving their hands with slightly different speed or direction, typically a turn of the planchette results. With two sitters sitting face to face, the effect is strongest for motions to the left or right, while backward/forward motions are less likely to cause a rotation. This is based on the observation that with single fingers touching the respective side of the planchette not too firmly, each sitter mostly exerts a translational force on the respective contact point on the planchette, without being able to exert significant torque. Thus, the angular motion of the planchette can be an indication that sitters are not acting synchronously, that one is moving his hand faster or earlier, while the other is dragging behind or reacting with some delay.

Figure 9 illustrates how the rotation varies, with angular velocity being represented by the size of the circles, green for clockwise, red for counterclockwise rotation. The two sitters were to the right and left of the board. Cases 1 and 2 were done as experiments with volitional motions, Case 3 was part of a normal Ouija session (all done on 2019/01/13 under equal conditions, the experiment being performed directly after the Ouija session):

Case 1. A volitional motion was made, with one sitter forcing the planchette to spell a message unknown to the other sitter, who just followed the planchette motions. Strong rotational motions resulted.

Case 2. In this volitional motion, both sitters spelled a text agreed upon by both beforehand. The action is much more synchronous.

Case 3. This is the case of Ouija movement where both sitters have no conscious knowledge about what is going to be spelled. The degree of rotation is similar to Case 2.

It can be seen that during volitional motions, when one person is taking the lead, the other is following with some delay (and sometimes considerable difficulty) required for reacting. In contrast, ideal Ouija motions seem to show much less rotation, the sitters are acting rather synchronously, as if they have the same stimulus or target, which in contrast to Case 2, is unknown to them and was not defined in advance. This observation challenges the ideomotor hypothesis, which seems to require some (unconscious) negotiation process between the sitters, and would probably cause asynchronous motions similar to Case 1. Even if sitters are frequently changing their roles of who is acting and who is reacting, this would show up in the paths.

Blind Ouija?

With the experimental setup of automatic tracking, in principle the whole Ouija process can be done with all sitters closing their eyes while interacting with the planchette. Of course, kinesthetic perception is still available, which was sufficient for blindfolded experiments in Gauchou, Rensink, & Fels (2012) when the planchette only had to be moved to the left or right side of the board to hit yes or no. In our case, when all sitters closed their eyes, spelling quickly came to a stop. When some of the sitters temporarily closed their eyes or looked away from the board, while at least one was still watching, communication usually continued, but could slow down. Apparently, some hand–eye coordination is required for Ouija, to do precise positioning and spelling. This is another field for more systematic research which could easily be done with the system, including precise measurements of how the motion paths are affected.

A somewhat related aspect was observed, when during a session (with four sitters) after a question no letters were spelled but the planchette made a swift motion which at first did not convey any meaning to the sitters. After it was repeated two more times, one of the sitters suggested it could be a heart, which the Ouija communication confirmed with yes. After later analyzing the motion trace (during the session it was switched off), the heart was clearly visible with amazing accuracy (Figure 10). This effect indicates that it is possible that the planchette moves in ways for which the meaning is unveiled only after a later analysis. From the perspective of ideomotor theory this puts another burden to be performed by the unconscious minds of the sitters.

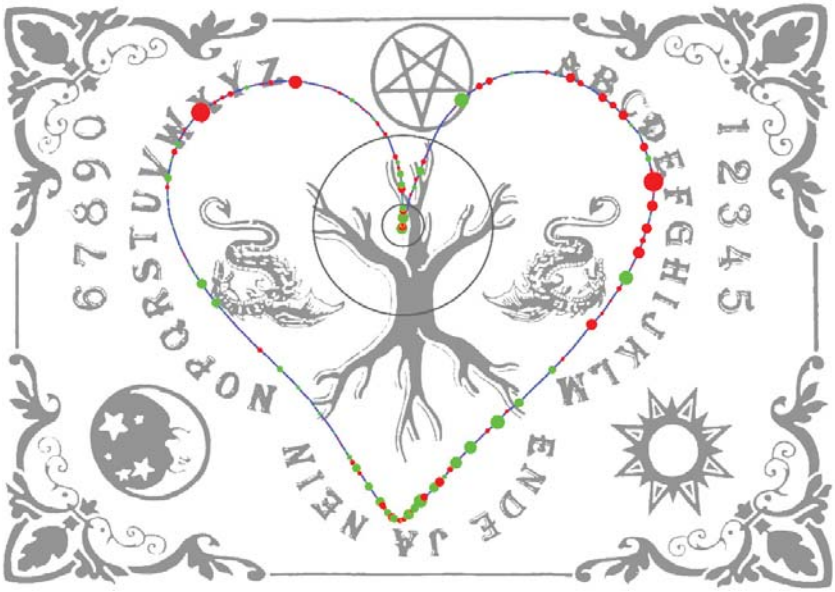

Figure 10. Planchette trace (duration 7 seconds).

Touch Sensors

So far, the touch sensors have been used in just a few sessions, with the current version only working for two sitters. Both sitters have to place one finger in the middle of the sensor field. Results show that with this setup it is possible to have a fine-grained view of the interactions of the sitters and planchette. For example, Figure 11 shows that a slight displacement of the sitter's finger precedes the planchette acceleration, thus supporting the assumption that the planchette is actually moved by the sitters. If the planchette would move by itself and the sitters just follow, it would be vice versa; the planchette motion would result in a displacement of the fingertip in the opposite direction, until the sitter reacts and moves his finger to follow the planchette.

Similar to the analysis of the planchette rotation, the touch data could also be used to identify the precise timing and possible delay with which the sitters are interacting with the planchette. In contrast to the visual tracking of the planchette, currently the data produced by the touch sensor is much more prone to other unwanted influences on the readings. Especially the need to precisely put just one finger on the center of the sensor field caused some stress for the sitters, distracting from the normal flow of the Ouija

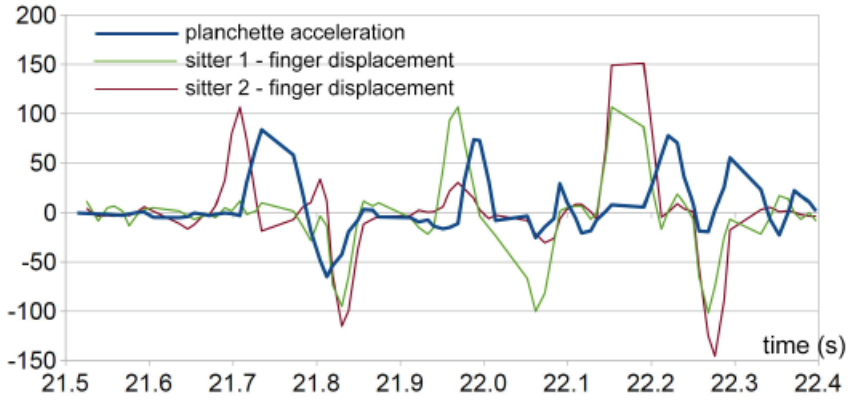

Figure 11. Data from the planchette sensor.

session. Changes of finger positions caused different sensor readings such that an automated, statistical evaluation of the data over longer periods of time was not yet feasible.

Linguistic Analysis

As stated in the Introduction, the sparse research on Ouija is based on experiments where very limited content is communicated. Gauchou, Rensink, and Fels (2012) address only yes–no questions, Andersen et al. (2018) have single words spelled. Also, the speed of the communication was slow in comparison to the quick spelling in our experiments, which leaves much less room for the conscious minds of the sitters to interfere.

The system presented here allows us to easily build up a database of texts produced during Ouija sessions and to use them for further analysis. The textual data collected so far comprises about 220,000 characters (more than 42,000 words), including the precise timing of the spelling of each character. Thus it is tempting to apply linguistic analysis such as is used in forensic scenarios with the goal of authorship attribution (e.g., Kredens & Coulthard 2012). Can lexis, grammar, and semantics provide clues about the identity of the author? This question is also relevant for facilitated communication, because it is confronted with the criticism that it is the facilitator, not the client, who is the source of the typed messages. Biklen et al. (1991) and Niemi and Kärnä-Lin (2002) use linguistic analysis to argue for the validity of facilitated communication. Bernardi (2009) employ statistical text analysis with quantitative measures such as lexical richness.

The software presented here provides a good basis to apply such

approaches, in combination with other tools such as AntConc (Anthony 2018), to the Ouija scenario. For example, a corpus analysis was done to describe what words are used and with what frequency. It gives an impression of the typical content and style of communication, but so far does not offer any hard evidence with regard to authorship attribution. Hopefully, with well-designed experiments such as specific protocols and participant selection, linguistic analyses may provide additional insight into the Ouija phenomenon.

Discussion

This article presented a technical system for performing various measurements during Ouija sessions and presented example data. There are various ways these data can be analyzed, offering some new insight into the phenomenon. The system worked reliably throughout most of the sessions, especially after some adaptations were made in early sessions to improve the robustness of image processing and letter recognition. The decision whether a letter is being registered as a hit is always made by the software following identical rules, thus avoiding subjective discussions about whether a letter was part of a message or not. Some minor problems occurred when the system was used in different light conditions, causing single outliers in the readings of the planchette positions and in rare cases requiring manual adjustment of the HSL-color search range during the session. Sitters, especially those who were using the system for the first time, occasionally covered the colored markers of the planchette with their fingers, causing wrong readings until being reminded to keep the markers visible. To deal with that problem, a different version of the planchette was built where the markers are placed three centimeters above the surface of the planchette (held by nails).

All the presented data has been collected in real-life Ouija sessions. On the one hand, this has the advantage of having a realistic scenario to test the system in practice, with engaged test persons, most of them with considerable Ouija experience, and with personal and emotional content in the communication in which the sitters have real interest. Presumably as a consequence, spelling speed, accuracy, and overall quantity and complexity of content surpass the output of more controlled experiments, such as mentioned in the Introduction, by orders of magnitude. On the other hand, controlled experiments with a careful selection of participants and predefined tasks or test questions offer the potential to thoroughly look for correlations between the specific situation and the data captured by the presented system.

While there is still potential for improving the measurements and

evaluation, the current analyses show some results that hopefully contribute to more comprehensive explanations of the Ouija phenomenon beyond the ideomotor effect:

• When hitting a letter, details of the motion path (cusps vs. smooth curves) could indicate whether the next letter is already anticipated, hinting at (conscious or unconscious) knowledge of how the spelling will proceed.

• The time needed to spell the next letter was only weakly related to its "guessability," i.e. the number of choices to construct meaningful words, in contrast to Andersen et al.'s (2018) statement about imposing "structure on initially random events."

• According to the experiments with the touch sensor, it is the sitters' fingers that are moving first, then the planchette follows. This complies with the ideomotor explanation. If there were psychokinetic effects, it seems likely that it would be the other way around and the fingers would be following the actions of the planchette.

• Often two sitters were able to move the planchette synchronously, similar to the volitional spelling of a given message. This challenges conventional ideomotor explanations, as these would require some negotiation process regarding the next, unknown target. Even though this might happen unconsciously, it would require some time for information transmission between the sitters and potentially some delay in the action of one sitter, causing similar rotations as when one sitter voluntarily leads the planchette—unless there are psi effects explaining the synchronicity.

The data presented here focused on the planchette motion. Of course, spelling and text content also are of interest, as mentioned with respect to linguistic analysis. In addition, there are various ideas for further improvement of the technical setup. For example, to improve the reliability and ease-of-use of the touch sensor on the planchette, the tinfoil electrodes should be replaced with PCB boards with a fine-grained zigzag pattern. Regarding the evaluation of the motion paths, more elaborate metrics could be calculated such as path smoothness or intensity of rotational movements to find measures that eventually may describe the overall quality of the interaction with the planchette and peculiarities of spelling.

