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INVITED PAPER

Precognition at the Boundaries: An Empirical Review and Theoretical Discussion[1]

Julia Mossbridge

TILT: The Institute for Love and Time

Abstract: The rigorous scientific study of precognition, the human ability to accurately predict future events that are not already predictable based on information about the past or from the five senses, spans the last 90 years. This review describes different types of precognition, underscores the basic principles of precognition research, and discusses the evidence for and potential mechanisms of two very different forms of precognition: 1) mostly unconscious precognition with short lead times (e.g., presentiment) and 2) mostly conscious precognition with longer lead times (e.g., precognitive remote viewing). I describe two potential models to explain each of these forms of precognition, along with ideas for empirical tests of each one.

Keywords: precognition, presentiment, remote viewing, precognitive remote viewing, predictive anticipatory activity, anomalous cognition

Highlights

- Precognition is the scientific term for physiology, behavior, perception, and cognition that seem to reflect future events not currently predictable by usual means.
- There are many kinds of precognitive phenomena, but two are described in detail: Presentiment (physiological precognition) and precognitive remote viewing (perceptual and cognitive precognition).
- Presentiment and precognitive remote viewing have very different characteristics, suggesting distinct mechanisms.

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- A physical-time-symmetry (PTS) model may explain presentiment but a pervasive-universal-consciousness (PUC) model may be required to explain precognitive remote viewing.
- Each model has testable elements and is therefore falsifiable.

For centuries, the ancient and indigenous idea that we might be able to navigate life by obtaining information from the future has been intriguing to Western mystics and psychologists alike. For example, Rabbi Moses Luzzatto, an 18th century Italian mystic, spoke clearly about how he felt intuition (particularly prophetic intuition) and intellect were related. He stated that, "...one should naturally be able to teach himself, understand and reason with his intellect...However, there exists another means of gaining knowledge that is much higher. This is what we call ruach ha-kadosh [the spirit of the holy one]...In this manner one can gain knowledge that could not otherwise be gained through logic alone. This includes information including future events and hidden secrets" (Hoffman, 2010, p. 54). More recently, the foundational 20th century psychologist C. G. Jung spoke about precognition in a way that brings to mind the classically non-intuitive behavior of quantum particles. "As the relativity of time and space includes the relativity of causality, and as the psyche partakes of relative time-space, it also relativizes causality and therefore enjoys, in so far as it is microphysical, an at least relative independence of absolute causality. (Chinese philosophy says that as long as things are in the North-East, i.e., before they have risen, they can be altered. When they have entered the East, they take their unalterable course)." (Jung, 1973, p. 364).

The relatively modest modern controlled experimental study of precognition began with J. B. Rhine in the 1930s (for a review see Mossbridge & Radin, 2018) and has continued to ramp up at a non-continuous pace (Figure 1), with discontinuities punctuated by the U.S. intelligence community's classification (1972) and declassification (1995) of what became their "Star Gate" program focused on accessing distant information in time and space (for a review see Marwaha & May, 2018). The pace of precognition research has quickened a bit in recent decades, but this is also when the phrase "precognitive processing" began to be used by some artificial intelligence researchers, cognitive scientists, and neuroscientists to refer to unconscious processing, though "preconscious processing" has been the more commonly used term. In the previous century (1900 to 2000), there were only eight references to "precognitive processing" within the text of any materials indexed by Google Scholar, with the earliest in 1978 (Michon). From 2000 to 2020, there were 31. Thus, in Figure 1 all papers with "precognitive processing" in the title have been excluded from the counts. Because of the need for this disambiguation, it is worth re-stating that the classical definition of precognition refers to cognition, perception, behavior, or physiology that reliably predicts future events that are not otherwise predictable by actually causing the event (direct cause), via sensory input from the known five senses, or inferring the event based on prior information.

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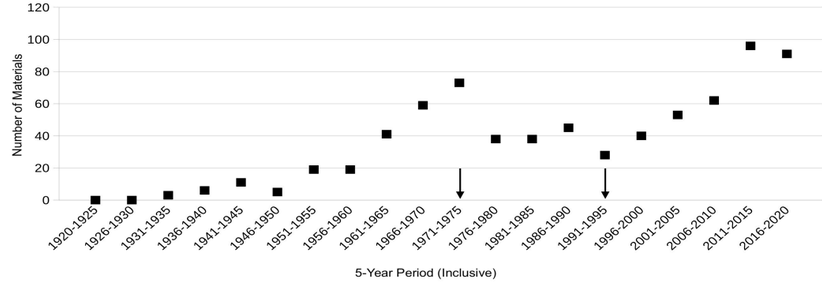
Figure 1

Scholarly Materials with Titles Containing "Precognition" or "Precognitive" but not "Precognitive Processing"



Note. Arrows note the dates of the beginning (1972) and end (1995) of the U.S. intelligence community's research program investigating the usefulness of precognition as well as other related phenomena.

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Although interest in precognition arises because it is common to have experiences in which we feel that we have predicted future events, not all types of experiences that seem precognitive are actually precognitive or easily examined in the laboratory. Precognitive experiences (Figure 2) range from those in which people are completely conscious of the contents of the precognition, like precognitive remote viewing, to those in which there is usually no conscious awareness of the precognition, like physiological presentiment (also called predictive anticipatory activity or PAA). The time between the physiological change, perception, or action marking the precognition and the event that is "precognized" (i.e., the "lead time") also distinguishes types of precognition. Behavioral precognition, such as the type studied in the famous "feeling the future" experiments (Bem, 2011), is also mostly unconscious and operates on a similar time frame as presentiment, but the effect sizes are less robust than for presentiment (see Bem et al., 2015 vs. Mossbridge et al., 2012). Compulsive precognition describes when someone knows they must take an action but they do not know why, one of the many types of psi-mediated instrumental response (PMIR) described by Stanford (2015). Compulsive precognition is spontaneous and very impressive to those who experience it (e.g., soldiers who evade danger by taking a seemingly circuitous detour), but it has not been often studied experimentally. This may be because the need context may be critical to the manifestation of PMIR in general (Stanford, 2015), and it seems that few researchers consider need as a motivator in their laboratory experiments.

Forced-choice conscious precognition tasks, in which a participant must consciously predict a target from a finite set of possible future stimuli, often have lead times on the same order as compulsive precognition (seconds to minutes), but they are much easier to study in the laboratory. Forced-choice precognition is replicable, but the results of these experiments tend to have very small effect sizes (Honorton & Ferrari, 1989; Storm et al., 2012). The small effect sizes may arise partially because participants get bored with repeated trials, and partially because conscious deliberation (also called "system 2") overshadows the continuous activity of unconscious intuitive decision making (also called "system 1"; Kahneman, 2011; Tressoldi, 2013). Finally, while precognitive dreaming is the most commonly reported precognitive experience (Rosenberg, 2016), controlled tests of precognitive dreaming have been few and far between (Mossbridge & Radin, 2018). In early studies producing significant and replicable results, a pre-screened skilled participant was used as the dreamer (Krippner et al., 1971, 1972). Since that time, the combined results of controlled precognitive dreaming experiments have been less impressive than in the foundational study (though still significant), and equivocal in the last 20 years (Storm et al., 2017). The mismatch between the commonality of the experience of precognitive dreaming and the capacity to reveal precognitive dreaming with well-controlled methods may be a result of most people's ability to connect their dream content to future events even when there is only a very weak relation between them, giving them the belief that they are skilled at precognitive dreaming and providing motivation to enroll in precognitive dreaming experiments.

As a result of these caveats about other forms of precognition, it seems that the precognitive experiences at the extremes – presentiment (or PAA) on one hand and precognitive remote viewing on the other – may be the easiest to study in controlled experiments. By studying the factors that influence these "boundary precognition phenomena," we may be able to shed some light on the mechanisms underlying precognition in general. The remainder of this summary is written with that hope.

Empirical examinations of precognition in controlled experiments require only three fundamental steps. The keys to a rigorous test of precognition include: the proper order of the three steps of the experiment, good selection of experimental stimuli, and sound data analysis. The proper order of the three steps of the experiment is: 1) record the dependent variable(s) (physiology, behaviors, cognitions, perceptions) for a pre-planned period of time, 2) randomly select a stimulus or target from a pool of stimuli or targets and

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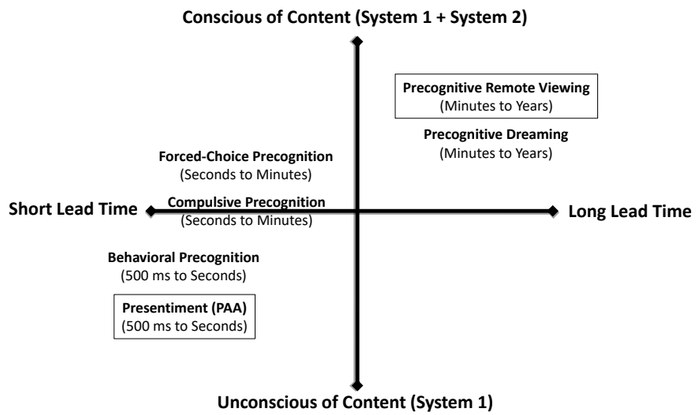
present it, 3) determine whether the values of the dependent variable(s) are correlated to different types of stimuli/targets in some predictable way. Note that the final determination of the relation between the dependent variable and the stimulus or target could also be made prior to the selection of the stimulus, as a way to discover whether the stimulus can be predicted on a trial-by-trial basis. This requires performing the same experiment multiple times so that a relation between the dependent variable and the stimulus type can be inferred (e.g., Tressoldi et al., 2009).

The best practices for all three steps of a precognition experiment depend on the systems being studied (human vs non-human; physiology vs behavior vs cognition vs perception) and what is already known about how those systems respond to the selected stimuli. Here I will treat presentiment and precognitive remote viewing as case studies in precognition research and consider what the results of presentiment and precognitive remote viewing experiments teach us about the mechanism(s) underlying precognition.

Figure 2

Six Common Types of Precognition in Humans



Note. Types of precognition are organized according to the lead time between the precognitive experience and the related future event ("lead time," *x*-axis) versus the level of consciousness of the content of the precognitive experience (*y*-axis). Boxes indicate the two extreme cases examined in greater depth in this article. PAA=predictive anticipatory activity.

Presentiment

Presentiment is a physiological form of precognition. In presentiment experiments, the physiological system under study is tested to determine whether (and sometimes how) it can predict future randomly selected events of importance to the organism. Because it is a physiological phenomenon, the actual contents of what is predicted – the presentiments themselves – are usually completely unconscious. In the laboratory, presentiment is often studied by using conscious behavioral tasks during which researchers record the unconscious physiological system of interest. The lead time in a presentiment task between the physiological "pre-response" that correlates with a future stimulus and the future stimulus itself ranges from around 0.5 to 15 seconds; two meta-analyses have estimated an effect size for presentiment at around 0.21 to 0.28 (Duggan & Tressoldi, 2018; Mossbridge et al., 2012). Presentiment has been described in multiple physiological systems in humans and animals alike (human: Mossbridge et al, 2012; see Mossbridge & Radin, 2018 for review; nonhuman presentiment-like phenomena: Alvarez, 2010a,b; Alvarez, 2016; Mothersill et al., 2018; Sheldrake & Smart, 2000; Wildey, 2001). There is some tentative evidence of similar phenomena among physical systems (Moddel et al., 2011; Mossbridge, 2021), supporting the idea that presentiment and rapid time-frame precognitive effects reflect an organism's exploitation of physical mechanisms that allow for some sort of retrocausality or time symmetry (see *Hints About Mechanism*, below).

Although there are many presentiment experiments to examine in more detail (for reviews see Duggan & Tressoldi, 2018; Mossbridge et al., 2012), briefly highlighted here are three experiments from my laboratory in which I examined presentiment as measured by three physiological dependent variables: EEG (electroencephalography or brain wave activity), GSR (galvanic skin response or skin conductance), and IPI (inter-peak interval, related to the inverse of heart rate). These different but related experiments also serve to illustrate some of the methodological issues that can arise as experimenters attempt to

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eliminate potential confounds. The readers should note that the GSR and IPI results have not been peer reviewed yet, but they may be instructive nonetheless. Some statistical analyses are shown, but where appropriate the reader is also warned that these are unpublished analyses, so they should be taken as preliminary.

Electroencephalography (EEG)

Non-emotional auditory and visual stimuli were used in a series of 100 simple response trials performed by 40 participants. On each trial, participants saw a number 1 vs. a number 2 on a computer monitor, or heard a low vs. a high tone over headphones; stimulus order was randomized. Participants were asked to press the left button on a mouse if they saw the number 1 or heard the low tone, and the right button if they saw the number 2 or heard the high tone (all participants were right-handed) (Mossbridge, 2017). Because accuracy was easy to obtain with this simple task, participants were asked to be as fast and as accurate as they could be, as a way to motivate presentiment of the response, if it existed. A machine learning algorithm determined whether the current source density-transformed EEG activity in any of the five 25-ms bins *prior* to the time the software presented the stimulus could predict whether the future response should be a left or right button press. The same method was used to determine whether the modality of the stimulus (auditory or visual) could be predicted. The presentiment effect was that the left vs. right response press was predictable based on left frontal and right temporal-parietal activity at approximately 550 ms prior to the stimulus presentation, $p < 1x10^{-6}$; intriguingly, this effect was at the same time period that a type 1 readiness potential would be expected in this sort of task (Libet, 1999). Meanwhile, the same method was not successful in predicting the stimulus type (auditory or visual), only the participants' responses. If these results were replicated with a true random number generator selecting the stimuli, it would offer stronger evidence that the type 1 readiness potential in fact is predictive of future responses in a general sense, even in situations where those future responses rely on stimuli that have yet to be determined.

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Galvanic Skin Response (GSR)

Skin conductance responses and related pre-responses to feedback were investigated in a 4-option forced-choice precognitive guessing task, with the future contrast being correct vs. incorrect trials. The major result was a gender difference, with men showing a significant arousal presentiment effect that matched their skin conductance responses after they learned that they were correct (versus incorrect; data in Mossbridge et al., 2012). Because of concern about expectation bias due to possible physiological effects of previous trials (Dalkvist et al., 2014), only the initial trial of each participant's 40-trial dataset was examined. The effect grew stronger in this single-trial analysis, showing a significant gender interaction with correctness ($p < .004$, $\eta^2 = 0.016$; unpublished analysis) as well as a significant presentiment effect for men during the 10 seconds prior to learning about the first trial's correctness ($p < .005$, $d = 0.359$; unpublished analysis). Specifically, men showed significantly increased arousal prior to being told that their guess was correct, whereas women showed (if anything) decreased arousal prior to being told that their guess was correct. It was intriguing that with a single trial the original gender difference effect became even clearer, suggesting that additional trials muddied the effect. Further, it was apparent that the physiology in the pre-feedback period in both genders echoed the post-feedback period. It was not the stimulus (correctness vs. incorrectness) that influenced presentiment – it was the nature of the response that was correlated with the pre-response.

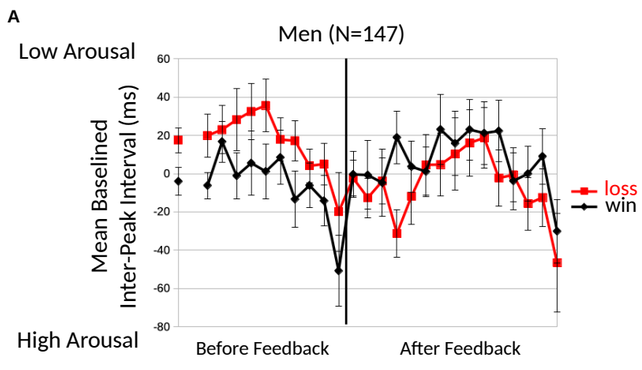
Heart Inter-Peak Interval (IPI)

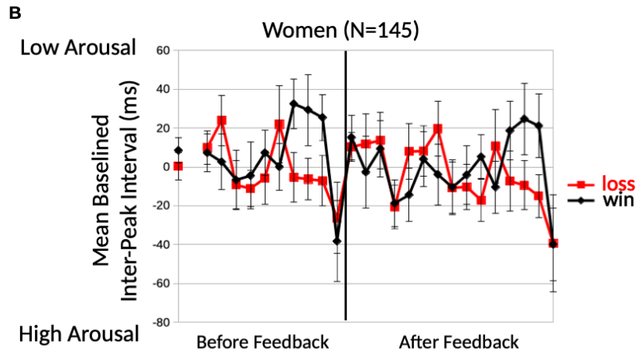
In this experiment I tested the idea that the skin conductance result described above would replicate with an inter-peak interval (IPI; inverse of heart rate) measure instead of skin conductance, and with a downloadable app instead of in the laboratory (Koestler registry 1005). The "Heart Tracker" application measured inter-peak intervals using a smartphone's camera during the ~10 seconds before and 15 seconds after

participants learned whether they correctly identified a "door" behind which was a $2 dollars prize. The analysis, which was pre-registered, showed an effect similar to the skin conductance effect described above (Figure 3a,b), with an equivalent gender interaction and a significant effect for men in the 10 seconds prior to the feedback (men: N = 147, p < .04, d= 0.36; gender interaction: N = 292, p< .04, η^2 = 0.016; unpublished analysis). However, a follow-up study (Koestler registry 1018) using a $4 dollars reward did not replicate these effects, potentially because the pre- and post-feedback durations were too brief to capture what is likely a much larger and delayed post-response to the feedback (already apparent for men in the $2 version of the experiment; Figure 3a; unpublished analysis). The idea that some form of time symmetry can explain presentiment (e.g., Bierman, 2008) could be considered to be weakly supported by this lack of replication – but this interpretation would require an experiment showing that the effect is recovered with longer data collection periods before and after feedback.

Figure 3

Inter-Peak Interval (IPI) Heart Rhythm Data Gathered Using a Smartphone App





Note. Data are baselined to the first IPI value (not shown). The values at the left of each graph are the grand means of the baselined IPI values in the 10 seconds prior to receiving feedback for wins (black symbols) and losses (red symbols) revealed at the time indicated by the vertical line. Error bars represent +/- 1 standard error of the mean (S.E.M.).

Presentiment and Behavioral Precognition

Presentiment and behavioral precognition operate at a similar time frame and are mostly unconscious, albeit with most behavioral precognition tasks requiring a bit more conscious attention than most presentiment tasks. So, it is natural to assume that presentiment mechanisms underlie performance on behavioral precognition tasks. If this assumption were true, what conclusions could we draw about the shared mechanisms governing both types of precognition performance?

In particular from the GSR and IPI presentiment studies highlighted above, one might conclude that if gender is indeed related to differential presentiment performance, it ought also be related to differential behavioral precognition performance. This idea was tested using two behavioral precognition tasks requiring two different degrees of consciousness of the content of the precognition (Mossbridge & Radin, 2021). They both showed significant overall effects, but gender differences were only found for the largely unconscious behavioral precognition task rather than for the task that required more conscious awareness, suggesting that there might be something about largely unconscious processing that is influenced more readily by gender differences.

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Although these gender difference results, especially among mostly unconscious precognition tasks, could reflect gender-specific learned associations with "winning," they may alternatively suggest that reproductive hormones could be involved in precognitive processing, especially for the brief time frames influenced by presentiment and behavioral precognition. An examination of the reproductive hormone idea used a retroactive facilitation of recall task (Bem, 2011) – a behavioral precognitive learning task with a relatively long lead time (minutes). An investigation of data from over 2,000 online participants found no overall effect, no gender difference, and no consistent effects of reproductive hormones except for an under-powered observation of consistently better performance for pregnant women (Mossbridge & Bem, 2018). It is possible that the long lead time for this task in particular may drive participants into a more conscious or deliberative state, making the effect difficult to obtain (Bem et al., 2015),

Overall, current results suggest that performance on presentiment and behavioral precognition tasks can be influenced by gender, perhaps through a mechanism involving reproductive hormones, among other possibilities. Further, it appears that pre-responses prior to a stimulus tend to match or predict post-responses, rather than matching or predicting the nature of the stimuli themselves. This particular phenomenon, as applied to presentiment, is almost like a "time loop" in that it often appears that the response rather than the stimulus is what drives the pre-response (Wargo, 2018; see *Hints About Mechanism*, below). Finally, it is worth noting that for presentiment and behavioral precognition tasks in which one trial follows the next, shorter inter-trial intervals may muddy the effect because past responses (and conceivably future ones) will likely influence responses on a given trial. Thus, for these phenomena it is possible that the best approach when trying to understand the mechanisms underpinning them is to examine single-trial datasets to determine the relations, if any, between presentiment and potential moderating factors (Dalkvist et al., 2014).

Precognitive Remote Viewing

Precognitive remote viewing is a form of precognition performed as an extended, conscious, 1-trial task with the intention of describing a target or the answer to a question that is unknown by anyone at the time of the task and is revealed in the future. As such, precognitive remote viewing tasks are a subset of general remote viewing tasks, in which practitioners attempt to describe information that is distant in time and/or space (e.g., May & Marwaha, 2018; McMoneagle, 2015; Utts, 1995). A precognitive remote viewing session can take between two minutes and two hours at the discretion of the "viewer," who is the percipient or participant in the task. The delay between the session and the target feedback may be from minutes to years, or in certain operational cases there may not be any target feedback shared with the viewer. For instance, if an intelligence or law enforcement agency feels that revealing a target will compromise a project, they may choose not to reveal the target.

Precognitive remote viewing tasks are excellent candidate tasks for scientists interested in understanding how various factors relate to precognitive ability, because a viewer's capacity for accuracy is often revealed in the very first session performed by a novice viewer (Targ, 2019), making single-trial work generally more consistent (less noisy) than that of physiology or behavioral experiments. This also allows the possibility of online data gathering for precognitive remote viewing experiments from hundreds of people, a sample size necessary to rigorously examine the relations between relevant factors and precognition performance (Mossbridge & Radin, 2018; Mossbridge et al., under review).

Ever since the U.S. intelligence community declassified its work on remote viewing and precognition in 1995, remote viewing practitioners have experimented with multiple methods to improve their accuracy. Drawing from the relatively well-controlled experiments included in the intelligence community-sponsored research and anecdotal reports, a few particular claims are repeated with regularity. Here I review four of these claims and briefly describe recent well-controlled experimental evidence related to them.

Gender Difference

The first claim is that, unlike what appears to be the case for presentiment and behavioral precognition tasks (Bierman & Scholte, 2002; Lobach, 2009; Mossbridge et al., 2012; Mossbridge & Radin, 2021; Radin & Lobach, 2007; Wittmann et al., 2021), there is no clear gender difference when it comes to precognitive remote viewing accuracy. In recent work on precognitive remote viewing examining trials gathered online, there was a gender effect only in an experiment in which the precognitive remote viewing task included a forced-choice component (Mossbridge et al., under review). Specifically, when participants were asked to choose one of two targets based on their remote viewing session, men performed better than women although accuracy was not above chance for either gender. However, when a more traditional free-responses precognitive remote viewing task was used, there was an overall significant effect but no significant gender effect in performance; only a very slight tendency for women to perform better than men.

Feedback

Remote viewers working with law enforcement or with targets classified beyond their clearance level claim that feedback is not necessary for them to perceive accurate information about the target (McMoneagle, 2015) – whereas remote viewers working to predict targets associated with financial markets claim that feedback is crucial (Katz et al., 2021). The role of feedback is key when it comes to understanding the mechanisms underlying precognition, because if feedback is not necessary for accurate performance, then the idea that a person is pre-responding to their own future experience cannot correctly describe the situation. For forced-choice precognition experiments, meta-analytic results indicate that trial-by-trial feedback supports accuracy (Honorton & Ferrari, 1989), so it is not unreasonable to assume the same would be true for precognitive remote viewing. Nonetheless, the role of feedback has only been explored in a few precognitive remote viewing experiments.

In one such experiment, the conscious availability of feedback was manipulated and was shown to have no effect on the accuracy of precognitive remote viewing for participants producing significant performance (May et al., 2014). And a related recent study showed that skilled and pre-screened remote viewers were capable of describing changes in a German stock index (DAX) prior to the realization of those changes, but there was no significant difference in their performance when feedback was available versus when it was not (Müller et al., 2019). Based on these well-controlled studies it appears that feedback may not be required for the *accuracy* of precognitive remote viewing, though it is possible that feedback supports viewer *motivation* when performing repetitive precognitive remote viewing trials.

Interesting Targets

Another often-repeated claim among professional remote viewers is that targets with high "numinosity" – that is, greater affect, more information, or more meaning – produce greater accuracy (May et al., 1994a,b; Schwartz, 2007; Watt, 1988). This claim has been tested in multiple precognitive remote viewing experiments and has been upheld (Delanoy & Solfvin, 1996, Krippner et al., 2019, Mossbridge et al., under review). In one study (Delanoy & Solfvin, 1996), video targets containing more information (and potentially therefore more interesting) were common among targets that were likely to be described well, even if they were not the selected target on a particular trial and instead were used as comparison targets and therefore only seen by independent judges. In a more recent

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study, Krippner et al. (2019) found that static image targets rated as more numinous by independent judges produced significant precognitive remote viewing performance, while lower-rated image targets did not. Further, the relation between target interestingness and accuracy was independently analyzed in three data sets (one confirmatory analysis was pre-registered, Mossbridge et al., under review). All three analyses revealed that photo targets rated as more interesting were more likely to be correctly described – even when those targets were used as comparison targets for judges and not seen by participants. Overall, it appears that precognitive remote viewing tasks are similar to memory tasks in that some feature related to the salience of the target influences accuracy. This same rule has been proposed for forced-choice and behavioral precognition tasks, but thus far it appears that target affect does not seem to have a profound impact on accuracy in these sorts of tasks (Storm et al., 2012).

Self-Transcendence

The final claim about precognitive remote viewing performance is that better performance is obtained when viewers are in a positive or expansive mood (McMoneagle, 2000; Swann, 2018). Some scientists believe that this effect is motivational because belief in the possibility of precognition and other forms of psychic phenomena impacts performance in forced-choice and behavioral precognition tasks (e.g., Mossbridge & Radin, 2018, 2021), and therefore is believed to impact remote viewing performance in general (Subbotsky et al., 2019). But in the only direct study of precognitive remote viewing in which belief was measured, belief was not shown to impact accuracy (Roe et al., 2020), providing another example of the non-equivalence of precognitive remote viewing with forced-choice and behavioral precognition tasks.

Meanwhile, the experience of being in a positive or expansive mood has been shown to be correlated with better accuracy in largely precognitive ESP (anomalous cognition) experiments conducted in a ganzfeld context (Carpenter, 2005), a context in which participants are re-focused on internal stimuli. Ganzfeld may also support an experience of self-transcendence and it seems to lead to significantly higher scoring on a free-response precognitive remote viewing task (Roe et al., 2020). Along the lines of self-transcendence, the experience of unconditional love might support better accuracy in free-response precognitive remote viewing. This idea comes from a post-hoc analysis of laboratory data showing that participants self-reporting high levels of unconditional love prior to being hypnotized to experience it performed significantly better than chance and better than participants who reported low levels of unconditional love in the same time frame (Mossbridge et al., 2021). A follow-up experiment modified to be performed online examined the relation between a measure of unconditional love and free-response precognitive remote viewing accuracy and had the same result (Mossbridge et al., under review). Together, these experiments suggest that unconditional love – or perhaps expansive, self-transcendent, altered states in general – support precognitive remote viewing. In fact, environmentally imposed self-transcendence, or what Cameron (2022) calls "alter association," may be the key to understanding why people with a high childhood history of trauma, especially neglect, have been found to score significantly better than those with a lower trauma history on a precognitive remote viewing task (Cameron, 2022).

Taken together, it appears that the four claims about precognitive remote viewing described here are supported by independent and well-controlled tests. Although these results could be overturned by the recognition of methodological flaws or the production of multiple well-controlled studies contradicting the existing results, the current data point to the following conclusions about precognitive remote viewing: 1) there is no significant gender difference in accuracy, 2) there is no significant decrease in accuracy when there is no feedback about the target, 3) viewers are significantly better at describing more interesting or information-filled targets (whether they see them or not),

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4) high self-transcendence, including greater feelings of unconditional love, produce significantly higher accuracy.

Hints About Mechanism

There are some key differences between presentiment and precognitive remote viewing, described briefly above and elaborated on below, indicating that they are distinct phenomena (Table 1). A few of the entries in Table 1 require further explanation, which I will briefly provide here. Whether feedback about the stimulus is required for presentiment to occur is a semantic question. A presentiment experiment consists of giving the participant the conscious experience of a stimulus and determining what the physiological response was prior to that stimulus, and teasing out how that response relates to the stimulus type and the post-stimulus response. Although an experiment cannot really be considered a presentiment experiment without a stimulus revealed to the participant, some scientists have examined presentiment-like responses to stimuli selected but not shown, and have been able to differentiate responses to "blocked" versus presented stimuli (e.g., Tressoldi et al., 2009). However, since a non-presentation of a stimulus versus its presentation can be interpreted as two different stimulus types, this type of experiment does not fully demonstrate that presentiment-like responses can occur without stimulus presentation.

Two other entries in Table 1 require explanation as they relate to presentiment: interesting targets and self-transcendent states. Although the comparison classes in presentiment experiments are often between emotionally engaging versus neutral targets, this does not have to be the case to get a presentiment result. What is required, it seems, is to create a situation in which the post-stimulus physiological response is different between two stimuli (Mossbridge et al., 2015). This can be done with stimuli that differ in their arousal response and therefore their level of interest to the physiological

Table 1

Comparison Between Presentiment Versus Precognitive Remote Viewing

Characteristic	Presentiment	Precognitive Remote Viewing
Mostly conscious?	No	Yes
Prediction up to years in the future?	No	Yes
Gender influences accuracy?	Probably[a]	No
Feedback required?	Yes	No
Interesting targets help?	No	Yes
Self-transcendence helps?	Not Clear	Yes

Note. [a] Indicates this conclusion would be stronger if all unpublished data described above were peer-reviewed.

system in question, or it can be done with neutral stimuli that do not differ in interestingness but differ in their meaning within the context of the task (as in examples 1 through 3 above). Thus, it is not interestingness per se but rather the contextual interpretation and response to the stimulus that determine the presentiment effect. This is best illustrated in example 1 (above), in which the EEG pre-responses predicted the participants' responses but did not predict the stimulus types themselves.

As to self-transcendence and presentiment, to my knowledge there is no experiment in which either presentiment or behavioral precognition tasks in particular (i.e., exclusive of other psi tasks, see Carpenter, 2005; Roe et al., 2020) have been examined in an environment like the Ganzfeld to examine whether self-transcendent states support these effects. Some experimenters note that meditation practice, associated with self-transcendence, can increase accuracy in some conscious forced-choice precognition tasks (Roney-Dougal et al., 2008: Roney-Dougal & Solfvin, 2011; Varvoglis, 2019), but for presentiment tasks the results may depend on the nature of the stimuli. For example, when the stimuli are from two neutral classes as in a study of EEG pre-responses to auditory and visual stimuli (Radin et al., 2011), meditators may perform

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better on presentiment tasks than non-meditators, as they may differentiate events in time less rigidly. But as Bierman (2002) noted, meditators are adept at suppressing arousal response to challenging or erotic stimuli, and this may explain worse performance by meditators on presentiment tasks in which some of the stimuli are meant to produce emotional arousal. Therefore, the jury is still out on whether presentiment effects are improved when participants are in a self-transcendent state.

Assuming that human capabilities with sharply different characteristics are likely to be served by at least partially separate mechanisms, it appears that presentiment is likely served by a mechanism that is at least partially separate from the mechanism underlying precognitive remote viewing. Although hypotheses about physical mechanisms governing precognition have been offered in the past, they have generally treated precognition as a somewhat unitary phenomenon. That is, they have either tailored their models to explain results from a particular type of precognition and no other type, or they have combined presentiment, precognitive remote viewing, and other forms of precognition into one conceptual lump (e.g., multiphasic model: Marwaha, 2018; Marwaha & May, 2015; CIRTS model: Bierman, 2008, 2018; thermodynamic retrocausal model: Sheehan & Cyrus, 2018). In contrast, an important psychological model of precognition does a good job of separating forms of precognition (Carpenter, 2004, 2005), but it primarily focuses on the relation between precognition and other aspects of unconscious processing, rather than trying to describe physically how the information revealed in precognition experiments "arrives from the future." Elements of all of these influential theories are almost certainly reflective of some aspects of each of the mechanisms underlying presentiment and precognitive remote viewing. Here very broad strokes are used to speculate about potential physical and non-physical mechanisms, including the theories mentioned already, that might underly presentiment and precognitive remote viewing (Figures 4a,b).

Presentiment and the Physical-Time-Symmetry (PTS) Model

Let us first consider the case of presentiment and other largely unconscious forms of precognition with brief lead times. The consciousness restoration of time symmetry (CIRTS) model of Bierman (2008, 2018) was designed largely to explain such presentiment results. The idea here is that the information processing during conscious awareness of a stimulus or target restores an underlying physical time symmetry to physiology, providing the retrocausal effect of presentiment. According to this idea, if there is no conscious processing of the stimulus, there is no presentiment.

Taking the CIRTS idea and imposing the physical portion of it on a completely physical system is possible, and that is what I call a "physical-time-symmetry" (PTS) model of presentiment (Figure 4a). The proposition of this toy model is that presentiment and other short time-frame, largely nonconscious precognitive phenomena act through physical time symmetry in the three dimensions of space and one dimension of time, within the human body and brain. Note that a stimulus must be present in the future to induce a post-stimulus response, but if the stimulus can induce this post-stimulus response without consciousness, then consciousness is not necessary for this model.

The PTS model is very similar to the thermodynamic retrocausal model of Sheehan and Cyrus (2018), although their model is more detailed than PTS and it suggests that precognition will be enhanced by conscious awareness of the feedback because it will boost post-feedback responding. The benefit of such a model is that only time symmetry need be proposed, a concept already available in classical physics (Sheehan & Cyrus, 2018). Further, the fact that gender and potentially hormone differences influence these unconscious, short time-frame forms of precognition is consistent with the idea that they are strictly physical in nature. Similarly, the lack of long time-frame access to information about future events is consistent with a solely physical mechanism, because physiological mechanisms responding to many forms of future input would get

exponentially noisier the greater the distance between the pre-response and the future event. Finally, the dual findings that presentiment effects seem to be retrocausal responses to future internal states of the percipient and that presentiment effects themselves are largely unconscious both support the idea that consciousness and other potentially non-physical phenomena are not required for these effects to occur.

Precognitive Remote Viewing and the Pervasive-Universal-Consciousness (PUC) Model

The multiphasic model and the thermodynamic retrocausal model are both based almost entirely on precognitive remote viewing and precognitive dreaming results. For the thermodynamic retrocausal model, feedback is required because it is the feedback itself that creates a retrocausal impact on the past perceptions of the experimental participant (Sheehan & Cyrus, 2018). In contrast, for the multiphasic model information arises from an unknown external source distant in spacetime which is transferred through sensory means to the human brain and body (Marwaha, 2018; Marwaha & May, 2015). This process does not seem to require specific feedback about the target, and various factors including information content and the state of the remote viewer can influence the reception of the information through sensory means. These features of the multiphasic model match the existing precognitive remote viewing results better than the thermodynamic retrocausal model does. However, the missing piece of the multiphasic model, as the authors themselves explain, is how the information gets from somewhere/somewhen distant in spacetime with respect to the percipient.

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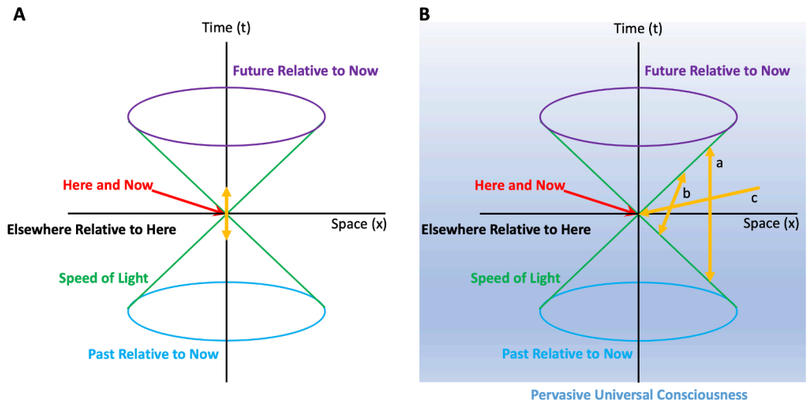
I too am unable to satisfactorily explain how information gets from somewhere/somewhen in spacetime with respect to a percipient in the here and now. I will speculate nonetheless about the mechanisms underlying precognitive remote viewing and other largely conscious forms of long lead-time precognition, with the goal of creating a testable *toy model* – that is, an overly simple model designed to ignite creativity and understanding but not meant to include all factors. I call this model the "pervasive-universal-consciousness" model (PUC; pronounced like the character "Puck" in Shakespeare's *A Midsummer Night's Dream)*.

The basic idea of the PUC model is that the source of the information retrieved by the precognitive remote viewer arises from a universal consciousness (e.g., Barušs & Mossbridge, 2017; James, 1909), an information-rich and pervasive nonlocal, non-3D, non-physical "field" not confined to an individual's local position in spacetime. If one makes the assumption that this universal consciousness permeates everything (because it is not constrained to local spacetime) and stores all the information in the universe regardless of the space or time from which it originated (e. g., Akashic records; Nash, 2019), then the question is about how information can be received, since there is so much information to be had. Within the context of seemingly limitless information, the question becomes how a viewer can receive specific information appropriate to a given precognitive remote viewing task when so much information is apparently available. This question actually has two parts: 1) how does the percipient communicate to the universal consciousness what information is needed, and 2) how does the universal consciousness provide that information?

Figure 4

Physical and Non-Physical Aspects of Two Proposed Precognition Mechanisms



Note. A) The physical-time-symmetry (PTS) toy model describing presentiment and other short time-frame, largely nonconscious precognition. B) The pervasive-universal-consciousness (PUC) toy model describing precognitive remote viewing and other long time-frame, largely conscious precognition. [a] Transferring intention from the percipient forward in time and information backwards in time to the percipient's light cone at its electromagnetic boundary.[b] The same as (a) but asymmetrically relative to "now." [c] Transferring both information and intention unidirectionally, from the pervasive universal consciousness to now.

Continuing to speculate in the service of creating a model that may eventually be falsifiable, let us assume in the PUC model that the percipient uses *intention* to communicate to the universal consciousness what information is needed. Intention as the carrier of this request is proposed for several reasons: 1) multiple anecdotal reports suggest that the success of precognitive remote viewing is driven by intention, 2) intention is a conscious experience and therefore can be thought of as having both a physical (brain/body) and nonphysical (mental) component, providing two media with which to communicate with pervasive universal consciousness, and 3) we use intention in our physical everyday actions to help us select our sensory inputs and motor actions (e.g., if I intend to eat blueberry pie I am more likely to eat blueberry pie).