Obviously, the above results should be further investigated and checked if they can be replicated with other sitters under different conditions, potentially also in the context of more controlled experiments. I am considering refining my software such that it can be given away to other interested researchers and/or Ouija circles to do their own experiments.

Basically a webcam, a PC, and colored dots on the planchette are sufficient. It would be great if other groups recorded their sessions in a similar way and results could be compared. However, there are still some obstacles: Currently, the use of the software is somewhat complicated, especially setting it up with different boards requires manual work. Also, I have not written any user documentation. Alternatively, the software could also do an offline analysis of Ouija sessions recorded on video, but then the live feedback of letter detection would be lacking and Ouija circles would probably not want to share their recordings containing personal information. If there is real interest, I am sure we can find a way to jointly benefit from the system to gather more insight into Ouija workings. In any case, I hope this article stimulates the discussion about Ouija research, a subject that is, even after more than a century, still worth exploring further.

Acknowledgments

I would like to thank my wife Heike Bauder as a continual fellow sitter, as well as the other unnamed sitters who diligently spent much time with us at the Ouija board.

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ESSAY REVIEW

Subtle Energies and Quantum Mechanics

From Quantum Physics to Energy Healing: A Physicist's Journey to Mind and Healing by Johanna Blomqvist, translated by Tuula Yrjö-Koskinen. Helsinki, Finland: Mindstream Publishing, 2018. 294 pp. $16.16. ISBN 978-9529404186.

The Mind's Interaction with the Laws of Physics and Cosmology by Jeffrey S. Keen. Cambridge Scholars Publishing, 2018. 435 pp. $33.95 (paperback). ISBN 978-1527513648.

DOI: https://doi.org/10.31275/2019.1453

Today such notions as chi, "subtle energy," or "life force energy" are typically ridiculed by conventional scientists, who might argue that our modern understanding of matter and energy leaves no room for what they might call New Age versions of vitalism. Yet such notions persist in in the yoga studio, the acupuncture clinic, the tai chi class, and other venues. What can we make of this? Such notions also are the focus of two recent books that explore them in very different ways. One book is *The Mind's Intervention with the Laws of Physics and Cosmology* by Jeffrey Keen, which provides a dowser's deep exploration into the various kinds of subtle energy in the world all around us. The other book is Johanna Blomqvist's *From Quantum Physics to Energy Healing*, which is a much more personal journey into energy healing. As it happens, both books look for links between so-called subtle energy and quantum mechanics. While some might scoff, I submit that there may be dividends here, given the persistent mystery of quantum mechanics. In any case, I will discuss these two books as well as consider how what they present as subtle energy might fit with quantum mechanics.

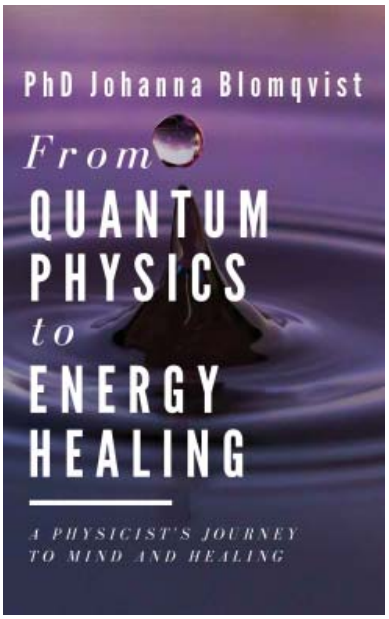
Blomqvist's book can be characterized as a personal journey of a trained physicist exploring the world of energy healing. The book serves as a good overall introduction to energy healing, with a heavy emphasis on Blomqvist's personal experience and insights. Her focus is primarily Reiki, with a dash of William Bengston's energy healing method added in. She also presents an overview of the empirical research on both Reiki and Bengston's technique.

There is also something of a theoretical foundation for her claims through the chapters on quantum mechanics and consciousness.

She begins by discussing how energy healing (sometimes called "laying on of hands") has appeared in ancient cultures, including Egypt, Greece, early Christianity, and the Middle Ages of Europe. She then turns to the East to include China, India, and Tibet, where references to energy healing are plentiful and persist to the present day. She notes that the system of the body's meridian system (energy channels) through which chi or life energy flows through our body originates in China. This chapter's key thread is how ancient and universal these practices are. Of course, many practices such as acupuncture and qigong draw heavily on this system and understanding of chi. Interest in hands-on healing became rather fashionable in Enlightenment Europe through such doctors and alchemists as Paracelsus, Mesmer, and Galvani. However, this heightened interest gained little traction among the scientists of the time.

Blomqvist pivots toward a more contemporary inquiry with the work of William Bengston, whose publications document some remarkable results from applying his technique on mice with cancer. A distinctive feature of Bengston's method is that the healer uses a "cycling" technique which involves rapid mental imaging of positive situations in one's mind. Apparently, this creates an emotional state that facilitates healing. Blomqvist notes that unlike many other methods, Bengston's technique isn't necessarily relaxing or peaceful; further, Bengston claims that the healer's belief in the healing process has no effect on its efficacy. Blomqvist discusses an especially interesting mechanism from Bengston's work, "resonant bonding," to account for cases where one group receiving treatment might affect another (perhaps control) group that is not intended to receive treatment. That is, the healer, either through inadvertent contact with the control group (that does not involve treatment) or possibly thinking about them, fails to exclude some healing effects intended only for the treatment group.

But Blomqvist's main focus, in her own experience and throughout the book, is Reiki. Indeed, Reiki has a particularly prominent place in the world of energy medicine. Drawing on a UCLA study, *The Washington Post* recently reported that "More than 60 U.S. hospitals have adopted Reiki as part of patient services, . . . and Reiki education is offered at 800 hospitals" (*The Washington Post* 2014). As Blomqvist explains, Reiki originated from the Japanese teacher Mikao Usui in the 1920s. Usui, as the story goes, climbed Mount Kurama and there received healing wisdom, including the symbols used in Reiki. As Blomqvist notes, when one learns Reiki, one is attuned or initiated to receive and give energy, as well as to support one's spiritual growth. Like other healing methods, Reiki draws on a framework of universal life



energy, which might be also described as a field that encompasses everything and has a dynamic character. Skeptics might dismiss such talk as vitalism, while those at the other end of the spectrum might conjure notions such as "the Force" invoked in a well-known movie franchise.

Reiki symbols distinguish Reiki from other modes of energy healing, and are used during Reiki training (different symbols at different levels of training) to heal the healer and to bring in universal energies. During the Reiki course, the student learns the symbols and the positions on the body to place the hands. But Blomqvist (and Reiki teachers generally) also encourage students to trust their intuition and allow the Reiki energy to guide them on where to place the hands. And Reiki is remarkably flexible in other ways; remote healing is available for those not in the vicinity of the Reiki practitioner. And Reiki healers apparently are not bound by time: Blomqvist shares her experiences of "treating one's timeline with the present as a starting point, moving from either toward the past or the future. In one's mind one can imagine the path as a ribbon with pearls, knots, anything" (p. 64).

Much of the book recounts Blomqvist's personal experience with energy healing (mostly with Reiki). She provides copious descriptions of such things as her initiations in her first courses, details about the Reiki symbols and descriptions, and the sensations she experiences as she treats clients. She counsels that ego must relinquish control and that one needs not believe in Reiki to achieve results. Some of her insights have a New Age ring. For example, in her words, "my subconscious mind . . . would say that Reiki was all about love, pure love, total acceptance" (p. 53). In another example, "Negative feelings express that the direction is wrong. . . . Positive feelings, on the other hand, tell that the direction is right and that more of this is needed" (p. 62). Of course, my bristling at these and similar more or less innocuous passages, may say more about my own limitations than hers. And to be fair, I do believe Blomqvist endeavors to give the reader a sincere and transparent account of her experiences.

Later in the book, Blomqvist provides material on the empirical research

on Reiki. Caution should be exercised here, given the likely variance of efficacy across practitioners, as well as other difficulties, such as controlling for all factors during remote healing. That said, she provides a wealth of evidence that Reiki provides valuable results. However, as she notes, many of the studies have relatively small sample sizes. Also, the variable of interest for many studies is an overall feeling of well-being rather than some specific physiological variable. While this might seem vague and subjective, it is probably defensible given the holistic character of energy healing. But reading the descriptions and results of study after study is not light reading, and many readers might have some difficulty assessing all of it. A table summarizing the empirical research would have been a helpful addition.

One particularly well-known study Blomqvist discusses, by Catlin and Taylor-Ford (2011), found that groups receiving Reiki treatment and a sham Reiki treatment both achieved significant results, but there was no statistical difference between them; however, a control group receiving no treatment achieved no significant results. Catlin and Taylor-Ford thus argue that sham Reiki is likely as good as official Reiki and suggest that the true benefit arises from the physical contact which allows patients to relax, as well as possibly a placebo effect. However, Blomqvist notes that this may demonstrate the resonant bonding (suggested by Bengston and briefly discussed above) where two different groups are linked in some unconventional way and respond similarly, despite only one group receiving the official treatment. (Perhaps another possibility is that even those untrained in Reiki provide energy healing benefit to patients.)

But what, you may ask, does all of this have to do with quantum mechanics (as the book's title implies)? Blomqvist does provide the reader with an overview of quantum mechanics, emphasizing the Copenhagen interpretation, with alternative interpretations, such as Hugh Everett's many worlds and David Bohm's hidden variables, briefly added in. Blomqvist's presentation of quantum mechanics might be characterized as a boiled-down version of what one might find in an introduction to the subject, aimed at a broad audience. Blomvqist does give hints of a speculative sort about how energy healing might be linked with quantum mechanics, but it falls a bit short of anything resembling a clear framework.

Blomqvist also gives us some of the recent thinking on the "hard problem of consciousness," a term coined by philosopher David Chalmers. For Chalmers, the hard problem is how to account for our subjective experience. According to Chalmers, we have made progress in understanding consciousness on some fronts, but we are not any closer to resolving the hard problem. Blomqvist posits that Chalmers and some other philosophers suggest that the answer likely requires moving away from purely physicalist

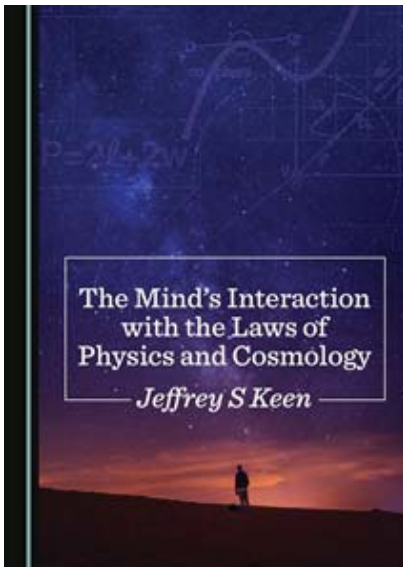
explanations of our world. And viewing consciousness or the mind as fundamental in some sense (she briefly discusses dualism, idealism, and neutral monism as possible alternatives) helps to support her claim that mind can affect matter, at least in subtle ways. To back this up, she cites work from Dean Radin and the PEAR (Princeton Engineering Anomalies Research lab) project that suggest one's intention can influence the world around us in unconventional ways.

Overall, Blomqvist probes the subject of energy healing from many angles. Although she falls short in providing a satisfying link between energy healing and quantum mechanics, we can note that currently no consensus on how to think about quantum mechanics exists. While much of the material on Reiki is likely helpful for those considering a healing practice, quite a lot of that material is available online, including on YouTube, in addition to copious books. Nevertheless, Blomqvist's book is likely unique in the wide variety of fields and methods she brings together in her exploration.

I pivot now to another investigation of what we might call subtle energy, but this time from the vantage of dowser Jeffrey S. Keen, which he presents in his book *The Mind's Interaction with the Laws of Physics and Cosmology*. Of course, just as in the healing energy work discussed above, the nature of these subtle energies sensed by dowsing is not understood within the framework of conventional science. And Keen's notion of subtle energy extends beyond living organisms to include all physical objects and even abstract mathematical shapes.

Dowsing, as Keen explains, is the ability to detect and measure various subtle energy fields in our world that are not detected by either the five senses or existing scientific instruments. Keen also explains that, in conjunction with the mind's intent, our subconscious mind has the ability to probe these subtle energy fields, usually using something like a pendulum or metal rods. According to Keen, the world most likely contains an uncountable number of different subtle energy fields that the mind must learn to block in order to manage what would otherwise be an enormous flow of information. Thus, it is necessary to learn how to tune into a specific "channel." Dowsing involves the mind interacting with this environment in the widest sense via consciously specifying intent, and visualizing what information is being sought.

So, what Keen (the dowser) describes as subtle energy may differ in significant ways from what Blomqvist (the healer) describes. Perhaps Keen offers a broader range of subtle energy that also includes whatever is sensed by the Reiki healer. That said, there also seem to be important similarities. Both seem to be inherently subjective in the sense that we know of no objective method for the detection of either. In both cases, the human subject appears to play a necessary role; the healer or dowser learns to detect subtle sensations



or follow one's intuition, presumably rooted in the subconscious. And both Blomqvist and Keen invoke something of an underlying field of information that supports the process in each case.

Keen's book is a highly ambitious and serious inquiry that is most likely intended for the scholarly or serious dowsers. The book is fairly dry and technical, albeit for the most part quite readable. Although he eschews introductory guidance on pendulums or dowsing rods, he usually breaks down his inquiries into careful steps, perhaps to allow others to confirm his observations. Keen is eager to fit subject matter with mathematical formulas whenever possible; however, the mathematics remains at an undergraduate level and thus is accessible to most people. And Keen presents copious graphs, illustrations, and photographs to facilitate what would otherwise be very difficult subject matter to grasp.

One important caveat: We really have no way of knowing how much of the results Keen reports would be confirmed by other dowsers. Dowsers generally use various devices, such as a pendulum or rods, to "amplify" the sensations they learn to feel; but Keen explains that most of his presented results were obtained without such devices (except for an occasional use of angle rods). Thus, Keen relies on intuition or his other gifts to a greater degree than most other dowsers to give us a much wider range of examination in the nature of subtle energy.

All of this said, Keen offers a deep (and in my view fascinating) exploration into different kinds of subtle energies, which range from lines across the landscape, auras (for both living and non-living forms), vorticular energies, "psi-lines," and others. While Blomqvist tries to describe as best she can the details of inherently subjective experiences, Keen is eager to quantify everything he can, often in surprising ways. Many of his findings are counterintuitive, as well as intriguing. His detailed charts and illustrations demonstrate how various properties vary with distance or time. Also, Keen's attempts to use equations to ascertain the relationships of various aspects of subtle energy observations are impressive. Almost needless to say, Keen is especially interested in mathematical constants and

series, such as phi and Fibonacci's sequence, that mystics and occultists have been fascinated with for centuries.

In the space of this review, I cannot do justice to the range and detail that Keen covers. But I'll discuss a few examples, beginning with auras. According to Keen, they surround every object on earth, be it inanimate object, life form, or even a shape of abstract geometry. The size of an aura is a function of its source object's shape, size, composition, and mass. And unlike gravity or electromagnetism, auras (and subtle energies in general) possess a constant field-strength with a very unnatural sudden sharp boundary. Thus, there is no gradual fade-in or fade-out, nor does the dowsing reaction obey the inverse square law.

Keen begins his examination of auras with solid inanimate source objects, such as stones and crystals. Fundamentally, dowsing solids produce a pattern centered on the source object, comprising seven distinct fields. Typically, the aura(s) of a physical object includes seven concentric ovoid shells (which Keen compares to Russian dolls). Each shell is associated with a color, and Keen provides tables that illustrate this as well as other properties, such as how they shrink in darkness or expand in light. Keen then proceeds to explore the auras of plants, and ultimately humans. He notes that, unlike inanimate objects, human intent enables us to alter our own and other people's auras and chakras. Another interesting, and likely controversial, claim is that the auras of all life forms produce a "Tree of Life" structure of vortices/conical helices and lines in a horizontal plane adjacent to the life form. But perhaps most surprising is Keen's finding that abstract geometric shapes produce very similar auras to those of solid objects. (This is something he observed with other sorts of subtle energies in addition to auras.) In fact, he reports that the subtleties of abstract shapes might exceed solid objects: He reports that 2- (or 3-) dimensional solid discs "only have a 7-fold geometry, but abstract drawn circles produce 9-fold geometry in their ellipsoidal auras, spirals, bands, and rings" (p. 86).

Keen also explores the interactions between two bodies in relatively close proximity. He finds that provided their auras overlap, the interaction of any 2 bodies (even of pure abstract geometry forms) instantly generates a complex pattern. He also finds that complex patterns of subtle energy persist as the bodies separate. (There is a surprising diverse range of patterns that space prevents me from providing more detail about.) At several points in the book, Keen argues that the structure of the universe has the ability to treat abstract geometric sources similarly to physical objects, with respect to the creation of subtle energies. But intriguingly, physical bodies, which one might have thought involve more information than an equivalent abstract geometrical pattern, produce less subtle energy.

I admit I found Keen's presentation on the quantity and range of subtle energies, as well as mathematical relationships on some properties—with literally everything around us—a bit bewildering. Often, I was a little torn between skepticism—would other dowsers give us similar reports?—and admiration for Keen's systematic inquiries on all aspects of subtle energies. In the end, I couldn't help but look at objects around me and wonder what subtle properties might be emanating around them. (And it has also strengthened my motivation to follow Marie Kondo's advice for tidying up my home!)

Another subject the author turns to is mind–matter effects; that is, how the mind creates patterns of subtle energy. He focuses especially on what he terms "psi-lines," which he describes as "a form of linear subtle energy, often perceived to be flowing along the ground" (p. 247). Keen argues that these psi-lines are also created by animals to assist in migrations, and by our ancestors for travel and tracking. According to Keen, psi-lines have been known from ancient times and were presumably used for direction finding and navigation. They are created by the mind, sometimes to find a route from A to B, where A is the creator desiring to find a place or person located at point B. The psi-line can then subsequently be used by future people requiring the same optimum route. They can have beneficial or detrimental effects on health, according to Keen. Keen's results suggest that local and astronomical forces, including gravity and the earth's spin, affect the properties and structure of psi-lines. Also, he notes that these mind-generated subtle energies are terminated by spirals. Based on experimental observations, Keen develops a formula on the relationship between their length and width.

Keen also provides in detail many other facets of subtle energy that I will touch on only briefly. These include details and properties of spirals, conical helixes, and columnar vortices. He provides some depth about the relationship between such subtle phenomenon and various ancient cites and burial mounds, as well as natural features, such as underground intersecting watercourses. Keen also explores how the auras change when objects are rotated. (He finds that the auras of inanimate objects are unchanged through spinning, but the aura of spinning water expands.) He also notes that mind-generated fields (which would include prayers) have similar properties to rotationally generated subtle energy fields.

Among the intriguing findings, Keen notes that the measurements from subtle energy readings do vary with time. He also finds that the dimensions of auras and subtle energies vary with various celestial events (such as the time of day, time of year, and the position of the moon relative to the earth). (In most cases, he presents the results of his measurements in

charts.) Particularly interesting events include equinoxes and solstices (he argues that the spin of the earth on its axis leads to vorticular movements in subtle energy). In addition, he finds that shifts in subtle energies occur with astronomical alignments, involving Jupiter, Neptune, Saturn, and the moon.

To help us make sense of all this, Keen invokes a notion of cosmic consciousness as a fundamental part of the structure of the universe. This cosmic consciousness, or cosmic field of information, responds to passive requests (such as those asking to be led to an underground source of tin ore) or pro-active ones (projecting a geometric shape to remote parts of the world). The author makes some references to quantum mechanics as a justification for this rather vague characterization, but doesn't provide much additional theoretical structure.

One minor quibble I have is that there aren't many references to Eastern notions of subtle energy. Keen's view of subtle energy appears to be influenced more by Western mysticism. Such concepts as the Tree of Life and the golden ratio appear prominently in his work. Philosophers and mathematicians who influence him include Plato, Pythagoras, and Fibonacci. Now, I have no real problem with that; I only find it a little surprising, given that arguably most contact we have with subtle energy today is through Eastern practices or systems, such as tai chi, yoga, Feng Shui, and qigong.

At this point, I would like to suggest how the works of Blomqvist and Keen might both fit within an interpretation of quantum mechanics, as well as consciousness. It is of interest that both Blomqvist and Keen invoke something like a field of information that is an ultimate base or ground supporting the work of both the healer and the dowser. For Blomqvist, the healer is drawing on what we might call a universal life force that is characterized by—not exactly energy, at least not in the conventional sense—but what we might describe as a field of information. Thus, we might say the healer is tapping into a kind of energy-information that supports our life processes. Keen invokes a notion of a cosmic field of information—that he also argues is conscious in some sense—which responds to passive requests or pro-active ones. While both Keen and Blomqvist invoke quantum mechanics in rather vague terms, I believe that their suggestions of an underlying field or ground of information can be fruitfully compared with the physicist David Bohm's (2005) "implicate order."

Bohm's implicate order (2005) is an extension of his earlier hidden variables framework, which described how subatomic particles are guided by an underling "pilot wave." This pilot wave in turn Bohm characterized as "active information," which depends holistically on the entire configuration of the quantum system. Usually, the configuration is understood as the given

positions in space of all the system particles. But fun fact: If the quantum system is entangled with its environment, the relevant configuration becomes the particles of the entire universe. Thus, the active information guiding subatomic particles is grounded on a vast amount of information indeed. Bohm called this inherently nonlocal "space," which is the base or source for active information, the implicate order. For Bohm, the implicate order is also the foundation for both matter and consciousness. Thus, Bohm's interpretation is not too far from Keen's notion of a cosmic source of information and consciousness.

Recently, some philosophers, such as Nagasawa and Wager (2016), consider the possibility that the universe as a whole is conscious (in some sense), in order to solve the hard problem of consciousness. Such work has also been motivated by Schaffer's (2010) argument that the universe is best viewed as a fundamental whole, rather than a vast collection of parts. Of course, such views remain far from the current mainstream. Nevertheless, the persistent problems of quantum mechanics and consciousness appear to be leading some people to consider such possibilities.

I believe this interpretation (or something similar to it) has some attractive features with respect to the subject matter in these two books. In the case of Blomqvist's energy work, the "resonant bonding" that links two different groups together might be explained through quantum entanglement. Perhaps as the healer is connecting with a group intended for treatment (via the field of active information) he inadvertently connects with the other group as well due to the inherently nonlocal properties of this universal life field. The inherently holistic nature of this active information sheds light on the holistic nature of energy healing. But holistic, energy medicine—contrary to the mechanistic framework of conventional medicine—is far more subtle, less predictable, often effective (but not always), and avoids the intrusive side effects of conventional medicine. And of course, the nonlocal aspect of this field (or the implicate order) suggests why remote healing might not be so far-fetched.