In terms of how the universal consciousness provides the information, let us imagine that if the information originates outside the light cone, the information is transferred by the PUC to the electromagnetic boundary of the percipient's light cone and can, from there, be perceived by the percipient (Figure 4b). This odd assertion arises from examining a precognition-like effect in a quantum optical system (Mossbridge, 2021), in which it appears that both presentiment-like behaviors (i.e., registering the future state of the system) and precognitive remote viewing-like behaviors (i.e., registering information not in local spacetime) are being displayed by the photons in the experiment. From this comes a highly speculative proposition that light – or electromagnetic radiation – can be seen as a translator between universal consciousness and local spacetime. Although not essential to the PUC model, it is an intriguing detail that could potentially be tested (see below, *Testing the Models*).

One may reasonably ask, how does this intention piece actually work? In a precognitive remote viewing task in which no one including the experimenter knows the answer to a question being posed by the target, which is often the case in operational precognitive remote viewing (e.g., "Where is this missing child?"), the intention communicated to universal consciousness would be something along the lines of "Please get the information required for this tasking and communicate it to me effectively." For instance, if the task is to address an unknown future question that turns out to be a future scientist's query about how to create a time machine, then it is up to universal consciousness to first access the future scientist's query, find the answer to the question, and deliver the answer to the percipient. Thus, the intention provided to universal consciousness is very different from the information content coming back to the percipient. That is, there is an essential asymmetry in that the PUC knows the question and the answer and must provide it, while the percipient only holds the intention that the correct information be provided to them. Further, in the case of spontaneous precognitive dreaming in which there is no clear intention on the part of the dreamer at all, the intention and the information

seem to go in only one direction – as if the universal consciousness has its own intention as well as the information matching that intention, and these are transferred to the dreamer through elements of their dream, directly to the observer in the here and now (e.g., Figure 4b, arrow c).

The PUC toy model described here is consistent with the characteristics of precognitive remote viewing, but the universal consciousness component is of course very speculative. It is necessitated by three key results. First, precognitive remote viewing can be used to accurately describe structures, people, and events distant in space as well as far in the future and past without feedback. If a percipient never sees the feedback, this means that their "now" never consists of that feedback – placing this information outside of the light cone of the percipient. Any model explaining precognitive remote viewing must explain how information from outside of local spacetime gets into local spacetime. In other words, a wormhole or other exotic physical process must be postulated to send and receive information to the percipient, or nonphysical processes like a PUC must be considered. Second, the fact that in precognitive remote viewing tasks targets that are interesting to a viewer or more "numinous" are more likely to be described accurately than other targets suggests that there is a type of two-way communication between the percipient and the source of the information, rather than a mechanical one-way flow of information. Finally, the evidence that self-transcendent states may support accuracy in precognitive remote viewing tasks suggests that there is an aspect to the mechanism that is more accessible from a mental state that explicitly involves moving oneself beyond the boundaries of the personal, decreasing critical thinking while increasing a boundaryless state (Cardeña, 2010; Lindström et al., 2022). Absent these results related to interesting targets and self-transcendent states, several alternative and intriguing physical and mental-physical dualist models could also be considered as potential explanations for precognitive remote viewing effects (e.g., Atmanspacher, 2003, Greene et al., 2022), Thus in the PUC model, the pervasiveness and personal nature of the universal consciousness reflects primarily the target-interestingness and self-transcendence results.

Testing the Models

Testing the PTS Model

Portions of each of these two models can potentially be tested. For the PTS model, a way to elicit presentiment or at least behavioral precognition responses without de facto stimuli would be the most obvious way to test the claim that the phenomenon does not require consciousness and relies on post-feedback responses. If pre-responses associated with non-displayed feedback occurs when there are no stimuli presented (ever) within an experiment, there is no feedback of any kind (e.g., stimuli are selected but not shown), and there are no post-feedback responses (e.g., responses after the time of the non-feedback), then the physical-time-symmetry model cannot explain presentiment. In that case, presentiment would have to be explained by something like the PUC model. Another way to test the PTS model would be to introduce a general anesthetic just before a stimulus is delivered (in a single-trial experiment) and determine across participants if pre-responses matched post-responses regardless of conscious awareness of the stimulus. The PTS model predicts that if there is a post-stimulus physiological response, there should be a pre-stimulus response in the same physiological system (regardless of conscious awareness of the stimulus).

Testing the PUC Model

The first step to ruling out the PUC model would be to demonstrate methodological flaws in the precognitive remote viewing experiments showing precognitive access to information never given to the percipient. The second step would be to repeat such no-feedback experiments and find the result that feedback trials were in fact significantly more accurate than no-feedback trials. Of course, ruling out that there

is a personal and individual communication of sorts with some kind of nonlocal source of information would also be key. One experiment designed to rule out the human side of this sort of communication is to ask a group of skilled precognitive remote viewers to obtain information about the future state of someone they love versus a stranger, and to compare the accuracy of both types of sessions. If there is no difference in accuracy, the PUC model is likely wrong, because it proposes an intentional connection between the PUC and the viewer. Along those lines, although it is difficult to test whether a universal consciousness has intention toward us, it might be useful to investigate implicit and explicit human intentionality and observe how each type of intentionality influences precognitive remote viewing performance. Another feature of the PUC model is that there is no causal closure – specifically, that there is something about the pervasive universal consciousness that can influence physical reality. In the PUC model, this influence is imagined to be the electromagnetic force. If electromagnetic phenomena, including biophotons, can be tested in the presence of a precognitive remote viewing session and there is never any association between electromagnetism and session accuracy, this would suggest (but not prove) that the PUC model requires another method to transfer information from the nonphysical to the physical. And, in general, if it can be shown that precognitive remote viewing performance does not depend on intentionality, that portion of the PUC model would be incorrect.

Next Steps

Regardless of what will eventually be uncovered about the mechanisms underlying precognitioin, given existing data it appears that at least some forms of precognition will have to be explained by what is currently considered exotic physics or a nonphysical/extraphysical mechanism. As explained above, this does not mean that the PTS and PUC models are untestable, just that they may be easier to understand and rigorously test for those scientists who acknowledge that the scientific method itself does not rely on a materialist worldview (Barušs & Mossbridge, 2017). In the meantime, it is useful for those interested in practical applications of precognitive phenomena to keep in mind that each type of precognition might be explained by slightly different mechanisms, so understanding and characterizing the features of precognition that work best for a given application are keys to making practical progress.

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Präkognition an den Grenzen: Eine empirischer Übersicht und eine theoretische Diskussion

Julia Mossbridge

Zusammenfassung: Die streng wissenschaftliche Untersuchung der Präkognition, der menschlichen Fähigkeit, zukünftige Ereignisse, die nicht bereits aufgrund von Informationen über die Vergangenheit oder durch die fünf Sinne vorhersehbar sind, genau vorherzusagen, umfasst die letzten 90 Jahre. In dieser Übersicht werden verschiedene Typen der Präkognition beschrieben, die Grundprinzipien der Präkognitionsforschung dargestellt und die Beweise und potenziellen Mechanismen für zwei sehr unterschiedliche Formen der Präkognition erörtert: 1) zumeist unbewusste Präkognition mit kurzen Vorlaufzeiten (z. B. Vorahnung) und 2) zumeist bewusste Präkognition mit längeren Vorlaufzeiten (z. B. präkognitives Remote Viewing). Zwei mögliche Modelle werden beschrieben.

German translation: Eberhard Bauer

Precognição nos Limites: Uma Revisão Empírica e Discussão Teórica

Julia Mossbridge

Resumo: O rigoroso estudo científico da precognição, a capacidade humana de antever com precisão eventos futuros que ainda não são previsíveis com base em informações sobre o passado, ou a partir dos cinco sentidos, já abrange os últimos 90 anos. A presente revisão descreve diferentes tipos de precognição, destaca os princípios básicos da pesquisa sobre precognição e discute as evidências e mecanismos potenciais de duas formas muito diferentes de precognição: 1) a precognição fundamentalmente inconsciente, com períodos de curta duração (por exemplo, pressentimento) e 2) a precognição predominantemente consciente com com períodos de duração mais longos (por exemplo, visão remota precognitiva). Dois modelos potenciais são descritos.

Portuguese translation: Antônio Lima

La Precognición en los Límites: Una Revisión Empírica y un Debate Teórico

Julia Mossbridge

Resumen: El riguroso estudio científico de la precognición, la capacidad humana de predecir con exactitud acontecimientos futuros que no son predecibles basándose en información sobre el pasado o procedente de los cinco sentidos, abarca los últimos 90 años. Esta revisión describe distintos tipos de precognición, subraya los principios básicos de la investigación sobre la precognición, y analiza las pruebas y los posibles mecanismos de dos formas muy distintas de precognición: 1) la precognición sobre todo inconsciente con tiempos de espera cortos (por ejemplo, el presentimiento) y 2) la precognición sobre todo consciente con tiempos de espera más largos (por ejemplo, la visión remota precognitiva). Describo dos posibles modelos para explicar cada una de estas formas de precognición, así como ideas para poner en prueba empíricamente cada uno de ellos.

Spanish translation: Etzel Cardeña

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Understanding the Factors at Play in the Sender-Receiver Dynamic During Telepathy Ganzfeld: A Meta-Analysis[1]

Abby L. Pooley Aja L. Murray Caroline Watt

University of Edinburgh

Abstract: *Objective*. To use meta-analysis to explore five previously uninvestigated factors related to the sender-receiver dynamic in the telepathy ganzfeld. The five factors of interest are: a) did the receiver see the sender's room prior to the session?; b) could the sender hear the receiver during the mentation period?; c) could the sender hear the receiver during the judging period?; d) was the sender explicitly told to be silent?; and e) did the experimenter assist in the review section of the session? *Method*: Telepathy ganzfeld studies conducted post *Joint Communiqué*, with one session per day and the receivers rating the targets, were chosen. Two mixed-effects models were fit: 1) using the study hit rates as the binomial mean; and 2) using the study hit rates as a proportion. Both models have the five factors as binary moderators. *Results*: Both the binomial mean and proportion models suggest a significant effect of the moderators overall and two factors individually: 1) the sender being able to hear the receiver during the mentation period; and 2) a review period after the mentation period. Permutation tests for both models also show significant effects of the moderators and the two factors. *Conclusion*: The sender being able to hear the receiver's mentation appears to increase overall study success, while the review period decreases overall study success.

Keywords: meta-analysis, ganzfeld, psi, telepathy, extrasensory perception, anomalous cognition

Highlights

- There was a significant overall effect of the moderators on study success (hit rate)
- The sender being able to hear the mentation period was associated with a significant increase in study success
- A review period after the sending period was associated with a significant decrease in study succes

1 Address correspondence to: Abby Pooley, Department of Psychology, School of Philosophy, Psychology and Language Sciences, 7 George Square, University of Edinburgh, EH8 9JZ, United Kingdom, apooley@ed.ac.uk. Preliminary results were presented at the *Society for Psychical Research's* 2021 Annual Conference. The analysis discussed at the conference only contained one analysis that used the hit rate as the outcome variable and based upon the ratings by the first author, before inter-rater disagreements could be resolved. The current report details the final methods, analyses and results. The authors would like to thank Umberto Noé for assisting with the standard deviation formula for the Binomial approximation distribution, and rater Stacey Bruce. Caroline Watt thanks the Bial Foundation for Grant 190/18 to support her ganzfeld work.

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The ganzfeld is a procedure commonly used to test for anomalous cognition or extrasensory perception (ESP; Cardeña, 2018; Cardeña et al., 2015) and researchers have often reported replicable findings using this method (Baptista et al., 2015; Honorton et al., 1998; Storm & Tressoldi, 2020; Storm et al., 2010). The method uses an environment where the participant experiences a mild form of sensory deprivation. More specifically, the ganzfeld is defined as: homogeneous, unpatterned sensory stimulation: audio-visual ganzfeld may be accomplished by placing translucent hemispheres (for example, halved ping-pong balls) over each eye of the participant, with diffused light (frequently red in hue) projected onto them from an external source, together with the playing of unstructured sounds (such as "white" or "pink" noise) into the ears, and generally with the person in a state of bodily comfort; the consequent deprivation of patterned sensory input is said to be conducive to introspection of inwardly-generated impressions, some of which may be extra-sensory in origin. [From the German for "entire field"]. (Parapsychological Association, 2015)

With a telepathy design, there are two participants, one acting as the sender and the other as the receiver. Telepathy can be formally defined as "Anomalous cognition (AC) to refer to ostensible acquisition of information in ways that are currently unexplained" with telepathy referring to the source presumably being another person's mind (Cardeña et al., 2015, p. 2).

During a telepathy ganzfeld session, the receiver is exposed to the ganzfeld environment. Their task is to become aware of the sender's thoughts while the sender views a randomly chosen target such as a video clip r static image in a different room. Usually receivers are asked to make a verbal report of any impressions or sensations they are experiencing and this mentation is audio recorded as well as being noted by an experimenter. Often the experimenter may review the mentation with the participant after

the impression period, a part of the session typically referred to as the review period. After the impression (and review) period, the receiver views a random selection of decoy video/image clips, along with the target (the clip the sender was aiming to communicate). While the receiver and experimenter remain unaware of the identity of the actual target, the receiver ranks the similarity of their impressions with the presented targets. If the highest rated target is the same as the target that the sender was viewing the session is registered as a hit.

Parapsychologists have been reporting significant results in ganzfeld studies since the 1970s, however there has been little systematic investigation of which aspects of the experimental set-up are associated with elevated hit-rates. Ganzfeld design features such as target type have been analyed, with dynamic targets producing larger study effect sizes (Honorton et al., 1990), though this observation was not confirmed in Milton and Wiseman's (1999) analysis of "new generation" ganzfeld studies. Honorton (1977) reported that successful sessions have on average 37 minutes of ganzfeld exposure. Bem and colleagues (2001) found that more standard studies obtained higher hit-rates, although there is little consensus on the definition of the standard ganzfeld (Milton, 1999; Schmeidler & Edge, 1999).

Most attention has been paid to the role of the sender, with studies hoping to shed light on the sender's influence and whether it is instrumental (inherent to the communication process) or peripheral (pertaining to psychological or motivational factors). Honorton's (1995) meta-analysis of the ganzfeld literature reported that studies using senders perform better than those without. However, later studies designed directly to compare sender and no sender conditions generally report no significant difference between conditions (e.g. Morris et al., 1995; Roe & Holt, 2005; Roe et al., 2003). Other potentially important aspects of the ganzfeld set-up, especially around the sender-receiver dynamic, remain unexplored. As Cardeña (2020) argues, although there is abundant evidence that the ganzfeld creates a psi-conducive environment, we need to be more systematic in investigating which elements of the ganzfeld procedure are important. Therefore, the focus of this meta-analysis is to explore how five previously uninvestigated ganzfeld telepathy study design features may influence study outcome.

Factors of Interest

Factor 1: Do Receivers See the Sender's Room?

Psi-conduciveness is often mentioned in the ganzfeld literature, with some stating that creating a warm and pleasant atmosphere creates a more psi-conducive session (Dalton, 1997; Milton, 1997). However, more information is required about the detailed protocol of each study, especially concerning experimenter-participant interactions, which are quite extensive in the ganzfeld due to the one-to-one nature of the testing, and the duration of each session (Smith & Savva, 2004). Ganzfeld researchers often mention rapport building chats between experimenter and participants, however it is not known whether having the receiver see the sender's room before the session is a key aspect of the study. Being told there is a sender in a different room may be unnerving to a new participant, especially given the length and intensity of the study. Furthermore, perhaps any emotional or social connection between the sender and receiver will be stronger if the receiver has been introduced to the sender's environment and the sender, in turn, is aware that the receiver knows where they are. Thus, the rationale for assessing this factor is to understand whether scoring is higher when the receiver has seen the sender's room before the session commences.

Factor 2: Do Senders Hear the Receiver's Mentation Live?

It takes some effort to set up a one-way audio connection from the ganzfeld receiver to the sender. Researchers often make this effort thereby enabling the sender to hear the receiver describe out loud their feelings, impressions and sensations during the

sending period. The stated justification for this design feature is to allow the sender to mentally reinforce the correct images and impressions to the target (Dalton, 1997) and to add an air of excitement and active involvement for the participants (Parker et al., 1997). If the sender's influence is peripheral via motivational factors (as suggested by Honorton, 1995), then the sender being able to hear the receiver during the sending period may be the most important aspect of a telepathy design because by hearing the receiver's mentation the sender should, theoretically, be able to reinforce receivers at times when they seem to be describing the target. Further, not every ganzfeld study features this audio channel (or perhaps does not clearly report this aspect of procedure), so it is also of interest to establish how common this practice is.

Factor 3: Do Senders Hear the Receiver During the Judging Period?

If the sender can hear the receiver produce their mentation during the sending period and reinforce impressions linked to the target (Factor 2), the same logic extends to the judging period - the time when the receiver decides which target clip is most like their experiences. As the receiver (and/or the experimenter) are reviewing the mentation report and making decisions about the ratings, the sender being able to hear this should, in theory, be able to mentally reinforce the target. Nevertheless, to date there has been no analysis of the impact of the sender hearing the judging period.

Factor 4: Sender Told to be Silent

This factor is primarily assessed from a target security concern: even if senders are physically distanced from the other experimenters and receiver and the target is shielded, explicitly telling the sender to be silent provides an extra layer of security. Although a minor aspect of the ganzfeld procedure, if this factor is significantly related to study outcome then it suggests that previous studies may have been susceptible to sensory leakage. Instructions for the sender to "silently communicate" the target have been used in study protocols throughout the ganzfeld literature (e.g., Berger & Honorton, 1986; Honorton et al., 1990). Thus, assessing the prevalence of this factor may help us to evaluate whether subtle sensory leakage (such as vibrations) may potentially influence study outcome, even if acoustic shielding in these studies is assumed to be adequate (see Wiseman et al., 1994).

Factor 5: Mentation Review

It is common for ganzfeld studies to have review periods (after the sending and before the judging period) in which the experimenter reviews the mentation notes and allows the receiver to elaborate or clarify their mentation (Kanthamani & Broughton, 1994; Roe et al., 2004; Watt et al., 2020). The review period may assist participants in processing their experiences, remembering their mentation and in making connections between their mentation and the targets that they may have otherwise not noticed (Wooffitt, 2003). However, there has not yet been a systematic review of the importance, or otherwise, of the mentation review.

Objective

This meta-analysis is exploratory as there has been no previous systematic review of the above aspects of the ganzfeld study procedure. The research questions originate from a pragmatic motivation: to provide evidence to guide the design of future ganzfeld telepathy studies. Hence, there are no expectations from the analysis. Nonetheless, the null hypothesis is that there will be no effect of the moderators (five factors) on study success (hits significantly greater than chance). Ganzfeld telepathy studies published between January 1988 and September 2021 are included, to assess studies conducted with the potential benefit of the methodological guidelines from the *Joint Communiqué* (Hyman & Honorton, 1986).

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The independent variables are the five factors (detailed above) rated by two raters (details in Appendix Figure C2). The dependent variable for both meta-analytic models is the study hit rate (percentage of hits). The first author created two models, the first treating the study hit rate as a mean, following the approximated binomial distribution. The intention was to use the *z*-scores for each study, which are approximated from the binomial distribution, but the standard deviations could not be computed. The model effect size metric is defined in Appendix Formula A6. The second, supplementary, model uses the study hit rate as proportion and uses the effect size metric defined in Appendix Formula A8. Homogeneity analysis was automatically calculated by the model function, which calculated the I^2 value (See Appendix Formula A3). The I^2 statistic describes the variation across studies due to heterogeneity, rather than chance and is a simple description of the inconsistency of studies' results (Higgins & Thompson, 2002; Higgins et al., 2003). Analyses were conducted with RStudio Workbench Version 1.4.1717-3 © 2009-2021 RStudio, PBC, and models built with the *metafor* package (Viechtbauer, 2010). A protocol was not pre-registered for this project due to its exploratory nature. The data set used for analysis, analysis code, and information are all publicly and freely available at https://github.com/yeloopa/telepathyMA.git

Method

Inclusion and Exclusion Criteria

We include all ganzfeld telepathy studies using visual targets and human participants from January 1988 to September 2021. All studies had a measure of hit rate (%) as well as session binomial *z*-score as their outcomes, and a four-option design with one target and 3 decoys (thus resulting in a 25% mean chance expectation; MCE). Study hit rate is a percentage calculated as the overall number of hits obtained across the study sessions (see Appendix Formula A2). The associated *z*-scores are the related binomial distribution *z*-ratio for situations of the general "k out of n" type with the formula as defined in Appendix Formula A1.

Information Sources

We first extracted all telepathy studies from Tressoldi's ganzfeld database, accessible at the *Society for Psychical Research's* open-access data website *Psi Open Data* (Tressoldi, 2019), which contains all studies conducted since 1974 to 2018, used for the two recent meta-analyses of the ganzfeld literature (Storm & Tressoldi, 2020; Storm et al., 2010).

To check for studies produced since 2018, a literature search on Google Scholar was conducted, using the search terms "ganzfeld," "telepathy," and "study," using the Boolean connector "&" in the title and abstract fields for the years 2018 to 2021. Inspection of reference lists of included papers was also used as a part of the search strategy to ensure all relevant studies were included. The literature search resulted in one addition, a telepathy study published in 2020 (Cardeña & Marcusson-Clavertz, 2020). ALP contacted the author of the 2020 paper to establish if the multiple sessions had been performed on a single day by the participants – which they had not.

Study Selection

The study selection procedure is outlined in Appendix Figure C1. Studies were excluded based on these criteria:

- Duplicated: for example, if a published paper was produced from a conference proceeding, the conference proceeding was removed from the database. Published papers have more detailed and full analyses and usually all planned sessions are complete.

- Studies using external judges: the factors Hear and Hear judging asses if the sender hearing the receiver during the two periods (outlined above) influences study outcome. Thus, using external judges would not help this assessment, especially for the Hear judging factor (see Hyman, 1995).

- Multiple sessions a day: if the studies had a repeated participants design which ran multiple sessions on the same day, they were removed. Participants contributing to multiple sessions violates the independence assumption of most statistical hypothesis tests. Likewise, there is literature noting a decline effect due to fatigue in experimenters (Broughton & Alexander, 1997; Parker et al., 1998; Wezelman & Bierman, 1997)

• Multiple trials per session: like the point above, only one trial per session in the current study design.

• Stimuli material: Studies which used non-visual targets were removed. Visual targets are considered standard (specifically dynamic targets; Bem et al., 2001).

• Multiple or no senders: Some studies included designs that involved 0, 1, or 2 senders. In these reports, it was unclear if the analysis combined all of these trials into one analysis, or the different sender options had low sample sizes (< 10).

• Low sample size: studies with samples of 10 or less were removed because of potential bias in results stemming from sampling error.

The first author conducted an initial analysis presented at the *Society for Psychical Research's* 2021 Conference (Pooley, 2021) using the data set composed of the studies rated by her using the study hit rate as the outcome measure. She stated then that this was not the final analysis, with corrections and changes still to be made, such as resolving the rater discrepancies and analysis with *z*-score as an outcome. After the conference and study selection was assumed to be final, numerous reports in the *Journal of Scientific Exploration* reported the serious fraudulent actions and widespread plagiarism conducted by Alejandro Parra (Braude, 2021; Cardeña, 2021; Nahm, 2021). Because of the seriousness of the accusations and evidence collected, we deemed it best to remove all the Parra studies from the dataset (a total of 5 data points). Likewise, there was duplicate reporting of some results in the Gothenburg study series (Parker & Westerlund, 1998; Parker et al., 1997). Given the removals and corrections to the database, the final data set is 41 studies.

Data Extraction and Coding

As the data are primarily sourced from a freely available ganzfeld database (Tressoldi, 2019), the number of variables of interest for experiments were reduced to:

- Study author(s) and year (and series number if multiple series per study)
- Study hit rate (%; see Appendix Formula A2)
- Study *z*-score (see Appendix Formula A1)
- Number of participants
- Number of trials

Studies were then organized according to the five factors of interest:

- Did the participant (receiver) see the sender's room before the session? (See)
- Could the sender hear the receiver produce their mentation? (Hear)
- Could the sender hear the receiver during the judging period? (Hear judging)
- Was the sender explicitly told to be silent? (Silent)
- Did the experimenter review the receiver's mentation notes with the receiver, after the sending period? (Review)

Each factor is rated on a binary scale (0 for no presence, 1 for presence of factor). See Appendix Figure C2 for the instructions given to the raters. For the five factors, the first author first assessed each paper and provided ratings based on the instructions. A second rater then did the same, following the same instructions. However, because of health issues with the second rater, it was not possible to arrange a meeting to resolve the discrepancies in ratings and those ratings were disregarded, so CW was recruited as a third rater. Discrepancies in ratings between Raters 1 (ALP) and 3 (CW) were resolved in a meeting (see Table 1 for the inter-rater reliability scores). Due to the ambiguity of what constitutes a "review period," ALP and CW agreed in the rating meeting that if the study report explicitly stated a review occurred, then it was rated a 1. If a review period was not explicitly stated in the paper, it was up to the rater to decide if a review stage could be inferred: hence the rating instructions included the opportunity for the receiver to add, alter and/or discuss their mentation with the experimenter (Appendix Figure C2).

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Summary Measures

Primary Analysis: Binomial Test with Mean Number of Hits

For the primary analysis we intended to use the *z*-score as the outcome measure. However, we noted that a recent pre-publication of a ganzfeld meta-analysis has been criticized during open peer review for the effect size calculation for the study *z*-scores as not being scientifically sound (see Tressoldi & Storm, 2021). Thus, for the current analysis, ALP performed the Binomial test using the mean number of hits rather than the total number of hits, using a random-effects model with study hit rate treated as a mean. The five factors (all binary) of interest were added as moderators in the model, thus resulting in a mixed-effects model. The final model is as follows:

$$\theta_i = \beta_0 + \beta_1 * See + \beta_2 * Hear + \beta_3 * Hearjudge + \beta_4 * Silent + \beta_5 * Review + \mu_i$$

where $\mu_i \sim N(0, \tau^2)$

First, the number of trials, study hit rate and the associated standard deviation of the binomial distribution for treating the hit rates as a mean were calculated and entered into the *escalc* function, which resulted in the observed effect sizes and sampling variances in order to fit the meta-analytic model (see Appendix Formula A5 and A6, respectively). We estimated the heterogeneity of the effect sizes by fitting the model with a restricted maximum-likelihood (REML), which is better when working with smaller samples (Viechtbauer, 2005), and using the Knapp-Hartung adjustment (Knapp & Hartung, 2003).

Secondary Analysis: Proportion of Hits

For this model, we used the proportion of hits as the outcome measure. As the meta-analysis used aggregate scores that provide data about individual groups in respect to a dichotomous dependent variable (hit or miss), the number of events and number of trials are required to calculate the appropriate effect size. We provide the formulae for the model in Appendix Formulas A7 and A8. Due to the similarity between the primary and secondary models, we report the primary analysis in full in the Results section with the model prior to the removal of outliers. The secondary model results can be found in full in Appendix A1-A4.

Methods of Synthesis

Because of the exploratory nature of the study and lack of previous relevant research, a meta-regression for both models was created. Meta-regression not only provides a summary of the selected studies but also evaluates how the five potential moderators may influence study outcome. Study results are not weighted.

Publication Bias and Selective Reporting

Funnel plots for each analysis were created (a funnel plot is a useful visual aid to assess publication (and other) potential bias in the database). Because of the inclusion of moderators in the models, we could not perform the trim-and-fill method to assess publication bias. However, multiple reviews of the ganzfeld literature have reported no suggestion of publication bias problem (Baptista & Derakhshani, 2014; Cardeña, 2018; Storm et al., 2010).

Results

Inter-Rater Reliability

For the sake of transparency, Table 1 presents the results of the initial ratings between Raters 1 and 3. These disagreements were resolved before the final analyses reported below (also see Appendix Figure C1).

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Table 1

Unweighted Kappa Scores and Agreement Between Raters 1 and 3

Factor	Kappa	Observed agreement
See	76%	83%
Hear	50%	78%
Hear judging	21%	71%
Silent	33.5%	63%
Review	8%	71%

Descriptive Statistics

Appendix Table C3 details the studies included in the models and the respective measures. A total of 41 studies (or series reported as part of a wider study) were conducted by 17 different lead authors who reported their results in a total of 23 articles. All 41 studies used a four-choice design therefore the mean chance expectation is 25%. A total of 1,496 participants contributed to 1,624 ganzfeld telepathy sessions. The average hit rate across the studies is 32% (*SD* = 10.40%) with a skewness of 0.72. An exact binomial test is reported to assess if the mean hit rate in the data set is significantly greater than chance. There are 520 hits in 1,624 trials, resulting in a significant difference from chance at the 5% significance level: Binomial Exact p <.001, one-tailed. The mean z-score is 0.91 (*SD* = 1.37), the sum of z-scores is 37.20 and Stouffer's Z is 5.81, although, as discussed earlier, the z scores were not used in the models reported.

Results of Binomial Mean Model (Model 1)

The model was first fit with all 41 studies. The model output is reported in Table 2. The test for moderators is non-significant at the 5% level $F(5, 35) = 1.89$, $p = .12$. However, the coefficient Review is significant suggesting that the presence of a review session in a ganzfeld telepathy study decreases the average study success by 12%, when all the other study features are set to 0. See Table 2)

Table 2

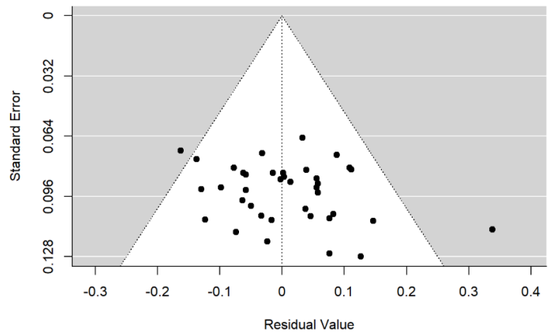
Model 1: Hit Rate as Binomial Mean Summary Prior to Influential Studies Removed

	Estimate	Standard error	t-value	p-value	95% CI Lower Bound	95% CI Upper Bound
Intercept	.38	.07	5.71	<.0001***	0.25	0.52
See	-.01	.05	-0.32	.75	-0.11	0.08
Hear	.07	.04	1.66	.11	-0.01	0.15
Hear judging	-.02	.04	-0.35	.73	-0.07	0.09
Silent	.01	.04	0.20	.84	-0.07	0.09
Review	-.12	.06	-2.16	.04*	-0.24	-0.01

The unaccounted variability in the model is moderate (I^2 = 43%) and the QE test for residual heterogeneity is significant $QE(35) = 62.38$, $p = .003$. As shown in Figure 1, the funnel plot suggests that there is publication bias in the dataset. A mixed-effects meta-regression model Egger's regression test for funnel plot asymmetry was performed and was significant $t(34) = 2.15$, $p = .04$. Further assessment of the model revealed there were influential studies in the dataset. First, Honorton 302 (Honorton et al., 1990) was removed due to having the highest standardized residual value of 3.41, where standardized residuals between -2 and 2 are commonly used as acceptable limits. The model with Honorton 302 removed still flags an influential case, Goulding et al. (2004) with a standardized residual value of -2.7. With the removal of Honorton study 302 and Goulding et al. (2004), the model checks flag another influential study exceeding the limit: Broughton and Alexander (1997) FT2 has a standardized residual value of -2.7. The model was run once again and checked for influential values and returned no more influential cases, thus we detail the final model below.

Figure 1

Funnel Plot for Model 1 Before Removal of Influential Studies



Binomial Mean Final Model (Model 1.1)

With the three influential cases removed, the test for moderators is significant at the 5% level $F(5,32) = 3.78$, $p = .01$. As in Model 1, Review is significant and Hear now is also significant, as shown in Table 3. On average, study success rate is increased by 7% when the sender can hear the mentation period, when all other factors are set to 0. However, the addition of a review period in a ganzfeld telepathy study decreases the average study success by 10% when all other factors are set to 0. A permutation test (5000 iterations) was performed and confirmed the findings, with the test for moderators significant $F(5,32) = 3.78$, $p = .016$. The factors Hear (Factor 2) and Review (Factor 5) were significant, as shown in Table 4. The forest plot for the final model (Model 1.1) is shown in Appendix Figure A1.

Table 3

Model 1.1: Hit Rate as Binomial Mean Summary Output

	Estimate	Standard error	*t*-value	*p*-value	95% CI Lower Bound	95% CI Upper Bound
Intercept	.36	.05	7.22	<.0001***	0.26	0.46
See	.00	.03	0.10	.92	-0.07	0.07
Hear	.07	.03	2.26	.031*	0.01	0.13
Hear judging	-.04	.03	-1.10	.28	-0.11	0.03
Silent	.02	.03	0.62	.54	-0.04	0.08
Review	-.10	.04	-2.40	.022*	-0.19	-0.02

The estimated amount of residual heterogeneity for the model is very low ($\tau^2 < .001$, $SE = 0.001$), unaccounted variability is also low ($I^2 = 2.8\%$) and total amount of heterogeneity accounted for by the model is very high ($R^2 = 92\%$). Model funnel and forest plots are shown in Figures 3 and 4, respectively.

Because of the inclusion of moderators in the model, the trim-and-fill method could not be performed (the trim-and-fill method was applied to the binomial mean model without the moderators, using the original dataset and the dataset that had influential studies removed. Trim-and-fill analyses did not estimate missing studies). However, as shown in Figure 3, there is little evidence to suggest publication bias in the data set. Furthermore, a mixed-effects meta-regression model Egger's regression test for funnel plot for asymmetry was performed and was non-significant $t(31) = 0.17$, $p = .87$.

Binomial Mean Model with Review Factor Removed (Model 1.2)

Because of the high incidence rate of the Review factor (only 3 studies were rated to have *no* identifiable review period), the Binomial final mean model (Model 1.1) was performed with the Review factor removed to assess if the model results changed with this factor removed. The model formula is the same as the primary analysis, just with this

factor removed. Given the similarity between the Binomial mean model (Model 1.1) and Proportion of hits model (Model 2), only the Binomial mean model was performed. Full results are reported in Appendix B5, B6, and B7.

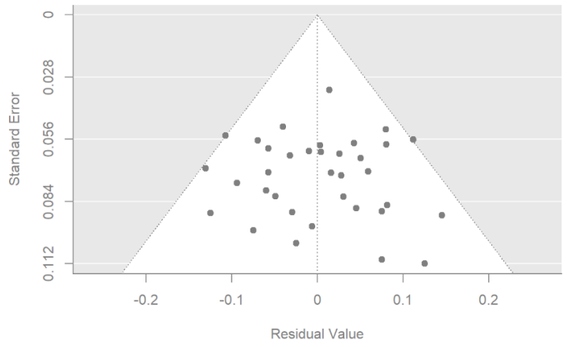
Table 4

Permutation Test Results (5,000 iterations) for Model 1.1

	Estimate	Standard error	*t*-value	*p*-value	95% CI Lower Bound	95% CI Upper Bound
Intercept	.36	.05	7.22	.04*	0.26	0.46
See	.00	.03	0.10	.92	-0.07	0.07
Hear	.07	.03	2.26	.04*	0.01	0.13
Hear judging	-.04	.03	-1.10	.29	-0.11	0.03
Silent	.02	.03	0.62	.55	-0.04	0.08
Review	-.10	.04	-2.40	.03*	-0.19	-0.02

Figure 2

Funnel Plot for Model 1.1



Discussion

In this study, we used a meta-analysis to explore how five potentially important aspects of ganzfeld telepathy study procedure might be associated with study outcome., and found two factors that had significant impacts on study outcome. First, studies that allowed the sender to hear the receiver's mentation (Factor 2) were associated with an increase in study hit rate by approximately 7%. This suggests that the sender hearing the receiver may motivate them to actively reinforce the target during the sending period and keep the receiver "on track." An alternative interpretation arises from work by Fox (2004), who found senders are susceptible to wandering and boredom, suggesting that perhaps an audio link is sufficient reinforcement to keep the sender engaged and motivated throughout the session.

In contrast, the inclusion of a mentation review period (Factor 5) was associated with a significant decrease in study hit rate by 10%. This supports Dalton's observations in her doctoral thesis that the experimenter-receiver interaction during the review period decreases study success (Dalton, 1997). However, this finding is based upon only three studies (after influential cases were removed) that the raters judged did not have an identifiable review period. Nonetheless, perhaps the review period with the experimenter and receiver discussing correspondences between the mentation and clips does not provide clarity but rather introduces ambiguity and could allow the experimenter to direct the receiver away from the target. Alternatively, perhaps the review period introduces confusion about who (experimenter or receiver) is making the final judgement. In support of this latter interpretation, Model 1.2 with the Review factor (Factor 5) removed resulted in Hear (Factor 2) becoming more significant than in Models 1.1 and 2 and Hear judging (Factor 3) becoming significant (as shown in Appendix B).

Our analysis revealed two factors to be clearly unrelated to study outcome. Factor 1 (See) was not significant in any model nor near significance at any point, suggesting that knowledge of the sender's location may not have a major influence over telepathy study success. Likewise, the non-significance of Factor 4 (Silent) may suggest that sensory leakage is less of a concern than has been suggested for some of the early

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ganzfeld telepathy literature (Wiseman et al., 1994), but this factor is an indirect measure of sensory leakage.

One caveat to our finding that the mentation review is associated with lower hit-rates, was that the rating instructions did not distinguish between a review period which was stipulated in the procedure in order for receivers to clarify or elaborate upon their mentation, but a simple opportunity for the receiver to add, comment upon, or discuss their mentation period. This is in contrast to a scenario where the receiver moves immediately from the sending/mentation period to the judging period. Hence, there is scope for future research to look more closely at the researcher-receiver relationship and to investigate how interactions during the session may influence study outcome. Likewise, the inter-rater reliability (kappa) scores are noticeably varied: Factor 5 (Review) was significant in all models, but this factor had the lowest kappa values. This illustrates a limitation with kappa values: kappa is not reliable for rare observations and low values of kappa may not necessarily reflect low agreement overall (Viera & Garrett, 2005), and given that there were four studies rated as not having a review period, the kappa value is unsurprisingly low for this factor. During the meeting to resolve disagreements, both raters discussed their ratings. Some discrepancies were merely mistakes whereas others were different interpretations. For example, for the Hear judging factor, it was decided during the rating meeting that if (after the receiver had logged their ratings) the sender was summoned via the one-way audio link then this *implied* that the sender could hear the whole judging procedure (given they could already hear the mentation period). Hence, the ambiguity of the phrasing used by the authors in their study methods allows for different interpretations of the study designs and we recommend future ganzfeld researchers take care to give a comprehensive description of possibly important aspects of study procedure. Similarly, with the Review factor, the rater clarified during their meeting that if there was an *opportunity* for the receiver to add, comment, or discuss their mentation notes with the researcher then this was rated as a review period, as were the more clearly defined review periods where the receiver *had* to explicitly elaborate their mentation and experiences during the sending period. This a limitation with the rating instructions due to the broad criteria for the Review factor.

One weakness of the current analysis is that the studies are not rated or weighted in terms of their study quality. For the current report, only studies produced years (1988 onwards) after the *Joint Communiqué* (Hyman & Honorton, 1986) were included, in an attempt to exclude earlier studies that did not have the benefit of Hyman and Honorton's methodological recommendations. Nonetheless, studies with better security protocols and clearer method sections could have been given more weight in our meta-analysis.

Even so, there are still some valuable findings from our analysis. First, this meta-analytic review shows that the results found in both models (Model 1.1 and Model 2) were confirmed in the permutation tests of the model coefficients. The omnibus test for the moderators shows that there was a significant effect of the factors, with the Hear and Review factors significantly affecting study outcome. Second, even when using different outcome and effect size measures than previous meta-analyses (Storm & Tressoldi, 2020; Storm et al., 2010), the results previously reported in the literature still stand: the noise-reducing ganzfeld protocol significantly produces hit rates greater than MCE. This is not surprising as the studies we used were primarily extracted from the same database; however, there is no need to account for selected participants in the current analysis as heterogeneity is low in both models, unlike what Storm and colleagues (2010) found. Third, although our study is limited in its generalizability, it has provided a new angle to look at the telepathy ganzfeld literature and can perhaps aid in providing an evidence-based procedure for future ganzfeld telepathy studies. The vast majority of reported ganzfeld telepathy studies have a review period, even though it appears from our analysis to be detrimental to study outcome. Likewise, the difficulty we had in coding some study reports should encourage future researchers to provide more detail when

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reporting their study designs. Given current day open science infrastructure and internet-based dissemination possibilities available, there are plenty of opportunities for full disclosure of study designs. This meta-analysis also adds to recent publications looking at study design factors in the ganzfeld, such as Schmidt and Prein's (2019) study investigating different auditory homogenizations and Kübel et al.'s (2020) assessment of red vs green light visual stimulation. This suggests that there is interest in ganzfeld design factors and prospective ganzfeld researchers should try to make their methodological decisions based on the available evidence.

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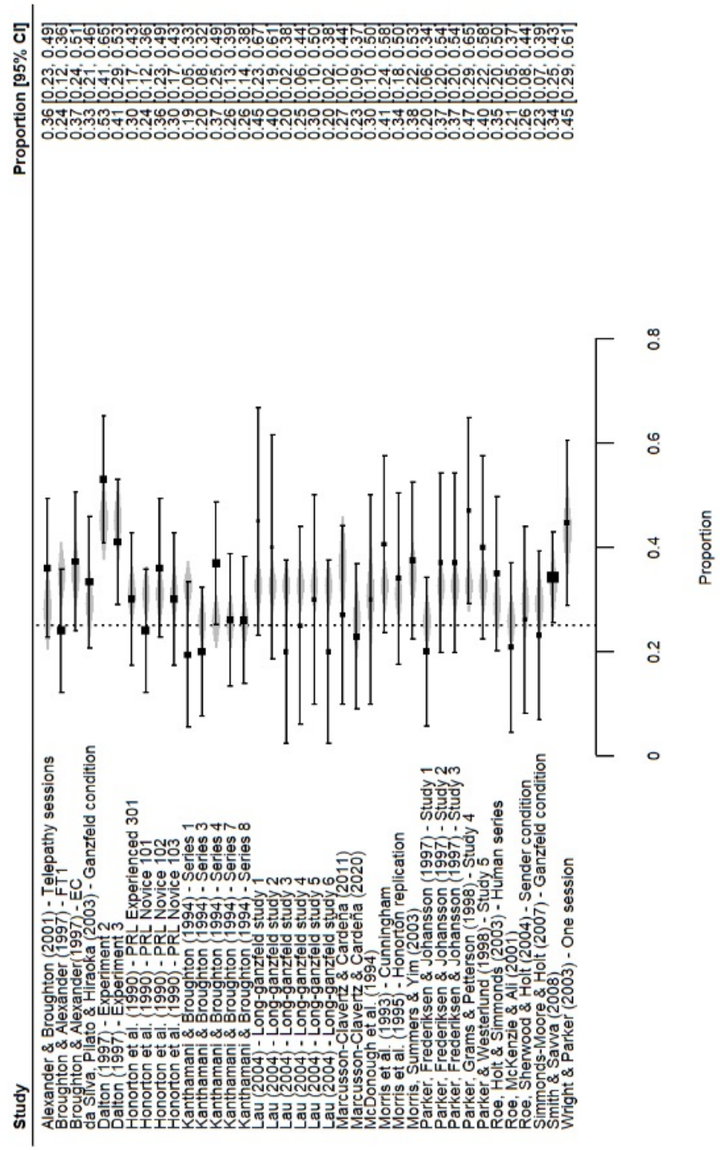
Appendix A

*Forest Plot for Model 1.1 (*reference Line is Set to MCE = 0.25)



Appendix B

Table B1

Model 2: Proportion of Hits Summary with same 3 Outliers Removed as Model 1.1

	Estimate	Standard error	*t*-value	*p*-value	95% CI Lower Bound 95	95% CI Upper Bound
Intercept	.36	.05	7.15	<.0001***	0.26	0.46
See	.00	.03	0.03	.92	−0.07	0.07
Hear	.07	.03	0.03	.03*	0.01	0.13
Hear judging	−.04	.03	0.03	.28	−0.11	0.03
Silent	.02	.03	0.03	.53	−0.04	0.08
Review	−.10	.04	0.04	.02*	−0.19	−0.01

Table B2

Model 2: Permutation Test Results (5000 iterations)

	Estimate	Standard error	*t*-value	*p*-value	95% CI Lower Bound	95% CI Upper Bound
Intercept	.36	.05	7.15	.05*	0.26	0.46
See	.00	.03	0.10	.92	−0.07	0.07
Hear	.07	.03	2.27	.03*	0.01	0.13
Hear judging	−.04	.03	−1.10	.29	−0.11	0.03
Silent	.02	.03	0.64	.53	−0.04	0.08
Review	−.10	.04	−2.38	.03*	−0.19	−0.01

Figure B3

Forest Plot for Model 2 with same 3 Outliers Removed as Model 1.1

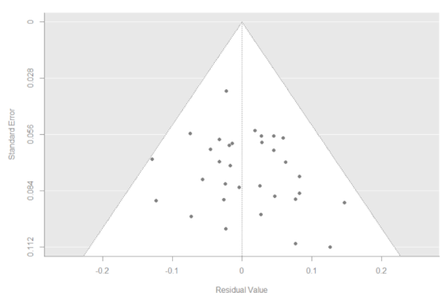


Figure B4

Funnel Plot for Model 2

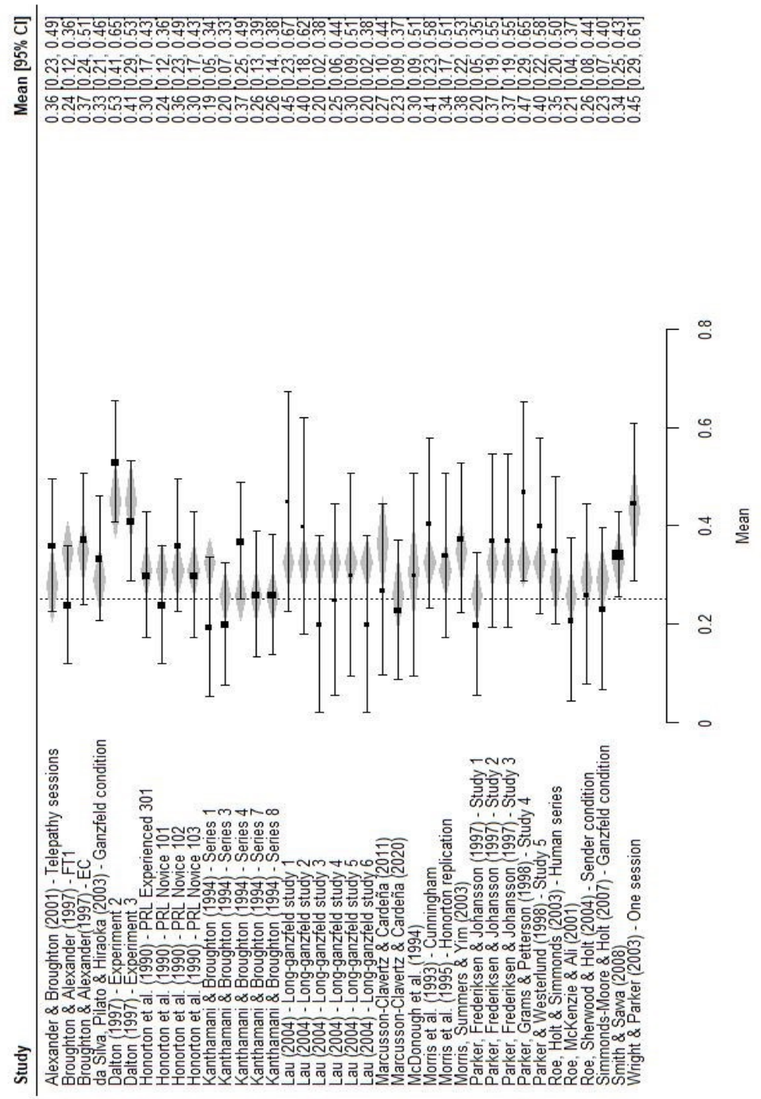


Table B5

Model 1.2: Binomial Mean Model with the Review Factor Removed (In addition to the three studies removed in Model 1 and 2, Broughton & Alexander FT1 was removed first, then Kanthamani & Broughton Series 4, then Dalton Experiment 2 until no more studies were flagged as influential. These studies were removed to the same criteria for the previous models with standardized residuals exceeding ±2).

	Estimate	Standard error	*t*-value	*p*-value	95% CI Lower Bound	95% CI Upper Bound
Intercept	.23	.02	10.22	<.0001***	0.19	0.28
See	.04	.03	1.51	.14	-0.01	0.10
Hear	.09	.03	3.38	< .01*	0.04	0.15
Hear judging	-.08	.03	-2.70	.01*	-0.14	-0.02
Silent	.03	.03	0.97	.34	-0.03	0.08

Table B6

Model 1.2. Permutation Test (5,000 Iterations)

	Estimate	Standard error	*t*-value	*p*-value	95% CI Lower Bound	95% CI Upper Bound
Intercept	.23	.02	10.22	.51	0.19	0.28
See	.04	.03	1.51	.15	-0.01	0.10
Hear	.09	.03	3.38	<.01**	0.04	0.15
Hear judging	-.08	.03	-2.70	.01*	-0.14	-0.02
Silent	.03	.03	0.97	.34	-0.03	0.08

Figure B6

Forest Plot for Model 1.2

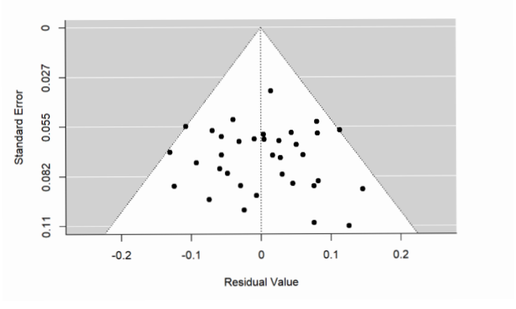


Figure C1

Flowchart of Study Selection

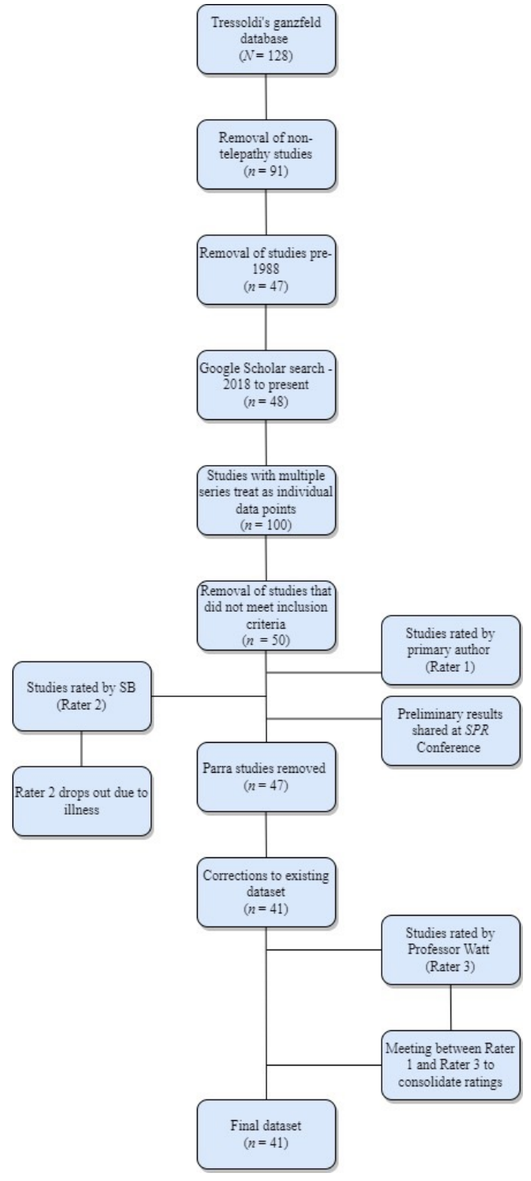


Figure D2

Rating Instructions

For each of the papers your task is to assess if they have certain characteristics present. If the characteristic is present then give it a 1, if not then a 0. Give a 1 if the characteristics are **explicitly** stated.

There are 5 characteristics to assess:

1. Did the receiver see the sender's room?

a. Some papers may say that both participants were shown the whole operation.

2. Did the sender hear the receiver produce their mentation (verbal report)?

3. Did the sender hear the receiver during the judging procedure?

4. Was the sender explicitly told to be silent?

a. Some are told that any shouting/loud noises from sender's room would abort the session.

5. Did the experimenter review/allow additions to the mentation notes with the receiver, after the sending period?

a. Some papers say they review the notes with the participant and allow for additions/changes.

Use your judgement and common sense to assess if these characteristics were present, some will require re-reading and thinking but the main question is, "Is this clearly stated? Would I be able to run the exact same procedure given the detail in this paper?"

Important Notes:

- Some shorter papers refer to other, already published papers and their procedures. Unless the authors state there were specific deviations from the previous design, you can give them the same ratings.

- Also, be careful for footnotes and procedural information outside of the 'Methods' section. It's worth skim reading all sections. Information about the study design may also be in the 'Participants'/'Procedure'/'Lab set-up'/'Design' parts of the paper (depending on how the paper is formatted).

- Some papers have multiple studies in them – you will be given a list of the studies of interest. However, this might require you to distinguish any differences in the procedures between the series, so it may take some deeper reading.

Figure D3

Dataset

Study	ID	See	Hear	Judge	Silent	Review	HR	z-score	ES(h)	N participants	Trials
Alexander & Broughton (2001) - Telepathy sessions	125	1	0	0	1	1	36.00%	1.63	0.24	50	50
Broughton & Alexander (1997) - FT1[b]	101.1	1	1	0	1	1	24.00%	0	-0.023	50	50
Broughton & Alexander (1997) - FT2[a]	101.2	1	1	0	1	1	18.00%	-0.98	-0.171	50	50
Broughton & Alexander(1997) - EC	101.3	1	1	0	1	1	37.30%	1.81	0.267	51	51
Cardeña & Marcusson-Clavertz (2020)	143	1	0	0	0	1	22.86%	-0.1	-0.05	35	35
da Silva, Pilato & Hiraoka (2003) - Ganzfeld condition	113.1	1	1	1	0	1	33.33%	1.26	0.184	37	54
Dalton (1997) - Experiment 2[b]	133.2	1	1	1	0	1	53.00%	5.06	0.584	64	64
Dalton (1997) - Experiment 3	133.3	1	1	1	0	0	41.00%	2.75	0.343	64	64
Goulding, Westerlund, Parker & Wackermann (2004) - Receivers' judging[a]	127	1	1	1	1	1	14.00%	-1.88	-0.28	64	64
Honorton et al. (1990) - PRL Experienced 301	103.7	1	1	1	1	1	30.00%	0.65	0.112	25	50
Honorton et al. (1990) - PRL Experienced 302[a]	103.8	1	1	1	1	1	64.00%	4.26	0.807	25	25
Honorton et al. (1990) - PRL Novice 101	103.1	1	1	1	1	1	24.00%	0	-0.023	50	50
Honorton et al. (1990) - PRL Novice 102	103.2	1	1	1	1	1	36.00%	1.63	0.24	50	50
Honorton et al. (1990) - PRL Novice 103	103.3	1	1	1	1	1	30.00%	0.65	0.112	50	50
Kanthamani & Broughton (1994) - Series 1	105.1	0	1	0	0	1	19.40%	-0.52	-0.135	31	31
Kanthamani & Broughton (1994) - Series 3	105.3	0	0	0	0	1	20.00%	-0.55	-0.12	35	40
Kanthamani & Broughton (1994) - Series 4[b]	105.4	0	0	0	0	1	36.90%	2.08	0.259	65	65
Kanthamani & Broughton (1994) - Series 7	105.7	0	0	0	0	1	26.10%	0	0.025	27	46
Kanthamani & Broughton (1994) - Series 8	105.8	0	0	0	0	1	26.00%	0	0.023	16	50
Lau (2004) - Long-ganzfeld study 1	139.1	0	1	0	0	1	45.00%	1.8	0.423	20	20
Lau (2004) - Long-ganzfeld study 2	139.2	0	1	0	0	1	40.00%	1.29	0.322	20	20
Lau (2004) - Long-ganzfeld study 3	139.3	0	1	0	0	1	20.00%	-0.26	-0.12	20	20
Lau (2004) - Long-ganzfeld study 4	139.4	0	1	0	0	1	25.00%	0	0	20	20
Lau (2004) - Long-ganzfeld study 5	139.5	0	1	0	0	1	30.00%	0.26	0.112	20	20
Lau (2004) - Long-ganzfeld study 6	139.6	0	1	0	0	1	20.00%	-0.26	-0.12	20	20
Marcusson-Clavertz & Cardeña (2011)	134	1	0	0	0	0	27.00%	0	0.044	26	26
McDonough et al. (1994)	131	0	1	0	1	1	30.00%	0.26	0.112	20	20
Morris et al. (1995) - Cunningham	110.1	0	1	0	1	1	34.00%	1.02	0.068	32	32
Morris et al. (1995) - Honorton replication	107	1	1	0	1	1	40.60%	1.84	0.334	32	32
Morris, Summers & Yim (2003)	119	1	1	0	1	1	37.50%	1.643	0.271	40	40
Parker & Westerlund (1998) - Study 5	118.1	0	1	0	1	1	40.00%	1.27	0.261	30	30
Parker, Fredenksen & Johansson (1997) - Study 1	102.1	0	0	0	1	1	20.00%	-0.42	-0.12	30	30
Parker, Fredenksen & Johansson (1997) - Study 2	102.2	0	1	0	1	1	37.00%	1.27	0.261	30	30
Parker, Fredenksen & Johansson (1997) - Study 3	102.3	0	1	0	1	1	37.00%	1.27	0.261	30	30
Parker, Grams & Petterson (1998) - Study 4	108.4	0	1	0	1	1	47.00%	2.53	0.464	30	30
Roe, Holt & Simmonds (2003) - Human series	136	1	1	0	1	1	35.00%	1.28	0.219	40	40
Roe, McKenzie & Alt (2001)	135	0	0	0	0	1	20.83%	-0.24	-0.099	24	24
Roe, Sherwood & Holt (2004) - Sender condition	137.1	1	1	0	1	1	26.10%	0.12	0.025	23	23
Simmonds-Moore & Holt (2007) - Ganzfeld condition	141.1	1	1	0	1	1	23.10%	0	-0.044	26	26
Smith & Sarvva (2008)	114	1	1	0	0	1	34.20%	2.16	0.202	114	114
Wright & Parker (2003) - One session	129.1	1	1	0	0	0	44.73%	2.62	0.418	10	38
Totals (factor, participants, trials)		**22**	**32**	**12**	**15**	**37**	**31.85%**[c]	**0.91**[c]	**0.139**[c]	**1496**	**1624**

Note. [a] indicates the three studies that were removed from both Models 1, 1.1 and 2 due to influence [b] indicates the three studies removed from Model 1.2 due to influence [c] is the column mean.

Zum Verständnis der Faktoren, die bei der Sender-Empfänger-Dynamik beim Telepathieversuch im Ganzfeld eine Rolle spielen: Eine Meta-Analyse

Abby L. Pooley Aja L. Murray Caroline Watt

Zusammenfassung: *Zielsetzung.* Mit Hilfe einer Meta-Analyse sollen fünf bisher nicht untersuchte Faktoren im Zusammenhang mit der Sender-Empfänger-Dynamik beim Telepathieversuch im Ganzfeld untersucht werden. Von Interesse sind fünf Faktoren: a) Hat der Empfänger den Raum des Senders vor der Sitzung gesehen? b) Konnte der Sender den Empfänger während der mentalen Übertragungsphase hören? c) Konnte der Sender den Empfänger während der Beurteilungsphase hören? d) Wurde der Sender explizit aufgefordert, zu schweigen? und e) Hat der Experimentator in der Sitzung bei der Beurteilungsphase geholfen? *Methode*: Es wurden Telepathie-Ganzfeld-Studien ausgewählt, die nach dem Gemeinsamen Communiqué durchgeführt wurden, mit einer Sitzung pro Tag und der Bewertung der Zielobjekte durch die Empfänger. Zwei Modelle mit gemischten Effekten wurden angepasst: 1) unter Verwendung der Trefferquoten der Studie als binomialer Mittelwert; und 2) unter Verwendung der Trefferquoten der Studie im Verhältnis. Bei beiden Modellen ergeben sich fünf Faktoren als binäre Moderatoren. *Ergebnisse*: Sowohl das binomiale Mittelwert- als auch das Verhältnismodell deuten auf einen signifikanten Effekt der Moderatoren insgesamt und zweier einzelner Faktoren hin: 1) die Möglichkeit des Senders, den Empfänger während der Überlegungsphase zu hören, und 2) eine Einschätzungsphase nach der Überlegungsphase. Permutationstests für beide Modelle ergeben ebenfalls signifikante Effekte der Moderatoren und der beiden Faktoren. *Schlussfolgerung*: Die Tatsache, dass der Sender die mentale Verarbeitung des Empfängers hören kann, scheint den Gesamterfolg der Studie zu erhöhen, während die Überprüfungsphase den Gesamterfolg der Studie verringert. Diese Analyse ist die erste, die die Auswirkung dieser Faktoren des Studiendesigns auf die Ergebnisse von Ganzfeld-Telepathie-Experimenten untersucht.

German translation: Eberhard Bauer

Compreendendo os Fatores em Jogo na Dinâmica Emissor-Receptor Durante a Telepatia Ganzfeld: Uma Meta-Análise

Abby L. Pooley Aja L. Murray Caroline Watt

Resumo: *Objetivo*. Utilizar a meta-análise para explorar cinco fatores previamente não investigados relacionados à dinâmica emissor-receptor na telepatia ganzfeld. Os cinco fatores de interesse são: a) o receptor viu a sala do emissor antes da sessão?; b) o emissor pôde ouvir o receptor durante o período de atividade mental?; c) o emissor pôde ouvir o receptor durante o período de julgamento?; d) o emissor foi explicitamente instruído a ficar em silêncio?; e) o pesquisador auxiliou na seção de revisão da sessão? *Método*: Foram escolhidos estudos de telepatia ganzfeld conduzidos após o *Joint Communiqué* (Comunicado Conjunto), com uma sessão por dia e os receptores avaliando os alvos. Dois modelos de efeitos mistos foram adaptados: 1) usando as taxas de acerto do estudo como média binomial; e 2) usando as taxas de acerto do estudo como uma proporção. Ambos os modelos têm os cinco fatores como moderadores binários. *Resultados*: Tanto os modelos de média binomial como os de proporção sugerem um efeito significativo dos moderadores, em geral, e de dois fatores, individualmente: 1) o emissor ser capaz de ouvir o receptor durante o período de atividade mental; e 2) um período de revisão após o período de atividade mental. Os testes de permutação para ambos os modelos também mostram efeitos significativos dos moderadores e dos dois fatores. *Conclusão*: O emissor ser capaz de ouvir a atividade mental do receptor parece aumentar o sucesso geral do estudo, enquanto o período de revisão diminui o sucesso geral do estudo. Esta análise é a primeira a examinar o impacto desses fatores de design de estudo nos resultados dos experimentos de telepatia ganzfeld.

Portuguese translation: Antônio Lima

Clarificando los Factores que Intervienen en la Dinámica Emisor-Receptor durante la Telepatía Ganzfeld: Un Metaanálisis

Abby L. Pooley Aja L. Murray Caroline Watt

Resumen: *Objetivo*. Usar un meta-análisis para explorar cinco factores no investigados previamente relacionados con la dinámica emisor-receptor en el ganzfeld de telepatía. Los cinco factores de interés son: a) ¿vio el receptor el cuarto del emisor antes de la sesión?; b) ¿podía el emisor oír al receptor durante el periodo de mentación?; c) ¿podía el emisor oír al receptor durante el periodo de evaluación?; d) ¿se le dijo explícitamente al emisor que guardara silencio?; y e) ¿ayudó el experimentador en la sección de revisión de la sesión? Método: Se eligieron estudios ganzfeld de telepatía realizados después del Comunicado Conjunto, con una sesión al día y los receptores evaluado los objetivos. Se ajustaron dos modelos de efectos mixtos: 1) usando las tasas de aciertos del estudio como media binomial; y 2) utilizando las tasas de aciertos del estudio como proporción. Ambos modelos tuvieron a los cinco factores como moderadores binarios. Resultados: Tanto el modelo de media binomial como el de proporción sugieren un efecto significativo de los moderadores en general y de dos factores individualmente: 1) que el emisor pueda oír al receptor durante el periodo de mentación; y 2) un periodo de revisión tras el periodo de mentación. Las pruebas de permutación de ambos modelos también muestran efectos significativos de los moderadores y de los dos factores. Conclusiones: El hecho de que el emisor pueda escuchar la mentación del receptor parece aumentar el éxito global del estudio, mientras que el periodo de revisión disminuye el éxito global del estudio.

Spanish translation: Etzel Cardeña

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Rating the Persuasiveness of Empirical Evidence for the Survival of Consciousness After Bodily Death: A Cross-Sectional Study Among Academics[1]

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Abstract: *Objective.* Throughout history and across all cultures, many people have believed in some form of afterlife. Recent surveys show that most people worldwide believe they will survive after bodily death. Those who do not believe would require substantial empirical evidence to influence their skepticism. This study's objective was to evaluate what types of evidence might persuade academic professionals that some aspect of consciousness survives after bodily death. *Method.* We surveyed academic professionals and collected demographic and professional background data, personal confidence in survival, and paranormal belief ratings. Respondents also rated the persuasiveness of 10 relevant experiments and the likelihood of their success. These data were analyzed over all participants and partitioned by confidence in survival. *Results.* Professional academics (N = 442) completed the survey. Gender was a significant predictor of confidence in survival, paranormal belief, and many persuasiveness ratings, with females having higher scores than males. Older age was a positive predictor for persuasiveness ratings of a proposed experiment involving after-death communication. Confidence in survival and paranormal beliefs were highly correlated. The highest persuasiveness ratings were for a controlled, prospective experiment that resulted in veridical out-of-body perceptions during a near-death experience, a mediumship experiment, and a reincarnation experiment. The least persuasive proposed experiment was survival in the form of computer-based artificial intelligence. *Conclusion.* Academics hold a wide range of beliefs and confidence in survival. Successful experiments designed to test for survival may influence skeptics' prior beliefs.

Keywords: after-death communication, near-death experience, mediumship, skepticism, survival of consciousness, paranormal belief, contact with the dead, out-of-body experience

Highlights

- Over 400 academics rated their confidence in survival and paranormal beliefs.
- They also judged whether successful experiments designed to test for survival would persuade them to reassess their prior beliefs and the likelihood of these experiment's positive results.
- A veridical out-of-body perception during a near-death experience was the most frequently selected controlled, prospective experiment.
- Mediumship and reincarnation studies were also rated as potentially persuasive.

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Surveys among adults worldwide show that most believe they will survive after bodily death. "Survival" in this context means they will retain their personal sense of self. For example, of 18,000 people from 23 countries surveyed, over half said they believed in an afterlife, 23% said, "you simply cease to exist," and 26% said they were not sure (Ipsos, 2011). Other extensive global surveys show that 21% to 78% of respondents believe in survival after bodily death (Haraldsson, 2011; Sigelman, 1977). This belief may arise for psychological or sociological reasons, including existential angst, comfort in the face of a loved one's death, faith in religious doctrine, or cultural dictates.

People with first-hand experiences suggestive of survival, such as near-death experiences (NDEs), are often thoroughly convinced that they will survive (Lindsay & Tassell-Matamua, 2020). After-death communications (ADCs) are another such experience, suggesting that a deceased person can intentionally communicate with the living. Out of thousands of people questioned worldwide, 25% to 66% have reported that they have "felt as though [they] were really in touch with someone who died" (Wahbeh et al., 2018). A dissertation review of 35 studies collating data from more than 50,000 participants in 24 countries and spanning 102 years found that people of all ages, nationalities, ethnicities, education levels, incomes, and religious affiliations report ADCs (Streit-Horn, 2011).

ADCs can take many forms, including sensory perception, dreams, symbolic means (e.g., a meaningful song on the radio or an unexpected appearance of a favorite animal), telephone calls, and apparitional phenomena (Streit-Horn, 2011). A recent study that characterized the sensory nature of 991 ADCs reported that 48% included touch, 46% were

visual, 44% were auditory, and 28% were olfactory, with 34% sensing the presence of the deceased without any input from the five ordinary senses (Woollacott et al., 2021).

Many people benefit from ADC experiences (Moreira-Almeida & Cardeña, 2011; Sagher et al., 2019; Wahbeh & Butzer, 2020; Wahbeh & Radin, 2018). For example, contact with the dead through mediumship sessions can help the grief process (Beischel, 2019). Such experiences also support the growing de-pathologizing of contact with the dead in the Western world. Rather than being perceived as having hallucinations, ADCs may provide a way for people to share their experiences and gain a sense of understanding from their community (Kwilecki, 2009). In another study, ADCs are perceived as positive life experiences resulting in an increased sense of spirituality (Kalelioglu et al., 2021). Similarly, multiple studies demonstrate that long-lasting positive transformation is a critical characteristic of NDEs, which are often accompanied by an unshakable confidence in survival after death (Blanke et al., 2016; Lindsay & Tassell-Matamua, 2020) and loss of fear of death (Pehlivanova et al., 2022).

Substantial anecdotal and several classes of experimental evidence suggest that some aspect of consciousness survives bodily death, but the evidence is far from conclusive from a scientific perspective (Delorme et al., 2021). Important evidence includes: a) mental mediumship providing information about deceased persons not obtainable through traditional means (Braude, 2003 Fontana, 2005; Sarraf et al., 2021); b) *xenoglossy*, using a foreign language not acquired by natural means (Haraldsson, 2012; Stevenson & Pasricha, 1979, 1980); c) claims of reincarnation (Stevenson, 1997, 2015); and d) demonstration of high-level specialized skills such as extraordinary art production (de Oliveira Maraldi & de Fátima Fernandes, 2020) or grandmaster level chess by mental mediums not having those skills (Wehrstein, 2018). Individually such cases are often not persuasive, but as a whole, they provide intriguing evidence supporting the concept of survival.

Although most people purportedly believe in some form of survival, some are uncertain or strongly disbelieve (Haraldsson, 2011; Ipsos, 2011; Sigelman, 1977). Atheism and a conviction that philosophical materialism is the only correct way to understand reality are two of many reasons for uncertainty. Those who hold the latter stance maintain doubt because the scientific doctrine of materialism assumes that you—all aspects of yourself, including consciousness and memory—emerge from brain activity (Crick, 1994). If the brain dies, nothing remains. Survival of consciousness is impossible if one holds this view. Academics instilled with materialistic philosophy throughout their education and careers often maintain this position (Lorimer, 2019; Walach, 2018).

Sometimes personal experiences can sway skeptics. However, strong skeptics may require repeated, substantial evidence to permanently influence their skepticism. For example, science historian and skeptic Michael Shermer (2014) admitted that he experienced a startling ADC involving his fiancée's deceased grandfather that "shook his skepticism to the core," as described in his *Scientific American* column. However, in his column two years later Shermer (2016) wrote, "Where the known meets the unknown we are tempted to inject paranormal and supernatural forces to explain unsolved mysteries. We must resist the temptation because such efforts can never succeed, not even in principle." Evidently, two years after Shermer's "core shaking" had settled down, his former skepticism returned. For some, no evidence—not even personal experience—is sufficient to budge their prior beliefs.

Beyond the firm believers and committed skeptics, many others have yet to make up their minds about survival. This study aimed to discover what type of evidence might persuade these agnostics, nudging them from a position of uncertainty to greater certainty. We wanted to understand what evidence would help *persuade someone* that human consciousness survives after permanent bodily death. To do this, we devised 10 experiments relevant to survival and surveyed academic professionals to see which of

these, if successful, would be most persuasive. Our research questions and exploratory hypotheses were:

What is the confidence for the survival of consciousness after bodily death among academics, and their average level of paranormal belief? We hypothesized that both would be greater than zero, reflecting average levels in the general population, and that there would be a positive correlation between these two variables.

Which is the most persuasive potential experiment testing for survival? Do these results vary by a) current spiritual affiliation, b) academic discipline, or c) confidence in survival? We predicted variations in persuasiveness ratings by these factors, but made no a priori hypothesis about which experiments would score higher or lower than the others because of the lack of previous studies.

How do participants rate the likelihood that these experiments could have positive results? We predicted increased likelihood scores in already conducted or popularized experiments (i.e., mediumship, ADC, and out-of-body experiences during an NDE).

Method

This cross-sectional study recruited a convenience sample of people working in science, engineering, and other professional fields. Respondents rated how persuasive the positive results of 10 proposed experiments would be to convince them that consciousness survives bodily death and how likely they thought each of those experiments might be successful.

We previously reported a preliminary description of these survey results in a non-peer-reviewed essay submitted to the 2021 Bigelow Institute for Consciousness Studies (BICS) Essay Contest for the Best Evidence for Afterlife (Delorme et al., 2021) with the same authors. That essay contained a subset of the research methodology and results; here, we report those fully. Although some text presented here is similar to the BICS essay, we avoided duplication of large text sections and referenced the original essay where appropriate. The new author order reflects the contribution to the present study.

Participants

We selected academics as likely to represent a subpopulation that would be more agnostic about survival than the general population due to their immersion in the Western scientific worldview. We sent an email invitation to a list of scientists and engineers from the National Data Group (Omaha, NE) that we used in a previous study (Wahbeh et al., 2018). We also used the website Hunter.io to obtain emails from top universities worldwide, including Brown, California Institute of Technology, Cambridge, Columbia, Cornell, Dartmouth, Duke, Georgia Technical, India Institute of Technology, John Hopkins, Harvard, Massachusetts Institute for Technology, Northwestern, Oxford, Princeton, Rice, Stanford, University of San Francisco, University of California Berkeley, University of Southern California, and the University of Texas Austin. Selection bias toward academics and related professionals, which was the study's objective, was accomplished through this recruitment method. There was no preferential recruitment for age, race, gender, or other demographic variables beyond those inherent to imbalances in academia.

All study activities were automated online without interactions between the study team and participants. Potential participants received an email with the subject line: "Do you think consciousness survives bodily death?" The email included the survey's consent form. Volunteers could click "Yes" or "No." If they clicked "Yes," they were directed to a survey online hosted by SurveyMonkey (2021). This screening question biased recruitment to volunteers interested in such topics, and thus perhaps toward believers.

Inclusion/exclusion criteria were: 1) answered "Yes" on the informed consent, 2) adults, 3) completed at least one experiment rating, and 4) completed professional information items. Participants completed surveys from April 28, 2021 to November 10,

2021. The sample size was determined by the number of participants who completed the survey during this predetermined period because no previous studies were available from which to form estimated outcomes. All study activities were approved and overseen by the Institutional Review Board (IRB) of the Institute of Noetic Sciences (IORG#0003743).

Survey

The survey form can be sent by the authors and includes demographic questions, professional information, confidence in survival ratings, paranormal beliefs questionnaire, and experiment persuasiveness and likelihood ratings. The experiments were displayed in randomized order for each participant to avoid order bias. Age, education, gender, race, country, state, and childhood and current spiritual affiliation were collected.

Professional Information. This item included the individual's primary field of training, current or past occupation, years of experience in the occupation, and the number of peer-reviewed scientific or technical papers they had read. Primary field of training choices were Basic Sciences, Engineering and Technology, Medical and Health Sciences, Agricultural Sciences, Social Sciences, Humanities, and Other (Delorme et al., 2021).

Confidence in Survival. Respondents rated the question, "How sure are you that some form of consciousness survives the death of the physical body?" on a sliding scale anchored by Very sure it does not (-50), Don't know (0), and Very sure it does (+50).

Participants completed the 10 belief items of the *Noetic Experience and Belief Scale* (Wahbeh et al., 2020) to evaluate pre-existing belief in paranormal phenomena such as survival of consciousness. Each item in that scale is a belief that the respondent rates on a scale of 0 to 100, anchored by disagree strongly and agree strongly. Items are averaged for the total score and the scale is reliable (Wahbeh et al., 2020). The paranormal belief score was subtracted by 50, so values were comparable to the persuasiveness ratings (i.e., range -50 to +50).

Experiment Ratings

The experiment rating section began with an introduction (available on request from the first author). For each of the 10 experiments, participants were asked, "How persuasive would this experiment's positive results be for you to believe in the survival of consciousness after death?" Responses were rated on a sliding scale anchored by Not at all persuasive (-50), Neutral (0), and Very persuasive (+50). The participants did not see the values associated with the anchoring words. They were also asked, "What is your assessment of how likely this experiment would have positive results?" Answer choices were Too unlikely to even assign an odds (Impossible), About 1 in a million, About 1 in a thousand, About 1 in ten, and About 1 in 1 (Very likely).