Now many people might object that quantum mechanics simply cannot operate in the relatively warm and noisy environment of the healer or dowser. Until recently, most physicists have argued that quantum mechanics generally remained confined to the laboratory, where conditions could be controlled for observation of paradoxical behavior at the level of subatomic physics. However, recently quantum mechanics has been observed to play a significant role in a growing number of biological processes (McFadden & Al-Khalili 2014).

While this might not be the view of these authors, I submit that Bohm's implicate order has points in its favor. In any case, I do believe that both

authors of the books under review here, in different ways, contribute to a richer understanding of how subtle energy appears to permeate our world. And I also believe that progress in this area likely requires that we let go of the notion that we can study it in isolation from our own being.

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BOOK REVIEW

Time Loops: Precognition, Retrocausation, and the Unconscious by Eric Wargo. San Antonio, TX: Anomalist Books. 435 pp. $22.95 (paperback). ISBN 978-1-938398-93-3.

DOI: https://doi.org/10.31275/2019.1467

Some nonfiction book reviews are more like CliffsNotes—they provide the reader with a well-packaged synopsis of a book. After reading that kind of a review, I don't feel the need to buy the book. You will be spared that fate. If I don't make you want to buy *Time Loops*, I've failed. This book can hardly be summarized. The whole point of the book seems to be to spark new ideas and challenge old ones.

Wargo's effort recruits the full spectrum of academic disciplines from psychology to physics, providing everything from a lucid argument about the role of emotion in precognition to a discussion about how Philip K. Dick's name may have caused, through the intersection of culture and retrocausality, the very precognitive experiences that the science-fiction writer documented.

With his well-researched magnum opus *Time Loops*, it seems that Wargo hopes to drive forward the field of parapsychology from a scholarly position, but one that is well outside experimental science. His training is in anthropology, and he has held a lifelong interest in the gifts and pitfalls of psychoanalytic thought. For an empiricist like me, the book could have been easy to dismiss. I admit that at first my ego was affronted. I found myself asking, "Who is this guy who wants to tell me how to think about the science of time and precognition?" However, by page 11 I was hooked on the personal nature of Wargo's intellectual exploration of the topic. There he writes,

> Although precognition often surfaces to awareness in the context of stress and trauma, even death in many cases, I will argue that it really orients us ultimately to life, and to a renewed, intensified awareness of being alive.

While I've been a student of the scientific aspects of precognition for about a decade and a half, I've been a student of the personal experience of precognition since I was about seven years old. This sentence showed

me that Wargo knows the intimate and mystical pleasure of precognitive experience—the growing sense of connection with oneself over time that is experienced by those of us who take precognition seriously—but not so seriously that we fret about our predictions. Wargo's insight—that precognition is life-directed—felt intuitively correct, based on my personal experiences and on the scientific idea that any common human experience likely exists because it orients us in some way toward survival.

As with any great work, some elements caused irritation followed by inspiration. I'll briefly describe my irritations and the resulting inspirations, with the hope that you will have the pleasure of finding your own.

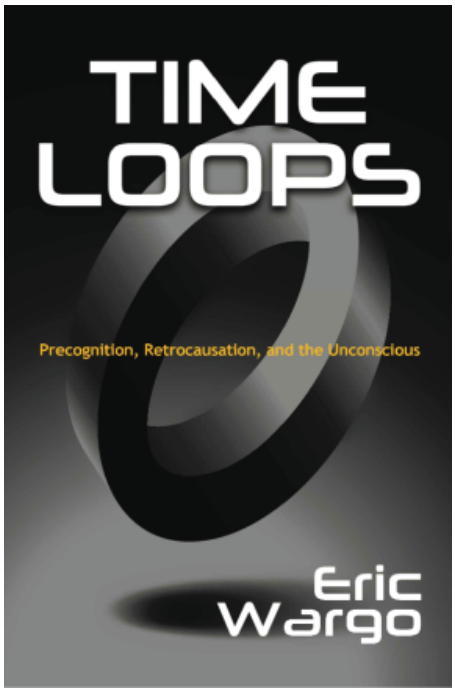
Irritations

Wargo covers so much territory with such an air of mastery that one can lose the thread and become concerned that he is bending every idea to meet his own set of hypotheses (he presents a large but not infinite set of hypotheses). The lack of humility wore thin when it came to the field I know best: experiments in precognition. My sense was that Wargo's brief discussion of experiments in precognition seemed cursory compared with the bulk of the book, which focused on spontaneous precognitive experiences almost to the exclusion of other forms of precognition. For most of the book, I had to learn to tolerate both a reliance on psychoanalytic case studies and a lack of reliance on empirical results from controlled experiments. This was good exercise for me.

Throughout the book, I wrote in the margins all sorts of annoyed responses to claims about "precognition" when in fact the claims only worked for spontaneous precognitive experiences. For example, in a section in which Wargo discusses his hypothesis that precognition is an unconscious orientation toward a rewarding experience (which, as far as I can tell, is consistent with the idea that every animal behavior is an unconscious orientation toward a predicted rewarding experience), he writes,

> Thus an alternative explanation for the link between psi accuracy and entropy is the perverse pleasure—that is *jouissance*—aroused in people by signs of destruction. Some vigilant part of us needs to be constantly scanning the environment for indications of threats to our life and health, which means we need on some level to find that search rewarding. (p. 245)

Familiar with the well-controlled empirical data Wargo is referring to—Edwin May and Sonali Marwaha's work showing a link between entropy in the target and free-response precognition (for review, see Marwaha and May 2015)—I was frustrated to see these data used to support the apparent



hypothesis that precognition in general (not only spontaneous precognition) is all about survival. It's clear from my own experience and more importantly from the Star Gate work that free-response precognition of the form studied by May and Marwaha is a highly technical skill that seems to involve few emotions on the part of the practitioners (see Volumes 1 and 2 of the archives, May & Marwaha 2018a,b). In fact, emotion can seem to get in the way of the process.

I found myself working hard to take into account that most of Wargo's hypotheses were based on stories of spontaneous precognitive phenomena. I was reminded more than once of a mentor's advice that when one entertains an idea, one "invites it in, offers it tea, and listens to its stories before commenting." As a result, I mentally substituted "spontaneous precognitive experiences" for "precognition" every time I saw it in the latter chapters of the book, a move that allowed me to make much greater sense of Wargo's arguments. It also turned out that trying to discipline myself in this way generated some new thoughts.

Another major discipline I had to undertake was one that I find necessary when reading almost any book about the physics or philosophy of time. Most scientists seem to believe that thoughts, experiences, and ideas are part of the physical world somehow—even though these things don't behave like any other things in the physical world. I am enamored of philosopher Galen Strawson's arguments that physicalism must include the mental, because we can't deny the existence of the mental, and as scientists we are living in a physicalist paradigm (e.g., Strawson 2006). But Strawson has yet to convince me that there isn't an important difference between everything we already admit into the set of things that we call "physical" and what we call "mental." This difference ends up causing all sorts of problems, when thinkers are not conscious of blending one world with the other, and *Time Loops* is no exception here. However, because dualism is a

minority position, I am used to having to undertake the discipline of making sure I think about what each statement in an argument is considering the physical world to be.

In *Time Loops*, Wargo presents a hypothesis that precognition takes place in a block-world spacetime, and therefore there is no real sense in which the dream of a plane crash can be used to "change" the future. If the plane crash happens (in the block world), then it will happen (in our experience) once we get to that point in spacetime. The problem I have with this hypothesis is that it brings the extra element of human experience into the block-world model of spacetime. One could argue that Minkowski's block world was at least partially created because human experience *does not* tell us the truth about the nature of reality, in that our experience that two events are simultaneous is only a relative one (Minkowski 1920/2019). A block world is explicitly without motion, cause, or effect. It is non-dynamic. Not only are human experiences not accounted for in a block world, anything that is dynamic (including motion, cause, and effect) does not take place in a block world, whether it is experienced as forward- or backward-moving in time (Kastner 2017). Therefore, one major theme and hypothesis of the book, that spontaneous precognitive experiences are actually the result of closed causal loops in a block-world spacetime and the errors in our predictions of future events are indicators of the predetermined nature of these events, had to be unpacked carefully. I am not complaining, however, because this unpacking led to the second inspiration I happily took away from *Time Loops*.

Inspirations

The book itself is inspiring overall for the obvious time, effort, and scholarship put into its pages, as well as the clear commitment to cross-disciplinary thought. But in terms of specific inspirations, two major ones have come to my consciousness so far. I'm sure there will be others as the book does its work on me.

So much of my work in this field has been spent trying to capture precognition in the laboratory or in controlled online experiments. Prior to reading *Time Loops* I didn't take spontaneous precognitive experiences that seriously as fodder for scientific thought. I knew they existed, and I was convinced if only by my own experiences that some of them could probably be explained by genuine precognition. But I had thought that the way forward was to capture the essence of precognition in the laboratory and use controlled methods to examine it. While this kind of work remains attractive to me, Wargo's emphasis on that form of precognition was so opposed to my own orientation that it forced me to think about what spontaneous

experiences can offer that can't be found in a controlled experiment. This was a further personal integration for me, as lately I've been working on my own precognitive experiences in a daily "controlled precognition" practice (a subset of remote viewing in which the target is always only available precognitively—no one on the planet knows what it will be at the time of the session). I've seen profound and difficult-to-explain examples of precognition in these sessions, as I've had with my dreams throughout my life. But until reading *Time Loops*, I've been thinking of them as a relatively uncontrolled way for me to capture and control spontaneous precognitions so I can examine them personally, on a regular basis. Now I see my efforts as a chance to bridge the gap between the empirical and the personal, using empirical results to meet the universal need to understand who we are as humans.

This outcome probably began with Wargo's emphasis on the idea that precognitive experiences reflect not the target itself, but our response to the target. This is one of the ideas he presents that actually matches at least the empirical presentiment data I've analyzed as well as my own experiments (Mossbridge 2017, Mossbridge, Tressoldi, & Utts 2012), which might be why it took hold for me. It had occurred to me in the past that this result suggests that the rules dictating what occurs in our experiences seem to be written differently depending on each person's future response to a target. What hadn't occurred to me previously, because I was thinking only about controlled experiments in which the targets were not traumatic, was Wargo's idea that spontaneous precognitive experiences could be thought of as a neurotic process—a psychologically defensive response to a future event. This kind of process would be largely absent in a laboratory experiment, especially one with repeated trials, and most especially one with a talented precognitive who had done thousands of such trials over their lifetime. But Wargo makes a good argument that it is largely the case that compelling spontaneous precognitive experiences are compelling specifically because they occur in situations in which we or a loved one survives a trauma.

In addition to the detailed documentation Wargo provides in the book, the public response to plane-crash precognitions discussed in the November 2017 bulletin of the Parapsychological Association *Mindfield* (Van Luijtelaar 2017) provides another example of this idea. There is a guilty pleasure we take in witnessing disasters that don't kill us; it is a selfish but biologically consistent reward for surviving. This idea is made compelling throughout Wargo's work, and yet this seems to me to not be the case for repetitive laboratory experiments in precognition—especially not those where the participants aren't consciously aware the experiments are testing precognition. I started to toy with the idea that spontaneous precognition,

while being of the same genus as precognitive effects obtained in controlled experiments, is not of the same species. I began to imagine a taxonomy of precognition that very quickly became so complex that I abandoned the project, though it might be of some use in the future.