Proposed Experiments

The 10 experiments were devised by the research team and informed by existing evidence for the survival of consciousness (Delorme et al., 2021). The goal was to design *prospective* experiments that, if they had not been conducted already, could potentially be conducted in the future and might provide robust evidence. The experiments were:

The *Apparition in the Lab (Apparitions)* experiment tests whether a deceased person could influence a physical system to reveal their presence. The physical system would be a controlled source of steam (or smoke) recorded by a high-quality camera. Steam would be used to provide a presumably easily manipulated substance that an apparition might be able to influence. A medium would be asked to invite a deceased person to influence the steam so that it appeared in the form of their face, or someone else's face, or any recognizable shape. The picture frames of the resulting video would be analyzed using machine vision techniques to identify frames in which faces or shapes

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appeared automatically. Those video frames would be compared to control session frames, in which the medium did not summon a deceased person. Positive results would include reliably produced faces or shapes in the mediumistic conditions as compared to control sessions.

The Deceased Person Communicating through Artificial Intelligence (Communication AI) experiment tests whether a deceased person could influence a truly random number generator (RNG) and use it to communicate in a meaningful way. A participant would provide the name of a deceased person. A medium would ask the deceased person to respond through an AI chatbot designed to generate natural language. The sentences generated by the chatbot would be randomly selected by the RNG. To judge the results, participants requesting a communication would blindly judge (1) sentences associated with the requested deceased person and (2) sentences generated purely at random. Positive results would include statistically more meaningful sentences judged in condition (1) as compared to (2).

Glossolalia/Xenoglossy. Glossolalia refers to speaking in tongues (i.e., producing sounds that resemble speech but are not part of an existing language) and xenoglossy to the apparent ability to speak in a language unknown to the speaker. This distinction was not highlighted for the survey and the words glossolalia and xenoglossy were used interchangeably. Subsequent mentions of this experiment will be designated by the more accurate term xenoglossy. In this study, researchers would evaluate trance channelers (trance channelers go into altered states and believe that they use their bodies as a "vehicle" for an apparent nonphysical entity to incorporate into and communicate directly via speaking, writing, or movement) who claim the ability of glossolalia/xenoglossy. If they spoke any known foreign language during their trance (i.e., xenoglossy), the channelers would be investigated to assess if they already knew the foreign language they claim to speak, and then their trance sessions would be observed, and their utterances evaluated for language accuracy and fluency. A team of linguists would evaluate unknown spoken languages. Cases in which languages from a previous era are spoken would be prioritized (e.g., third-century German, ancient Aramaic). Positive results would include at least five rigorously vetted cases of xenoglossy.

In the *Channeling Specialized Expertise* experiment, trance mediums would channel (the experience of communication with or incorporation of an apparent non-physical entity) deceased persons who had highly specialized skills while alive. The channelers' personal, educational, and professional history would be investigated to confirm that they have no background in the skill. For example, a medium might channel a deceased chess grandmaster and then play a living grandmaster who would rate their skill level. Multiple trance mediums claiming different skill types would ultimately be tested, including skills in games such as Chess and Go, music performance, mathematical knowledge, and fine art. In each case, independent experts would rate the channeled performance or product. Positive results would include at least five rigorously vetted cases where skeptical judges confirmed that there was no ordinary way for the channelers to demonstrate the skill through ordinary means.

In the *Mediumship* experiment, ten people in hospice who agreed to contact five or more mediums after they passed away would be recruited. None of those mediums would be aware of this experiment. After each person died, they would request that the mediums contact the researchers within the next 30 days. Positive results would include at least five mediums contacting the researchers within 30 days for each deceased person, giving that person's name, and saying that the deceased person told them to contact the researchers.

In the *Reincarnation experiment,* a dying person would be asked to assemble a collection of their unique favorite objects and place them into a sealed box, which would then be given to researchers. No living individual would know about the box's content

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(barring the possibility of clairvoyance or via telepathy while the dying person was still alive). A child claiming to be the reincarnated person would be located and asked to describe the objects in the sealed box. Only then would the sealed box be opened. Positive results for this experiment would include an accurate description of the deceased person's objects.

In the *After Death Communication (ADC)* experiment, participants who claimed to experience after-death synchronicities would be recruited. They would wear body cameras continuously while awake, and they would indicate when they experienced a synchronicity. A panel of judges would review the videos and rate the likelihood that a given observation recorded by the participants could be interpreted as an ADC. Positive results for this experiment would include agreement among the judges that the reported synchronicities were not likely due to chance.

Physical Mediumship in a Daylight Setting. Historical physical mediumship studies have been conducted without light. However, some cases have been observed in daylight, including Daniel Dunglas Home (Home, 1874), Henry Slade (Zöllner, 1882), Carlos Mirabelli (Braude, 2020) and with more recent technologies in red light (Vandersande, 2008). It is not inconceivable that future physical mediumship studies could be conducted in daylight or at least in red light settings. For this experiment, physical mediumship experiments would be conducted in a highly controlled environment designed to prevent and detect fraud, and in full lighting, with skeptical judges in attendance and multiple cameras continuously recording the phenomena. Positive results of this study would include observation and recordings of deceased persons speaking or materializing.

Out-of-Body Experiences During Near-Death Experiences (OBE in NDE). This study would investigate claims of OBE visions said to occur during some NDEs. Randomly selected images would be displayed on a computer screen near the ceiling and pointed upwards so that no one at the floor level could see them. Patients scheduled for a cardiac arrest as part of a medical procedure would be asked to float up to the ceiling and observe the computer screen if they have an OBE during their procedure. Upon resuscitation, the patient would be asked if they had an OBE and were able to see a picture on the screen. If so, they would be asked to indicate which of 20 possible pictures was the one they saw (i.e., that one being the actual target). A positive result for this experiment would include a majority of the participants accurately describing and selecting the correct target image shown on the screen.

Survival Through Artificial Intelligence. If an AI absorbed an individual's memories and personality while alive (as portrayed in movies based on this theme), when that person died, would you consider that the person has survived within the AI? The responses and perceived personality of the AI would be indistinguishable from the original person, although the AI would be portrayed on a screen or in an android body and not in a living body. A positive result from this experiment would be agreement by people who intimately knew the living person that the AI was identical to that person.

Data Analysis

All statistical analyses were conducted in Stata 15.0. Means and standard deviations for continuous variables and the number and percentage of the total were calculated for categorical variables. Variables of interest were assessed for normal distribution using the Shapiro-Wilk test. The variables were non-normally distributed so non-parametric statistical analyses were conducted. The *npregress* function was used with kernel-epanechnikov and bootstrap replications for estimation parameters options to evaluate the relation between each experiment's persuasiveness rating and the demographic variables age (continuous), education (continuous), gender (categorical), race (categorical). Twelve regression models were conducted to evaluate the potential prediction of demographic variables on confidence in survival (1 model), paranormal

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belief (1 model), and persuasiveness ratings (10 models). Effect estimates reported are derivative averages for continuous covariates and contrast averages for factor covariates. The Spearman's rank-order correlation evaluated the relation between confidence in survival and paranormal belief.

There were three subgroup analyses: confidence in survival level, religious or spiritual affiliation, and primary training field. The confidence in survival level subgroups consisted of 1) those who did not believe in survival (non-believers: scores less than -20); 2) those who are uncertain about their beliefs (uncertain: scores between -20 and +20); and 3) those who do believe in survival (believers: scores greater than +20). Religion subgroup analyses included respondents who endorsed *currently practicing religious* or *spiritual but not religious* and those who endorsed *not religious*. Participants who endorsed *minimally practicing religious* and *non-practicing religious* were not included in the religion subgroup analysis.

Kruskal-Wallis ANOVAs were used to evaluate persuasiveness rating differences by non-believers/uncertain/believers, current religious or spiritual affiliation, and primary field of training. Results are reported for respondents overall and also by confidence in the survival subgroup. A Wilcoxon signed-rank test was used to evaluate if confidence in survival and paranormal belief were statistically above zero. Chi-squared tests were used to evaluate if likelihood rating categories differed within the experiments. Multiple comparisons were corrected for all applicable analyses using the False Discovery Rate (Benjamini & Hochberg, 1995). Missing data were left as is in the dataset. Participant numbers for each variable are noted in the results indicating where participants skipped items they did not want to answer.

Results

A total of 27,607 people opened their recruitment emails. Of those, 631 responded to the consent, 45 clicked "No," and 586 clicked "Yes." Ninety-six people did not rate any experiments, and 48 did not include professional information and were excluded. In total, 442 people responded to the survey, rated at least one experiment, included their professional information, and were included in the analysis.

Participants were older (M = 57.24, SD = 13.75 years), mostly male (56%), Caucasian (77%), and with 19.48 average years of education (SD = 3.86). They could check more than one race and were mostly Caucasian (77%, Asian 6%, Latino 5%, Native American 5%, African 4%, Middle Eastern 2%, and Native Pacific Islander, 0.2%). Most participants were from the United States (98%), with two respondents from Australia and one each from Bahrain, Canada, France, Ghana, India, and Mexico. Participants made, on average, 17.9 experiment ratings (SD = 5.1) out of 20 possible (persuasiveness and likelihood ratings for each of the 10 experiments).

The primary fields of training were medical and health sciences (38%), social sciences (19%), other (13%), basic sciences (12%), engineering and technology (9%), humanities (9%), and agricultural sciences (1%). Current and past occupations were Healthcare Practitioners and Technical (34%); Other (19%); Education, Training, and Library (15%); Life, Physical, and Social Science (11%); Management (6%); Computer and Mathematical (5%); Healthcare Support (5%); and Business and Financial Operations (4%). On average, participants had spent 25.60 years (SD = 13.08) in these occupations, and 49% had read over 100 peer-reviewed scientific or technical papers (0 papers 10%; 1-10 papers 17%, 11-100 papers 24%).

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Most participants' childhood religious or spiritual affiliation had been "practicing religious" (60%, minimally practicing religious 24%, not religious or spiritual 7%, non-practicing religious 6%, spiritual but not religious 3%), whereas their current religious or spiritual affiliation was "spiritual but not religious" (35%, practicing religious 29%, not religious or spiritual 19%, minimally practicing religious 11%, non-practicing religious 7%).

Gender was a significant predictor for: 1) confidence in survival (Effect estimate = -10.42, 95% Confidence Interval = [-17.83 to -4.60], p = .001), 2) paranormal belief scores (-15.0 [-19.04 to -10.11], p < .000005), and 3) persuasiveness ratings for xenoglossy (-11.24 [-16.86 to -4.93], p = .001), reincarnation (-9.27 [-15.73 to -3.95], p = .004), ADC (-11.94 [-17.72 to -4.65], p < .000005), and OBE in NDE (-8.1 [-13.86 to -2.97], p = .004). Statistical details are available from the first author upon request. On average, males had lower scores for confidence in survival, paranormal belief, and persuasiveness ratings for xenoglossy, reincarnation, ADC, and OBE in NDE.

Age was a significant predictor for ADC persuasiveness ratings (0.50 [0.29 to 0.79], p < .000005). For every 0.50 year increase in age, there was a one-point increase in persuasiveness rating for ADC; in other words, the older one is, the more one is persuaded by the positive results of an ADC experiment. Education and race were not significant for any of the models.

Confidence in Survival and Paranormal Beliefs. Confidence in survival (p <.0001) and in paranormal belief (p <.0001) were statistically above zero (Table 1). They were also highly correlated (r_s = .70, p <.000005). There were significant differences by non-believers/uncertain/believers category, with believers having higher confidence/belief values than uncertain, who had higher confidence/beliefs than non-believers.

Persuasiveness Ratings. Persuasiveness ratings for the 10 experiments overall and by confidence in survival subgroups are displayed in Table 1. OBE in NDE was the highest-rated overall and for all non-believers/uncertain/believers groups. Mediumship was the second-highest-rated overall and for the believers but was third-highest for uncertain and non-believers. Reincarnation was rated the third most persuasive overall for the believers and the second-highest for uncertain and non-believers. Survival through AI was rated as the least persuasive experimental result overall and by all three groups.

There were significant differences in the persuasiveness ratings by non-believers/uncertain/believers subgroups, with believers having higher ratings than uncertain, who had higher ratings than non-believers. Figure 1 displays a graphical representation of the persuasiveness ratings overall and by non-believers/uncertain/believers subgroups.

Table 1

Persuasiveness Experiment Ratings Overall and by Belief in Survival or the Paranormal

	Overall			Believer			Uncertain			Non-believer			Statistics	
Variable	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*H*	*p*
Confidence in Survival	442	14.34	32.54	217	42.75	8.46	139	2.73	8.04	86	-38.56	9.81	371.85	.0001
Paranormal Beliefs	372	10.99	24.21	187	26.02	16.94	108	7.73	13.85	77	-20.92	16.88	196.76	.0001
9. OBE in NDE	396	**14.34**	**28.30**	202	**24.09**	**25.12**	115	**12.59**	**21.40**	79	**-8.08**	**31.64**	68.50	.0001
5. Mediumship	399	**9.67**	**32.92**	196	**16.35**	**31.68**	120	11.83	27.15	83	-9.22	36.46	30.46	.0001
6. Reincarnation	395	8.97	33.39	198	14.04	34.48	118	**12.48**	**26.37**	79	**-8.96**	**34.32**	27.81	.0001
8. Physical Mediumship	388	5.51	32.15	193	12.02	31.16	118	7.92	27.05	77	-14.52	34.06	30.14	.0001
4. Special Expertise	395	4.70	32.07	195	11.68	32.13	122	6.05	26.75	78	-14.87	31.99	37.49	.0001
1. Apparitions	392	0.81	31.10	193	9.48	30.64	120	-1.59	26.02	79	-16.75	31.57	41.73	.0001
3. Xenoglossy	400	-0.63	31.63	199	9.38	30.70	121	-3.94	27.18	80	-20.51	29.97	51.49	.0001
2. Communication AI	399	-5.33	30.88	196	4.39	30.54	124	-8.25	26.51	79	-24.87	28.08	53.06	.0001
7. ADC	399	-7.87	31.03	195	4.57	30.55	122	-8.66	25.61	82	-36.28	18.01	102.85	.0001
10. Survival through AI	402	-12.56	31.57	198	-8.68	31.78	124	-14.94	28.93	80	-18.50	34.00	8.70	.013

Notes. Means and standard deviations of persuasiveness ratings for the 10 experiments overall and by the subgroups of non-believers (confidence in survival scores less than -20), uncertain (confidence in survival scores between -20 and +20), and believers (confidence in survival scores greater than +20). Mean values range from -50 to + 50. Experiments are listed in terms of largest to smallest ratings for all participants. All comparisons are significant after correction for multiple comparisons. Confidence in survival and paranormal belief scores are also displayed. Bold and underline font corresponds to the first choice; bold corresponds to the second choice; underline corresponds to the third choice for the non-believer/uncertain/believer categories.

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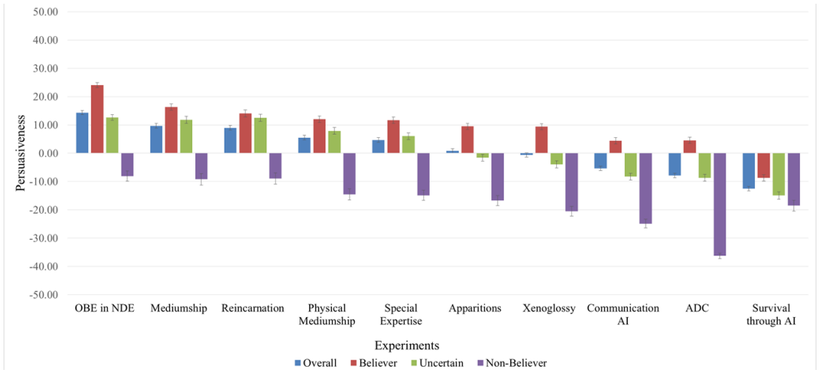
Figure 1

Persuasiveness of Ten Experiments Positive Results



Notes. Persuasiveness ratings for the participants overall and by non-believers/uncertain/believers subgroups. Means and one standard error bars are displayed.

Persuasiveness Results by Current Religious or Spiritual Affiliation 1. Participants' confidence in survival, paranormal belief, and persuasiveness ratings by religious or spiritual affiliation are displayed in Table 2. The non-religious respondents showed low confidence in survival and paranormal belief. Non-religious respondents selected the OBE in NDE experiment as the most persuasive, followed by the reincarnation and then the mediumship experiment. Religious or spiritual respondents had high survival and paranormal belief levels. They, too, selected OBE in NDE as the most persuasive experiment, followed by mediumship, then reincarnation. All of the comparisons by religious or spiritual affiliation were significant after correction for multiple comparisons except for the ratings on the Survival through AI experiment. Both religious and non-religious participants rated this experiment as not very persuasive.

Table 2

Beliefs and Persuasiveness Ratings by Current Religious or Spiritual Affiliation

	Religious or Spiritual			Not Religious			Statistics	
	n	*M*	*SD*	*n*	*M*	*SD*	*H*	*p*
Beliefs								
Confidence in Survival	276	25.19	27.67	84	11.79	28.04	94.62	.0001
Paranormal Beliefs	232	18.06	20.16	69	12.83	22.30	81.24	.0001
Experiments								
9. OBE in NDE	250	**18.31**	26.78	73	**17.45**	24.85	29.40	.0001
5. Mediumship	246	**11.91**	31.71	75	13.73	32.66	9.82	.0017
6. Reincarnation	248	10.75	33.74	72	**15.14**	29.70	10.53	.0012
4. Special Expertise	246	9.45	31.59	76	4.86	29.77	23.63	.0001
8. Physical Mediumship	242	8.19	30.65	75	6.53	33.72	7.11	.0077
1. Apparitions	241	4.80	30.29	76	0.80	29.25	17.00	.0001
3. Xenoglossy	250	3.89	30.40	74	-0.85	32.13	21.27	.0001
2. Communication AI	246	-0.69	29.78	78	-3.29	32.24	30.36	.0001
7. ADC	247	-2.94	30.08	75	-6.67	32.39	31.92	.0001
10. Survival through AI	251	-12.25	31.21	75	-7.99	32.31	2.3	.13

Notes. Means and standard deviations of persuasiveness ratings for the 10 experiments by religious or spiritual affiliation. *P*-values are shown after correction for multiple comparisons. Bold and underline font corresponds to the first choice; bold corresponds to the second choice; underline corresponds to the third choice for the non-believer/uncertain/believer categories. ADC – After Death Communication.

The OBE in NDE was rated the highest for all disciplinary subgroups except for the basic sciences. That group rated the mediumship experiment the highest, followed by the OBE in NDE experiment (see Supplemental Data Table 1). When a correction for multiple comparisons was applied, there were no significant differences between these groups on any of the experiment ratings. The analysis did not include the agricultural sciences group because only four participants selected that discipline.

Likelihood Ratings. OBE in NDE's highest count rating was in the *About 1 in a thousand* category (Table 3). Xenoglossy's highest count rating was in the *About 1 in a million* category. The other eight experiments were all rated *Too unlikely to even assign an odds (Impossible)* for their highest count. Chi-squared analyses within experiments across the five answer choices revealed significant differences for all 10 experiments. The

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likelihood ratings were also significantly different across all experiments (χ^2 = 127.7, p < .00005). ADC, Apparitions, Xenoglossy, OBE in NDE, Reincarnation, and Survival in AI experiments had absolute residual values greater than 2, suggesting that they had a major influence on the significant chi-square test statistic (Statistical details available from the first author upon request). Examining likelihood ratings within each experiment, Reincarnation, ADC, and OBE in NDE had significant differences across likelihood rating levels after correction for multiple comparisons.

Discussion

Confidence in the survival of consciousness and paranormal beliefs were greater than zero and were highly correlated. These beliefs are common worldwide, and their strong correlation was not surprising. Other studies have found similar associations (Dagnall et al., 2010; Thalbourne, 1995).

Table 3

Likelihood Rating That the Experiment Would Have Positive Results

		Percent (%) of Respondents						
Experiment	***N***	**1/1**	**1/10**	**1/1,000**	**1/million**	**Impossible**	**X^2**	***p***
Apparitions	390	3	12	22	27	**36**	4.9	.30
Communication AI	397	5	9	20	25	**41**	7.3	.12
Xenoglossy	397	6	11	21	**33**	29	8.6	.07
Special Expertise	393	5	10	23	27	**35**	1.6	.81
Mediumship	396	6	11	21	27	**35**	0	1.00
Reincarnation	393	6	7	15	29	**42**	20.9	<.000005
ADC	397	7	15	24	26	**28**	13.1	.01
Physical Mediumship	385	5	9	19	28	**39**	5.4	.25
OBE in NDE	394	7	19	**30**	24	21	57.3	<.000005
Survival through AI	398	7	11	19	23	**41**	8.5	.08

For our sample, about 50% indicated some confidence in survival and paranormal belief according to our classifications (30% uncertain, 20% non-believers). These values are roughly proportional to results found in global surveys (Ipsos, 2011).

Spiritual affiliation did not predict persuasiveness ratings, but there were some differences in values by affiliation, and religious people had higher confidence in survival and paranormal beliefs, as well as higher persuasiveness rating scores. The primary field of training did not predict any of these variables. Confidence in survival subgroups did not predict the topmost persuasive experiment ratings, but there were significant differences in values, with believers having higher scores than those who were uncertain, which were, in turn, higher than non-believers. Although lower than believers' scores, persuasiveness scores for uncertain participants were still positive, indicating the possibility that the evidence would be persuasive to them. However, the non-believers' scores were slightly negative (i.e., towards the end of the scale, indicating that they would not be persuaded). Earlier studies inquiring about belief in psi among scientists reported that their belief was inversely correlated with their knowledge of psi research. In general, a personal experience most often explains their belief (McClenon, 1982). Our results suggest that among academics scientific evidence may persuade those who are uncertain or who have not yet made up their mind about the survival of consciousness, but scientific evidence may not be able to persuade non-believers.

In general, most did not think that the proposed experiments would be completed with positive outcomes. The proposed experiments were chosen based on the existing evidence for the survival of consciousness. Overall, the experiments were selected as plausible, and we did not exclude experiments that may be challenging to undertake given current technologies. This choice may partly explain the low likelihood ratings. Thus, these results are not completely unexpected, given that the prospective systematic study of the nature of consciousness is still a growing field.

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Gender was a significant predictor of paranormal beliefs, with women having higher paranormal beliefs than men, confirming previous similar findings (Drinkwater, 2017; Irwin, 2009; Spinelli et al., 2002). Because confidence in survival and paranormal belief were strongly correlated, it is not surprising that gender also predicted confidence in survival. Studies support that women believe in survival more strongly than men (Pew Research Center, 2021; Rose & O'Sullivan, 2002). Women also had higher persuasive ratings for xenoglossy, reincarnation, ADC, and OBE in NDE. If gender were the primary reason, then one would expect significantly higher scores on all 10 experiments for women. However, this was not the case. We speculate that the increased ratings were associated with personal experience. Studies have demonstrated that women have (or report) more paranormal experiences than men in general (Castro et al., 2014; Palmer & Braud, 2002). For example, a review examining the incidence of ADCs reported that in 13 of 17 studies with gender data, ADCs were more common in women than men (Streit-Horn, 2011).

Participants of older age had higher persuasive rating scores for the ADC experiment. Perhaps this is because older adults have more experience with death. However, a review evaluating the role of age in ADC prevalence found that 9 of 14 studies observed no substantial difference in age groups (Streit-Horn, 2011). The five studies that did observe substantial differences had mixed age association results.

OBEs in NDEs are not uncommon. A large prospective study found that 24% of people who reported NDEs also experienced an OBE (van Lommel et al., 2001). Prospective studies have been conducted similar to the experiment proposed with, for example, surgical patients being asked to describe a face-up image located near the operation room's ceiling if they experienced an OBE during the procedure. Other studies, such as the AWAreness during Resuscitation (AWARE) investigations, have explored end-of-life cognitive processes and recalled death experiences (Parnia et al., 2014). These experiments have not demonstrated consistent evidence to date (Fox, 2017; Parnia et al., 2001; Sartori et al., 2006). Conducting the OBE during an NDE experiment in multiple centers worldwide would generate more data to examine the nuances required for a veridical OBE in NDE. Are there similarities in favorable cases, such as the participants' health, drugs used during the procedures of these experiences, focused attention practice (e.g., meditation), or some other factor that influences the phenomena?

As far as we know, no prospective mediumship experiments similar to the one we proposed have been conducted. The closest cases are the so-called "cross-correspondences," where segments of a communication from the same deceased person were purportedly distributed among many mediums. Critics have found it challenging to propose mundane explanations for many of these cases, although because the messages were unplanned, questions about their interpretations remain unresolved (Fontana, 2005). Similar cases involving planned communications, such as combination lock or code experiments, have not revealed consistent results either (Berger, 1984; Levin, 1994; Mulacz, 1997; Stevenson, 1968).

On the other hand, evidence for reincarnation is quite extensive. Notable among the investigations of numerous researchers (e.g., Hassler, 2018; Matlock, 2019; Wehrstein, 2019) is the work of Ian Stevenson (1997), who collected thousands of verified cases. Stevenson's work has been continued by Jim Tucker (2008). Our proposed reincarnation experiment would be prospective, removing some of the issues with these retrospective studies (e.g., recall bias), and many reincarnation cases are reportedly found early enough to address some of these issues.

The likelihood ratings for the success of these experiments were very low. Only two experiments had higher likelihood ratings, xenoglossy, and OBE in NDE. Xenoglossy was selected even though it was not rated very high for persuasiveness. Perhaps participants misunderstood the spiritual tradition of "speaking in tongues." However, most of the

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proposed experiments were associated with moderately well-known spontaneous cases (e.g., xenoglossy and skilled mediumship cases reported in popular books and documentaries). Because the proposed experiments were designed as controlled, prospective studies, a positive result may have been more challenging to imagine. (A table of belief and persuasiveness and persuasiveness ratings by primary field of study, as well as information to the participants can be obtained from the authors).

Limitations. Several study limitations should be considered. The research questions and hypotheses were exploratory, and future research will be required to confirm these findings. Also, the study's population was a convenience sample of academic professionals. Many people who received the recruitment email may not have been interested in this topic. This study could be repeated using randomized sampling techniques with academic professionals, but potential volunteers may not participate when the topic is revealed. Of course, this is an issue for any anonymous recruitment survey study. The convenience sample thus limits the generalizability of the results to all academic professionals or the general population.

Another limitation is that the study did not attempt to provide evidence for the survival of consciousness but only assessed what kinds of evidence professionals might find most compelling. In addition, the proposed experiments were designed to provide evidence for but not definitive proof of survival of consciousness after bodily death. Rigorous experiments can improve evidence quality, but interpretations are challenging. Even the experiment indicated in this study to be most persuasive (an OBE in NDE) does not provide definitive evidence for the survival of consciousness and could even be interpreted in ways that do not support the survival of the consciousness. For example, the experience could be a clairvoyant impression from a living person during an altered state of consciousness. A veridical perception during an NDE could also be attributed to a perception that occurred before or after the apparent period of physical death (i.e., precognition or retrocausation). Because these kinds of experiments involve information presumably gained from outside the ordinary limits of space and time, evidence for survival is inextricably entangled with psi interpretations — at least with our current conceptualizations and understanding (see Delorme et al., 2021 for further discussion on this point).

The current study suggests that scientific evidence (at least as provided by the proposed experiments) would not be strong enough to persuade academics that currently do not believe in the survival of consciousness or psychic phenomena. For those that already believe or are uncertain, prospective studies involving an OBE in NDE, mediumship, and reincarnation may be persuasive. The prospective, systematic study of consciousness is still growing. This subtype of research has largely remained outside the mainstream as a scientific and scholarly discipline, a state of affairs that appears to be slowly changing. The question of survival lies at the heart of our most basic existential questions and warrants continued research.

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Einschätzung der Überzeugungskraft empirischer Beweise für das Überleben des Bewusstseins nach dem Tode: Eine Querschnittsstudie unter Akademikern

Helané Wahbeh Arnaud Delorme Dean Radin

Zusammenfassung: *Zielsetzung.* Im Laufe der Geschichte und in allen Kulturen haben viele Menschen an eine Form des Lebens nach dem Tode geglaubt. Neuere Umfragen zeigen, dass die meisten Menschen weltweit glauben, dass sie nach dem körperlichen Tod weiterleben werden. Diejenigen, die nicht daran glauben, benötigen stichhaltige empirische Beweise, um von ihrer Skepsis abzurücken. Absicht dieser Studie war es, festzustellen, welche Arten von Beweisen akademisch Gebildete davon überzeugen könnten, dass ein bestimmter Teilaspekt des Bewusstseins nach dem körperlichen Tod weiterlebt. *Methode.* Wir befragten akademisches Personal und erhoben demografische und berufliche Hintergrunddaten, persönliches Für-Möglichkeit-Halten von Überleben und Einschätzungen des Glaubens an das Paranormale. Die Befragten bewerteten auch die Überzeugungskraft von 10 einschlägigen Experimenten und wie wahrscheinlich ihr Erfolg sei. Diese Daten wurden über alle Teilnehmer hinweg analysiert und nach der Wahrscheinlichkeit für das Überleben aufgeteilt. *Ergebnisse.* Professionelle Akademiker (N = 442) füllten die Umfrage aus. Das Geschlecht war ein signifikanter Prädiktor für das Vertrauen in das Überleben, den Glauben an paranormale Phänomene und viele Einschätzungen im Hinblick auf Überzeugungskraft, wobei Frauen höhere Werte erzielten als Männer. Fortgeschrittenes Alter war ein positiver Prädiktor für die Bewertung der Überzeugungskraft eines vorgeschlagenen Experiments über nachtodliche Kontakte. Das Vertrauen in das Überleben und der Glaube an paranormale Phänomene waren hoch korreliert. Die höchsten Überzeugungswerte wurden für ein kontrolliertes, prospektives Experiment, das zu verifizierten außerkörperlichen Wahrnehmungen während einer Nahtoderfahrung führte, für ein Experiment zur Medialität und für ein Reinkarnationsexperiment vergeben. Als am wenigsten überzeugend wurde ein Experiment eingestuft über das Überleben in Form einer computerbasierten künstlichen Intelligenz. *Schlussfolgerung.* Akademisch Gebildete weisen ein breites Spektrum an Überzeugungen und Vertrauen in das Überleben auf. Erfolgreiche Experimente zum Nachweis des Überlebens können vorherige skeptische Glaubenseinstellungen beeinflussen.

German Translation: Eberhard Bauer

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Avaliando a Persuasão de Evidência Empírica sobre a Sobrevivência da Consciência Após a Morte Corporal: Um Estudo Transversal entre Acadêmicos

Helané Wahbeh Arnaud Delorme Dean Radin

Resumo: *Objetivo*. Por toda história, e em todas as culturas, muitas pessoas acreditaram em alguma forma de vida após a morte. Pesquisas recentes mostram que a maioria das pessoas ao redor do mundo acredita que sobreviverá após a morte corporal. Aqueles que não acreditam exigiriam evidências empíricas substanciais para rever seu ceticismo. O objetivo deste estudo foi avaliar quais tipos de evidências podem persuadir profissionais acadêmicos de que algum aspecto da consciência sobrevive após a morte corporal. *Método.* Pesquisamos profissionais acadêmicos e coletamos dados demográficos e profissionais, convicção pessoal na sobrevivência e classificações sobre crenças paranormais. Os entrevistados também classificaram a capacidade de persuasão de 10 experimentos relevantes e suas chances de sucesso. Os dados de todos os participantes foram analisados e divididos por confiança na sobrevivência. *Resultados.* Acadêmicos profissionais (N = 442) completaram a pesquisa. O sexo foi um preditor significativo de confiança na sobrevivência, crença paranormal e muitas classificações de persuasão, com as mulheres tendo pontuações mais altas do que os homens. A idade maior foi um preditor positivo para as classificações de persuasão de um experimento proposto envolvendo comunicação pós-morte. A confiança na sobrevivência e as crenças paranormais foram altamente correlacionadas. As classificações mais altas de persuasão foram para um experimento prospectivo controlado que resultou em percepções verídicas fora do corpo durante uma experiência de quase morte, um experimento mediúnico e um experimento de reencarnação. O experimento proposto menos persuasivo foi a sobrevivência na forma de inteligência artificial computadorizada. *Conclusão.* Os acadêmicos possuem um amplo espectro de crenças e de confiança na sobrevivência. Experimentos bem-sucedidos projetados para testar a sobrevivência podem influenciar convicções prévias de céticos.

Portuguese translation: Antônio Lima

Una Evaluación de la capacidad Persuasiva de Pruebas Empíricas de Supervivencia de la Consciencia tras la Muerte Corporal: Un Estudio Transversal Entre Académicos

Helané Wahbeh Arnaud Delorme Dean Radin

Resumen: Objetivo. A lo largo de la historia y en todas las culturas muchas personas han creído en algún tipo de vida después de la muerte. Encuestas recientes muestran que la mayoría de las personas en todo el mundo creen que sobrevivirán después de la muerte corporal. Los que no creen necesitarían pruebas empíricas sustanciales para cambiar su escepticismo. El objetivo de este estudio fue evaluar qué tipos de pruebas podrían persuadir a académicos de que algún aspecto de la consciencia sobrevive después de la muerte corporal. Método. Encuestamos a profesionales del mundo académico y recogimos datos demográficos y profesionales, confianza personal en la supervivencia, y valoraciones de creencias paranormales. Los encuestados también valoraron la capacidad de persuasión de 10 experimentos relevantes y la probabilidad de que tuvieran éxito. Los datos se analizaron con toda la muestra y dividiéndola según la confianza en la supervivencia. Resultados. Académicos profesionales (*N* = 442) completaron la encuesta. El sexo fue un factor predictivo significativo de la confianza en la supervivencia, la creencia en lo paranormal, y muchas valoraciones de persuasión, con las mujeres obteniendo puntuaciones más altas que los hombres. Mayor edad predijo positivamente las puntuaciones de persuasión de un experimento propuesto que implicaba la comunicación después de la muerte. La confianza en la supervivencia y las creencias paranormales se correlacionaron altamente. Las puntuaciones más altas de persuasión correspondieron a un experimento prospectivo controlado que daría lugar a percepciones extracorpóreas verídicas durante una experiencia cercana a la muerte, un experimento de mediumnidad, y un experimento de reencarnación. El experimento propuesto menos persuasivo fue el de la supervivencia en forma de inteligencia artificial basada en computadoras. Conclusiones. Los académicos tienen una amplia gama de creencias y confianza en la supervivencia. El éxito de los experimentos diseñados para probar la supervivencia puede influir creencias previas de los escépticos.

Spanish translation: Etzel Cardeña

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Performing Artists and Anomalous Experiences: Overexcitability, Creativity, and Trauma History Are Part of the Picture[1]

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Abstract: *Objective*: To evaluate the relations of anomalous experiences with five overexcitabilities, cumulative trauma exposure, and Beyond the Personal creative process, with samples of performing artists, athletes, and control participants. Method: This is a cross-sectional study (N = 454) in which participants were administered in one session five self-report instruments to assess the five overexcitability dimensions, past childhood adversity and trauma events, creative experiences, and anomalous experiences. *Analyses* included inter-instrument and intergroup analyses, with a regression analysis that focused only on performing artists (n = 248), and a moderation analysis to determine a moderating effect of cumulative trauma on other variables. *Results*: Results showed that, compared to athletes and controls, performing artists had greater overexcitabilities, higher Beyond the Personal creative experiences, and more anomalous experiences, but no differences in cumulative trauma. Imaginational overexcitability, cumulative trauma, Beyond the Personal creative experience, and emotional overexcitability explained 32% of the variance in anomalous experiences in the performing artists group. The moderation analysis did not reach significance. *Conclusion*: The findings in this study suggest that a desire to create works that expand Beyond the Personal, coupled with elevated overexcitability factors, relate to greater sensitivity and awareness of novel and unusual experiences, including anomalous experiences.

Keywords: anomalous experiences, creativity, overexcitability, performing artists, trauma

Highlights

- The examination of the relation between anomalous experiences and overexcitability is seldom included in either field of research.
- The focus on performing artists and their anomalous experience prevalence profile adds to the literature, specifically about the predicting variables of imaginational and emotional overexcitabilities, as well as the creative process, Beyond the Personal.

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• The comparison between performing artists, athletes, and control participants illustrates unique anomalous experience differences between these three groups.

Performing artists are both interpreters and generators of creative products (Kogan & Kangas, 2006; Thomson et al., 2009). They work within a collaborative field that includes other artists, technicians, and audience members. All influence the creative and performance experience (Osipovich, 2006). To function in this complex discipline, performers must gain technical skills necessary to succeed in their specific performance domain (e.g., theater, dance, music, singing) as well as psychological skills that will enhance emotional expressivity, tolerance for uncertainty, and stress management (Byron et al., 2010). The primary purpose of this study was to evaluate the relational patterns of anomalous experiences, overexcitability traits, a sense that the creative process expands beyond the personal experience of the individual performer, and past trauma exposure. Previous research has indicated that these factors may be related, and this study delves deeper into this association within a performing artist sample.

In general, artists report different types of anomalous experiences (Cardeña et al., 2012; Holt, 2019; Holt et al., 2004). Throughout the ages, themes of the paranormal have been explored in performance (drama, dance, opera, music, film), and "supernatural" practices are evident in the performing arts as well. In most theaters, placing a ghost light on stage each night is routine. Theater folklore holds that the light will chase away the ghosts or that they will perform in the theater when everyone else leaves the building (https://chicagocritic.com/theatre-superstitions). Performers are reticent to utter the name of Shakespeare's play, Macbeth, within a theater. This play is referred to as the "Scottish" play by performers so that they can avoid the perceived curse attached to it. The acceptance of these and many other practices illustrates the blurring of mental boundaries between the inner imagination, beliefs, and perceptions of the performer and their outside environment (Holt, 2019).

Because many parapsychology terms are used interchangeably (Schmidt, 2007), the following distinctions will be applied: (1) parapsychology (alongside psychology) is an experimental and academic discipline that investigates purported psychic phenomena; (2) paranormal is a collective term for phenomena such as extrasensory perceptions, telepathy, precognition, clairvoyance, psychokinesis (telekinesis), near death experiences, synchronicity, and apparitional experiences; (3) psi addresses the unknown factors of gaining information from a distance via extrasensory perceptions or psychokinesis (Schmidt, 2007; Zahran, 2017); and in some individuals, (4) anomalous experiences may be characterized by extreme perceptual realism such as apparitions of individuals or objects that are not physically present, out-of-body experiences that involve quasi-perceptual viewing the self from an external vantage point, lucid dreaming, auditory or visual hallucinations, sensing a presence of someone alive or dead, mediumistic experiences, and mystical experiences (Cardeña et al., 2018; Rabeyron & Loose, 2015). For simplicity's sake, this paper will use the term anomalous experiences, which will reference the following phenomena: deeply moving mystical or spiritual experiences, seeing apparitions or ghosts, out-of-body experiences, pre-cognition experiences, being guided by a "force," a feeling of being called to a place or activity, and belief in reincarnation or past lives. A significant percentage (30% - 70%) of the population reports anomalous experiences and even though anomalous experiences may be infrequent, they tend to be highly significant and meaningful (Drinkwater et al., 2017; Rabeyron et al., 2018; Ross & Joshi, 1992). Once individuals have an anomalous experience, they become sensitized to future anomalous experiences (Raberyon & Loose, 2015).

Performing artists often experience life with a heightened intensity of thought and imagination and a greater sensitivity to interactions with others and the world around them (Ackerman, 2009; Martowska et al., 2020; Martowska & Romanowicz, 2020; Thomson & Jaque, 2016a). This internal sensitivity drives them to explore and experience novelty (Holt et al., 2004) and they tend to experience daily life with more multifaceted visual-spatial and cognitive processes (van Thiel et al., 2019). Heightened imagination and sensory experiences are the norm for these individuals (van Thiel et al., 2019). Kazimierz Dabrowski, a Polish psychologist and psychiatrist, created an original model of personality development to explain the unique traits of intellectually gifted and talented individuals. Although overlapping, intellectual giftedness is associated with individuals who have an IQ of 125 or higher (Frances et al., 2016) whereas talented individuals can achieve high performance levels, including general intellectual ability, specific academic aptitude, creative or productive thinking, leadership ability, visual and performing arts aptitude, and psychomotor ability (Limont et al., 2014; Renzulli, 2011).

According to Dabrowski's Theory of Positive Disintegration, gifted/talented individuals are influenced by their genetic inheritance, the environment in which they are raised, and a unique drive for autonomy (Ackerman, 2009). The combination of these three factors propels them through a sequence of developmental challenges and conflicts that influences how they develop. The increased sensitivity to external and internal stimuli and the intensity of responses are collectively defined as overexcitability traits (Alias et al., 2013; Mendaglio & Tillier, 2006). Overexcitability is a concept that explains heightened psychophysiological arousal; it operates in five separate domains that may present separately or in combination (Alias et al., 2013): (1) psychomotor (surplus energy expressed in movement-oriented activities), (2) sensual (heightened awareness and need to engage via some or all of the senses), (3) imaginational (easily bored and escape into internally generated fantasy), (4) intellectual (passion for receiving and processing information and engaging in problem solving activities), and (5) emotional (relational awareness and sensitivity to emotional expression) (Falk et al., 1999; Piirto & Fraas, 2012). Heightened overexcitabilities may be discriminating factors when comparing gifted and non-gifted samples (Winkler & Voight, 2016). Interestingly, performing artists display elevated overexcitability in several or all of the five domains

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(Martowska, Matczak, et al., 2020; Martowska & Romanowicz, 2020; Medaglio & Tillier, 2006; Piirto & Fraas, 2012; Thomson & Jaque, a,b).

In performing artists, there is a direct relation between overexcitabilities and creativity (He et al., 2017: Martowska et al., 2020; Martowska & Romanowicz, 2020). Both overexcitability and creative processing experiences are higher in performing artists compared to athletes and active control participants (Thomson & Jaque, 2016, a,b). Individuals who possess one or several overexcitabilities tend to be creation-directed (Piirto & Fras, 2012; Rabeyron et al., 2018; Thalbourne, 2000; van Thiel et al., 2019), and they are open to novel experiences (Mendaglio & Tillier, 2006). Heightened overexcitabilities are also associated with increased intrapersonal awareness; this is vital for performing artists, in fact they have greater self-awareness compared to scientists and other professionals (Holt et al., 2004). As well, overexcitability factors are strongly associated with the Big Five personality trait, Openness to Experience (Limont et al., 2014; Vuyk et al., 2016). Engaging in the creative process involves a willingness to openly explore and, for many, there is a desire to create something that moves beyond the personal life of the creator (Nelson & Rawlings, 2009, 2010). Creativity and openness to experience are features associated with anomalous experiences (Holt et al., 2004).

Performing artists with a history of childhood adversity and adult traumatic events tend to value their creativity; it may operate as a resilience factor for individuals who were poly-victimized, in part because it can provide an outlet for personal expression and may offer a way to connect with others (Corley, 2010; Richtner & Lofsten, 2014; Thomson & Jaque, 2018). Anomalous experiences may also operate as a resilience factor as they are often associated with both mental health and heightened creativity (Cardeña et al., 2012, 2017; Palmer & Braud, 2002; Rabeyron et al., 2018). The exploration and psychological processing of past trauma and loss experiences may be facilitated by creative expression (Corley, 2010; Metzl & Morrell, 2008); the acceptance of anomalous experiences may add to creative exploration (Cardeña et al., 2014). Research study findings indicate that creativity and anomalous experiences can serve as coping strategies under conditions such as childhood adversity (abuse, neglect, family dysfunction) or traumatic events (Irwin, 2000; Rabeyron & Loose, 2015). Heightened anomalous experiences have been identified in individuals who are classified as unresolved for past abuse or loss, specifically when these events involve attachment figures and other close significant relationships (Marcusson-Clavertz et al., 2017; Thomson & Jaque, 2012, 2012a, 2014). One of the hallmark indicators for lack of resolution is an unconscious denial that the event occurred (Main et al., 2003). In some unresolved individuals, paranormal events are attributed to the abuse and/or loss experiences (i.e., precognition that abuse or loss would occur, appearance of spirits to protect them from pain); this is regarded as a strategy to minimize or deny these painful events (Marcusson-Clavertz et al., 2017). The creative effort to cope with traumatic events may influence a receptiveness for the paranormal; this receptiveness may offer meaning or an explanation related to the traumatic events, which then may enhance resilience and adaptation rather than intensifying distress (Bonanno, 2004; Marcusson-Clavertz et al., 2017). Further, exposure to more childhood adversity in a performing artist sample was associated with more intense appreciation of the creative processes (Thomson & Jaque, 2018).

The desire to further examine anomalous experiences in performing artists grew from previous findings in our laboratory (Thomson & Jaque, 2014). In this study, we hypothesized that there is a significant relation of anomalous experiences with the five overexcitabilities, cumulative trauma exposure, and the creative process, Beyond the Personal. Second, we hypothesized that performing artists would differ from athletes and control participants, with higher scores on most overexcitability scales, anomalous experiences, cumulative trauma, and Beyond the Personal creative process.

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Method

Participants

After receiving ethics approval from the university Institutional Human Review Board (#1213-116-i-a), this cross-sectional study included a sample (*N* = 454) of performing artists, athletes, and controls. The sample was recruited via word of mouth from a university and community sample. The volunteers met with the Investigators of the study and were provided a brief explanation about the study purpose and the process of informed consent. See Table 1 for demographic details. A sub-sample of pre-professional/professional performing artists (*n* = 248) was then selected to conduct a more specific investigation on performing artists. The majority of performers were dancers (*n* = 219, 89%), with opera singers, actors, and directors completing the sample (*n* = 34, 12%). The inclusion criteria were: trained as a performing artist for five or more years and having received financial remuneration for at least one performance. For athletes, trained for five or more years and competed at the regional, national, or international level. The control sample engaged in recreational sport or community performing arts activities.

Table 1

Descriptive Statistics (N = 454): Number (Percentage), Mean (SD)

Variable	Descriptive Statistics		
	Performers	Athletes	Controls
Age (years)	22.9(5.5)	24.1(3.7)	23.3 (3.9)
Males	*n* = 52 (21%)	54 (63%)	53 (40%)
Females	*n* = 136 (79%)	32 (37%)	80 (60%)
Major Ethnicity			
Black	*n* = 41 (17%)	*n* = 8 (9%)	*n* = 18 (14%)
Asian	*n* = 54 (22%)	*n* = 12 (14%)	*n* = 37 (28%)
White	*n* = 94 (38%)	*n* = 43 (50%)	*n* = 37 (28%)
Latinx	*n* = 56 (23%)	*n* = 22 (26%)	*n* = 39 (29%)

Procedure

All participants completed an informed consent form and a brief biographical screener to determine years of training, previous injuries and illnesses, and level of performing/competing. Five self-report instruments were administered to assess the five overexcitability dimensions, past childhood adversity and trauma events, creative experiences, and anomalous experiences. These measurements were completed in a dance studio, rehearsal hall, or laboratory. A smaller sample (*n* = 152) returned to the laboratory one year later to determine the test - retest reliability of the ICMI anomalous items.

Measurements

Cumulative Trauma (CumT): This factor was derived by combining the 10 items of the Adverse Childhood Experience Questionnaire (ACE) with the eight items in the Traumatic Event Questionnaire (TEQ). The ACE is a dichotomous 10 item self-report instrument that assesses categories of childhood abuse, neglect, and household dysfunction (Felitti et al., 1998; Felitti & Anda, 2010). A total score of yes responses is derived, regardless of frequency or intensity. The abuse category probes for emotional, physical, and sexual abuse; the neglect category evaluates emotional and physical neglect. The household dysfunction category includes mother treated violently, substance abuse, parental separation or divorce, household member imprisoned or suffering a mental illness The ACE has excellent validity and reliability (Felitti et al., 1998). The TEQ (Lauterbach & Vrana, 2001; Vrana & Lauterbach, 1994) is a self-report 11-item dichotomously scored instrument. Only the eight items that assessed exposure to accidents, natural disasters, crime, rape, adult abusive experiences, witnessing death/mutilation of someone, being in a dangerous/life-threatening situation, and receiving news of an unexpected death of a loved one were included. The TEQ has excellent validity and reliability (Vrana & Lauterbach, 1994). Three items were excluded from the TEQ when

the cumulative trauma score was calculated. They included the item probing for childhood abuse because it was assessed in the ACE. The two other TEQ items excluded were any other traumatic event not listed (this item does not specify the type of abuse which made it difficult to determine if it was a clear marker for traumatic exposure) and traumatic event(s) that were too difficult to discuss with anyone (this did not add to the total score but rather indicated the participants disclosure difficulties). The last two TEQ items discussed were excluded because they did not add further categorical information about types of traumatic events. In this study, the Cronbach alpha score for Cumulative Trauma was adequate, α = .74.

The *Experience of Creativity Questionnaire (ECQ)* (Nelson & Rawlings, 2009) gathers information associated with experiential and existential processes. The ECQ was developed from previous qualitative research findings on an artist sample. It is a Likert-type rating ranging from 1 (definitely not my experience) to 5 (very much my experience), and it has adequate reliability and validity. The ECQ probes for five separate experiential factors (distinct experience, power/pleasure, absorption, anxiety, clarity/preparedness) and three separate existential factors (centrality, transformation, beyond the personal). Two sample questions from the ECQ include: "I put myself in the mood I wanted my creative work to take on." and "I have found there is a compulsive, addictive quality to the experience of being engaged in the creative process." Only Beyond the Personal scale was included. In this study it had low reliability (3 items, α = .62), which may be related to only three items comprising this scale. Beyond the Personal is a scale that examines concern about whether the creative work will communicate with others and explores a desire to expand beyond the confines of the self.

Inventory of Childhood Memories and Imaginings (ICMI) (Wilson & Barber, 1983) is a 52-item dichotomous questionnaire that probes for experiences and memories from childhood and adulthood (23 items for childhood experiences and 29 items for adult experiences). The scoring is a simple total of all items endorsed by the participant and this instrument has excellent validity and reliability (Wilson & Barber, 1983). Following the practice of previous researchers who examined only the ICMI paranormal items as a separate scale (Irwin, 1990; Klinger et al., 2009; Thalbourne, 2008; Thalbourne & Maltby, 2008), in this study only the seven anomalous experience items (34, 35, 36, 37, 38, 39, 40) were examined. These items probed for deeply moving personal religious, spiritual, or mystical experiences, perceiving apparitions or ghosts, out-of-body experiences, precognitive experiences, automatic creations that were controlled by a spirit, telepathic messages, awareness of past lives, and experiencing the oneness with the universe. In this study, Cronbach's alpha was adequate (α = .67). Six months after the first round of data collection, a smaller sample of performing artists (n = 152) returned to the laboratory for data collection. Based on the test – re-test reliability analysis the ICMI-Anomalous scale was adequate (r = .70, p < .001).

The *Overexcitability Questionnaire–II* (OEQ-II) (Falk et al., 1999) is a 50-item measurement used to assess the five forms of overexcitability. Each overexcitability subscale (psychomotor, sensual, imaginational, intellectual, emotional) consists of ten 5-point Likert items ranging from 1 (not at all) to 5 (very much like me). Mean scores are derived for each scale. There are no OEQ-II cutoff scores that identify giftedness or talent; however, scores above the 75th percentile can be regarded as elevated overexcitability (Falk et al., 1999). The OEQ-II has high internal reliability and internal consistency and good content validity (Falk et al., 1999). In this study, Cronbach alpha scores include psychomotor (OE-P) (α = .81), sensual (OE-S) (α = .86), imaginational (OE-I) (α = .89), intellectual (OE-T) (α = .89), and emotional (OE-E) (α = .74).

Data Analysis

SPSS 28 (IBM Corp., Armonk, NY) was used for all statistical analyses. First, descriptive statistical analyses were conducted. Cronbach's alpha and test-retest results are included in the measurement section. ANOVAs were conducted to determine whether

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the performing artists and athletes in the current study differed from the musicians, actors, and intellectually gifted participants in three previously reported studies. Chi square analyses evaluated frequency distributions. Multivariate analyses of covariance (MANCOVAs) were conducted to determine group differences (performing artists, athletes, controls) for all variables examined in this study, with age and sex as covariates, based on previous study findings indicating sex differences in the overexcitabilities questionnaire (Martowska & Romanowicz, 2020; Piirto et al., 2008); although there are less differences between androgynous males and females (Miller et al., 2009). In all MANCOVA analyses, Bonferroni corrections were used to determine the differences between the group means. According to the guidelines outlined by Dugard et al. (2010), all MANCOVA assumptions were met. Box's M test showed that covariance matrices across groups were equal, $M = 88.17$, F (72,215357) = 1.19, $p = .13$. Pearson correlations were conducted to investigate the relation between continuous variables for the performing artist sample. The results from this investigation informed the inclusion of the variables to predict anomalous experiences in a multiple linear regression analysis. The independent variables included all five overexcitability dimensions, cumulative trauma, and Beyond the Personal creative experience scale. A moderation analysis was then conducted to determine the effect of cumulative trauma on the relation between Beyond the Personal creative process and anomalous experiences.

Results

The descriptive statistics for age, sex, and major ethnicity for performing artists, athletes, and controls are included in Table 1. The responses on the ICMI anomalous experience items were stable ($r = .70$, $p < .001$) based on the test – retest analyses conducted one year later. This supports the reliability of participant's responses over time regarding their anomalous experiences.

We compared the overexcitability mean values in this study with the means gathered from three different studies. ANOVAs from summary data were conducted to determine whether the performing artists and athletes in the current study differed from the musicians, actors, and intellectually gifted participants in the previously reported studies (see Table 2). In this study, the performing artists differed from the following groups (higher scores): female musicians, male musicians, and intellectually gifted in OE-P ($p < .001$, $p = .003$, $p = .001$, respectively), higher than intellectually gifted in OE-S ($p < .001$), lower than actors, both groups of musicians, and intellectually gifted in OE-I ($p < .001$), and lower than female musicians and higher than intellectually gifted participants in OE-E ($p = .001$ and $p < .001$, respectively).

The athletes in the current study differed (higher) from the female musicians ($p < .001$), male musicians ($p = .011$), and intellectually gifted ($p = .009$) in OE-P, lower than female musicians and actors in OE-S ($p < .001$), lower than actors, female musicians, male musicians, and intellectually gifted ($p < .001$) in OE-I, and lower than actors and female musicians ($p < .001$) in OE-E. The performing artists and athletes in the current study did not differ from any of the participant groups in the referenced studies for OE-T. Unlike the athletes, the performing artists in the current study did not differ from musicians (female and male), actors, and intellectually gifted samples. See Table 2 for mean and standard deviation details reported in the comparison studies.

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Table 2

Mean Scores (SD) for Overexcitability Scales Across Five Studies

	OE-P	OE-S	OE-I	OE-T	OE-E
Current Study					
Performers	3.7(0.7)	3.9(0.7)	2.6(0.9)	3.7(0.8)	3.7(0.7)
Athletes	3.7(0.7)	3.2(0.8)	2.1(0.8)	3.5(0.8)	3.2(0.7)
Controls	3.2(0.8)	3.3(0.8)	2.3(0.8)	3.3(0.8)	3.3(0.7)
Martowska & Romanowicz, 2020					
Females					
Musicians	3.1(0.8)	3.9(0.6)	3.6(0.7)	3.8(0.6)	4.1(0.5)
Controls	3.2(0.8)	3.1(0.8)	3.3(0.9)	3.6(0.7)	4.0(0.5)
Males					
Musicians	3.1(0.7)	3.4(0.7)	3.4(0.6)	3.7(0.6)	3.6(0.6)
Controls	3.6(0.7)	3.0(0.9)	3.2(0.5)	3.8(0.5)	3.2(0.6)
Martowska et al., 2020					
Actors	3.6(0.7)	4.1(0.6)	3.7(0.8)	3.8(0.6)	4.0(0.6)
Controls	3.2(0.8)	3.2(0.9)	2.9(0.7)	3.7(0.5)	3.5(0.7)
Limont et al. 2014					
Gifted	3.3(0.8)	3.1(0.8)	3.3(0.8)	3.7(0.6)	3.2(0.6)
Control	3.4(0.7)	2.9(0.8)	3.0(0.8)	3.3(0.7)	3.2(0.8)
Falk et al. 1999					
Students	3.3(0.8)	3.3(0.9)	2.9(0.8)	3.5(0.8)	3.7(0.8)

The first hypothesis, that there would be a significant relation between anomalous experiences, the five overexcitabilities, cumulative trauma experiences, and Beyond the Personal creative process, was supported. Specifically, anomalous experiences were low to moderately associated with Beyond the Personal creative process, cumulative trauma, and the five overexcitability variables. Beyond the Personal creative process was low to moderately associated with cumulative trauma and the five overexcitabilities. There were low associations with cumulative trauma and psychomotor overexcitability, intellectual overexcitability, and Beyond the Personal creative process, and a low-moderate association with anomalous experiences. All five overexcitabilities were moderately associated with each other (Table 3).

Table 3

Correlation Matrix

	1	2	3	4	5	6	7	8
1. AE								
2. Bey Pers	.32**							
3. CumT	.36**	.18**						
4. OE-P	.32**	.32**	.14*					
5. OE-S	.22**	.26**	.10	.38**				
6. OE-I	.40**	.34**	.101	.39**	.39**			
7. OE-T	.33**	.31**	.13*	.58**	.51**	.48**		
8. OE-E	.32*	.25**	.10	.44**	.47**	.45**	.50**	

Notes. AE = anomalous experiences; Bey Pers = beyond personal creative experience; CumT = cumulative traumatic events; OE-P = overexcitability-psychomotor; OE-S = overexcitability-sensual; OE-I = overexcitability-imaginative; OE-T = overexcitability-intellectual; OE-E = overexcitability-emotional. * $p < .05$, ** $p < .01$

The findings from the multiple linear regression analyses partially supported the first hypothesis. In the regression analyses, only performing artists were included. This decision was based on the chi square results and informed by the MANCOVA group comparison results (see chi square and MANCOVA results in the following paragraphs). Imaginational overexcitability ($F(1,238) = 48.16$, $p < .001$, $R^2 = .19$, $\beta = .27$), cumulative trauma ($\Delta F(1,237) = 35.76$, $p < .001$, $\Delta R^2 = .11$, $\beta = .30$), Beyond the Personal ($\Delta F(1,236) = 8.38$, $p = .004$, $\Delta R^2 = .03$, $\beta = .16$), and emotional overexcitability ($\Delta F(1,235) = 4.30$, $p = .039$, $\Delta R^2 = .01$, $\beta = .13$) explained 32% of the variance in anomalous experiences. Psychomotor OE, sensual OE and intellectual OE were not significant predictors. Imaginational and emotional overexcitabilities, along with more cumulative trauma, and heighted creative experiences that expand Beyond the Personal predicted anomalous experiences.

The second hypothesis was that performing artists would differ from athletes and control participants, with higher scores on most overexcitability scales, anomalous experiences, cumulative trauma, and Beyond the Personal in the performing artist group. This was examined in the chi square analysis for each anomalous experience item

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collected in the ICMI and in the MANCOVA. Chi square analyses were conducted to determine frequency patterns for the anomalous experience items in the performing artist, athlete, and control participant groups. The performing artist group had higher frequencies than athlete and control groups for the items (n = 467): deeply moving religious, spiritual or mystical experiences, χ^2 = 15.07, p < .001, perceiving ghosts or apparitions, χ^2 = 11.30, p = .004, precognitive experiences, χ^2 = 12.68, p = .002, past lives, χ^2 = 8.53, p = .01, and experience of feeling one with the universe, χ^2 = 7.17, p = .03. The items relating to out of body experience and creating written work or songs that were out of personal control did not differ significantly across groups. These results support findings that identified an association with creative individuals and increased anomalous experiences (Holt et al., 2004). The chi square results in this study suggest that performing artists may be more open to anomalous experiences than athlete and control groups.

The MANCOVA had significant main effects (Wilks's Λ = .69, F(16,884) = 11.08, p < .001, η^2 = .17). Age (p = .01) and sex (p < .001) were significant covariates. Only cumulative trauma was not significantly different among the three groups. This result may be related to the high variance in this variable. Compard to the athlete and control groups, the performing artist group had more anomalous experiences, heightened beyond the personal creative processing experience, and elevated sensual, imaginational, intellectual, and emotional overexcitabilities. Both the performing artist and athlete groups had elevated psychomotor overexcitability compared to the control group. The mean, standard deviation, and test of between subjects effects for the performing artists, athletes, and control groups are outlined in Table 4.

Table 4

Mean Descriptive Statistics, Standard Deviations (SD), and MANCOVA (age and sex covariates) Group Comparisons (Performing Artists, Athletes, Control Group)

Item	PA	Athl	Control
AE	2.5(1.9)	1.5(1.7)	1.8(1.8)***
CumT	3.5(2.9)	3.2(3.4)	2.9(2.7)
BeyPers	10.7(2.7)	7.3(3.3)	8.3(3.1)***
OE-P	3.7(0.7)	3.7(0.7)	3.2(0.7)***
OE-S	3.9(0.7)	3.2(0.8)	3.3(0.8)***
OE-I	2.6(0.8)	2.1(0.8)	2.3(0.8)***
OE-T	3.7(0.8)	3.5(0.8)	3.3(0.8)***
OE-E	3.7(0.7)	3.2(0.7)	3.3(0.7)***

Note: PA = Performing Artists, Athl = Athletes, AE = anomalous experiences, CumT = cumulative trauma, OE-P = overexcitability – psychomotor, OE-S = overexcitability – sensual, OE-I = overexcitability – imagination, OE-T = overexcitability – intellectual, OE- E = overexcitability – emotional, ***p < .001

The moderation analysis to determine the effect of cumulative trauma on beyond the personal creative experience and anomalous experiences was not significant (p = .07). Although the significance value was not significant there may be a very small relation and the marginal effects were in the predicted direction; cumulative trauma may moderate personal creative experience and anomalous experiences if a larger sample was studied. Future studies should consider conducting a Bayesian analysis to determine whether this result truly supports the null hypothesis.

Discussion

The primary purpose of this study was to investigate performing artists and explore associations with anomalous experiences, overexcitability traits, Beyond the Personal creative experience, and cumulative trauma exposure. In summary, the main outcomes in this study included low to moderate associations among anomalous experiences, Beyond the Personal creative process, and the five overexcitabilities, with cumulative

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trauma having small associations with anomalous experiences, Beyond the Personal, as well as psychomotor and intellectual overexcitability. Compared to the athletes and control participants, the performing artists were more likely to experience five of the seven anomalous experience variables. There were no group differences for out of body experience and creating written work or songs that were out of one's personal control. Overall, 80% of the performing artists experienced at least one anomalous event, a similar percentage to those in American and British population surveys (76%) (Drinkwater et al., 2017).

Study outcomes also included some important findings in the group difference analyses (MANCOVA). All variables were higher in the performing artist group compared to the athlete and control groups, with the following exceptions: psychomotor overexcitability was similar within the performing artist and athlete groups and there were no group differences for cumulative trauma. The lack of difference for cumulative trauma may be related to the high variance in this measure, but the mean cumulative trauma scores suggested that the performing artist group had more trauma exposure compared to the other two groups despite a lack of statistical difference. When the performing artist group was examined independently, anomalous experiences were predicted by imaginational and emotional overexcitability, cumulative trauma, and Beyond the Personal creative experience. Based on these findings, performing artists might be more receptive to anomalous experiences if they experienced several childhood and adult traumatic events, exhibit a desire to create something that moves beyond their own individual experiences, and if they have innate traits to engage in their imagination and emotional sensitivity.

This study's results support previous findings that indicate receptiveness to anomalous experiences by artists (Holt, 2019). Compared to athletes and controls, the performing artists in this study had a higher prevalence rate for five anomalous experiences; however, the limitation in this study is that we were not able to determine if these anomalous experiences were positive, negative, or neutral. Future studies should explore the valence of these anomalous experiences.

Studies that have examined the relation between anomalous experiences and creativity have yielded inconsistent findings, most likely due to the multifaceted aspects that characterize creativity (Holt et al., 2004). To offset this limitation, this study narrowed the focus on creativity to the experience of moving Beyond the Personal while engaging in the creative process. This scale identifies the performing artist's desire to have creative products that exist outside the narrow bounds of the individual creator and into the realm of the universal (Nelson & Rawlings, 2009). This form of creative experience was identified as a significant predictor of anomalous experiences in the performing artists. When the creative process, Beyond the Personal, is heightened there is a sense that the creative engagement provides an expansive sense of self, the world, and beyond (Nelson & Rawlings, 2009). A similar sense can be derived when experiences are both exceptional and positive (Falk et al., 1999; Palmer & Braud, 2002). Both Beyond the Personal and positive exceptional experiences offer a sense of meaning, although anomalous experiences may be experienced as positive or negative (Rabeyron et al., 2018). In the study conducted by Cardeña and Terhune (2014), absorption and self-transcendence related to the ability to experience consciousness alterations during a hypnotic procedure. In this study on performing artists, Beyond the Personal has a self-transcendent quality and was a predictor of anomalous experiences.

Beyond the Personal creative process was also associated with the five overexcitabilities, a finding that indicates a relation with the overexcitability traits and the creative process experience (He et al., 2017; Piirto & Fras, 2012; Rabeyron et al., 2018; Thalbourne, 2000; van Thiel et al., 2019). This association was higher in the performing artist group compared to the athletes and control participants.

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The overexcitability pattern in this study, indicated that athletes and performing artists were similar for psychomotor overexcitability and higher than the control group (Thomson & Jaque, 2016a). This result may be influenced by the fact that there were more dancers in this performing artist sample; dancers share similar physical demands with athletes (Bird, 2009; Koutedakis & Jamurtas, 2004). Sensual, imaginational, intellectual, and emotional overexcitabilities were higher in the performing artists compared to the athletes and control participants; similar findings were identified in several studies (Martowska et al., 2020; Martowska & Romanowicz, 2020; Mendaglio & Tillier, 2006; Piirto & Fraas, 2012; Thomson & Jaque, 2016, a,b; Winkler & Voight, 2016).

Imaginational and emotional overexcitability were significant predictors of anomalous experiences in the performing artist group. These two overexcitability traits may promote an increased awareness and acceptance of anomalous experiences in performing artists. We hypothesized that imaginational overexcitability would be the only overexcitability variable to predict anomalous experiences. Imaginational overexcitability did explain 17% of the variance; however, emotional overexcitability explained another 1% of the variance. Imaginational overexcitability may enhance intellectual giftedness/ talent development by propelling individuals to escape boredom by engaging in internal multifaceted imaginative constructs (Ackerman, 2009). When imaginational overexcitability is an innate dimension, retreating into imaginative worlds or openly exploring anomalous or exceptional experiences are common (Falk et al., 1999; Palmer & Braud, 2002). Emotional overexcitability was not originally included in our hypothesis. Based on Dabrowski's Theory of Positive Disintegration (Ackerman, 2009), emotional overexcitability is regarded as the most important overexcitability to shape personality growth and development (Ackerman, 2009; Mendaglio & Tillier, 2006). Emotional overexcitability is associated with psychological understanding and is often heightened in individuals who pursue careers in the performing arts (Mendaglio & Tillier, 2006). Optimal engagement of emotional overexcitability promotes a global understanding of relationships; however, it can also operate negatively by increasing neurotic self-absorption (Harrison & van Haneghan, 2011; Mendaglio & Tillier, 2006). Despite the potential negative valence of emotional overexcitability, in general, this overexcitability trait is associated with greater emotion regulation and well-being (Perrone-McGovern et al., 2015).

Childhood adversity and trauma exposure have been associated with anomalous experiences (Cardeña et al., 2012, 2017; Palmer & Braud, 2002; Rabeyron et al., 2018), including in an unresolved classification based on an assessment in the Adult Attachment Interview for trauma and adversity (Thomson & Jaque, 2014). Increased exposure to cumulative trauma is also associated with increased valuing of the creative process (Thomson & Jaque, 2018). Cumulative trauma, along with Beyond the Personal creative process, were strong predictors of anomalous experiences in performing artists. Beliefs in anomalous experience are often associated with a desire to gain control over life (Irwin, 1990, 2000) and may operate as a way to find connection with the self, world, and beyond (Nelson & Rawlings, 2009), especially when past loss and abuse remain unresolved (Thomson & Jaque, 2014). To further explore cumulative trauma, a moderation analysis was conducted to determine if cumulative trauma moderated the effects of Beyond the Personal on anomalous experiences. Trauma was not a significant moderator, but the lack of significance was marginal. Cumulative trauma was not a significant predictor of imaginational or emotional overexcitability, a finding that supports the trait characteristic of overexcitability, regardless of exposure to childhood or adult adversity (Ackerman, 2009).

The limitations in this study include the inherent subjective bias of self-report measures. The cross-sectional design precludes longitudinal causal predictions. The sample examined in this study had a larger representation of pre-professional and professional dancers as well as female performers. Previous studies have indicated that

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dancers have higher serotonergic neurotransmission while dancing, which is associated with higher human religious and spiritual experiences (Bachner-Melman et al., 2005). The fact that this sample had more dancers may directly influence the anomalous experiences findings.

Future studies should include a more evenly distributed representation of performing artists. The implementation of other self-report measures such as the Paranormal Belief Scale (Drinkwater et al., 2017) would increase validity and reliability beyond the use of the anomalous experience items contained in the ICMI questionnaire. Creating measurements that differentiate anomalous experience beliefs from specific paranormal experiences will also provide more clarity in future research (Wahbeh et al., 2020). As well, determining the intensity and valence of anomalous experiences may further increase understanding about anomalous attributions (Lange et al., 2019). We recommend that future studies explore overexcitabilities in other populations to see if anomalous experiences are associated with overexcitabilities (Alias et al., 2013).

The primary purpose of the study was to investigate performing artists and anomalous experiences. The uniqueness of this study was the inclusion of the five overexcitability traits, cumulative trauma exposure, and a sense that the creative process can expand beyond the narrow constraints of the personal. Examining performing artists and their relationship with anomalous experiences addresses a gap in anomalous experiences research (Cardeña, 2015, 2018). The overexcitability traits, along with creative and adversity experiences may open performing artists to a greater sensitivity and awareness of novel and unusual anomalous experiences (Holt, 2019; Osipovich, 2006).

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Darstellende Künstler und anomale Erfahrungen: Übererregbarkeit, Kreativität und Trauma-Vorgeschichte sind Teil des Bildes

Paula Thomson **S. Victoria Jaque**

Zusammenfassung: Zielsetzung: Es sollten die Beziehungen zwischen anomalen Erfahrungen und fünf Übererregbarkeiten, kumulativer Traumaexposition und dem kreativen Prozess ‚Beyond the Personal" anhand von Stichproben von darstellenden Künstlern, Sportlern und Kontrollpersonen untersucht werden. Methode: Es handelt sich um eine Querschnittsstudie (N = 454). Den Teilnehmern wurden in einer Sitzung fünf Selbsteinschätzungsinstrumente vorgelegt, um fünf Dimensionen von Übererregbarkeit, frühere Missgeschicke und Traumaereignisse in der Kindheit, kreative Erfahrungen und anomale Erfahrungen zu bewerten. Die Analysen umfassten Analysen zwischen den Instrumenten und zwischen den Gruppen, mit einer Regressionsanalyse, die sich nur auf darstellende Künstler (n = 248) konzentrierte, und einer Moderationsanalyse, um einen moderierenden Effekt des kumulativen Traumas auf andere Variablen zu bestimmen. Ergebnisse: Die Ergebnisse zeigten, dass darstellende Künstler im Vergleich zu Sportlern und Kontrollpersonen größere Übererregbarkeiten, höhere Kreativitätserfahrungen ‘Beyond the Personal’ und mehr anomale Erfahrungen aufwiesen, aber keine Unterschiede bei kumulativen Traumata. Imaginative Übererregbarkeit, kumulatives Trauma, kreative Erfahrung ‘Beyond the Personal’ und emotionale Übererregbarkeit erklärten 32% der Varianz der anomalen Erfahrungen in der Gruppe der darstellenden Künstler. Die Moderationsanalyse erreichte keine Signifikanz. Schlussfolgerung: Die Ergebnisse dieser Studie deuten darauf hin, dass der Wunsch, Werke zu schaffen, die ‚Beyond the Personal’ hinausgehen, in Verbindung mit erhöhten Übererregbarkeitsfaktoren eine größere Sensibilität und Aufmerksamkeit für neue und ungewöhnliche Erfahrungen, einschließlich anomaler Erfahrungen, mit sich bringen.

German translation: Eberhard Bauer

Artistas Performáticos e Experiências Anômalas: Superexcitabilidade, Criatividade e Histórico de Traumas Fazem Parte do Contexto

Paula Thomson **S. Victoria Jaque**

Resumo: Objetivo: Avaliar as relações entre experiências anômalas com cinco superexcitabilidades, exposição cumulativa a traumas e processos criativos Além do Pessoal (Beyond the Personal), com amostras de artistas performáticos, atletas e grupo de controle. Método: Trata-se de um estudo transversal (N = 454). Os participantes receberam em uma sessão cinco instrumentos de relato pessoal para avaliar as cinco dimensões de superexcitabilidade, adversidades passadas na infância e eventos traumáticos, experiências criativas e experiências anômalas. As análises incluíram observações inter-instrumentos e intergrupo (n = 248) e uma análise de moderação para determinar um efeito moderador de trauma cumulativo em outras variáveis. Resultados: Os resultados mostraram que, em comparação com atletas e grupo de controle, os artistas performáticos tiveram maiores superexcitabilidades, mais experiências criativas Além do Pessoal (Beyond the Personal) mais altas e mais experiências anômalas, mas sem diferenças em traumas cumulativos. Superexcitabilidade imaginativa, trauma cumulativo, experiência criativa Além do Pessoal (Beyond the Personal) e superexcitabilidade emocional explicaram 32% da variação em experiências anômalas no grupo de artistas performáticos. A análise de moderação não alcançou significância. Conclusão: Os achados deste estudo sugerem que o desejo de criar obras que expandam para Além do Pessoal (Beyond the Personal), juntamente com fatores elevados de superexcitabilidade, relacionam-se a uma maior sensibilidade e consciência de experiências novas e incomuns, incluindo experiências anômalas.

Portuguese translation: Antônio Lima

Artistas Escénicos y Experiencias Anómalas: La Sobreexcitabilidad, La Creatividad, y la Historia Traumática Forman Parte del Cuadro

Paula Thomson **S. Victoria Jaque**

Resumen: Objetivo: Evaluar las relaciones de las experiencias anómalas con cinco sobreexcitabilidades, la exposición acumulada al trauma, y proceso creativo más allá de lo personal, con muestras de artistas escénicos, atletas, y grupo control. Método: Estudio transversal (N = 454) en que se administró a los participantes en una sesión cinco instrumentos de autoinforme para evaluar cinco dimensiones de la sobreexcitabilidad, adversidad en la infancia pasada y acontecimientos traumáticos, experiencias creativas, y experiencias anómalas. Los análisis incluyeron análisis entre instrumentos e intergrupos, con un análisis de regresión que se centró sólo en los artistas escénicos (n = 248), y un análisis para determinar el efecto moderador del trauma cumulativo sobre otras variables. Resultados: Los resultados mostraron que, en comparación con los atletas y los controles, los artistas escénicos tuvieron mayores sobreexcitabilidades, mayores experiencias creativas más allá de lo personal, y más experiencias anómalas, pero no difirieron en el trauma cumulativo. La sobreexcitabilidad imaginativa, el trauma cumulativo, la experiencia creativa más allá de lo personal, y la sobreexcitabilidad emocional explicaron el 32% de la varianza en las experiencias anómalas en el grupo de artistas escénicos. El análisis de moderación no fue significativo. Conclusiones: Los resultados de este estudio sugieren que el deseo de crear obras que se expandan más allá de lo personal, junto con factores de sobreexcitabilidad elevados, se relacionan con una mayor sensibilidad y consciencia de experiencias novedosas e inusuales, incluyendo experiencias anómalas.

Spanish translation: Etzel Cardeña

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Anomalous Mind-Matter Influence, Free Will, and the Nature of Causality[1]

George Williams

Independent Researcher

Abstract: This paper proposes a framework that supports both free will and anomalous mind-matter interaction (psychokinesis). I begin by considering the argument by the physicist Sean Carroll that the laws of physics as we understand them rule out psychokinesis (and other modes of psi), and find his claims problematic, in part due to misunderstandings of arguments borrowed from David Hume. I proceed to consider a more dispositional notion of causality (in contrast to one characterized by universal and necessary laws) which is more hospitable to both psychokinesis and free will. I then incorporate recent work from the philosophy of mind and science to arrive at a framework that supports real volition and psychokinesis, which are intimately linked. This approach is fundamentally dispositional but grounded in an ontologically prior field of awareness and potentiality. I also consider that the regularities (or causal natures) we observe in our physical world are ultimately supported by teleological "intentions" within a nonlocal, mind-like quantum ground.

Keywords: causality, psychokinesis, PK, consciousness, free will, Dispositionalism, quantum mechanics.