Returning back to the hypothesis that there is a mechanistic similarity between precognition that occurs in laboratory experiments and that which occurs spontaneously or even in an individual's controlled precognition practice like my own, I settled on an idea with which I think Wargo would agree. The idea is that all precognitive experiences can be explained by causal loops in mental objects. These objects can include, as Wargo argues for spontaneous precognitions, the mental object of a conscious prediction causing and being caused by the mental object of a consciously rewarding survival-related occurrence. But I would argue that precognitive experiences can also include the mental objects of conscious or unconscious behaviors or thoughts causing and being caused by the conscious or unconscious mental object of a simple, unemotional stimulus. It could be that what determines the species of precognition is the type of mental objects involved (conscious versus unconscious, emotional versus nonemotional, behavior versus thought) and the diameter of the causal loop (milliseconds, seconds, minutes, days, months, years). But I still insist that someone more patient than my present self—perhaps my future self?—ought to sort this out.

Following this line of thinking, I began to think that all experiences involving a sense of self—not just precognition—must necessarily be embedded in causal loops. What are these mental objects we call our "selves" if they are not consistent over time? And how could any consistency over time occur without the mental object of a "cause" being conveyed in both directions at once? If causes are only in the forward direction, it would feel that our "selves" don't ever exist except in the present moment—everything has been "building up" to cause a singular present-moment self-experience. But this idea flies in the face of our experience that our selves were once three, and six, and nine years old, and the mental objects of our experience of those selves are inarguably impinged upon by our present experience—the tail and the dog wag each other. This has been a convoluted journey, so I'll repeat this insight: *Time Loops* made me consider that perhaps causal loops are not only responsible for precognition, they are responsible for us having any continuous sense of self at all. While it almost certainly serves a survival function, precognition may also serve to make this contiguous relationship with ourselves over time more apparent to us.

The second inspiration I believe derived from Wargo's work is that the relationship between our own conscious experience and the physical elements related to that experience could be temporal rather than spatial.

Wargo presents the hypothesis that what is in the unconscious mind at the present moment is in fact what consciousness is in the next moment—that the unconscious mind is consciousness displaced backwards in time. This led me to think about a potential rejoinder to an argument that is sometimes voiced in response to the hypothesis that the brain acts like a radio receiver for consciousness. The argument asks, "Well, where's the transmission coming from?" An excellent point really—we don't see a consciousness-beaming tower anywhere around. But Wargo's idea about consciousness displaced in time invited me to revisit an old idea that, for me, was relatively unformed—the idea that consciousness is literally transmitted from the future. The idea is that in a physical but not block-world conception, consciousness is like a physical wave that is transmitted from our future selves to create our present mental objects. This wave may be received by what we call our current experience, or what we call our unconscious mind. But it's not "where" the control tower is—it's "when."

In sum, this book was in no way easy to dismiss, precisely because the author does not actually want to tell anyone how to think. Wargo wants to reveal how he's thinking as a way of sparking ideas in others. Wargo disarmed me, because for the most part he admits he is speculating throughout. The book offers a compelling series of arguments for some interesting points of view—and in good humanities-writing style offers little proof for any of these speculations. For an empiricist who loves to test ideas, I found that Wargo's lack of proof makes his arguments that much more compelling to ponder.

You might notice that my minimalist reflection on Wargo's tremendous work can be seen as a nod to his philosophy that precognition is intimately tied with emotional responses in the future—I only previewed for you those elements of the book that evoked emotional responses in me. Regardless of how precognition relates to emotional experiences, I think we can all admit that science, like every human activity, moves forward largely as a result of strong emotional responses to experiences, even if those experiences result from analyzing data. Because I'm committed to moving the science of precognition and time travel forward, I hope you will be intrigued enough to read *Time Loops* and discover the unique elements that annoy and inspire you, *and* that you'll be so inspired that you'll do something about your emotional responses—like run the insightful experiment that created your annoyance and inspiration in the first place.

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BOOK REVIEW

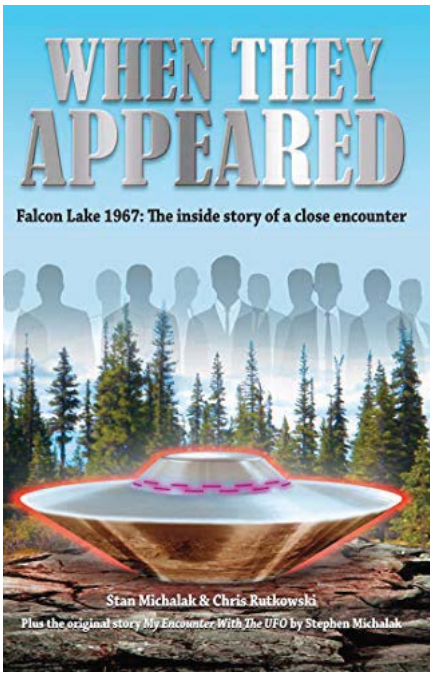
When They Appeared. Falcon Lake 1967: The Inside Story of a Close Encounter by Stan Michalak and Chris Rutkowski, Plus the original story **My Encounter with The UFO** by Stephen Michalak. August Night Books, 2019, 247 pp., $17.99 (paperback). ISBN 9781786770851.

DOI: https://doi.org/10.31275/2019.1525

The incident at Manitoba's Falcon Lake in 1967 has been reported upon repeatedly. Thoroughly researched by multiple sources and agencies, the authenticated physical effects are sufficiently convincing and leave little doubt that a serious encounter with UFOs did occur. Those who collect UFO reports and want details about this incident may find this book of interest.

Initially, this was a single-witness case. On 20 May of that year, Stephen (aka Stefan) Michalak, a Polish immigrant to Canada and part-time prospector, was collecting samples in a relatively remote area when the incident happened. The fundamentals are that he reported seeing two UFOs in close proximity. When one landed, his thoughts were that these craft were experimental and of American origin. He reported hearing voices and addressing them in several languages, but to no avail. Among the immediate effects was a feeling of "wafts of warm air that seemed to come out in waves from the craft, accompanied by the pungent odour of sulphur."

Shortly after the incident, Stephen Michalak wrote a short booklet about his experience. Initially published by Osnova Publishing in Winnipeg, Canada, it is included in its entirety in this book. It is not great literature, but in fairness we note that the book was written in Polish and then translated into English for printing. Still, there is value in having this firsthand account. What is of concern are the physical effects that Michalak experienced immediately following the departure of the craft. These adverse effects followed him for a long time and were never clearly understood by the various medical facilities at which treatment was sought. That even included the world-famous Mayo Clinic in Minnesota. In addition to significant weight losses, there were recurring headaches and skin lesions that appeared to be burns as if sustained from engine exhaust. Over time, some of the effects were attributed to allergies, but with no identification of the causal agent.

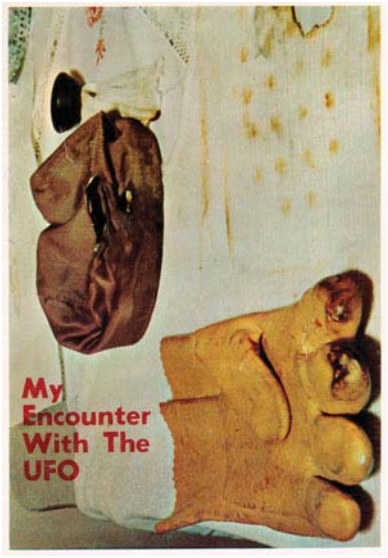


Since the case had considerable physical evidence, it was of sufficient significance to be covered in several pages of the infamous Colorado UFO Study, also known as the Condon Report. In fact, Roy Craig, one of Condon's investigators, did visit Michalak personally and attempted to locate the actual site of the encounter.

The rationale for the title of this book, *When They Appeared*, is counterintuitive at first blush. It does not refer to the appearance of those craft on 20 May, 1967. Rather, the authors are addressing the aftermath and the plethora of people who showed up, not all with benevolent intentions. That included many media requests, researchers of all ilk, and those people just obsessively curious. All interfered with the family's lives. In my presentations on UFOs, I suggest that participants need three things: thick skin (as you will be attacked), to understand conspiracy theories (as you are now part of one), and a day job (as you will not make much money for such reports). In my opinion, Michalak's experiences were a textbook example of all of those issues. He was berated, charged as a hoaxer, conned, and accused of being an alcoholic. It did not stop with Stephen Michalak, as the harassment extended to his entire family.

A substantial portion of this book with written by Stephen's son Stan Michalak. In it he describes the bullying he experienced at school when the media printed articles about his father. Also included are many stories of their family life while under scrutiny. A degree of respect for Stephen Michalak was gained when some in the media learned that during World War II he had spent time interned at Gross-Rosen, a Nazi concentration camp. Then, after escaping from Poland, he worked for the U.S. Army as a translator while they were dismantling other German extermination facilities, and he recounted his firsthand observations of the horrors inflicted at those sites. It was his work with the military that facilitated his immigration to Canada.

As might be expected, UFO investigators of both APRO and their Canadian counterpart, CAPRO, descended on the family. Additionally,



there were apparently considerable interest and investigations by the Royal Canadian Mounted Police (RCMP) and the Royal Canadian Air Force (RCAF). The RCMP became involved almost from the time of the initial event. Staggering from the burns, and only partially clothed, shortly after trekking to the highway, Michalak came upon an RCMP officer engaged in other activities in the area. He described an encounter that would seem incoherent to any rational person. Fearing he was suffering from radiation and might contaminate others, he refused to allow the officer near him. Some of that activity probably led them to later question if he was merely drunk.

As might be expected, members of both the RCMP and the RCAF approached the incident quite skeptically. As recounted in the book, there were several examples of inconsistent details. Still, there was sufficient evidence to keep their involvement for a considerable period of time. In fact, the amount of effort that both the RCMP and the RCAF put in was remarkable. The critical factor was probably an indication that there was a real risk of radiation poisoning to the civilian population. In the end, both agencies declared the case to be *unexplained*.

In addition to the personal accounts of both Stephen and Stan Michalak, there is a third section written by respected UFO researcher Chris Rutkowski. He had entered the case much later (1996), when A&E (Arts and Entertainment Network) was creating a television program about the Falcon Lake event. Obviously Rutkowski was able to gain the trust of the family and to help them bring credible information to light. While the details remain the same, his section adds his personal reflection on the accounts provided by the father and son.

Since the beginning, this case has been plagued by inconsistencies and conspiracy theories. What *When They Appeared* does provide is considerable documentation to support the claims of the family. Aficionados of UFO research may find this a useful addition to the established body of knowledge.

—John B. Alexander

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BOOK REVIEW

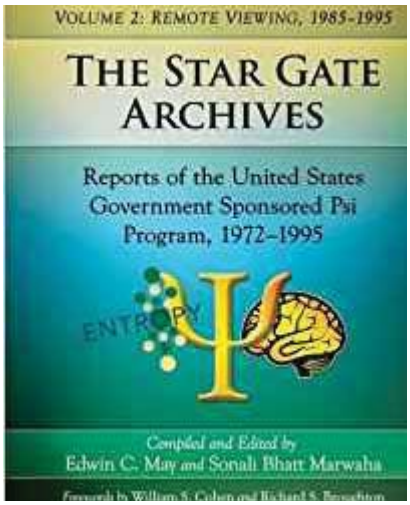
The Star Gate Archives. Volume 2: Remote Viewing, 1985–1995
compiled and edited by Edwin C. May and Sonali Bhatt Marwaha. McFarland, 2018. 614 pp. $95.00 (paperback). ISBN 9781476667539.