Highlights

- Arguments from the physicist Sean Carroll and others that our understanding of the "laws of nature" rule out the possibility of psychokinesis are flawed, in part because of misunderstandings of David Hume's arguments.
- Characterizing the causal nature of the world through dispositions provides a more favorable view to psychokinesis (and free will) than positions favoring necessary and universal laws.
- I link a version of causal dispositionalism established at the level of quantum mechanics with the notion of a quantum ground that is the base of conscious experience and the potentialities underlying our world.
- This framework is consistent with both the data on psychokinesis and our experience of free will, which are intimately linked.

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- Instead of fixed, universal, necessary laws, the regularities and stable relations we observe in our world are supported by teleological "intentions" of a nonlocal, mind-like ground of potentiality.

Can anomalous mind-matter interaction, also known as psychokinesis, be reconciled with our understanding of causality? Many conventional scientists are highly skeptical, as it is the case with most categories of psi. Even some parapsychologists, such as May et al. (1995), have registered strong reservations against such an interpretation. However, in this paper, I wish to consider a framework that supports the possibility of psychokinesis, as well as genuinely free will. I will begin with an examination of our more conventional notions of causality, a crucial lynchpin for our scientific understanding, and spill over into the fundamental question of free will. Deterministic-based views of the world seem difficult to reconcile with free will and psychokinesis. Later I will discuss an alternative framework for causality that will allow both volition and anomalous mind-matter interaction.

Carroll's Argument Against Psychokinesis

The physicist Sean Carroll has argued that we should dismiss the evidence on psychokinesis (he uses the term telekinesis) as well as other forms of psi, based on our current understanding of the "laws of nature." These arguments can be found on Carroll's blog (2008), as well as his recent book, *The Big Picture* (Carroll, 2016). As a physicist who specializes in quantum mechanics and cosmology, Carroll has authored three books intended for a wide audience and therefore has significant influence outside of his field. Recently, the psi skeptics Reber and Alcock (2019) and Pinker (2021) cited Carroll to back up their own arguments against psi. Further, Carroll (2021) deployed a similar argument regarding nature's "laws" to attack proposals by some philosophers that consciousness may be fundamental in some sense. By fundamental, I mean that consciousness is not emergent from non-conscious physical particles, but rather an aspect or

characterization of the world at the most basic (fundamental) level. In sum, Carroll attacks both the psi data in general and psychokinesis in particular, as well as the idea that consciousness may be fundamental by claiming that these would be inconsistent with our current understanding of the "laws of nature," about which we should place great confidence. Due to his wide influence, and because I believe his arguments are representative of many contemporary thinkers on science, I wish to focus on Carroll's arguments.

Carroll (2008) first made the argument on his blog: "...while there are certainly many things that modern science does not understand, there are many things that it does understand, and those things simply do not allow for telekinesis, telepathy, etc." Although he uses the term "telekinesis," I use the term "psychokinesis" here to refer to anomalous mind-matter interaction. Carroll then proceeds to present a relatively brief overview of the known forces (such as gravity) and the particles that constitute our world. He explains simply that psychokinesis is virtually impossible because our current knowledge of the particles and forces that comprise our world is sufficiently strong to rule out any anomalous mind-matter interaction.

However, some physicists have argued that a more cautious view is warranted, given the significant gaps that remain in our understanding of the world. Physicist Bernard Carr (2021), in a response to Reber and Alcock's (2019) claim that the psi data violated known "laws of physics," noted that we are not close to reaching a "final theory of physics" and thus are not in a position to rule out anomalous findings. Similarly, physicist Brian Josephson (2022), in response to Pinker's (2021) dismissals of the psi data, has argued that advances in science sometimes requires that we fundamentally revise our models of the world.

Hume's Argument Against Miracles

In *The Big Picture*, Carroll (2016) repeats the argument that he made on his blog. And like many psi skeptics, he also borrows from David Hume's argument *On Miracles*. He noted that Hume

> considered the question of how we should treat claims of miraculous events, defined as "violation of the laws of nature." His answer was Bayesian in spirit: we should accept such a claim only if it would be harder to disbelieve it than believe it. That is, evidence should be so overwhelming that it would strain our credulity more to deny it than to accept that the laws we thought governed the world have in fact been violated. The same holds for psychic phenomena: as long as the evidence in favor of them is weaker than our evidence in favor of the laws of physics (as it surely is), our credence in their existence should be extremely low. (p .157)

Using Hume's argument, Carroll noted that the evidence gathered in physics laboratories that support our current understanding of the laws of physics is overwhelming. Carroll's notion of the "laws of nature" is central to his dismissal of the psi data, particularly psychokinesis. In *The Big Picture*, he associates the "laws of nature" with the patterns discoverable by methods of science and empirical investigation. And throughout his book, he appears to use the phrases "laws of nature" and "laws of physics" interchangeably (as perhaps is common). Recently, Reber and Alcock (2019) take these "laws" as well-established mathematical relations developed through experiments in physics. And the view that the "laws of nature" are ultimately based on these relations arguably poses a strong challenge regarding our ability to reconcile the psychokinesis data with scientific understanding. Further, the necessary or deterministic nature of these laws supports the view of causal closure, which entails that our minds have no ability to cause action through will.

But I believe that Carroll and other psi skeptics get two things wrong about Hume. First, Hume's argument *On Miracles* targets religious miracles, such as those found in religious scripture, not experimental findings gathered under controlled conditions. Hume's main argument targeted the unreliability of religious testimony, which he argued was fatally undermined by the sense of passion and wonder evoked by such accounts as the dead rising from their graves (Williams, 2019). Reliable testimony, according to Hume, should be based on more common and sober accounts. Second, Hume argued against the position that the "laws of nature" are necessary or involve connections that could be mathematically characterized. His argument on the world's causal nature has been extremely important and influential, and I will take some space to summarize it.

Hume famously examined the nature of cause and effect based on sense impressions acquired during experience. According to Hume, our true knowledge on "matters of fact" must be based on sense impressions only, not a priori intuitions about the world. Concerning causal relations between various objects, he noted that all we truly see are the regularities between such objects, such as moving billiard balls striking other balls and forcing them to move. We do not observe the causal relations themselves. Thus, we cannot characterize the causal nature of the world beyond regularities. As he put it: "All events seem entirely loose and separate. One event follows another; but we never can observe any tie between them. They seem conjoined, but never connected" (Hume, 2007, p.54).

Thus, Hume viewed the "laws of nature" as only summaries or systemizations of the regularities that occur in the world. He rejected the view that nature's "laws" are necessary or can be characterized completely through mathematical formulations. He also considered whether the patterns of regularities of our world would continue to hold over time. He noted that no such regularities persisting over time meet our sense experience. He concluded that we may characterize causal relations, based on repeated observations, only in a probabilistic sense, and we cannot presume that the regularities we observe from data derived from a given set of objects and circumstances can be used to characterize or constrain the regularities for a very different set of objects, environments, or set of circumstances.

Let us turn now to Carroll's use of Hume's argument to dismiss the psi data. First, such data, generated over decades across diverse laboratories, have followed modern procedures of controlled conditions and peer review, and this departs considerably from Hume's characterization of religious miracles. Modern controlled procedures have been designed to rule out the unreliable, subjective factors that concerned Hume. Carroll makes no mention of the meta-analysis recently summarized by Cardeña (2018) on various categories of psi, but his argument seems to imply that the laws of physics revealed by experiments in physics laboratories are sufficiently strong to overwhelm the meta-analyses of decades of such psi research. In a recent interview, he stated that his confidence in this understanding justifies simply ignoring reports of the evidence (Broderick & Goertzel, 2015).

Thus, Carroll appears to believe that psi phenomena (such as psychokinesis) remain outside the boundaries of our current scientific understanding. Of course, it is also the case that anomalies have occurred periodically in scientific history that required an alteration of the scientific theories for that time. Simply dismissing those historical anomalies as impossible miracles that violated nature's "laws" would undoubtedly have hindered scientific progress. It is therefore crucial to distinguish the anomalous (with respect to our current views) from violations in the "laws of nature."

With that in mind, we can note that the experimental psi data, unlike the experiments in physics, focus on the existence of anomalous shared information between different individuals and their environments. This in turn touches on the nature of

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consciousness, which in many respects remains mysterious. The heart of many skeptical arguments is that the mathematical equations established in fields such as physics and chemistry can be extrapolated and applied to constrain what results should be acceptable in very different domains of inquiry. But as noted above, Hume provides no basis for extrapolating the regularities obtained from a particular domain in physics into very different domains that attempt to investigate shared information through consciousness.

It seems doubtful that Hume's arguments provide the resources to block out or rule out acceptance of the psi data, and his reasoning removes the basis for simply claiming we fully understand the "laws of nature." Exactly what such causal or natural laws are remains an ongoing debate among philosophers of science. Carroll's view, that strict mathematical laws determine how all events in our world unforld, appears to rule out not only psychokinesis but also our ability to exercise free will. A truly deterministic world might be expected to unfold according to mathematical rules going back to the ultimate origin, the Big Bang. But let me consider further the nature of these laws.

Consciousness, Quantum Mechanics, and Context Dependency

We might consider how quantum mechanics, which raises a number of interesting questions, impacts this discussio. First, its inherently probabilitic nature suggests that we might avoid a world where all events simply unfold deterministically. Does this suggest a channel through which free wll and/or psychokinesis might operate? Notably, much of the literature on psychokinesis involves quantum processes. However, Carroll rules out this possibility. According to Carroll (2021), the probabilitic nature of quantum mechanics represents merely random outcomes from the appropriate probability distributions (p. 23).

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But both quantum mechanics and consciousness remain poorly understood. Currently, there is no consensus around an interpretation for quantum mechanics. Similarly, philosophers of mind are far from arriving at a settled theory of consciousness. Currently, many working in philosophy of mind are exploring explanations of consciousness where some degree of sentience may exist at the subatomic level. At this stage, ruling out any possible connection between the probabilistic nature of quantum mechanics with volition and consciousness appears premature. In particular, I believe that a considerable problem that Carroll ignores is the problem of context dependency in quantum mechanics.

As we discussed, Carroll has argued that our world in all its complexity ultimately rests on well-understood laws that are deterministic (or necessary) and universal. However, Cartwright (1983) has challenged this view and has noted that our knowledge of such laws has usually required very special laboratory conditions that are tightly controlled. Such "ceteris paribus" laws are understood as laws holding under special conditions. This raises the question of how we are to characterize those laws outside of the tightly controlled conditions of the physics lab.

We might assume independence of context regarding laws associated with classical physics. Newton's law of gravity and Maxwell's equations of electromagnetism do not contain parameters that change in different environments. However, context dependency is a well-known property for quantum mechanics, which implies that the experimental outcomes in quantum systems can be expected to hinge critically on the choice of what is measured as well as the details of the experimental setup.

To be clear what context dependency on the quantum level implies, consider a wave function that describes the spin of two electrons we can call Bill and Tom. Expression (1) shows the spin of each electron can be either spin up or spin down. However, the two electrons are entangled, so that if one is observed to be spin up, the

other will be spin down, or vice versa. The parameters α and ß represent the Born probabilities concerning which electron spin states will ultimately be observed.

$$|\psi\rangle_{Bill,\,Tom} = \alpha\,(|\uparrow\rangle_{Bill} + |\downarrow\rangle_{Tom}) + ß\,(|\downarrow\rangle_{Bill} + |\uparrow\rangle_{Tom}) \qquad (1)$$

The wave function is placed within the Schrödinger equation, which in turn describes the evolution of the quantum system, electrons Bill and Tom, but notice that the parameters α and ß are not pinned down to specific values, unlike the parameters within equations from classical physics. These Born probabilities are obtained by averaging the results of many quantum experiments. And these probabilities are not constant across different kinds of experimental environments; the observed experimental outcomes depend critically on all aspects of the experimental setup, as well as the choices made on what to measure.

But does quantum context dependence truly impact the macro world, outside subatomic processes? As it happens, yes. The emerging field of quantum biology has identified quantum happens, yes. The emerging field of quantum biology has identified quantum properties in various biological processes. Marais et al. (2018) have recently presented a current overview of how energy transport processes, such as photosynthesis and enzyme catalysis, exhibit quantum mechanical properties. They also cited preliminary theories and data supporting quantum properties associated with aviary migration, olfaction, and cognition. In time, this growing field will likely add to our understanding on how quantum processes occur in the biological world.

In another recent paper, Carroll (2021) makes the case that the established "laws of nature" rules out taking consciousness as fundamental. However, he acknowledges that "particle-physics experiments typically examine the interactions of just a few particles at a time…" (p. 28). But biological systems exhibiting quantum behavior likely involve millions of particles, at temperatures and pressures considerably different from particle-physics laboratories. Can we expect that the quantum behavior found in small particle experiments will extend and apply toward more complex, biological systems? While we can expect that the formalism of quantum mechanics applies across very different systems, the specific values of the Born probabilities, as well as the nature of entanglement between vast numbers of particles, are context dependent and will depend crucially on their environments. Much of our understanding on what Carroll terms the "laws of physics" is based on highly specialized laboratory environments that cannot be extended in a straightforward way where we have reason to expect the relevant system to be context dependent.

I will briefly take up Carroll's (2021) argument against considering a more fundamental view of consciousness. As with his argument against psi phenomenon, Carroll argued that our impressive success in theory building (quantum field theory, in this case) presents a high bar that should discourage us from considering any radical change in our current understanding of the world, which he assumes would be required if we take consciousness as fundamental. However, while Carroll argues we should be able to explain consciousness through some process of weak emergence, he offers no hints of such a theory. Since there is no widely accepted theory on the table for either strong or weak emergence of consciousness, and because Carroll does not even cite any speculative attempts, his efforts to close off the possibility that a theory of consciousness may require something like new laws, or a more fundamental view of consciousness, fall short.

In addition, Goff (2021) replies to Carroll's argument by noting that recent panpsychist approaches take consciousness as intrinsic to the physical world, and this move does nothing to alter the theoretical structure within physics, which in turn is based on experiments concerned with the extrinsic (outer) aspect of our world. I will take up the notion that consciousness may represent the intrinsic aspect of matter below.

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To boil things down a bit, I highlight here two problems in Carroll's arguments, apart from the difficulties noted earlier regarding his interpretation of Hume. First, Carroll argues that the success of modern physics, especially quantum field theory, should discourage us from considering some alternative to our physicalist view of the world. However, the problem of consciousness, as well as the measurement problem in quantum mechanics, are at least two areas that suggest important gaps in our understanding of the world's ontology. Secondly, Carroll's arguments do not recognize the context dependency of quantum mechanics, and thus likely miss how quantum behavior in biology and other areas may be poorly characterized from experiments involving very few particles. In the next section, I will move forward from Carroll's arguments and consider how we might characterize causality in ways that might support genuine free will and psychokinesis.

The Dispositional View of Causality

So far, I have argued that our current scientific framework does not obligate us to accept necessary and universal laws, as Carroll argues (and as Hume himself rejected). The context dependency of quantum behavior strongly suggests we cannot characterize quantum behavior generally based on small particle experiments. I believe this opens the door for the possibility of free will and the sort of anomalous mind-matter interaction that the psi literature supports. To support free will and psychokinesis we must find a way to integrate consciousness with some notion of causality that in likelihood is different from both Hume's relatively meager view, based on regularity, and Carroll's more necessary and universalistic characterization.

Recently, some philosophers considering the metaphysics of causality have turned toward ways of characterizing the behavior of the physical world in ways that depart from both Hume and Carroll's more fixed version of laws. These characterizations have generally included such terms as dispositions, potentialities, powers, tendencies, and capacities, often interchangeably. Going forward, I will (mostly) use the term "disposition," with the understanding that this might be synonymous with other terms. Disposition can be used to describe the behavior of an object that is under some condition or stimulus. For example, a vase has the disposition (tendency, capacity, etc.) to break when dropped onto a hard floor. A match has a disposition to burst into flame when struck on a rough surface. An interesting thing about dispositions is that they involve possibilities that we cannot pin down. Thus, we cannot be completely sure that the match will light or whether the vase will fracture. (And if the vase breaks, we cannot predict how many pieces, nor their size and shape.) The dispositional view of causality has become an important and influential position among philosophers of science (Bird 2007; Chakravartty 2007; Choi & Fara, 2018; Mumford & Anjum, 2011).

In their text on causality, Illari and Russo (2014) introduce the importance of dispositions or capacities in describing causal behavior within biological systems. They note that with respect to biological systems, there are few if any universal, exceptionless laws, but instead descriptions and models of particular systems (e.g., cells, organs, species) and properties such as dispositions, powers, or capacities is the appropriate way to characterize causal behavior for such biological systems.

A frequent example dispositionalists take from the medical literature is the established causal link between smoking cigarettes and lung cancer. The evidence leaves little doubt that smoking and lung cancer are causally linked. That said, it is not possible to determine whether one will develop cancer, no matter how many years of smoking or how much additional information we have about the person in question. Although a causal link between smoking and cancer is not in question, we cannot remove the uncertainty involved. All we can say is that various tendencies or dispositional features about people and their smoking habit are at play, and we cannot determine with certainty whether any given smoker will develop cancer.

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Some may consider that describing the world in dispositional terms moves us away from a more mathematical and therefore elegant way to view the world. But even cases involving physical particles can be described in dispositional terms. For example, we can understand a negatively charged electron to have a disposition to repel other electrons. And a dispositionalist view should not discourage us from continuing to characterize causal relationships using mathematical formalism in physics and other areas, where it has proved so useful. A dispositionalist view may suggest, however, that some causal behavior cannot be completely captured in mathematical formalism. Later, I will suggest an example of this with respect to the quantum measurement problem.

Arguably, the dispositional approach is more general than a view characterized by universal, necessary laws. As Cartwright notes, the view that laws are rigid, necessary, or deterministic hold only under special circumstances. In addition to biology, dispositions are more useful for describing causal links in the areas of psychology and the social sciences. During busy traffic, I often experience a greater tendency to feel anxious, even angry. Such a description captures my emotional states in traffic in a way that would elude a more formal, mathematical framework. We also might note that human personalities are better characterized by tendencies and dispositions, rather than mathematical rules.

I further submit that the metaphysics of causality based on dispositions is much more hospitable to the notions of free will and psychokinesis than is the case with deterministic, universal laws. Advocates of dispositional frameworks have noted that such views are considerably more friendly to genuinely free will (Lowe 2013; Mumford & Anjum, 2018). But to genuinely make progress, I believe we need to bring in some notion of consciousness. However, first let me consider the dispositional nature of the world at the most fundamental level.

Dispositions and the Quantum View

The domain of quantum mechanics likely provides the best view of fundamental reality. Mumford and Anjum (2018) have recently examined the nature of causality within quantum mechanics and make the case for causal dispositionalism. The inherently probabilistic and contextualistic nature of quantum mechanics is arguably very attractive to a view that the world is fundamentally dispositional. They follow Heisenberg's (1958) recommendation for incorporating Aristotle's notion of real potencies into their metaphysics of causality. With this more Aristotelian approach, they argue that causation within our world is best understood in terms of irreducible tendencies (potencies) contributed from large numbers of influences, rather than more classical frameworks that entail necessity and predictability. Thus, the wave function, expressed in terms of the potential states of quantum entities that are in turn entangled with the potential states of other entities, appears to reveal a world fundamentally supported by tendencies and contingencies, jointly and holistically connected.

Mumford and Anjum (2018) characterize Heisenberg's notion of real *potentia* as "unformed energy," which they view as similar to Aristotle's *materia prima*. They quote Heisenberg (1958, p. 160):

> All the elementary particles are made of the same substance, which we may call energy or universal matter; they are just different forms in which matter can appear. If we compare this situation with the Aristotelian concepts of matter and form, we can say that the matter of Aristotle, which is mere 'potentia', should be compared to our concept of energy, which gets into 'actuality' by means of the form, when the elementary particle is created.

Heisenberg here suggests that some fundamental substance underlies all elementary particles, which he calls "universal matter" or Aristotle's "potentia."

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Heisenberg's proposal that something like Aristotle's notion of "potentia" should be incorporated into the ontology underlying quantum mechanics has gotten little traction among physicists, perhaps because this potentia is by definition not instantiated and hence unobservable. However, recently Stapp (2017) and Kastner et al. (2018) have followed Heisenberg's proposal that this real potentia characterizes the superposition of the quantum states as described by the orthodox (Copenhagen) quantum interpretation, which is the case with Mumford and Anjum (2018) as well. According to this view, the quantum system remains in superposition of possible states until a measurement occurs and the wave function "collapses" into the experimental outcomes. Kauffman and Radin (2023) have also recently explored Heisenberg's notion of "potentia" within the orthodox quantum interpretation to account for the psi data.

However, I recommend a different direction for understanding this notion of potentia within quantum mechanics. Rather than characterizing the superposition of the quantum states as ontologically real, I suggest using potentia as a way of describing an ontologically prior (deeper) ground for our world. Arguably, we can associate such ideas as a fundamental substance underlying all particles, or Aristotle's universal matter, with the concept of the physical world's intrinsic aspect. As Kant and other philosophers have argued, we have good reason to believe that matter has a deeper or intrinsic aspect beyond what our observations and scientific methods can reveal. If we link this notion of quantum potentia with matter's intrinsic aspect, we are arguably led to consider something that serves as the ontological ground or basis of the particles that constitute our world. And we avoid the ontologically problematic notion of quantum superposition.

A Quantum Ground

Recall the simple quantum wave function (1) discussed above. I noted that the Born probabilities associated with electrons Bill and Tom, which tell us the likelihood of which spin states will be observed, are not pinned down. In the example, these state outcomes are correlated (entangled) in spacetime in a way we currently do not understand.

Ismael and Schaffer (2020) make the case that an ontologically prior quantum ground is the best way to account for the nonlocal correlations between entangled states of entities. They prefer the term "nonseparable" rather than "nonlocal" to characterize the entangled correlations found in quantum mechanics. They and others note that the notion "nonlocal" is in greater tension with relativity (I prefer to retain nonlocal because that term is frequently used in the literature on psychokinesis and other modes of psi). On entanglement between entities, they noted that such correlations cannot be explained by causal connections between such entities because relativity rules out instantaneous causality in spacetime. Instead, such correlated behavior between entities suggests the presence of a common ground--beyond our spatiotemporal order--that coordinates the probabilities that characterize possible states. This coordination or influence between possible states is not described by quantum mathematical formalism. For they, this common ground establishes a metaphysical relation between relatively derivative entities, the particles that constitute our world, with an ontologically prior ground of the quantum system, which inhabits a high-dimensional space and is thus not confined to our familiar spatiotemporal order. The notion of a high-dimensional space is the basis for wave function realism, the position advocated by Ney (2020), Albert (2013), and others, that the extraordinary number of dimensions required by the wave function (due to entanglement) reflects an ontologically real, fundamental "space," ontologically prior to our familiar spatiotemporal order (see Carr, 2015, for another approach that considers additional or higher dimensions, using a framework comparable to string theory, that explores the connection between the mental and physical domains of reality in order to account for the psi data).

It seems reasonable that we link Heisenberg's notion of potentia, with Ismael and Schaffer's notion of a quantum ground, residing in a high-dimensional space of the wave

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function. We might go further and characterize this ground as the intrinsic or ontologically deeper aspect of the material world, but perhaps this ground of potentialities, which coordinates the probabilities of quantum systems, also possesses the resources to guide the behavior of their subatomic particles. That is, this quantum ground may be something like a hidden variable that guides or influences which experimental outcome is observed. I will say more about this below.

This proposal has a number of attractive features. As noted earlier, dispositions are properties that lead to an outcome, depending on a particular action and the given circumstances, but our world arguably requires something more fundamental than just dispositions or tendencies. My proposed field of potentiality provides a suitable grounding entity. In addition, we arguably place Heisenberg's notion of potentia on a stronger theoretical footing, as the quantum ground underlying and guiding the particles of our world, in a way where we avoid questionable ontologies such as quantum superposition and wavefunction collapse. There is a substantial philosophical literature that argues we have good reason to consider an ontologically deeper or intrinsic aspect of the physical world. Given the persistent measurement problems in quantum mechanics, attempting to find an interpretation that links with this philosophical reasoning of matter's intrinsic nature appears to hold promise.

Consciousness and a Ground of Potentialities

Going forward, I wish to consider how we might bring consciousness into the picture and thus have a framework for understanding anomalous mind-matter interactions, as well as free will. How do we bring consciousness into this notion of high-dimensional field of potentialities underlying our physical world? I will discuss two arguments that lead us in this direction.

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Russellian Monism

Recently an important literature has resurfaced among philosophers of mind that suggests a link between the intrinsic, or most ontologically basic, nature of matter and consciousness itself. The position, often associated with Bertrand Russell, notes that our scientific understanding of the world is based on identifying structural and dispositional properties. Thus, scientific theories generally characterize the world in terms of structural or mathematical equations. However, Russell (and others) argued that such structural descriptions cannot fully describe all aspects of our world, such as the deeper or intrinsic aspect. But Russell also argued that the only real knowledge we have of an intrinsic element in our world is based within our own conscious experience. This has led the way for Russell and others to argue that the (ontologically deeper) intrinsic aspect of our world is the basis or ground of our conscious experiences (Russell, 1927; Alter & Nagasawa, 2015).

If we are sympathetic to the view that consciousness is fundamental in some sense and hope to fit it into the physical world, we might consider the quantum ground of potentialities (that I have been discussing) as Russell's notion of an intrinsic aspect, which therefore provides the basis for conscious experience. And linking matter's intrinsic aspect with the probabilistic tendencies that provide the foundation of our reality is a promising direction.

Under this view, conscious experience is rooted in a nonlocal field of potentia underlying physical reality. Consciousness rooted in this inherently nonlocal, and therefore universal, field leads to a version of cosmopsychism, the position that the universe as a whole is conscious and all various conscious organisms are aspects of this cosmic mind. (This can be contrasted with constitutive panpsychism, the view that our conscious experience is somehow the product of combinations of micro-sentient particles.) Space does not allow me to consider in more detail how biological systems

interact with this deeper ground in a way that produces various kinds of conscious experience, but this appears to be a promising framework for exploring anomalous mind-matter interaction. The notion that our consciousness is ultimately rooted in a nonlocal, fundamental ground comprised of unified potential states, suggests that our minds can indeed influence quantum processes, as the psychokinesis literature suggests, assuming the mind has true volition. I turn to the question of free will next.

Dispositionalism as a Foundation for Experience and Will

I have noted above some of the attractive features of a dispositional view of causality, relative to necessary laws or Humean regularity, but such a dispositional view, which presents a world where some sort of stimulus leads to manifestation (dependent on context or circumstances), may leave us questioning the source of the stimulus or cause in a fundamental sense. Is every stimulus the result of a previous manifestation? Such a world might be consistent with a sort of determinism where free will has no place. Is there some fundamental source of causality? Perhaps the quantum ground, as an aware, nonlocal and unified field of potentialities, also provides a base for fundamental cause in some sense.

For William James (1911), attending to our direct experience of the world seemed to be a reasonable way to probe the fundamental nature of causality. As he put it,

> the concrete perceptual flux, taken just as it comes, offers in our own activity-situations perfectly comprehensible instances of causal agency....If we took these experiences as the type of what actual causation is, we should have to ascribe to cases of causation outside of our own life, to physical cases also, an inwardly experiential nature. In other words we should have to espouse a so-called 'pan-psychic' philosophy. (p. 218)

James argued that if direct experience of our own volition is our only window into the nature of true causation, then we may have grounds for attributing such agency more broadly throughout our physical world. Importing this reasoning into the framework we explore here suggests that the quantum ground may be a source of agency as well as phenomenal properties.

Mørch (2020) has recently surveyed similar arguments from the history of philosophy that support the view that the only fundamentally dispositional properties we have acquaintance with are phenomenal properties, which in our experience we associate with agency and intention. She maintains that these arguments lead us to toward considering fundamental causality in the world as mental and ultimately based on the expression of the world's underlying volition. Among the examples she presents in her survey (which includes the above James quote) is one from Schopenhauer (1966):

> Only from a comparison with what goes on within me when my body performs an action from a motive that moves me, with what is the inner nature of my own changes determined by external grounds or reasons, can I obtain an insight into the way in which those inanimate bodies change under the influence of causes, and thus understand what is their inner nature. (p. 125)

By "inner nature" Schopenhauer was referring to the intrinsic aspect of the world. Thus, Schopenhauer argued something close to Russellian monism, but while also attributing will or agency to the intrinsic aspect of matter.

Ismael and Schaffer do not suggest that their proposed quantum ground possesses phenomenal resources (or volition). However, Mørch's survey of introspective arguments appears to lead us not only in the direction of a mind-like quantum ground, but also toward this ground as the source of causality. If we take first-person acquaintance with volition as our only direct evidence of fundamental causality,

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attributing agency as the foundation of causality to this quantum ground appears to be a plausible step.

Quantum Interpretations

Assuming I am on the right track, what does this suggest concerning an interpretation for quantum mechanics? The various interpretations of quantum mechanics try to explain the measurement problem: the apparent transition from the wave function (a superposition of possible states) to the observed experimental outcomes. Ismael and Schaffer maintain that their proposal is neutral and that their quantum ground likely applies to some degree across all interpretations. However, I have noted earlier that their quantum ground has the flavor of a hidden variables approach. That is, something not referenced within the quantum formalism that nevertheless coordinates the tendencies and thus orchestrates the relations among all possible quantum states. If we accept an argument for a quantum ground outside our spatiotemporal order that coordinates the system's underlying probabilities, it Is arguably a short step to propose that this same holistic influence of the quantum field also guides particles toward the experimental outcomes we observe as well. This result appears to be similar with Bohm's later work (Bohm, 1980; Bohm & Hiley, 1993), which also described an ontologically deeper ground existing in a high-dimensional space as hidden factor.

The direction I have been proposing also shares elements with Henry Stapp's interpretation of quantum mechanics. Stapp (2017), working primarily within the orthodox interpretation, attributed mind-like properties to the workings of the world that ultimately "chooses" the experimental outcomes from the more probabilistic wave function. Thus, Stapp argues that nature "chooses," within the constraints of the Born probabilities, a result that responds to the probing inquiries of the experimental observers (who also must choose). Stapp's work appears to explicitly invoke the notion of real volition in the process leading to quantum outcomes. Also, as I discussed previously, Stapp (2017) accepted that the deep level of matter could be characterized as real potentialities.

> What human consciousness does, according to ontologically construed orthodox QM, is to initiate, by its choice of a probing action, a response on the part of nature that actualizes some aspect of reality that was, until then, merely a potentiality. Thus our conscious efforts become causal players in the game of converting potentialities to actualities, and thereby influencing reality. (p. 72)

However, while Stapp's framework retains the dualistic structure of Copenhagen interpretation, I instead propose an ontologically prior field of potentiality or potencies as the quantum ground and intrinsic aspect of matter. This metaphysical and high-dimensional ground, outside of our spatiotemporal order of the physical world, directs (or chooses), in conjunction with our own choices, the behavior of the subatomic particles that constitute our world, without the notion of wave function collapse. Thus, while I borrow Stapp's notion of a mind-like domain of potentialities that "chooses" quantum outcomes, I follow Ismael and Schaffer's reasoning in favor of an ontologically prior quantum ground, rather than quantum superposition (with wave function collapse). Interpretations influenced by von Neumann hold that the quantum superposition represents a stage or process of the world where different possible states coexist until measurement triggers a quantum collapse that leads to experimental observations, but according to Russsellian monism, our only acquaintance with any sort of intrinsic nature that might underpin our world comes from our direct experience. Given that no one experiences a quantum superposition, it appears that this is not something that characterizes the world's intrinsic aspect (in a Russellian spirit). I believe that the formalism of the wave function, depicting a probability weighted collection of possible states, is best interpreted as pointing us toward an underlying field of potentiality, outside our spatiotemporal order, which coordinates and guides the behavior of the subatomic world. While we do experience an aspect of this field of potentiality through our ability to

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make choices, I submit that, despite the formalism of the wave function, the physical world we inhabit is simply not characterized by quantum superposition.

Teleological Intentions Within the Quantum Ground

However, arguably this framework has difficulty accounting for the regularity in the world's behavior that leads so many to characterize our reality as underpinned by fixed laws. That is, we might consider how nature simply "choosing" quantum outcomes (as Stapp argues) accounts for the stable and precise mathematical relations revealed by science. Perhaps something else is required beyond characterizing the activity of the world as expressions of nature's will or choice to account for such stability and regularity.

Recall that we began by considering the causal nature of the world, described by Carroll and others, as characterized by necessary, universal laws, typically expressed in mathematical form, but we noted that Hume's arguments, based on a more phenomenological approach to causality, deflated our ability to characterize the world's causal nature this way. Such doubts were confirmed when we considered the context dependency of quantum mechanics and the dispositional nature found in many domains outside of physics. We also considered phenomenological inquiries by James, Schopenhauer, and other philosophers that suggested our own experiences of will gave us insight on the world's fundamental causal nature. Such introspection arguably leads toward the possibility that fundamental causality is an expression of will or agency from world's deeper or inner nature, which is consistent with Stapp's interpretation.

I suggest we carry phenomenological inquiry one step further and add the notion of cosmic "intention(s)," which provide the foundation for the stable tendencies within the quantum ground. Here I use the word "intention" to mean directing attention to move toward some goal, rather than the notion of "aboutness" of mental activity. Introspection gives us some familiarity with our own intentions of various kinds. Forming intentions such as following a healthy diet, giving to charities, studying hard in school, influences the dispositions that characterize our behavior, provided they have some importance or meaning so that we continue to maintain them. How might this apply with respect to an inherently nonlocal and mind-like quantum field? This introspection, if allowable, suggests that the stable regularities that characterize our reality might be conceivably based on intentions of a cosmic sort. Thus, the evolution of the universe may involve teleological processes that are purpose directed, as Nagel (2012) suggested.

Recently Goff (2018) has explored a view of cosmopsychism that I believe is consistent with this notion of cosmic intention. Cosmologists have noted that the universe appears to be fine-tuned, or implausibly calibrated, to support life. Current explanations on the table for this fine-tuning mystery include versions of theism as well as the multiverse, which Goff finds unsatisfactory. As an alternative, Goff suggests that a conscious universe possessing agency may have chosen to develop in ways hospitable to supporting life, in accordance with its own values. Goff is not suggesting an all-powerful God that simply creates life populated on worlds, but rather a conscious universe with agency, capable of choosing conditions over vast spans of time that are hospitable to life. This perhaps provides an interesting example for how an intention within cosmic mind might support the set of tendencies that govern our reality.

This reasoning suggests that cosmic intention(s), residing in an ontologically prior ground of mind-like potentiality, provides the basis for the regularities and behaviors that characterize our world. And given the vast scales of time and space regarding the universe, such cosmic intentions would by necessity be very stable, perhaps lawlike from our perspective. Cosmic and individual will continue to operate, but within the constraints of the ontologically deeper intentions of nature. Also, perhaps the success we have managing our own individual intentions hinges to a large degree on the congruency between our own intentions and the deeper teleological intentions of the universe, in some sense like someone swimming with the current will likely perform better than someone swimming against it.

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Discussion

A key aim in this paper has been to provide some critical evaluation of arguments that dismiss the possibility of anomalous mind-matter interaction based on our understanding of nature's "laws." Alternatively, I have argued that recent developments that emphasize the dispositional nature of causality are considerably more hospitable to the psi data, as well as our notion of free will. Further, I attempt here to link a fundamental view of dispositionalism with consciousness through borrowing ideas currently on the table, such as Russellian monism and quantum holism. According to this framework, the properties and behavior of physical particles that constitute our world are ultimately characterized by dispositions or tendencies, and these in turn are anchored by a mind-like ontologically prior field of potentiality, which is capable of choice and forming intentions. And I submit that this framework is consistent with a genuinely free notion of will and the psychokinesis data.

However, I recognize invoking such notions as cosmic will or cosmic intention likely invites the incredulous stare. That said, we must remember some context concerning the persistent challenges and problems that remain for more conventional approaches. The persistent measurement problem in quantum mechanics implies that we remain ignorant of the world's deeper nature. Currently we are not remotely close to achieving a consensus view of consciousness, and many argue that materialistic explanations have no hope for succeeding here. In addition, it remains difficult to reconcile notions of genuinely free will with common views that the universe is deterministic or governed solely by mathematical laws. Of course, conventional theories heavily invested in physicalist assumptions are generally not hospitable to the psi data. The incredulous stare notwithstanding, I submit that my proposed framework has resources to address such challenges. Here, I attempt to flesh out what I believe this framework brings to the table, especially with regard to the psychokinesis data.

Accepting the world as fundamentally dispositional helpfully reframes the debate around psi. A frequent complaint from skeptics against the psi data is that the effects cannot be demonstrated on demand. Of course, the small effect sizes and wide range of sources for variability associated with most psychological (and parapsychological) studies make such demands questionable (Rosenthal, 1990). But if the behavior of the physical world is fundamentally dispositional, and not characterized by fixed laws, the basis for this argument falls apart completely. As I have discussed, there is no controversy or debate around the causal link between smoking and lung cancer, yet we cannot determine whether cancer will manifest for a given smoker, no matter how much we know about the smoker and other poor lifestyle choices she has made. In a world where causation is fundamentally dispositional, it is more reasonable in many cases to accept evidence of causal links in terms of tendencies, dispositions, or potentialities.

My framework also responds to a common criticism that physicalists make against non-physicalist proposals, such as panpsychism and neutral monism. Physicalists often argue that such approaches, devised with the goal of explaining inherently subjective qualia, fail to provide ways of making testable predictions. However, my framework of a quantum ground as an aware base of potentialities suggests a way to link conscious experience with action at distance. Recall our earlier discussion of Mørch's argument linking fundamental dispositionalism with mental causality. If this implies that our own agency is ultimately rooted in a nonlocal field of potentiality, we have a framework that is at least consistent with the anomalous mind-matter data on the table.

I now turn to this data. With his survey of meta-analyses on psi experiments, Cardeña (2018) presents a bird's eye view of the evidence on anomalous phenomena that includes telepathy, remote viewing, precognition, presentiment, and anomalous mind-matter interaction. While my paper focusses on the latter, I note that my proposed framework is consistent with all of these. A quantum ground that is the source of

phenomenal properties arguably permits the anomalous sharing of information consistent with the data for telepathy experiments. Remote viewing can be understood in a similar way, through our access with a nonlocal field of holistically linked potentialities at the base of our world. Precognition and presentiment can be understood in terms of our ability to access the world's underlying field of tendencies or potencies.

With respect to influencing physical processes, these include micro-psychokinesis (Bosch et al. ,2006), and the Global Consciousness Project (Nelson, 2015). These two mind-matter interaction methodologies use quantum processes to produce random streams of 1s and 0s. Micro-psychokinesis tests the ability of participants to influence the output through mental intention. However, Nelson's Global Consciousness Project investigates the influence of important global events (presumably via shared emotions of the population reacting to such events) on networks of random number generators.