DOI: https://doi.org/10.31275/2019.1533

The parapsychological research by Harold Puthoff, Russell Targ, and their colleagues at SRI International during the 1970s and early 1980s was covered in my review of *The Star Gate Archives Volume 1* (Mörck 2018). This was an explorative period during which focus was on applications. Targ had to leave in 1982, and Puthoff, the director of research, left in 1985; one of the Editors, Edwin May, became the new director of research. During the 1980s and early 1990s much basic research was conducted and oversight increased. Among the members of the oversight committees were Daryl Bem, Robert Morris, Melvin Schwartz, and Philip Zimbardo. Comments from the Scientific Oversight Committee are attached to some of the reproduced documents. The names used for the program between 1985 and 1995 were Dragoon Absorb, Sun Streak, and Star Gate. Volume 2 consists of a collection of unclassified reports and declassified documents. The anthology also includes nine appendixes, a list of abbreviations, an extensive glossary, an author index, and a subject index. Brief comments about all reproduced documents can be found in the volume's Introduction.

The Backstory

During the 1960s, U.S. intelligence agencies learned that parapsychological research was once again undertaken in the Soviet Union after a long hiatus. In America parapsychology was regarded as a taboo topic (Murphy 1963), but the fifth attempt by the Parapsychological Association to become affiliated with the American Association for the Advancement of Science (AAAS) was successful in 1969. Subsequently, during the 1970s parapsychologists presented papers at AAAS symposiums (Ventola 2016) but continued to feel mistreated when they submitted papers to its journal *Science* (McClenon 1984, see also May 2009). Within the intelligence community parapsychology was controversial, but due to the developments in the Soviet Union it was deemed necessary to assess whether psychic abilities were of any real use.



The parapsychologist Richard Broughton recalls the 1970s: " . . . there was a palpable sense of excitement that real breakthroughs were not far off" (p. 2). Inspired by an article brought to their attention by Tart (1969), William Braud, Charles Honorton, and Adrian Parker conducted ganzfeld studies (more about those later). Tart (1969) also sparked interest in lucid dreams, that is dreams in which one knows that one is dreaming. Stephen LaBerge studied lucid dreams during the 1970s—his findings were too extraordinary for the journal *Science* (Blackmore 2005:140).

In the 1980s books concerning an alleged psychic arms race between America and the Soviet Union appeared (e.g., Ebon 1983, McRae 1984), and Jack Anderson wrote about it in *The Washington Post*. There was a mixture of fact and fiction in the literature (Krippner 1984, McRae 1992). Due to congressional interest in parapsychology, a report was written (Dodge 1983)—this provoked Paul Kurtz, Chairman for the Committee for Scientific Investigation of Claims of the Paranormal (CSICOP), to claim ". . . it has never been clearly demonstrated that extrasensory perception has any practical applications nor has it been clearly demonstrated to exist in the laboratory" (Kurtz 1984:239). In 1984 CSICOP arranged a panel devoted to the psychic arms race, which made it clear that Philip Klass, Fellow of CSICOP and editor of *Aviation Week*, was as oblivious about what was really going on despite his contacts (Frazier 1985). However, now anyone sufficiently interested can learn many of the facts.

Introduction

In one of the Forewords, former Senator William Cohen remarks that "Information is power and we should remain dedicated to exploring just how powerful mankind's mind is—and can be" (p. 1). Broughton has also written a Foreword, in which he puts the research in context. The Forewords and May's brief Preface are the same as in Volume 1. However, the Editors have written a new Introduction and stress that ". . . in the history of psi research, the Star Gate program is the largest funded sustained research program, with substantial oversight" (p. 15). Some claim that it was a CIA

program but this is simply not true—the CIA ceased funding the research in the 1970s. During the period covered by Volume 2, 1985–1995, most funds came from the Defense Intelligence Agency (DIA) and the U.S. Army Medical Research and Development Command (USAMRDC). The closure of the program in 1995 receives little commentary in the Introduction, but much has already been written about it (e.g., May, Rubel, & Auerbach 2014).

After the closure of the program, the *Journal of Scientific Exploration* published articles about the research that had been conducted (Vol. 10, No. 1, https://www.scientificexploration.org/journal/volume-10-number-1-1996). Most skeptics paid little attention to the research; however, Marks (2000) wrote critically about it. In addition, Wiseman and Milton (1998, 1999) commented on a study that is reproduced in Volume 2 (pp. 495–502; Lantz, Luke, & May 1994)—May (1998) responded. The controversy concerned who did what and possible flaws. It reminds parapsychologists of the need to carefully document how a study is conducted.

The Research

The focus in Volume 2 is on remote viewing (RV) research. According to the Glossary: "RV refers to the methodological procedures used in an experimental design in which a percipient attempts to describe [a target or] the surroundings of a target that is distant in time and space" (p. 606). The anthology is a hefty (614 pages), wide-ranging tome; it is not possible to cover everything in this review. The papers are arranged chronologically, but it is not necessarily a good idea to read them in that order. The book includes papers about how to evaluate RV, target pools, meta-analyses, experiments, overviews, and protocols. Several lines of research were pursued—I provide commentary about some of them.

An important question was naturally whether the quality of RV can be enhanced with training. In Volume 1 the reader was exposed to the psychic Ingo Swann's training methodology; in Volume 2 we get an account from another RVer, Gary Langford. Unfortunately, despite the research conducted, the usefulness of RV training remains unclear and Swann's training has been subject to severe criticism (May, Rubel, & Auerbach 2014).

The Personality Assessment System

In the 1980s, the researchers collaborated with David Saunders, known for his UFO research and his work on the Personality Assessment System (PAS). The PAS is a complicated instrument, originally developed within the CIA by John Gittinger (Marks 1979). It is ". . . a comprehensive

interpretive framework for profiles of subtest performances that have been generated by the Wechsler Adult Intelligence Scale (WAIS)" (p. 114). The PAS did not have a great following in academia and was still undergoing changes in the 1980s. The researchers at SRI International wanted to use the PAS to learn more about what characterizes good RVers. Both Volume 1 and 2 include papers about this. Saunders (1986) summarized the findings in a presentation at an annual convention of the Parapsychological Association. A brief critical review of the PAS was written by a consultant, Ralph Kiernan. The researchers' reaction to this suggest that they were a bit protective of the PAS (see p. 107, p. 123). However, a later review concluded that the main value of the PAS was "descriptive, rather than predictive, until a larger database of reliable psi performers is accumulated" (p. 130); Saunders agreed (p. 133). In the Introduction the Editors conclude: "Personality assessment measures have not proved to be effective methods for identifying people with good remote viewing skills" (p. 16).

Mass Screening

The Editors argue that the best method to identify good RVers is to test them. However, the results of two reproduced mass screening studies, from the late 1980s, suggests that one should not expect to find many people who test well. The participants were tested in two stages, first in a group setting, then individually—"this screening procedure is a labor-intensive and time-consuming method" (p. 355). In the first study 196 individuals were tested in a group setting and 19 were invited to participate in further testing (the exact numbers vary)—9 underwent further testing, and the results, although non-significant, suggested that 3 of them might be good RVers. In the second study 256 individuals were tested in a group setting—8 were good enough to warrant further testing. No information about the potentially good RVers is provided. Once good RVers have been identified, the Editors recommend May's (1994) guidelines for RVer certification, which are reproduced. However, given the results, the trouble for many researchers might well be finding individuals worth working with.

Precognition

In some studies, performance on real-time RV trials was compared with performance on precognitive RV trials. Joseph McMoneagle (1997) has acknowledged that he was RVer 372; he participated in one of these experiments. At the time he had expressed a strong preference for the outbounder protocol which requires a person to travel to the target and act as a beacon. Some refer to this person as a sender, but the researchers at

SRI International thought this term was inappropriate (see Targ, Puthoff, Humphrey, & May 1980)—his purpose is just to define the target area. When the experiment was conducted in 1987, McMoneagle was an experienced RVer and had "demonstrated significant RV performance" (p. 179) in prior studies with the outbounder protocol. However, this time he was less successful. Post hoc, the researchers suggest that the study was underpowered; they also note that feedback was given after more than two hours, in earlier studies feedback was given sooner. Two other experiments were conducted, with four RVers participating in each, in which performance on real-time trials was compared with performance on precognitive trials. Unfortunately, in one of them there was little evidence of psi. In the other, the level of feedback was varied; although there was evidence of psi for two RVers, the result is perplexing. One RVer appeared to perform worse and one seemed to perform better when the amount of feedback increased. Disappointing results, especially given the amount of time required for these two later experiments—each RVer ". . . had to produce 70 remote viewings in approximately 80 days" (p. 181).

Psi and the Brain

The researchers followed up on earlier work: EEG studies with the psychic Hella Hammid (originally brought in as a control subject). They conducted a conceptual replication, though using new stimuli and participants. Additionally, this time an MEG (magnetoencephalography) was used. In simple terms, a participant (the sender) is exposed to stimuli, in this case sinusoidal grating light flashes, and another participant's (the receiver's) brain activity is expected to react. The papers concerning this line of research are technical and the results are confusing. There were 8 participants in the first study conducted at Los Alamos National Laboratory; two papers cover this (oddly, the descriptions and the designations of the subjects are inconsistent). The environment was not particularly psi-conducive, the subjects had to lie facedown on a wooden table in darkness for about 30 minutes. One thing was clear, the receivers could not tell when the senders were stimulated. The other results were either inconsistent or could have been due to an artifact, electromagnetic interference. A replication study was conducted in 1992: ". . . the 1988 study did not replicate" and "earlier results appear to be spurious" (p. 452). The researchers later suggested that the stimulus might have been inappropriate (p. 480). Finally, an EEG study was conducted: Data from 21 out of 70 trials had to be discarded, and although there was evidence for psi no changes in brain activity were observed. These experiments must have been very costly to conduct and the results were disappointing.

Hypnosis

Three explorative studies were conducted in the late 1980s to examine if hypnosis could be used to enhance the quality of RV. In total, four RVers participated, but just one or two in each study, and two different protocols were tested. One protocol brings to mind old attempts to induce traveling clairvoyance by hypnosis. Unfortunately, except for one RVer, the effect sizes post-hypnosis were negative and non-significant. More interesting is that the Stanford Hypnotic Susceptibility Scale was used to assess hypnotizability; three RVers ". . . rated in the highly susceptible range and one in the medium to high range" (p. 312). In addition, several good RVers who did not participate also scored high. Perhaps this is characteristic of good RVers? This makes sense if engaging in RV puts the RVers in an altered state of consciousness.

Lucid Dreams

In the early 1990s, the researchers collaborated with Stephen LaBerge and conducted a pilot study to examine whether percipients could gain access to targets through lucid dreams. Three experienced lucid dreamers and four RVers participated; all slept in their own homes. The targets were in sealed opaque envelopes and were provided to the participants one at a time. After having had a lucid dream during which the target was observed, the percipient wrote down her perceptions and made drawings and then submitted the target envelope and her response to May—he then sent her the target as feedback and a new target envelope. Marks (2000) wrote: "This procedure is an abomination of a study, and . . . can be ruled out on methodological grounds" (p. 90).

Careful reading reveals that the percipients were originally expected to provide responses to six targets and that the study ran for six months. Given this, the fact that three percipients were experienced lucid dreamers, training to induce lucid dreams was provided, and the DreamLight (a lucid dream induction device) was utilized, the result is disappointing—just 21 trials had been completed when the study was terminated. One percipient quit because DreamLight gave him migraine headaches (Smith 2002). However, there was significant evidence for psi that encouraged a follow-up in a sleep laboratory. McMoneagle (2002) has written about this and how unnerving it can be for the percipient to experiment with lucid dreams, but perhaps some researchers wish to continue this line of research.

Applications

At this point the reader might well wonder if any good came out of the Star Gate program. The Editors provide their answer in the Introduction. Among the claimed successes, they include "a host of practical applications" and "a research methodology" to elicit "high quality psi nearly on demand" (p. 22)—bold claims; however, they provide no details. McMoneagle is world-renowned as a good RVer and not without reason (e.g., see McMoneagle & May 2004), but is it really because he learned to RV with an encouraging monitor? Frankly, there is much evidence for psi and RV, but I have certainly not seen convincing evidence for these two claimed successes.