A quantum ground characterized as an aware field of potentialities underlying our world is consistent with mental intention influencing the outcomes of random quantum processes. That is, mental intention presumably influences the field of potentialities fundamental to quantum processes. And this story requires agency. All this said, however, any sort of mind-matter interaction of this sort likely involves a larger number of factors, especially given the inherently entangled nature of this fundamental field. The relevant factors likely include characteristics of the sender, target, and environment. Given this, influencing physical processes at the quantum level in a substantial (and detectable) way may face higher hurdles than other modes of psi that involve only accessing information. This may reflect the generally smaller statistical significance associated with psychokinesis relative to other modes of psi, such as precognition and telepathy.

Nelson's (2015) Global Consciousness Project (GCP) explored the effects of significant world events on the output of a network of random number devices positioned around the world. Specifically, the GCP investigates whether the output from these devices is influenced during times of important (perhaps global) events, such as the terrorist attack on September 11, 2001. Nelson's hypothesis is that the random output of these devices is influenced by a kind of resonance as large numbers of individuals respond emotionally to a given event. Of course, unlike the version of micro-psychokinesis experiments briefly described above, the populations presumably affecting these RNG devices have no knowledge of their existence. Nelson's GCP arguably deserves to be distinguished from the other modes of mind-matter interaction, possibly representing its own unique category. Cardeña's (2018) summary findings (presented in Table 2 from his paper) suggest that the effect size for the GCP is substantially larger than other modes of psychokinesis. Of course, the GCP does indeed seem to be something very different: relatively large groups of people sharing a common emotional reaction in contrast to single individuals attempting to influence an RNG device through mental intention. However, while the GCP may arguably be characterized as a different mode of psi than other psychokinesis experiments, it nevertheless appears to fit reasonably well into this proposed framework.

Cardeña (2018) also reports meta-analyses findings for anomalous influences on living systems. These included pooled experimental results for remote staring, mental facilitation on meditators, remotely influencing biological activity (such as electrodermal activity), and healing studies with respect to both human and non-human organisms (animals, plants, and in-vitro cultures). Statistically significant results are found for all of these. While my proposal involves a quantum ground, which I suggest works well with respect to micro-psychokinesis data, there is reason to think it is useful for explaining anomalous influence in biological contexts, given the emerging links between biology and quantum mechanics briefly discussed above. That said, much work remains for establishing the links between the sort of quantum ground I propose and biological structure for various organisms. We can also note that considerable contribution on the

dispositional nature of causality has come from the biological literature (Illari & Russo, 2014).

In addition to accounting for the laboratory data, my proposed framework suggests some intriguing possibilities for our lived experience outside the lab. I submit that viewing the world's causal nature in terms of fixed, necessary laws discourages a sense of deeper connection with others and our environment. Many aspects of our modern understanding, with its mechanistic views of causality, have most likely resulted in a greater feeling of separation and isolation. On the other hand, the framework I propose suggests a much deeper relation between ourselves and the world, where our expressions of will and intentions are perhaps interwoven within the deeper fabric of cosmic will and teleological nature. As I noted above, our ability to maintain or choose successful intentions in our lives is likely dependent on choosing intentions that are in some sort of agreement with the more foundational intentions at the root of our reality. Perhaps clairvoyant or precognitive faculties help enhance our sense of these underlying cosmic intentions. And perhaps our levels of engagement with the world are considerably more profound and meaningful than conventional thinking would lead us to believe. Although the data do not support X-Men level psychokinesis or telepathy, it does suggest we have some capability through intuition to better navigate the cosmic intentions operating at the deeper levels of our reality.

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Anomale Geist-Materie-Beeinflussung, Willensfreiheit und die Natur der Kausalität

George Williams

Zusammenfassung: In diesem Beitrag wird ein Rahmen vorgeschlagen, der sowohl den freien Willen als auch anomale Geist-Materie-Interaktionen (Psychokinese) unterstützt. Ich beginne mit einer Darlegung des Arguments des Physikers Sean Carroll, dass die Gesetze der Physik, so wie wir sie verstehen, Psychokinese (und andere Formen von Psi) ausschließen, und halte seine Behauptungen für problematisch, zum Teil aufgrund von Missverständnissen der von David Hume entlehnten Argumente. Ich fahre fort mit der Betrachtung eines eher dispositionellen Kausalitätsbegriffs (im Gegensatz zu einem, der durch universelle und notwendige Gesetze gekennzeichnet ist), der sowohl für Psychokinese als auch für die Willensfreiheit besser geeignet wäre. Anschließend berücksichtige ich neuere Arbeiten aus der Philosophie des Geistes und der Wissenschaft, um einen Rahmen zu entwickeln, der echten Willen und Psychokinese, die eng miteinander zusammenhängen, zulässt. Dieser Ansatz ist grundsätzlich dispositionell, basiert aber auf einem Bereich von Aufmerksamkeit und Potenzialität, der ontologisch vorgelagert ist. Ich vertrete auch die Meinung, dass die Regelmäßigkeiten (oder kausalen Eigenschaften), die wir in unserer physischen Welt beobachten, letztlich durch teleologische "Absichten" innerhalb eines nichtlokalen, geistähnlichen Quantengrundes unterstützt werden.

German translation: Eberhard Bauer

Influência Anômala Mente-Matéria, Livre Arbítrio, e a Natureza da Causalidade

George Williams

Resumo: Este artigo propõe um enquadramento que sustenta tanto o livre arbítrio quanto a interação anômala mente-matéria (psicocinese). Começo considerando o argumento do físico Sean Carroll de que as leis da física como as entendemos excluem a psicocinese (e outros modos de psi), e identifico suas alegações problemáticas, em parte devido a argumentos mal-compreendidos emprestados de David Hume. Passo a considerar uma noção mais disposicional de causalidade (em contraste com aquela caracterizada por leis universais e necessárias) a qual é mais receptiva tanto à psicocinese quanto ao livre-arbítrio. Em seguida, incorporo trabalhos recentes da filosofia da mente e da ciência para chegar a uma estrutura que apoie a volição real e a psicocinese, que estão intimamente ligadas. Essa abordagem é fundamentalmente disposicional, mas fundamentada em um campo ontologicamente prévio de consciência e potencialidade. Também considero que as regularidades (ou naturezas causais) que observamos em nosso mundo físico são, em última análise, sustentadas por "intenções" teleológicas dentro de um fundamento quântico não local, semelhante à mente.

Portuguese translation: Antônio Lima

Influencia Anómala Mente-Materia, Libre Albedrío, y la Naturaleza de la Causalidad

George Williams

Resumen: Este artículo propone un marco teórico que apoya tanto al libre albedrío como a la interacción anómala mente-materia (psicoquinesis). Comienzo considerando el argumento del físico Sean Carroll de que las leyes de la física tal como las entendemos descartan a la psicoquinesis (y otros modos de psi), y encuentro que sus afirmaciones son problemáticas, en parte debido a malentendidos de argumentos tomados de David Hume. Procedo a considerar una noción más disposicional de la causalidad (en contraste con una caracterizada por leyes universales y necesarias) que es más hospitalaria a la psicoquinesis y al libre albedrío. A continuación, incorporo trabajos recientes de la filosofía de la mente y de la ciencia para llegar a un marco que apoya la volición real y la psicoquinesis, que están íntimamente ligadas. Este enfoque es fundamentalmente disposicional, pero se basa en un campo ontológicamente previo de consciencia y potencialidad. También considero que las regularidades (o naturalezas causales) que observamos en nuestro mundo físico se sustentan en última instancia en "intenciones" teleológicas dentro de un terreno cuántico no local similar a la mente.

Spanish translation: Etzel Cardeña

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The Presentiment Effect Points to an Occurrence of a von Neumann's Collapse[1]

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Abstract: Although small and embedded in strong noise, the surprisingly confirmed presentiment effect is deemed among the more reliable "psi" effects, although such an effect cannot reflect prediction in real-time. Rather, the effect reflects correlations found only in the historical past as a result of the end conditions represented by the participant's psychological responses to the stimuli. That is, the effect does appear, but in retrospect only. The current paper *mathematically* explains this suggestion through an orthodox interpretation of quantum mechanics whose ontology is outlined. The explanation is based on von Neumann's idea that the system's quantum state collapses when the participant's mind perceives an observation. The argument takes decoherence considerations into account. The presentiment effect's existence and its presented reasonable quantum explanation seem to support von Neumann's idea.

Keywords: tendencies, collapse, actual past, effective past, decoherent histories, consciousness, presentiment, predictive anticipatory activities

Highlights

- This paper provides an orthodox quantum mechanical mathematical model for the appearance of the presentiment effect with some empirical support for it. The framework used is “decoherent histories.”
- The paper suggests that the empirically confirmed existence of this effect indicates that the orthodox interpretation of quantum mechanics, with its emphasis on primary mind and perceptions, is the correct one.

Even though according to orthodox physics one cannot sense an undetermined future event before the occurrence of the event, during several decades what seem to be successful presentiment experiments (PSEXs) have been carried out and replicated (Duggan & Tressoldi, 2018). In such experiments, physiological measures of participants, such as skin conductance, heart rate, and electroencephalography (EEG) are monitored and recorded for several seconds by computers. The records are taken *before* randomly presented stimuli designed to evoke either a significant or a nonsignificant psychological post-stimulus response. After averaging the results for any specific pre-stimulus time over many trials, a significant difference emerges between the pre-stimulus response to stimuli that evoked a significant post-stimulus response and those that did not. Although the effect is small and embedded in strong noise (i.e., an estimated effect size of 0.28 with a 95% confidence interval of 0.18 - 0.38; Duggan & Tressoldi, 2018) the averaging improves the signal to noise ratio. This improvement allows the difference to become statistically significant; over 6 standard deviations or sigmas.

Various potential mechanisms to explain the surprising effect as an artifact have been discussed and examined over the years and rejected. The aforementioned meta-analysis (Duggan & Tressoldi, 2018), as well as Mossbridge and Radin (2018), concluded therefore that the presentiment effect (PSE) seems to be confirmed and can be considered among the more reliable psi effects. Due to its basic third person approach and its straightforward design, the PSE seems (at least to me) to be the simplest psi effect. As noted in Mossbridge and Radin (2018), sometimes such effects are called Predictive Anticipatory Activities (PAA). One can read a concise review of the PSEXs in Radin (2016).

Working within orthodox quantum theory, Levin (2020) justified the existence of this effect by contemporary Quantum Mechanics (QM) ideas described, for example, in Stapp (2017a). Levin (2020) repeated a well-known QM calculation that proves that an efficient real-time prediction of an unpredictable future sentiment is impossible. By using the QM's idea of a difference between an actual past and an effective past (or historical past), he then argued that the PSE is merely a quantum delusion that appears, but in retrospect only. He also suggested that "modified PSEXs" in which either the measurement apparatus or the recording device are intentionally disconnected from the participant just before a stimulus is shown to the participant (or the pre-stimulus records consciously read-up

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before the stimulus is shown to the participant) may indicate the crucial role played by a conscious act. Based on the aforementioned repeated proof of the impossibility of a real-time prediction of an unpredictable future sentiment or sensation, Levin (2020) predicted the disappearance of the PSEs for these modified PSEXs.

The proper interpretation of QM is highly controversial. The main question under dispute is how to resolve the infamous "measurement problem" (exactly when and how a superposition of many possible values described by the Schrödinger equation becomes a single measured value). Many interpretations have been suggested, and given the lack of a clear-cut evidence for any of them the debate concerning the proper interpretation continues (e.g., Kastrup et al., 2018; Ananthaswamy, 2018).

The so called “orthodox” interpretation is one of the oldest. A psychophysical approach was originally suggested by von Neumann (1932). He argued that the quantum state "collapses" (i.e., a multitude of possibilities reduces to the observed actuality) when an observer's mind perceives it. This was tentatively supported by Wigner (1967, p. 172) who wrote "it was not possible to formulate the laws of QM in a fully consistent way without reference to the consciousness. All that QM purports to provide are probability connections between subsequent impressions (also called "apperceptions") of the consciousness." However, as described by Esfeld (1999), Wigner later (apparently too hastily) abandoned it. The psychophysical approach is supported by H. P. Stapp and is common in his writing (e.g., Stapp, 2017b).

Even if one accepts that the quantum state collapses when an observer's mind gets the perception, there remains a mystery concerning who (and how) selects that specific perception. This gap in the quantum theory is reflected in Einstein's famous statement (American Institute of Physics, 2022) “God does not play dice” and Bohr's rebuttal “Einstein, stop telling God what to do!” It clearly seems that both realized that to close this gap one needs some immaterial powerful entity. They merely disputed what this entity reasonably does. Since then, the undisputable success of quantum theory has convinced all but a handful of contemporary physicists that that abstract entity does indeed determine the perception in each specific observation. In standard orthodox QM, the Born (1926) statistical rule is unbiasedly obeyed. However, though up to now successful in physical and chemical experiments, one must remember that this rule was empirically inducted. Therefore, whether this statistical rule is strictly unbiasedly held in *all* situations can be considered a yet unanswered question. In an attempt to explain some positive precognition results, Stapp (2017a) hypothesized that under some conditions the statistic may be slightly biased. In this paper I discuss PSE rather than precognition, and aim to explain it within standard orthodox QM. Hence, the current article assumes the standard Born rule. However, in order not to conceptually exclude such hypothetical biases, I henceforth prefer the vaguer term 'Deus-ex-Machina' (a term coined from the conventions of ancient Greek theater which means 'God out of the machine') over (what statistically appears as) Einstein's merely "playing dice" immaterial God.

With this terminology one can sum the orthodox interpretation of nonrelativistic QM in the following theo-psychophysical way. Reality consists of an interplay of six *abstract* factors:

- a stage - associated with space and time
- res potentia - associated with the coexistence of objective tendencies to generate "agents' conscious observations"
- a default temporal evolution rule - a rule that governs the default temporal evolution of the tendencies whenever there are no interventions (i.e., the unitary evolution via the Schrödinger equation, sometimes called Process 2)
- res cogitans - associated with agents' egos, minds, curiosities, abilities to freely choose and pose questions to nature, etc.
- Deus-ex-Machina - associated with the entity that, while statistically keeping the so-called Born (1926) rule, freely chooses which possibility will survive the eradication

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> of the possibilities in any specific intervention originated by an agent's mind, a mere *name* for this entity (other names that science cannot disallow: Nature, a cosmic MIND, Allah, God, etc.) (Wheeler, 1981)

• res extensa - now associated with "agents' conscious observations" that witness Deus-ex-Machina's choices under the measurement circumstances arranged by the agents, i. e., with the perceptions of minds.

In this most parsimonious description, an appropriate projection of the current world-representing ray (a whole class of normalized state vectors that differ from one another only by phase factors, that is by numerical factors with modulus entity) represents in the Hilbert space (a vector space equipped with an inner product that defines a distance function for which the space is a complete metric space, e.g., the space of square-integrable functions) the agent's mental event by itself. The projection is onto the ray that describes the new situation consciously felt by the agent. It is as if at the appropriate moment the currently existing ray "collapses" to a new ray compatible with the observation consciously collected by the agent. The collapse eliminates from the state of the universe all parts incompatible with the occurrence of that chosen by the Deus-ex-machina experience. Previous yet unobserved by any agent possibilities are among these eradicated incompatible parts. Physically, the change from the current tendencies to the new ones that the collapse in the Hilbert space represents describes the "actualization" of certain current tendencies. This forward-in-time process leaves a single consistent history.

According to this interpretation, QM tells us that there is no matter in the classical sense. The entities clasically conceived by people as tiny pieces of matter (often loosely called "elementary particles") are mere appearances of quantum excitations of extended tentative fields of various types. They are figments. As apparent quantum excitations of tentative fields, these entities may (and indeed do) exhibit what classically appear as imaginary features. Furthermore, in QM one interprets objects that people classically conceive as hard matter (e.g., atoms, molecules, crystals, rocks) as bound states formed out by entangling tendencies to observe various elementary quanta.

Wigner (1967, p. 173) explains the phrase "something exists" by writing: "The statement that it "exists" means only that: (a) it can be measured, hence uniquely defined, and (b) that its knowledge is useful for understanding past phenomena and in helping to foresee further events. It can be made part of the *Weltbild*." Indeed, a tendency enjoys a "softer" rather than the "hard existence" one usually attributes to classical matter. However, under various circumstances, tendencies may become very strong. In such cases, for all practical purposes, the soft existence almost cannot be discernible from a hard one. Practically speaking, when one kicks what seems to be a rock, there is little difference between a classical existing rock and just a probability of, say, .999999 to feel the rock. The orthodox interpretation claims that under such conditions one practically retrieves the feeling of classical confident existence. Actually, most of the inanimate situations encountered daily are of this type. When some test astonishingly results in a "Sword in a Stone observation," one usually calls it a miracle (Carroll, 2001; Bartoloni, 2002).

Notice that, whereas this orthodox interpretation dethrones the existence of "matter" in favor of the existence of the more abstract concept of "tendencies to feel existence" it considers minds primary as well. This reflects the undeniable fact that all our scientific knowledge is the result of our minds' curiosity and inquiry. Also, it takes seriously the equally undeniable fact that the inputs that feed this scientific learning process are in the last resort conscious perceptions. Therefore, one can say that the orthodox interpretation is the most natural interpretation. Moreover, nowadays, as Tressoldi and Facco (2022) argue, there seems to be accumulated epistemological and scientific evidence that consciousness is primary.

Decoherence arguments (e.g., Di Biagio & Rovelli, 2021; Gell-Mann & Hartle, 1989; Joos et al., 2003; Zurek, 1991, 2003) suggest a metaphoric ladder from this idea-like reality down to our mundane view of the world. Decoherence refers to the process through which the evolving quantum state loses coherence (i.e., the ability to interfere). The basic idea is that the environment almost constantly interacts with the studied system. The parts of the Hamiltonian (i.e., the quantum mechanical operator that corresponds to the total energy of the system) that describe these interactions determine at almost every moment some effective partition of the Hilbert space. The interaction entangles the environment with the system. Because one cannot follow the implications of such an interaction on the environment, one averages over them. This averaging leaves us at each moment with several decohered possibilities in the generated pertinent Hilbert space's partition. Since these are mere possibilities, they can logically coexist. In the orthodox interpretation of QM, every agent's posed-to-nature question and the (consequent) Deus-ex-Machina's answer cut this coexistence of multiple possible decoherent histories. The pertinent question-answer stage of this so-called Process-1 eradicates all the up-to-then coexisted possible decoherent histories that would have been incompatible with the Deus-ex-Machina's selected answer to the pertinent question. The sequence of such surviving decoherent pieces of history (approximately) appears to us as a classical physics history.

Arguably, the generalization of the theory to be compatible with relativity does *not* change this insight concerning reality in an essential way. Indeed, the "stage" becomes relativistic ("spacetime") and relativistic temporal evolution equations replace the nonrelativistic Schrödinger equation. Nevertheless, despite that, the critical point is that the *default* temporal evolution is still *unitary* (Weinberg, 1995). Being unitary, this default temporal evolution merely shuffles tendencies around without losing any of them. Thus, the full temporal unfolding of a *unique* reality remains a result of the interplay of *all* six abstract entities (including res cogitans and Deus-ex-Machina).

Timing the collapse to the moment a mind perceives the observation is inconvenient for an experimental physicist. This is because such timing interfaces with psychological variables that are less directly accessible. However, one can study science that interfaces both physics and psychology, namely physiology, and hope for advance. The PSE is such a physiological phenomenon. The cognition of the participant is bypassed. The participant is not asked to describe his subjective emotions or express out his predictions. Instead, his testifying physiological reactions are being directly measured. Just like classical experiments in physics, chemistry and biology, a PSEX fully uses a third person view. Most PSEXs use truly random number generators to select the future stimuli. Therefore, it seems certain that no one knows what stimulus is about to appear. This simplicity of the structure of the experiment, combined with its repeatability, increases its reliability. Hence this paper describes a mathematical-physical model for this effect.

A Mathematical-Physical Model for the PSE

Since a PSEX involves macroscopic systems such as an electrodermal activity measuring apparatus and a computer, decoherence is unavoidable. However, decoherence theory alone does not solve the "problem of outcomes"; without the collapse postulate, it is not clear in this theory how definite outcomes are to be explained. It was mentioned previously that in orthodox QM a Deus-ex-Machina's answer cuts the coexistence of multiple tentative decoherent histories. This collapse of the quantum state generates a specific end condition and solves the problem of outcomes. In orthodox QM (Stapp, 1994; Wigner, 1967), a collapse is associated with an agent's mental event. Various mental events, such as those generated by observing wild pictures and those generated by observing mild pictures, supply various end conditions to the prior Process-2 stages. The variety of these end conditions generates a corresponding variety in their effective (or historical) pasts. This variety in the effective pasts is the cause of the PSE. That is, the tentative records from the time *before* observing a wild picture that survived the eventual

collapse (associated with the, say, eventual wild mental event) partially reflect (are correlated with) the nature of this eventual, say, wild mental feeling.

An appropriate theory to describe such situations is the "decoherent histories theory," which is compatible with orthodox QM. (Notice that I distinguish between Gell-Mann and Hartle's (1989) decoherent histories theory and Griffith's (2002) consistent quantum theory, which is further away from orthodox QM.) It assumes that time "flows" strictly forward. However, according to Gell-Mann and Hartle (1989), the probability of the history that is composed of the sequence of decoherent alternatives $\alpha_n(t_n)$, $\alpha_{n-1}(t_{n-1})$, ..., $\alpha_1(t_1)$ is given by the trace of a multiplication of operators. That is,

$$p[\alpha_n(t_n), \alpha_{n-1}(t_{n-1}), ..., \alpha_1(t_1)] = Tr[P^n{}_{\alpha n}(t_n) \dots P^1{}_{\alpha 1}(t_1)\, \rho\, P^1{}_{\alpha 1}(t_1) \dots P^n{}_{\alpha n}(t_n)]. \qquad \text{Eq. 1}$$

Here, the trace operation is denoted by the Tr[] symbol. (This trace sums over the diagonal elements of the operator inside the square brackets.) The $P^n{}_{\alpha n}(t_n)$ is the Heisenberg n-th projection operator in Hilbert space on the α_n alternative for the time t_n. In terms of Schrödinger's picture projection operator $P_{Sh}{}^n{}_{\alpha n}$ and the unitary time evolution operator from t_0 to t_n it is given by $P^n{}_{\alpha n}(t_n) = U(t_0, t_n)\, P_{Sh}{}^n{}_{\alpha n}\, U(t_n, t_0)$. The ρ symbol denotes the initial density operator (a positive semi-definite, Hermitian operator of trace one acting on the system's Hilbert space and completely characterizing the system's statistical properties). Because one may circularly shift the operators in a trace operation and because the time evolution operator is unitary, one may omit the leftmost projection operator in the aforementioned trace. When treating decoherent histories one can adopt the usual rules of the classical probability theory.

According to orthodox QM, whether an emotionally significant experience occurs can be considered a "Yes" or "No" question posed to nature (Stapp, 2017a). Let us attribute a value of (+1) to a "Yes" answer and a value of (-1) to a "No" answer. This "Yes" or "No" question is a qubit of information.

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A PSE is observed, for example, in an EDA (electrodermal activity) measurement. The EDA signal level is actually a function of many variables used to describe the experiment, and the temporal state of aforementioned qubit is just one of these functions. Nevertheless, the EDA temporal physiological signal indirectly depends on this qubit through the processes generated as reactions to the mental experiencing of its state (i.e., through an effective transfer function). When a stimulus is being presented the significance of this qubit strongly shows up. During a prestimulus time interval the idle participants are most probably calm. Their calm state and various wandering boring thoughts are reflected in a chaotic low amplitude EDA signal. During this period, it is reasonable to assume that the functions upon which the EDA functional signal depends indeed vary, yet smoothly and relatively slowly. When the computer`s screen is suddenly turned on, the participant's mind is suddenly aroused as well. As a result, the gain of the EDA temporal physiological signal indirectly increases. This leads to higher poststimulus EDA signals' amplitude levels. Since the EDA signal's sudden change is mainly due to the change of the state of this qubit let us study the time history of this qubit.

I use the common bra and ket notation of Dirac (i.e., the usual | > and < | symbols to denote vectors in Hilbert space and its adjoint space). The Schrödinger's projection operator in Hilbert space onto the |1><1| ray in Hilbert space is represented by a 2 X 2 diagonal matrix with values of 1 and 0 along the diagonal. Likewise, the Schrödinger's projection operator onto the |-1><-1| ray is respectively represented by a 2 X 2 diagonal matrix with values of 0 and 1 along the diagonal. The inverse time evolution operator $U(t_0, t_n)$ is represented by the 2 X 2 Hermitian conjugate of the forward time evolution 2 X 2 matrix $\mathbf{U}(t_n, t_0)$. It is well known that this unitary time evolution matrix is given by $\mathbf{U}(t_n, t_0) = \exp[i\,\beta/2\,\mathbf{I} - i\,(n_1\boldsymbol{\sigma}_1 + n_2\boldsymbol{\sigma}_2 + n_3\boldsymbol{\sigma}_3)\,\omega\,(t_n - t_0)]$. Here: $i = \sqrt{(-1)}$; β is a real number; $\mathbf{I}$ is the 2 X 2 identity matrix; n_1, n_2, and n_3 are the three components of a unit vector (i.e., $n_1^2 + n_2^2 + n_3^2 = 1$); $\boldsymbol{\sigma}_1$, $\boldsymbol{\sigma}_2$, and $\boldsymbol{\sigma}_3$ are the three Pauli matrices (Schiff, 1968); and $\omega = 2\pi f$ is an angular frequency.

Let the initial state at t_0 be a state of ignorance. That is, let us represent the knowledge about the initial state by a 2 X 2 diagonal **ρ** matrix with two values of 0.5 along its diagonal.

Let t_2 be the instant at which the computer presents a stimulus to the participant and assume that ($t_2 > t_1 > t_0$). Consider first what one can expect for the pre-stimulus moment t_1. According to equation 1 the probability of getting a value of 1 at t_1 is $p[1(t_1)] = Tr[\rho\, P^1{}_1(t_1)] = 0.5$. Likewise, the probability of getting a value of (-1) at time t_1 is $p[-1(t_1)] = 0.5$. On average, one expects therefore at t_1 $\langle\alpha_1(t_1)\rangle = 0$.

Suppose now that at t_1 a macroscopic computer merely recorded the electrodermal activity of the participant. The record has been almost immediately decohered. However, assume that neither the experimenter nor any other conscious agent did inspect that decohered record yet. Thus, according to the orthodox interpretation of QM there has been *no* collapse and *all the decohered alternatives still coexist*. If nothing special occurs in the $[t_1, t_2]$ interval one can expect that the $p[1(t_2)]$ and $p[-1(t_2)]$ probabilities and the $\langle\alpha_2(t_2)\rangle$ average will remain the same as those at t_1. Unless one provides a definite end-condition these expectations should remain correct forever. *This describes the situation in a ("modified") PSEX in which the experimenter disconnected the electrodes from the recording computer just before t_2.* One does not provide a definite end condition in this case.

Next, consider what one can say after the t_2 moment of stimulus presentation. Suppose that a stimulus presentation at t_2 resulted in a "Yes" answer (that is, an emotionally significant experience occurred). According to equation 1, the conditional probability that the record from t_1 shows a value of 1, given the fact that $\alpha_2(t_2) = 1$, is (by direct calculation)

$$P[\alpha_1(t_1)=1 \mid \alpha_2(t_2)=1] = Tr[P^1{}_1(t_1)\, \rho\, P^1{}_1(t_1)\, P^2{}_1(t_2)] \,/\, Tr[\rho\, P^2{}_1(t_2)]$$
$$= 1 - (1- n_3{}^2)\, \sin^2[\omega\, (t_2 - t_1)]. \qquad \text{Eq. 2}$$

Of course, since at t_1 there are only two possibilities, the conditional probability $P[\alpha_1(t_1)=-1 \mid \alpha_2(t_2)=1]$ that the record from t_1 shows a value of (-1), given the fact that $\alpha_2(t_2) = 1$, must be $(1- n_3{}^2)\, \sin^2[\omega\, (t_2 - t_1)]$. Notice that the value of the record from t_1 is not unique. It is constant, of course, in each trial. However, it fluctuates from test to test according to these conditional probabilities. One cannot accurately retrodict what had happened in the past. Moreover, its average, $\langle\alpha_1(t_1) \mid \alpha_2(t_2)=1\rangle$, does not necessarily vanish.

This shows what happens in a continuously connected (i.e., usual) PSEX. That is, after the perception of the emotionally significant stimuli by the participant the pre-stimuli records still fluctuate from test to test. *In retrospect*, however, the effect on the participant that the subsequent stimuli made had fabricated a corresponding non-vanishing average of the pre-stimuli records.

By direct calculation it follows that the retrospective difference between the average at t_1 due to an emotionally significant stimulus at t_2 and the average at t_1 due to an emotionally insignificant stimulus at t_2 is

$$\langle\alpha_1(t_1) \mid \alpha_2(t_2)=1\rangle - \langle\alpha_1(t_1) \mid \alpha_2(t_2)=-1\rangle = 2 - 4\,(1- n_3{}^2)\, \sin^2[\omega\, (t_2 - t_1)]. \qquad \text{Eq. 3}$$

This last difference describes the difference that one gets in a usual PSEX. Obviously, in the general case, it must *not* be null: For one, for $n_3{}^2 \approx 1$ or $t_2 - t_1 << 1/\omega$ the second term on the right of this equation becomes very small leaving us with a difference of about $2 \neq 0$. For another, because the $\sin[\omega\, (t_2 - t_1)]$ oscillates as a function of $(t_2 - t_1)$, even if $n_3{}^2 \approx 0$ the second term on the right of this equation cannot always cancel the first term on the right of this equation (that is the 2). Such a cancelation occurs only at the discrete special times when $\sin^2[\omega\, (t_2 - t_1)] = 0.5 \,/\, (1 - n_3{}^2)$.

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Since, as was argued above, the EDA signal depends on the state of this qubit of information, the retrospective prestimulus EDA signals reflect the retrospective prestimulus states of the qubit as well. Non retrospectively (that is, during real time), even with the decoherence mechanism, unless observed, just like the prestimulus states of the qubit the samples of the prestimulus EDA signal are merely possible values. It is the answer of the Deus-ex-machina emotionally experienced by the (inquiring and) observing participant that serves as an end condition and retrospectively modifies the prestimulus tentative actual past to an effective past that matches this end condition. This is the explanation of the usual PSE.

Experimental Support

Several experimental findings seem to support the above developed explanation for the PSE:

1. The aforementioned (commonsensical) prediction that during real time one can expect at any prestimulus t_1 moment only $\langle\alpha_1(t_1)\rangle = 0$ (that is, that one cannot efficiently predict the unpredictable incoming event) can explain the results found by Duma et al. (2017) that indicate a participants' inability to efficiently predict unpredictable events in real time (and actively react accordingly) in spite of the existence of recorded indications for PSE in their body.

2. I developed above a general functional form that the temporal behavior of the PSE may be expected to follow. One should be aware, of course, that since we are dealing with complicated (psychological) evaluations of very complicated macroscopic systems various modifications of the functional form may occur in practice. Even the values of the parameters n_3 and ω were not fixed by the aforementioned general theory. In principle, one may hope to determine these parameters by fits to measurements. Consider, for instance, figure 4 in Radin (2004; reproduced as Fig. 1 in Radin, 2011, as well), which shows the presentiment effect over the last eight seconds before the application of the randomly selected stimulus. Assuming, for example, that $n_3=\surd(1/2)$, the temporal behavior of the difference between the two shown presentiment average skin conductance level curves suggests that under the used experimental conditions $f\approx 1/28$Hz. Of course, these parameters' values merely represent one possibility. They are not unique. Earlier presentiment data are needed to better determine both n_3 and ω. The surprising existence of the PSE and its (most probably wrong) interpretation as a real time "hunch" (or a subconscious effect) apparently misled most of the experimenters to restrict their studies to the last few seconds before the stimuli. However, unless attenuated by some other factors, our reached retrospective temporal behavior exhibits fluctuations over longer perstimulus periods.

3. This predicted retrospective PSE over longer prestimulus periods may find experimental support by the results of the experiment on precognition with planarian worms described in Alvarez (2016, p. 222) who found that "Frequencies of Head Movements behavior during the two observation periods (one min before and immediately before stimulation) for the experimental planarians more than doubled that of values during the corresponding observation periods for the control subjects (Table 1)."

Conclusion

Roughly speaking, it can be said that in spite of an experimentally verified violations of Bell type inequalities and proven theorems such as the Bell-Kochen-Specker one, many current mainstream scientists prefer some sort of physicalism over idealism. Following a Galilean attitude they dismiss minds, consciousness, and feelings as mere secondary. The conceptual problems that current mainstream physics has in sticking to an "objective particles worldview" can be clearly seen in Passon (2019) and Passon et al. (2019). Wallace (2019, p. 309) describes a bewildering situation by writing; "Quantum mechanics, as actually practiced in mainstream physics, makes no use of the eigenstate-eigenvector link, nor of the collapse postulate. Its dynamics are unitary; the

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unitarily evolving quantum state is interpreted inchoately, as describing physical goings-on in regimes where interference is important and as describing probabilities in regimes where it can be neglected. On pain of failure to account for interference, we cannot (it seems) consistently treat the state as probabilistic; on pain of failure to account for the probability rule, and more generally of failing to make contact with observation, we cannot (it seems) consistently treat the state as representational." Furthermore, this approach, adopted by mainstream physics, leads to an incurable tear in science; physics on one side and psychology on the other side. It leaves the "hard problem" of consciousness unsolvable. It also gives no explanation for any paranormal phenomenon. No matter how statistically well such phenomena are established, mainstream physics simply disregards it or even denies it. Arguably, this approach ignores the most mysterious and most important issue for us as human beings.

Concerning the consciousness-physics mutual influence, Wigner (1967, p. 181) almost desperately claimed; "we cannot help but feel somewhat helpless as we ask the much more difficult question: how could the two theses be verified experimentally?" He then suggested (p. 182): "discovering phenomena postulated by the second thesis, in which the consciousness modifies the usual laws of physics." Concerning the previous lack of success of such search, Wigner retorted (p. 182); "However, every phenomenon is unexpected and most unlikely until it has been discovered - and some of them remain unreasonable for a long time after they have been discovered. Hence, lack of success in the past need not discourage."

I argue here that the PSE is such a looked-for phenomenon. As Wigner expected, the PSE remains unreasonable for a long time after being discovered. I mathematically explained how PSE can retrospectively appear. Indeed, at this stage, the huge complexity of the involved systems prevents detailed numerical predictions of the effect. As suggested by me (Levin, 2020) and proved above (recall the aforementioned $\langle \alpha_1(t_1) \rangle = 0.5 - 0.5 = 0$ result), we only know how to prevent the effect by our intervention. However, its experimentally confirmed existence and our orthodox QM's successful mathematical (in principle) demonstration of it point to the central role held by consciousness in a proper comprehensive scientific (i.e., evidence-based) worldview.

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Der Presentimenteffekt deutet auf das Auftreten eines von Neumannschen Kollapses hin

Ephraim Y. Levin

Zusammenfassung: Obwohl er klein und in starkes Rauschen eingebettet ist, gilt der überraschenderweise bestätigte Presentimenteffekt als einer der zuverlässigeren "Psi"-Effekte, obwohl ein solcher Effekt keine Vorhersage in Echtzeit widerspiegeln kann. Vielmehr spiegelt der Effekt Korrelationen wider, die nur in der historischen Vergangenheit gefunden wurden, als Ergebnis der Endbedingungen, die durch die psychologischen Reaktionen der Teilnehmer auf die Stimuli repräsentiert werden. Das heißt, der Effekt tritt zwar auf, aber nur im Nachhinein. In der vorliegenden Arbeit wird diese Vermutung *mathematisch* durch eine orthodoxe Interpretation der Quantenmechanik erklärt, deren Ontologie skizziert wird. Die Erklärung basiert auf von Neumanns Idee, dass der Quantenzustand des Systems zusammenbricht, wenn der Geist des Teilnehmers eine Beobachtung vornimmt. Das Argument berücksichtigt Dekohärenzüberlegungen. Die Existenz des Presentimenteffekts und ihre hier vorgestellte vernünftige Quantenerklärung scheinen von Neumanns Idee zu unterstützen.

German translation: Eberhard Bauer

O Efeito Pressentimento Aponta para a Ocorrência de um Colapso de von Neumann

Ephraim Y. Levin

Resumo: Embora pequeno e envolvido em muito barulho, o surpreendentemente confirmado efeito pressentimento é considerado um dos mais confiáveis efeitos "psi", embora tal efeito não possa corresponder a previsão em tempo real. Em vez disso, o efeito reflete correlações encontradas apenas no passado histórico como resultado das condições finais representadas pelas respostas psicológicas do participante aos estímulos. Ou seja, o efeito aparece, mas apenas em retrospecto. O presente artigo explica matematicamente esta alusão através de uma interpretação ortodoxa da mecânica quântica cuja ontologia é referida. A explicação é baseada na ideia de von Neumann de que o estado quântico do sistema entra em colapso quando a mente do participante percebe uma observação. O argumento leva em consideração fatores de decoerência. A existência do efeito pressentimento e sua explicação quântica plausível apresentada parecem apoiar a ideia de von Neumann.

Portuguese translation: Antônio Lima

El Efecto de Presentimiento Sugiere la Aparición de un Colapso de von Neumann

Ephraim Y. Levin

Resumen: Aunque pequeño e inmerso en mucho ruido, el sorprendentemente confirmado efecto del presentimiento es uno de los efectos "psi" más fiables, aunque no puede reflejar la predicción en tiempo real. Más bien, el efecto refleja correlaciones encontradas sólo en el pasado histórico como resultado de las condiciones finales representadas por las respuestas psicológicas del participante a los estímulos. Es decir, el efecto aparece, pero sólo en retrospectiva. El presente artículo explica matemáticamente esta sugerencia mediante una interpretación ortodoxa de la mecánica cuántica cuya ontología se esboza. La explicación se basa en la idea de von Neumann de que el estado cuántico del sistema se colapsa cuando la mente del participante percibe una observación. El argumento tiene en cuenta consideraciones de decoherencia. La existencia del efecto presentimiento y su explicación cuántica razonable parecen apoyar la idea de von Neumann.

Spanish translation: Etzel Cardeña

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A Metaphysical Theory Connecting Mind, Matter, and Meaning[1]

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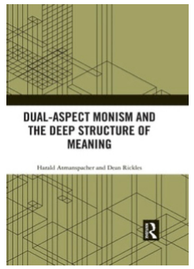

A review of *Dual-Aspect Monism and the Deep Structure of Meaning*, by Harald Atmanspacher and Dean Rickles. Routledge, 2022. Pp. xiii + 221. $128 (hardcover), $39.16 (ebook).