Two trials with McMoneagle (conducted in 1987 and in 1988) remind the reader of why intelligence agencies tasked RVers. The reproduced papers about them are brief, but include transcripts and drawings. In both cases, the outbounder protocol was used once again. McMoneagle got some feedback after the first trial, but he did not get to see the targets until approximately six months after the first trial, and about one month after the second trial. The reason for the six-month delay is unknown—the monitor started the first RV session by saying that they had extensive photos and information about the site in a safe (p. 236). Although McMoneagle produced some erroneous data, some descriptions and drawings are certainly interesting. All data could not be analyzed, because most of the tape recordings from three of the eight RV sessions were lost due to technical problems. Furthermore, the results are difficult to evaluate, partly because the person acting as the beacon was not at the site of interest (Site 300 at Lawrence Livermore National Laboratory) during two real-time RV sessions. Nevertheless, the results are sufficient to make intelligence agencies ponder the usefulness of RV. In addition, the results made the researchers start examining the influence of entropy on RV performance. That said, May notes:

> Long-standing difficulties in applying the RV phenomena to intelligence applications are at least twofold. In a lengthy response, those elements of genuine intelligence significance must be identified *a priori*. Second, even excellent examples of remote viewing do not necessarily imply intelligence usefulness. (p. 327, emphasis in the original)

Ganzfeld Studies

The amount of parapsychological research that was conducted thanks to subcontracts is noteworthy. A list of subcontractors is given in an appendix; among them were William Braud, Julian Isaacs, Charles Honorton, and Rhea White. In 1967, Honorton left J. B. Rhine and the Institute for Parapsychology; he went on to work at Maimonides Dream Laboratory. In

1979 together with James S. McDonnell he established the Psychophysical Research Laboratories in Princeton, New Jersey. However, PRL had to close in 1989. Honorton joined Robert Morris at the University of Edinburgh in 1991. While there, he and Morris received subcontracts for ganzfeld research. Honorton explains:

> A homogeneous visual field (ganzfeld) is produced through diffusion of a bright light source over translucent hemispheres covering the receiver's eyes. Homogeneous auditory stimulation is produced by white noise through headphones. (p. 529)

The idea was that this would help the subject get into a psi-conducive state. The Editors have reproduced five reports about ganzfeld research. The first report is a meta-analysis by Honorton, apparently unpublished. The remaining papers are a research protocol, a report by Morris on a study that was still ongoing (the completed study was presented by Morris, Dalton, Delanoy, & Watt 1995), and two papers that were later published in the *Journal of Parapsychology* (Dalton et al. 1996, Honorton 1997).

Summary

These expensive *Star Gate Archives* volumes are not meant to just include the best evidence, rather they are meant to show "the good, the bad, and the indifferent" (p. 5). Perhaps the most important contribution from the research concerns methodology, protocols, how to construct target pools, and how to evaluate RV. The researchers started with the assumption that psi exists and tried to find out how it works and how psi can be useful. Arguably, they discovered both dead ends and lines of research perhaps worth pursuing further. In hindsight, it seems unfortunate that relatively little research was devoted to the influence of feedback on RV performance. If RV is in reality mainly due to precognition of feedback, its value for intelligence agencies seems limited. To some extent modern technology may well have made RV redundant, but it remains a fascinating phenomenon. The Editors have come to believe that psi may actually just be precognition; they briefly mention their Multiphasic Model of Precognition and share their thoughts about how parapsychology should advance:

> We strongly believe that as we shift focus from an experiential person-centric perspective to a signal-based information-centric perspective, the seemingly difficult problems of the precognition experience become relatively easy to explore. A truly interdisciplinary team is needed to explore the physics and neuroscience domains. (p. 22)

—**Nemo C. Mörck**
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BOOK REVIEW

Poltergeist: La Conexión Entre Nuestra Mente y Otras Realidades
[Poltergeist: The Connection Between Our Mind and Other Realities] by David López Bueno. Privately printed, 2018. 140 pp. $17.26. (paperback). ISBN 978-1-9808-4492-1.

DOI: https://doi.org/10.31275/2019.1551

Poltergeist: La Conexión Entre Nuestra Mente y Otras Realidades (Poltergeist: The Connection Between Our Mind and Other Realities), is one of the few books about poltergeists originally published in Spanish during the last several decades (for another exception, see Jordan Peña 1982). The book was privately published by David López Bueno, presumably in Spain, who is described on the book's back cover as having worked in radio and television on different topics related to "the world of mystery, mysticism, and esoterism."

Readers unfamiliar with the topic of poltergeists will find López Bueno's summary of cases useful. They include some that took place in Spain in the cities of Barcelona, Cáceres, Ceuta, Madrid, Valencia, and Zaragoza. There are also summaries of cases from other parts of the world such as California, Enfield (London), and Tennessee (Bell family). In addition, the Rosenheim and the Columbus (Ohio) case of Tina Resch are summarized. Interestingly, the case of the Borley Rectory, generally regarded as a haunting, is also included. In the author's words:

> Borley Rectory was really a catalyst for paranormal activity. There was something in the place itself that seemed to encourage the energy inside and also acted as a battery to which Marianne Foyster could connect in some way. The house showed three different types of phenomena . . . the ghosts who interacted with the investigators, a haunting [that was] possibly something lingering from the nun . . . and the poltergeist type activity produced by Mrs. Foyster. (p. 103)

There are also brief discussions of the features of poltergeists. The author mentions specific phenomena such as sounds, movement of objects, levitation of objects, thermal variations, and electrical phenomena. He

contends that there are cases in which sounds show evidence of intelligent communication. While there are cases of this sort (e.g., Colvin 2008), it is not certain how common communications via raps is. Roll (1977) found in his analysis of 116 published poltergeist cases that there was some form of communication reported in the accounts of 47 cases (41%). But out of the 47 cases there were only 11 (23%) in which raps provided the information.

Although López Bueno is open to the possibility of discarnate agency, like previous writers he has a psychological approach to poltergeists. In his words:

> In most cases, these types of phenomena are produced in the habitat where adolescents, mostly of the feminine sex, live, who may be passing through a period in their lives in which they are going through an altered state of tension, stress, or hormonal change, etc., that makes the subject in question end up in a serious psychopathological syndrome that involuntarily manifests as psychokinesis, which source is a strong repressed psychic energy projected in a violent way toward the exterior . . . (p. 17)

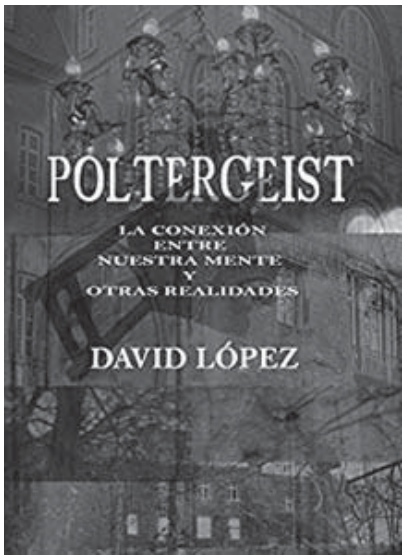
Regarding poltergeist psychology, it is argued that the phenomena produce various forms of "excitation" in the agents. These may include changes in the processes of imagination, memory behavior, mood, and psychomotor activity. In this part of the book the author could have mentioned the discussions of medical problems with poltergeist agents presented in the past by Owen (1964) and Roll (1977).

The book includes some unusual terminology and classification of cases. It is mistakenly stated that poltergeists are known today as a "Syndrome of Polymorphic Action," basically the frequent appearance of a group of paranormal phenomena that "appear without any type of order" (p. 17). However, such a designation is not common at all in the literature on the subject.

The syndrome is supposed to have three aspects. These are "hebemorphic" (phenomena in adolescents, mainly females), "non-specific" (no apparent relation to surrounding persons, may be place-centered, and may include apparitions), and a "conditioning of group action" (group agency, affected by factors such as beliefs). While the content of those factors make sense, it is questionable if such use of terminology is necessary. In any case, there is no estimate of how common each type is.

López Bueno places himself in the tradition of those who believe in the projection of a physical energy from the body to account for poltergeist activity, an idea that has been widely used in Spiritualism and psychical research to explain physical mediumship (Alvarado 2006). In his view poltergeists are caused by "the liberation of energy from the nervous

system" (p. 39), an idea that could be connected to more recent speculations (Roll & Joines 2013).



On the positive side, the strength of the book is that its author presents to readers of the Spanish-speaking world interesting cases and ideas about poltergeists. He states that these cases are not necessarily the product of a discarnate agency, a corrective I think that is necessary in the popular literature. Similarly, he informs his readers, many of whom will not be familiar with the poltergeist literature, that poltergeists have been seriously investigated for a long time. He also reminds us that poltergeists can be distressful for those who experience them.

In addition to the above, López Bueno also considers fraud in some cases, and cautions his readers about problems of exaggeration in testimony, sometimes caused by "an auto suggestive process reinforced by supposed 'professionals' to whom the witnesses report . . ." (p. 77). Similarly, he mentions conventional explanations that may explain some cases, such as normal sounds, seismic activity, and electromagnetic effects. Related to this, the author mentioned a poltergeist case in Madrid in which "a bathtub acted as a radio receptor presenting transmissions from the National Radio of Spain" (p. 79). Unfortunately, no details are given.

In his brief conclusion, the author emphasizes how difficult it is to document these cases, but speculates about the possibility that poltergeists represent a connection between our reality and a different reality. While unclear about the idea of "another reality," the speculation was presented that poltergeists "could be the interrelation between two realities, ours and another reality that leads to the manifestation of facts in our plane" (p. 139).

As for weaknesses, the book is problematic on many counts. The author does not cite the specialized literature about the subject. It is important to provide further information for readers, even though the book is addressed to the general public, some of whom may have interest in the subject beyond the brief discussion presented here, and may want to follow up on the topic to increase their knowledge. For example, although the author states that poltergeists have been reported since antiquity, and that they have been

investigated, he fails to provide bibliographical references to this research. The readers of *Poltergeist* could have been introduced to important past overviews of the topic such as the work of Gauld and Cornell (1979), Owen (1964), and Roll (1972), among others. The same may be said about the lack of mention of many important cases, among them the one in Miami (Roll & Pratt 1971). But more important than the mention of cases, one finds missing from this book the findings of many investigations reported in the specialized academic literature regarding both physical (e.g., Roll, Burdick, & Joines 1973) and the psychological aspects of the cases (e.g., Roll 1970). It is not clear if the author is familiar with this literature.

In addition, other problems include some theoretical concepts the author presents as physical "facts" without evidence for their support, among them ideas of exteriorized nervous force and of morphogenetic fields. Another one is that, typical of enthusiasts for psychological explanations of poltergeists, López Bueno does not recognize some of the problems behind those assumptions and their application (e.g., Martínez-Taboas 1980, and Martínez-Taboas & Alvarado 1981). To complicate matters, some discussions about the human nervous system, particularly the functions performed by the brain hemispheres, seem to reflect pop psychology more than current scientific thinking (Corballis & Häberling 2017).

One hopes that a second edition of the book will improve its content, particularly the evident lack of connection with the poltergeist literature. The general public deserves accurate and complete information about the topic discussed.

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BOOK REVIEW

Connected: The Emergence of Global Consciousness by Roger D. Nelson. ICRL Press, 2019. 332 pp. $24.95 (paperback). ISBN 978-1936033355.

DOI: https://doi.org/10.31275/2019.1557

Much has been written about the Global Consciousness Project (GCP), including in this Journal. *Parapsychology: A Handbook for the 21st Century* included a chapter about the GCP (Nelson 2015). The author of this book has been involved in the GCP since its onset in 1998.

> . . . the way to get on with the research is to listen to the whispers of serendipity. Approach new experiments with a fully open mind and the intention to take hints and surprising suggestions. Coincidence is your friend. The GCP had its beginnings in a long series of coincidences . . . (p. 39)

Nelson knows the origin story better than anyone else and relates it in the book. In the late 1960s, Helmut Schmidt (1928–2011), a physicist at Boeing Science Research Laboratories, developed quantum-based random number generators (RNGs) which he used in experiments; the participants were supposed to predict or influence their output: ". . . Schmidt never sought credit or glory. Years after Schmidt's devices were in use in numerous labs, his design was patented by others who cited his work in the patent document but did not acknowledge him as the key inventor" (Schlitz 2011:353). Schmidt was aware of the possible influence of the experimenter and gave a presentation about it (Schmidt 1974) before parapsychologists started to review their extensive literature about experimenter effects. Schmidt's (2009) worries about the GCP concerned the possible influence of the experimenter.

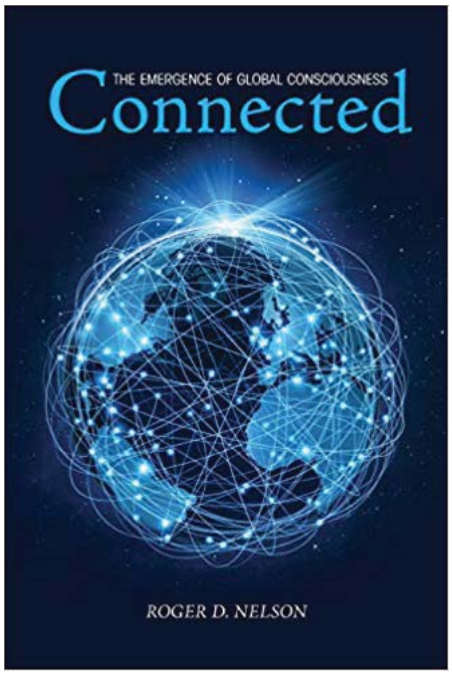
In 1979 Nelson was a professor of psychology when he read a job advertisement for the recently founded Princeton Engineering Anomalies Research (PEAR) laboratory. In short, Nelson got the job and his career took a new turn. Like the McDonnell Laboratory for Psychical Research (1979–1985) and the Psychophysical Research Laboratories (1979–1989), the PEAR lab also came about thanks to the James S. McDonnell

Foundation. James McDonnell (1899–1980), the founder of McDonnell Aircraft Corporation, had an interest in parapsychology (Stevenson 1981). Nelson describes the PEAR lab and shares his recollections of founder Robert Jahn (1930–2017), Brenda Dunne, John Bradish, and York Dobyns. He also describes some of the machines that were built for psychokinesis (PK) studies. Some pictures would have been a welcome addition. The lab was located in the basement of the engineering school at Princeton University. Thompson Smith (2016) recalls that when she visited there was no sign on the door, just the room number C131. Presumably, some researchers were embarrassed by the lab, but its founder Jahn was Dean of the School of Engineering/Applied Sciences at Princeton University and a world-class physicist, and hence not easy to get rid of. Nelson left the lab in 2002, and the PEAR lab closed down in 2007.

The PEAR lab is best remembered for its PK studies, but the researchers there also conducted remote viewing (RV) studies. As if to cause confusion, an RNG was referred to as a Random Event Generator (REG) and RV was referred to as remote perception or precognitive remote perception (PRP). In passing, Nelson describes his "Wishing for good weather" study (Nelson 1997). He compared the weather on celebratory days to the weather on control days: "Amazingly enough, there was indeed a significant difference: The weather in Princeton was just a little better than it might have been" (p. 70). Although not mentioned in that study, it actually had a predecessor (i.e. Cox 1962). Of more relevance to the story about the GCP are the FieldREG studies (Nelson et al. 1996, 1998). As the name implies, the researchers studied the influence of groups on the output of REGs in the field, for example during rituals and operas. Nelson carried an REG with him to Egypt:

> Group meditations and chanting in sacred spaces like the Holy of Holies in the temple ruins, or the interior chambers of the Great Pyramid reliably produced strong departures. Effects were on average a little smaller without the "ritual" activity. In contrast, there was little or no evidence for deviations during time spent in the chaos of the streets and markets. (p. 88)

The FieldREG studies led to the GCP. In 1997, Diana, Princess of Wales, died in a car crash—to many this was a real tragedy. Nelson asked colleagues to collect data from their REGs during her funeral, which was then analyzed to see if the funeral had an effect on their output. As a young man, Nelson had read Pierre Teilhard de Chardin's *The Phenomenon of Man* and was deeply affected (judging by the number of quotes, he still is). Teilhard wrote about something he called the noosphere, and Nelson explains:



> . . . the noosphere would be composed of all the interacting minds on Earth. What he encouraged us to envision is a transhuman consciousness emerging from our interactions to become a guiding intelligence for the planet. (p. 273)

> . . . we now have substantial evidence that it is an actual phenomenal presence in the world. It can be likened to the mind that arises when neurons interconnect. But in the case of the noosphere, there are no chemicals in synaptic junctions. Yet there is an interconnection, and a mutual influence matrix that can be observed only indirectly (and rarely) by our rather primitive tools. (p. 306)

The GCP consists of a number of RNGs scattered throughout the world. The idea being that their output should be influenced by global events, such as 911 (this refers to the terrorist attacks that occurred 11 September, 2001), disasters, celebrations, events that affect a large number of people either directly or indirectly through mass media: "The results in the experiment show that what we're calling global consciousness is linked to small, but ultimately significant correlations among the RNGs in the network" (p. 270). The formal database consists of 500 events, though reactions to more events than that have been analyzed. The inconsistent reactions to school shootings in America are curious (pp. 199–200). Nelson makes it clear that he and his colleagues do not know enough about the effects for any practical applications, such as using the GCP as a possible pre-warning system. The main controversy about the GCP is not about whether there is an effect but rather whether the effect is a result of ordinary people unaware of the GCP or due to the experimenters' choices.

Nelson is naturally well-aware of the controversy, having debated opponents for years. Nelson displays a number of results and graphs, including reactions to 911, that is his own analysis, and a post hoc analysis by Dean Radin (who wrote the Foreword). What is troublesome in Nelson's presentation of the results is that the experimenter effect is basically

dismissed, in passing, despite the fact that May and Spottiswoode (2001) argued that the interesting results were really due to fortuitous choices of analysis windows. In addition, after their own analysis they concluded that the network ". . . produced data consistent with mean chance expectation during the worst single-day tragedy in American history" (May & Spottiswoode 2001:1). At the time of 911, Nelson made a formal prediction about the reaction and also wrote:

> I want to acknowledge that I like the idea of "Global Consciousness," but that this idea is really an aesthetic speculation. I don't think we should claim that the statistics and graphs representing the data prove the existence of a global consciousness. (p. 140)

Some people, such as Stephan Schwartz and Russell Targ, think that the results of parapsychology experiments show that we are all interconnected. I beg to differ. If taken at face value, the results show that, among other things, people can perceive scenes distant in time and space, react as if they were somehow entangled, and feel it when they are being stared at. It does not necessarily follow that we are all interconnected—if accepted, the results just basically indicate that we can connect.

Nelson addresses his opponents, including Bancel (2017a, 2017b), later in the book and explains why he is unconvinced by their arguments (Nelson 2017). Much of the debate is technical. Bancel has analyzed data from the GCP since 2002, originally as a collaborator of Nelson's, but he eventually came to a different conclusion. My reading suggests that Nelson must dismiss his opponents' arguments because he is using the results of GCP to promote a New Age philosophy (p. 258), which he believes the world desperately needs since we are (apparently) on the brink of disaster (once again). Judging by the blurbs on the book's back cover from Larry Dossey and Stephan Schwartz, they agree with Nelson. He suggests that:

> You will find what you need by simply having the intention—putting the question "out there" and waiting confidently for your connections to become clear. If you are ready, opportunity appears. (p. 296)

Radin (2018) and Horowitz (2018) have argued along similar lines. If one accepts psi phenomena as real, then it follows that one's thoughts in addition to one's actions may have an effect, perhaps one finds a nice job or love relationship thanks to a coincidence. However, less pleasant effects also are imaginable, if one accepts psi then the possible influence of hexes suddenly makes sense. Presumably, psi can be used both for good and bad. Perhaps some of the more extreme reactions parapsychology evokes come

about because skeptics realize that the results encourage a kind of magical worldview. Arguably, Nelson's main claim is the more provocative. Does the GCP really show that we are all interconnected and that the output of RNGs (for some unknown reason) change when we are shocked by the latest tragedy or when we celebrate New Year's Eve? Have we not grown used to bad news? Why did the death of Robert Jahn have such a large effect on the RNG network? The opponents argue that the results are actually due to the experimenters.

Nelson has written an informative book. I enjoyed learning more about the PEAR lab and the people who worked there. The controversy over the GCP will likely continue for some time. The reason is simple: Analyzing the reactions to global events is not at all like analyzing the results of a series of guesses on Zener cards. It is really an oversimplification to say that the network reacted or that it did not, because the result depends on the experimenters' choices, including whether to look at data from, for example, 14:00 to 20:00 or from 14:00 to 22:00. Presumably, skeptics believe that the interesting results are just due to data dredging (though the formal predictions are registered prior to analysis), but informed opponents believe the results are really due to the experimenters, though not due to fraud. Nelson naturally disagrees with both groups. His book is readable, and one does not need to be receptive to New Age philosophy to find it enlightening.

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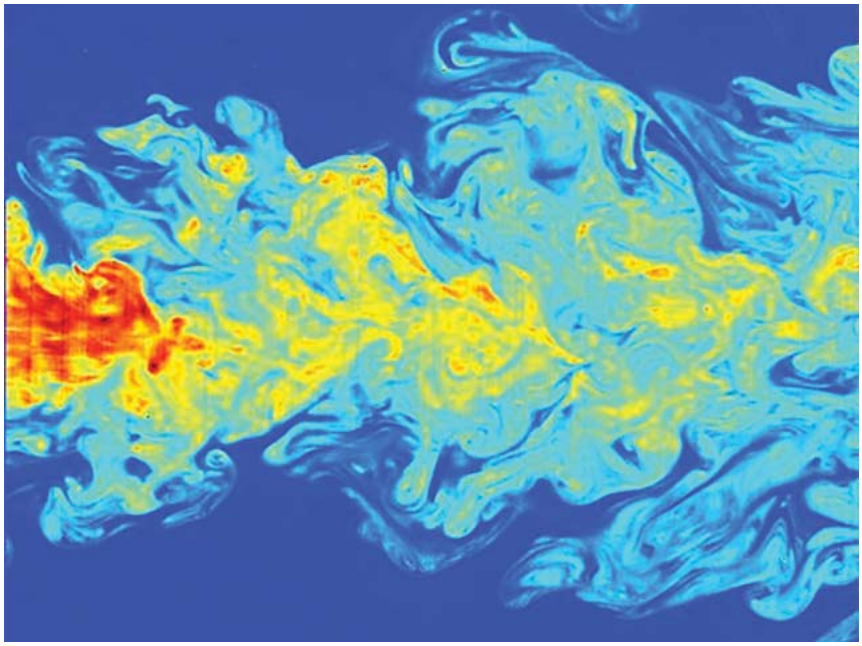

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