Abstract: Dual-aspect monism proposes that reality consists of a single, undifferentiated, holistic "substance" (monism) that splits into mind and matter (dual aspects). In this view, mind and matter are linked, or intimately correlated, by meaning. These tight correlations do not imply that mind causally affects matter, or vice versa, but rather they point to an acausal relation. Atmanspacher and Rickles propose that this metaphysical theory, based on deep philosophical roots and refined based on ideas from quantum mechanics, provides a satisfying model of reality that does justice to both the mental and physical domains. They describe a line of qualitative research that appears to support their theory, but they inexplicably dismiss a much larger body of quantitative studies that provide far greater support.

The philosophy of dual-aspect monism proposes that reality consists of a holistic psychophysical realm that is neither mind nor matter but contains the potential of both of those aspects, and more. Carl Jung called this realm the unus mundus, the "one world." Similar concepts involving a primordial, undifferentiated reality can be found throughout the world's esoteric literature, and even today one sees echoes of that idea in the form of a cosmic singularity from which the Big Bang purportedly arose. Within dual-aspect monism, this holistic realm is said to split (the authors also use the term "decompose") into the two aspects that we experience as mind and matter. As such, this philosophy could be viewed as a form of dualism (i. e., dual-aspect), where mind and matter are just two of a presumably infinite number of aspects that could emerge from the *unus mundus*. However, those potential other aspects are beyond our experience and are not addressed by this theory.

A question that may arise is why would the *unus mundus* "want" to split? That is, what would cause a distinction to arise in a fully holistic medium where there are no causes, at least not causation in the usual sense of that term? The answer provided in this book seems to be that the split is encouraged to occur via *meaning*. But do we mean meaning in the human-centric sense of an important relation assigned between this and that? And if so, then who or what assigns that importance, and how does meaning dip into and initiate the paradox of acausally causing the *unus mundus* to split? Perhaps meaning is meant in a more cosmic sense, something that defies what humans mean by meaning. These questions arise because meaning, which is highlighted in the title of the book, is not defined in a clear or satisfying way.

Regardless of why or how the *unus mundus* splits, mind and matter magically emerge in some way, and then – according to this theory – they also react back into that neutral psychophysical realm (i. e., the *unus mundus*), setting up a recursive relation (perhaps that recursion represents the meaning we are seeking?). An important part of the theory is that mind-matter correlations do not involve causal interactions in the sense of Aristotle's "efficient cause." Rather, mind and matter are said to be intimately related *acausally*, analogous to quantum entanglement, where the observed correlations are not caused, but they are also not due to chance.

That is the theory in a nutshell. The details and many nuances required to fully unpack this nutshell unfold over two hundred pages, which includes a survey of the historical precursors that underlie the theory. As a scholarly book, it is not an easy read for

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those who are not already steeped in the philosophy of mind, the formalisms and various interpretations of quantum theory, and the mathematics of Clifford and other geometric algebras. There are numerous footnotes and 20 pages of references at the end of the book for those who wish to gain a deeper understanding than the main text provides.

But even without a background in the topics covered in this book, it is well worth studying by anyone interested in gaining new perspectives on mind-matter interactions. In some respects, dual-aspect monism is akin to the story of Goldilocks because, like the character in that fairytale, this book seeks just the right way to think about reality. Unlike Goldilocks, this theory seeks to move beyond the three "bears" (i. e., the most popular philosophical models) that, following the fairytale we may call the Little Wee Bear of *dualism*, the Middle-Sized Bear of *idealism*, and the Great Big Bear of *materialism*.

Dualism, most often associated with René Descartes, proposes that reality consists of two fundamentally different "substances," one mental (*res cogitans*) and the other physical (*res extensa*). The problem with dualism is how two radically different substances can interact. We know that they do interact through the close relationship we experience between mind and body and in the neural correlates of consciousness. Dualism once held a prominent place in the philosophy of mind, but in the sciences today it has been relegated to Little Wee Bear status.

Idealism, found in various forms within the world's esoteric traditions, and discussed in Huxley's *Perennial Philosophy* and other works (Huxley, 1945), proposes that consciousness is primary over the physical world. In that case, the physical world and all of its manifold forms are a mental inference. The problem with idealism is that it seems as though there are aspects of the physical world that are not just mental creations. Einstein, in a widely cited complaint about the implications of quantum theory, doubted that the moon would cease to exist when nobody observed it (Mermin, 1985). That is, some aspects of the physical world seem to be so stable, whether we are around or not, that unless we postulate some form of "cosmic mind" that is not susceptible to human frailties like mind-wandering, then it is not clear how such stability could arise or be sustained. In any case, Idealism may be considered the Middle-Sized Bear in the philosophy of mind, with a recent resurgence of interest in science in the forms of panpsychism and cosmopsychism (Ramm, 2021).

Materialism, the Great Big Bear, is the prevailing assumption about reality within the sciences today. It has been adopted more or less uncritically as the guiding doctrine largely because of its demonstrable success in creating new technologies. The wisdom of such creations and their ultimate use and abuse is an extremely important issue, but that is a different topic. Materialism proposes that everything, including mind, is ultimately physical. This is why Francis Crick's "astonishing hypothesis" about consciousness is that you, your thoughts, your dreams, and subjective sense of identity are, as he put it, nothing but a pack of neurons (Crick, 1995). The problem with materialism is that no one has any idea about how something manifestly non-physical, like the subjective taste of an orange or the first-person experience of the color red, can emerge from the physical. As philosopher Jerry Fodor put it in 1992, and which still rings true today, "Nobody has the slightest idea how anything material could be conscious. Nobody even knows what it would be like to have the slightest idea about how anything material could be conscious" (p. 5).

Dual aspect monism's version of Goldilocks is unsatisfied with those three bears, so a fourth is required, and that is where the present book begins. To motivate the development of their model, Atmanspacher and Rickles provide a brief survey of early Sumerian myths and Greek ideas that were precursors to dual-aspect monism, then they

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move on to Descartes, Leibniz, and Spinoza, and then discuss neutral monism, a philosophy proposed by Ernst Mach, William James, and Bertrand Russell. With that background in mind, the book focuses in detail on three pairs of more modern figures, from which the authors' theory is derived: Wolfgang Pauli and Carl Jung, Arthur Eddington and John Wheeler, and David Bohm and Basil Hiley. The underlying commonality of these three dyads is that they all based their ideas on quantum-inspired concepts, which were not available to the earlier discussants. They also all emphasized the importance of meaning.

I believe that what the authors were attempting to achieve by highlighting the contributions of these six authors is that our philosophical worldview and our understanding of the physical world go hand-in-hand, e. g., the pragmatic success of classical physics gave rise to reductive materialism as a *de facto* practical philosophy that was adopted into the now-entrenched scientific worldview. But as our understanding of the physical world has evolved, now including notions of flexible spacetime and nonlocality, our worldview is also morphing into something more sophisticated. That will in turn influence our philosophical assumptions, and eventually we will end up with a new and presumably more comprehensive scientific worldview.

In their discussion of the role of meaning in this emerging worldview, the authors distinguish between surface and deep. Surface meaning refers to the notion of a relation between things, i. e., one thing referring to another conveys meaning via that relation. By contrast, deep meaning is said to refer to a more abstract notion of a "felt sense," as in "this doesn't make sense." Perhaps deep meaning is like the term *noetic*, an intuitive feeling held with conviction, but without conscious awareness of where that conviction comes from. Or perhaps deep meaning is deep because the word "deep" implies a gravitas or profundity that is not conveyed by the word "surface." In any case, the authors do not specify what deep meaning means in formal terms.

Because mind and matter are said to arise from the same *unus mundus*, they are correlated. That is, a correlation is a dependency between properties of objects. In simple physical systems, conservation laws require that properties like spin must be conserved, and thus one photon that splits into two photons will have properties like polarization that are strictly opposite to each other, and thus the two photons will be correlated (in this example, a negative correlation). In more complex systems, like identical twins arising from the same egg, there may be many physical and behavioral effects that are very similar, and thus exhibit a positive correlation.

However, the connection we are dealing with here is not localized in spacetime nor, as statisticians are fond of reminding us, does correlation necessarily imply causation. In fact, in this case the authors maintain that mind and matter are definitely *not* connected causally. This can make mind-matter correlations, like Jung's concept of synchronicities, appear to be quite mysterious when experienced at the level of everyday experience. Such experiences evoke ideas like teleology or goal-orientation, where mental and physical events correlate in meaningful, surprising, and non-chance ways, but without any (ordinary) cause. Incidentally, the concept of goal-orientation was rediscovered based on empirical research on mind-matter interactions (Schmidt, 1987), revealing a nice convergence when approaching this subject from both theoretical and experimental directions.

The strength of *Dual-Aspect Monism and the Deep Structure of Meaning* is that it offers a meticulously developed framework for understanding mind-matter correlations, in particular the types of correlations that the authors refer to as "exceptional

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experiences," like synchronicities. It also provides an intriguing clue about how these correlations may arise, namely through meaning. For example, consider an experiment seeking to demonstrate, say, a telepathic connection between an isolated pair of people. If the "receiver" of telepathic information successfully describes a randomly selected image that the "sender" is asked to mentally share with the receiver, then that outcome is viewed as a desirable "hit" rather than "dumb luck" because the experimental protocol was devised by experimenters who *assigned meaning* to that outcome. Whether this particular meaning may be called shallow or deep is uncertain, but it is clear that an experimental protocol is a type of meaning that transforms a random event into a nonrandom event (where confidence in that interpretation is bolstered by sufficient repeatability, which is also part of the protocol).

The primary weakness of the book is that, given its focus, one might have expected it to address the century of laboratory studies that have investigated mind-matter correlations under controlled conditions. Unfortunately, rather than displaying the same degree of scholarly depth as is evidenced throughout the rest of the book, on this issue the authors dismiss the entire body of relevant empirical literature in a single sentence. They allege, without elaboration or evidence, that the results of literally hundreds of such experiments are due to "fraud, or experimental incompetence, or they were simply insignificant" [p. 189]. Then, adding insult to injury, they contend that experimental approaches are "wrong-headed." This curt discharge then points to a footnote describing John Wheeler's fury at discovering that he was part of a panel on "physics and consciousness" at an AAAS panel discussion in 1979 that – horrors upon horrors – included parapsychologists who were discussing experimental evidence that in essence confirmed Wheeler's ideas.

Inclusion of the Wheeler footnote may help to explain why the authors avoided addressing the relevant parapsychological literature. In academic circles it can be difficult to maintain a respectable scholarly stance when discussing topics that are exceedingly close, or in some cases identical to, topics that fall within the discipline of parapsychology. This taboo is a pity, for in an earlier section of the book discussing Wheeler's contributions to dual-aspect monism, he is quoted as writing about how "the participant [in an experiment] is actively involved in the way the world develops" [p. 110]. Indeed, quotations by virtually all of the other historical contributors to this book, including the ideas offered by the authors, could easily be crafted into a fitting Foreword for a book that focused exclusively on laboratory studies of mind-matter interaction.

Instead, the only research mentioned in support of the theory is qualitative. While it is mildly interesting that "exceptional experiences" are commonly reported, relying on anecdotal reports to support a theory utterly fails to address the all-important *ontic* nature of mind-matter correlations. Qualitative research can inform us about the mental side of mind-matter interactions, but it tells us nothing about the physical side. What we really want to know is what happens after the frailties of memory, psychological biases, and elaborations are taken into account. Do any unexpected *quantitative* correlations remain? Although such experiments may not be trivially easy to replicate, using the same gold standard meta-analytical techniques employed throughout many mainstream sciences it has been amply demonstrated that mind-matter correlations, which arguably include the entire range of psychic phenomena, are indeed repeatable in the lab (Cardeña, 2018).

The book opens with a quote by T. S. Eliot: "Only those who will risk going too far can possibly find out how far one can go" [p. *v*]. The book closes with a quote by Bertrand Russell: "The physical world is a sort of governing aristocracy, which has somehow

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managed to cause everything else to be treated with disrespect…. We should treat with exactly equal respect the things that do not fit in with the physical world" [p. 197]. Sandwiched between these two quotes, which encourage bold open-mindedness, the body of the text provides an excellent introduction to a novel form of dual-aspect monism inspired by quantum theory. Its special emphasis on meaning as the essential connection between mind and matter may prove to be useful as a guide for developing ways of testing this theory. One hopes that a future, less timid edition of the book will add a chapter on the wealth of quantitative evidence that both supports the theory and honors the aspirations of those opening and closing quotations.

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Eine metaphysische Theorie zur Verbindung von Geist, Materie, und Bedeutung

Dean Radin

Zusammenfassung: Der duale Aspekte-Monismus geht davon aus, dass die Realität aus einer einzigen, undifferenzierten, holistischen "Substanz" (Monismus) besteht, die sich in Geist und Materie (dualer Aspekt) aufspaltet. In dieser Sichtweise sind Geist und Materie durch Bedeutung miteinander verbunden oder eng miteinander verknüpft. Diese engen Korrelationen bedeuten nicht, dass der Geist die Materie kausal beeinflusst oder vice versa, sondern deuten eher auf eine akausale Beziehung hin. Atmanspacher und Rickles schlagen vor, dass diese metaphysische Theorie, die auf tiefen philosophischen Wurzeln beruht und auf der Grundlage von Ideen aus der Quantenmechanik verfeinert wurde, ein zufriedenstellendes Modell der Realität liefert, das sowohl dem mentalen als auch dem physischen Bereich gerecht wird. Sie beschreiben eine qualitative Forschungsrichtung, die ihre Theorie zu stützen scheint, lehnen aber unerklärlicherweise eine wesentlich größere Anzahl quantitativer Studien ab, die sich für eine weitaus größere Unterstützung eignen würde.

German translation: Eberhard Bauer

Uma Teoria Metafísica Conectando Mente, Matéria, e Significado

Dean Radin

Resumo: O monismo de duplo-aspecto propõe que a realidade consiste em uma única"substância" (monismo), holística, indiferenciada, que se divide em mente e matéria (aspectos duais). Nesta visão, a mente e a matéria estão ligadas, ou intimamente correlacionadas, pelo significado. Essas correlações estreitas não implicam que a mente afete de maneira causal a matéria, ou vice-versa, mas apontam para uma relação acausal. Atmanspacher e Rickles propõem que essa teoria metafísica, baseada em raízes filosóficas profundas e refinada com base em ideias da mecânica quântica, fornece um modelo satisfatório da realidade que faz justiça aos domínios mental e físico. Eles descrevem uma linha de pesquisa qualitativa que parece apoiar sua teoria, mas, inexplicavelmente, descartam um corpo muito maior de estudos quantitativos que fornecem um suporte ainda maior.

Portuguese translation: Antônio Lima

Una Teoría Metafísica que Conecta a la Mente, la Materia, y el Significado

Dean Radin

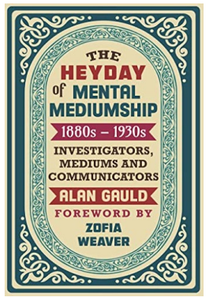
Resumen: El monismo de doble aspecto propone que la realidad consiste en una "sustancia" única, indiferenciada y holística (monismo) que se divide en mente y materia (aspectos duales). Según este punto de vista, la mente y la materia están vinculadas, o íntimamente correlacionadas, a través del significado. Estas estrechas correlaciones no implican que la mente afecte causalmente a la materia, o viceversa, sino que apuntan a una relación no causal. Atmanspacher y Rickles proponen que esta teoría metafísica, basada en profundas raíces filosóficas y refinada con ideas de la mecánica cuántica, proporciona un modelo satisfactorio de la realidad que hace justicia tanto al ámbito mental como al físico. Describen una línea de investigación cualitativa que parece apoyar su teoría, pero inexplicablemente descartan un conjunto mucho mayor de estudios cuantitativos que proporcionan un apoyo mucho mayor.

Spanish translation: Etzel Cardeña

The Definitive Account of Early Mediumship

Etzel Cardeña

Lund University



A review of *The Heyday of Mental Mediumship: 1880s-1930s: Investigators, Mediums and Communicators*, by Alan Gauld. White Crow Books, 2022. Pp. xiii + 324, $21.99 (Paperback). ISBN 978-1-78677-185-8

Abstract: Following his acclaimed earlier study on mediumship and survival, Alan Gauld provides a more complete account of about 50 years of early studies on mediumship with a select group of mediums (e.g., Mrs. Piper, Mrs. Leonard, Mrs. Dowden). He describes in detail why many if not most of the criticisms against extraordinarily accurate accounts by these mediums do not hold water when analyzed in detail. Gauld does not provide easy answers, but in his masterwork does something much more important by offering a justification to those who may want to base their belief of potential survival on empirically defensible grounds.

First, a warning to potential readers of Alan Gauld's superb new book: Stop reading it as you approach your train or bus stop or you might miss it (I know whereof I speak). His previous book (Gauld, 1982) of early mediumship has been the source of authoritative, eminently reasonable, and non-dogmatic source of what the early trance (or mental) mediumship, studied mostly by the Society for Psychical Research, suggested about the possibility of survival. I will no longer recommend that book as the first choice because Gauld's new book surpasses it by going into greater detail and more thorough argumentation, demolishing on the way ignorant, nonsensical, and dogmatic critiques. *Heyday* is circumscribed to research on mental mediumship in the UK and the USA during a period of about 50 years. It does not cover other areas that have been proposed as germane to a discussion of survival, such as apparitions or physical manifestation mediumship (e. g., Fontana, 2005), nor does it cover mediumship in other countries (e. g., Rocha et al., 2014). This lack of breadth, though, is justified by the depth of analysis.

Guided by Gauld, we enter the séance rooms with dedicated, brilliant, and astute researchers to clarify what happened many decades ago, which is not only intrinsically interesting but offers methodological and theoretical lessons that have much to offer to the present. I will revisit that point at the end of this review so let me start with one of the first shocks along the way.

On May 4, 1887, the then-agnostic psychical researcher Richard Hodgson, who had been investigating mediums and psychics suspected of fraud (most famously the Theosophist Madame Blavatsky, see Gurney et al., 1885) anonymously sits with the medium Mrs. Piper. He makes copious notes about what Piper's "control" (i. e., the purported intermediary between a medium and the dead) Phinuit tells him. It includes the mention of a "Fred" who went to school with Hodgson, was remarkable at jumping frog, and had convulsions before his death. The mind of the Australian debunker must have stopped in its tracks (or midstream, if one uses William James's metaphor) at this recondite information of his childhood in another continent. And those were not the only accurate facts that Mrs. Piper conveyed to Hodgson, who became convinced of her extraordinary abilities (as did William James and the cautious and meticulous Helen Sidgwick).

Heyday has many other examples of Mrs. Piper's (or her *controls* if you will) uncanny ability to offer accurate information that even the sitter did not know at the time, or to stand-in or proxy sitters that did not know the person for whom the reading was intended and thus could not have provided useful information to the medium. She even, a few times, correctly stated what someone else was doing at the time at another location, or

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what that person would do in the future. Mrs. Piper, although probably the best known and studied medium, was not the only one who communicated information that she seemingly could not have known through ordinary means and in controlled settings that minimized the possibility of any information obtained before or at the time. To give but two other examples described at length by Gauld, in a well-documented session Mrs. Dowden mentioned correctly at least seven names or nicknames known to the sitter but not to the medium (p. 253). And Mrs. Leonard's delightful control Feda (for an extant recording of her voice see Fischer & Knoefel, 2007), in six sessions with at times a proxy sitter, provided very precise information. The sessions scores were: a: 13 out of 13 correct statements; b: 6 out of 6; c: 9 our of 10 with the remaining unverifiable; d: 11 out of 11; e: 4 out of 4; f: 3 out of 4 with the remaining inconclusive (pp. 266-269), giving accurate readings that clearly applied to that person and likely to few others if any.

Were all mediums as accurate as the instances just mentioned, there would not be a controversy about mediumship and we would all consult mediums regularly, but another of Gauld's great strengths is his completeness and fairness in covering the often very extensive records. He gives many examples of the many instances in which the mediums were absolutely wrong or, at least, partially wrong, and/or were grasping at straws. Psi-deniers may use these instances to avoid dealing with the accurate instances, but, in my view, this is as nonsensical as it would be to deny the existence of poetry because even very good poets (a very select lot, of course, maybe as rare as good mediums) cannot produce good poems on demand. Consider the following quotation by the poet and critic Randall Jarrell (1953): "How necessary it is to think of the poet as somebody who has prepared himself to be visited by a dæmon, as a sort of accident-prone worker to whom poems happen… A good poet is someone who manages, in a lifetime of standing out in thunderstorms, to be struck by lightning five or six times; a dozen or two dozen times and he is great" (p. 136). This description of poetry could

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describe as well how manifestations of putative psi, often related to important emotional events, are experienced by most of us as events happening rather than being under our control.

One of Gauld's many strengths is that he discusses alternative explanations to that of anomalous cognition for extraordinary readings (including fraud, "cold reading," information that Mrs. Piper might have known at one point and forgot, and so on) and proceeds to dismantle them as *adhoccery,* a term he uses for hypotheses that lack any plausible evidence but are offered in order to safeguard a theory, sometimes, to use one of his memorable phrases, "prancing in the borders of Cloud Cuckoo Land" (p. 25). Gauld argues against the assumption that anomalous cognition, whether originating in the living (i. e., living agent psi or LAP, or "superpsi", typically attributed to the mediums themselves) or the dead (survival) is impossible and should not even be entertained as a hypothesis to be evaluated. I can offer the recent example of two psi-deniers (they cannot be called skeptics because they already *know* with certainty) who refused to even consider the methods or results of more than 10 meta-analyses supportive of psi cognition in a paper they criticized (Reber & Alcock, 2019; for two of various refutations of their arguments see Cardeña, 2019; Williams, 2019).

One lesson from *Heyday* is that it is important for theoretical and practical reasons to investigate under what circumstances good mediums are more -and less- likely to produce accurate information (for instance, Mrs. Piper's ability declined with age and perhaps with difficult life situations, much as it happens with geniuses in mathematics, literature, etc.). A variety of methodological, theoretical, and even cultural points are mentioned or can be derived from *Heyday* to explain why earlier research provided more impressive supportive evidence of anomalous cognition than seems to be the case now (an observation made repeatedly by Gauld).

A strong possibility, in my view, is that methodological practices that have come to dominate since the original SPR investigations may discourage the manifestation of *bona fide* mediumship. Although psi critics may claim that these changes just entail scientific progress, they may also have unfortunate consequences. For instance, an important change since the period studied by Gauld has been the questionable central role given to quantification of group data and related statistical inference in the behavioral sciences (e.g., Acree, 2021; Bakan, 1969). It should be mentioned, however, that parapsychology/psychical research, even in the early study of mediumship, developed ingenious mathematical analyses (e.g., Sidgwick, 1922), and the field has continued to produce methodological and topical innovations (Hövelmann, 2015). *Heyday* describes how analyses conducted by W. F. Prince and John Thomas resulted in astronomical odds against chance that accurate items in mediumistic readings would apply to other individuals; those original data and analyses deserve being revisited by contemporary statisticians. Furthermore, some early investigation practices are fortunately gone (e. g., exposing Mrs. Piper, unexpectedly, and without informed consent, to nocive stimuli), and current mediums/psychics are not likely to be willing to have their lives as controlled by investigators as happened earlier.

Although statistical analyses continue to support the validity of anomalous cognition during mediumistic readings (e.g., Beischel & Zingrone, 2015; Sarraf et al., 2020), in my view a change that has impoverished mediumship research is the neglect of longitudinal case studies in the context in which putative valid phenomena occur. Witness the thorough development of research procedures in collaboration with mediums depicted in *Heyday,* and compare it with the short-term relationships with mediums during a typical experiment. The field needs long follow-ups of promising genuine mediums, tracing when and under what circumstances they perform better. Developing a long-term relationship would give the researcher a "feeling for the medium," or, to quote Nobel prizewinner geneticist Barbara McClintock about maize, "No two plants are exactly alike. They're all different, and as a consequence, you have to know that difference. I start with the seedling, and I don't want to leave it. I don't feel I really know the story if I don't watch the plant all the way along" (McClintock, in Keller, 1983). New theoretical, methodological, and statistical approaches centered on the person (cf. Bergman & Lundh, 2015) offer potential tools to the mediumship researcher. Relatedly, Simmonds-Moore (2022) has proposed that investigations should not exclusively or perhaps even primarily center on absolute control of variables but also embrace relational, meaningful, and participatory approaches. In support of her position, a recent paper concluded that aspects common to most studies mentioned in *Heyday,* such as selecting mediums with demonstrated putative ability, using motivated sitters, and giving some non-leading information to the mediums about the deceased were associated with more successful studies (Silva & Moreira-Almeida, 2022). Critics who propose that even just names in reading can explain away supportive results (e.g., Battista et al., 2015) should conduct their own studies and show that their proposals have empirical backing and are not just data-free speculations or, to quote Gauld, mere adhoccery.

I also think that another factor contributing to the success of some early mediums involved long procedures to alter their state of consciousness, whereas inducing a distinct state of consciousness (and not merely focusing inwardly) does not seem to be a common current practice among mediums/psychics/channels. To give but an example, Mrs. Piper's different states of consciousness throughout long sessions were described in detail by Eleanor Sidgwick (1915), and the medium's imperviousness to painful stimuli parallels cross-cultural observations of "trance" (for a review see Cardeña et al., 2023). Results from studies on ganzfeld, hypnosis, meditation, and psychedelic drugs support the contention that anomalous cognition may be more likely to occur during different states of consciousness (Cardeña et al., 2015). Thus, evidential

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mediumship may require greater alterations of consciousness than seems to be the case in current practice. Furthermore, Gauld mentions that a cultural change that would make reductive materialism less potent, and the possibility of survival more, would strengthen the potential status of survival and psi. As an example, a survey of a representative population sample in Brazil showed that what is *very* unusual in that country is not to have had experiences of psi or survival , rather than the other way around (Monteiro de Barros et al. 2022). In countries or subcultures in which the default position is intense skepticism or even denial, it would be useful to note that many eminent scientists and other high-caliber intellectuals of the past and the present (Cardeña, 2014a,b) have supported research on the topic.

The final chapter of *Heyday* offers Gauld's summarizing thoughts. His conclusion has not changed substantially from his 1982 book, but in *Heyday* he develops it further. He mentions four theoretical explanations for the accurate information provided by mediums: a) LAP (living agent psi); b) actual psychic interactions with surviving spirits, c) the materialist perspective that posits that anomalous cognition from living or dead individuals is impossible by definition and discounts them *a priori* as random, fraudulent, and so on, and d) different agnostic approaches (p. 284). Gauld spends most of his discussion weighing the LAP versus survival hypotheses and concludes that there are many aspects- such as "drop in" cases of unsought apparently deceased communicators from people who had no acquaintance with the mediums or the persons consulting them- that are difficult to explain through LAP (e. g., the case of Mr. Rich described by Sir Oliver Lodge in a reading with Mrs. Piper; pp. 289-290). Gauld gives considerable weight, as Eleanor Sidgwick did, to the characteristic personality and the motivation implied in some communications, but at the same time he also criticizes survivalist assumptions that have little to no evidence to back them up (e.g., that even if survival of personality occurs it must occur to all people or for all time, p. 296), besides pointing out to the many inconsistencies in the information provided even by the best mediums.

What to make out all of this? Some years ago, as I became more familiar with the serious literature on the possibility of survival, including Gauld's 1982 book, my belief shifted from thinking that it was impossible to considering that the door of possibilities had opened slightly. *Heyday* has opened the door a bit more but refrains from supporting survival unequivocally as a certainty. The puzzle continues to have many missing pieces. The conclusion of John Thomas, cited approvingly by Gauld, can also sum his own thinking. After showing that ordinary explanations such as fraud are very implausible in the best cases, Thomas concluded that "The survivalist theory covers all the facts , but is not necessitated… because of the possibility of the alternative mind-reading explanation… irrespective of which way the balance may ultimately incline, the results of psychical research favor an interpretation of the universe that… affords all those who think that there are ultimate non-material values at the heart of things an increasingly broadening base of evidence" (Thomas, 1937, in Gauld, p. 281).

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Die definitive Darstellung der frühen Medialität

Etzel Cardeña

Zusammenfassung: Im Anschluss an seine wohlbekannte Studie (1982) über Medialität und Überleben liefert Alan Gauld eine noch umfassendere Darstellung der etwa 50 Jahre umfassenden Frühzeit von Studien über Medialität anhand einer ausgewählten Gruppe von Medien (z.B. Mrs. Piper, Mrs. Leonard, Mrs. Dowden). Er beschreibt eingehend, warum einige der Kritikpunkte gegen die außerordentlich genauen Berichte von Medien über Informationen, die sie nicht hätten wissen dürfen, bei genauerer Analyse nicht haltbar sind. Gauld gibt keine eingängigen Antworten, sondern leistet in seinem Meisterwerk etwas viel Wichtigeres, indem er denjenigen eine solide Rechtfertigung dafür bietet, dass ihr Glauben an ein mögliches Überleben auf empirischen und vernünftigen Gründen basieren könnte.

German translation: Eberhard Bauer

Relato Definitivo sobre a Mediunidade Primeva

Etzel Cardeña

Resumo: Dando continuidade a seu aclamado estudo (1982) sobre mediunidade e sobrevivência, Alan Gauld fornece um relato ainda mais completo de cerca de 50 anos dos primeiros estudos sobre mediunidade com um grupo seleto de médiuns (por exemplo, Sra. Piper, Sra. Leonard, Sra. Dowden). Ele descreve em detalhes por que algumas das críticas contra relatos extraordinariamente precisos de meios de informação que eles não deveriam saber não se sustentam quando analisadas em detalhes. Gauld não fornece respostas fáceis, mas em sua obra-prima faz algo muito mais importante ao oferecer justificativas sólidas para aqueles que podem fundamentar sua crença na sobrevivência potencial em bases empíricas e sensatas.

Portuguese translation: Antônio Lima

El Estudio Definitivo de la Mediumnidad Temprana

Etzel Cardeña

Resumen: Siguiendo su aclamado estudio anterior (1982) sobre mediumnidad y supervivencia, Alan Gauld proporciona un relato más completo de unos 50 años de estudios tempranos sobre mediumnidad con un grupo selecto de médiums (por ejemplo, la Sra. Piper, la Sra. Leonard, la Sra. Dowden). Describe en detalle por qué muchas, si no la mayoría, de las críticas contra los relatos extraordinariamente precisos de los médiums no se sostienen cuando se analizan en detalle. Gauld no ofrece respuestas fáciles, pero en su obra maestra hace algo mucho más importante al ofrecer una justificación a aquellos que quieran basar su creencia en una potencial supervivencia basados en argumentos empíricamente defensibles.

Spanish translation: Etzel Cardeña

Recent Publications of Note 3(1)

Etzel Cardeña

Lund University

Anomalous Experience

Buric, I., Farias, M., Driessen, J. M. A., & Brazil, I. A. (2022). Individual differences in meditation interventions: A meta-analytic study. *British Journal of Health Psychology*. doi: 10.1111/bjhp.12589. An important meta-analysis showing that meditation may have positive or negative effects depending on such characteristics as previous levels of psychopathology, interpersonal skills, and others.

Gandy, S., Bonnelle, V., Jacobs, E,. & Luke, D. (2022). Psychedelics as potential catalysts of scientific creativity and insight. *Drug Science, Policy and Law. 8.* doi: 10.1177/20503245221097649. This paper reviews the impact of altered consciousness on different aspects of scientific and artistic creativity.

Kauffman, S. A., & Radin, D. (2023). Quantum aspects of the brain-mind relationship: A hypothesis with supporting evidence. *Bio Systems*, *223*, 104820. https://doi.org/10.1016/j.biosystems.2022.104820. An eminent biologist and arguably the most important current PK researcher join forces to propose a model in which quantum mechanics may offer mind a role in converting Possible into Actual events.

Lebeau, C., & Richer, F. (2022). Emotions and consciousness alterations in music-color synesthesia. *Auditory Perception & Cognition,* 5(1-2), 76- 85. doi: 10.1080/25742442.2022.2041971. As compared with controls, music color synesthetes

[1]This regular feature summarizes recent papers of interest. If you want to recommend a paper, please send me a note with bibliographic information to etzel.cardena@psy.lu.se

https://doi.org/10.31156/jaex.25096

had more intense emotional experiences and alterations of consciousness, including time sense and body image alterations, when exposed to music.

Lifshitz, M., van Elk, M., & Luhrmann, T. M. (2019). Absorption and spiritual experience: A review of evidence and potential mechanisms. *Consciousness and Cognition*, *73*, 102760. https://doi.org/10.1016/j.concog.2019.05.008. The relation between being absorbed in experiences, "external" or "internal," has been amply studied in the hypnosis literature and in this piece it is related to the propensity to have spiritual experiences across cultures.

Luhrmann, T. M., & Weisman, K. (2022). Porosity is the heart of religion. *Current Directions in Psychological Science*, *31*(3), 247-253. https://doi.org/10.1177/09637214221075285. A paper related to the previously listed one, discussing the concept of mental porosity (similar to the construct of mental boundaries) in spiritual experiences (see also Cardeña & Terhune, 2014).

Marshall, P. (2022). Does mystical experience give access to reality? *Religions, 13*(983), https://doi.org/10.3390/rel13100983. An expert on mystical experiences discusses how they may not only be personal but offer valid insights "on fundamental issues such as the nature of reality, self, consciousness, and time."

Sawyer, D. (2022). What is the 'unitive mystical experience' triggered by psychedelic medicines and experience of? An exploration of Aldous Huxley's viewpoint in light of current data. *Religions, 13*(1061). https://doi.org/10.3390/rel13111061. A comparison of Robin Carhart-Harris' REBUS (mystical experiences are wholly subjective, with no ontological referent) and Edward Kelly's ROSTA (a mystical ontological referent need not contradict science) models. The paper points out that mystical experiences are consistent with research on psi phenomena and the viability of extended mind proposed by Aldous Huxley (and various spiritual traditions).

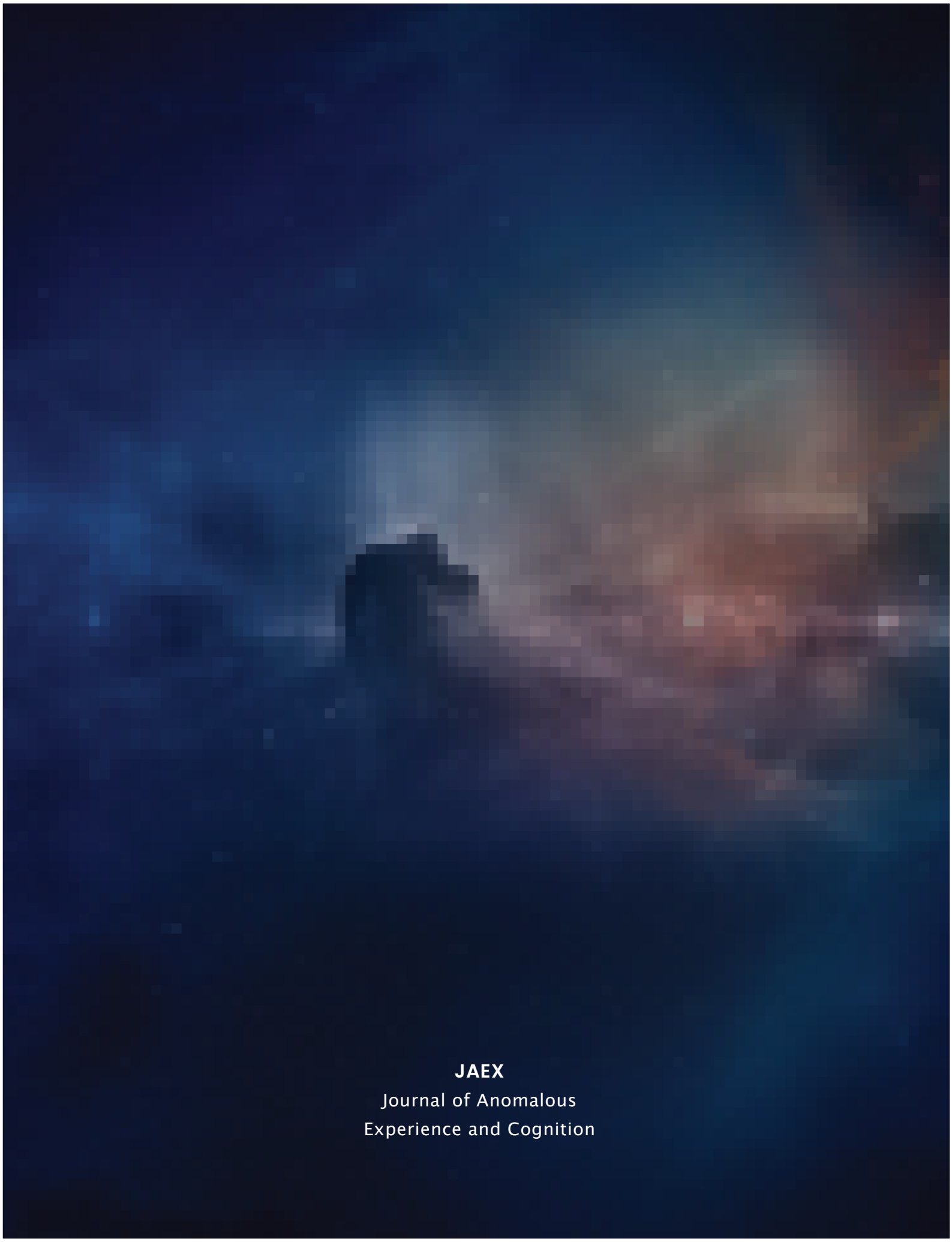
Timmermann, C., Bauer, P. R., Gosseries, O., Vanhaudenhuyse, A., Vollenweider, F., Laureys, S., Singer, T., Mind and Life Europe (MLE) ENCECON Research Group, Antonova, E., & Lutz, A. (2023). A neurophenomenological approach to non-ordinary states of consciousness: hypnosis, meditation, and psychedelics. *Trends in Cognitive Sciences*, *27*(2), 139–159. https://doi.org/10.1016/j.tics.2022.11.006. An overview of an approach that gives equal priority to thorough inquiry from the 1st (phenomenological) and 3rd (neuroscientific) perspectives. Disappointingly, it does not mention the foundational work of Charles Tart and other pioneers of his generation.

Anomalous Cognition

Charman, R. A. (2021). Empirical evidence of psi healing in mice confirms parapsychology, or psiology, as a legitimate scientific discipline. *Journal of the Society for Psychical Research, 85*(2), 91-103. A non-systematic review of studies proposing the reality of anomalous healing, including the recent work by Bengston.

Leverett, C. S., & Zingrone, N. L. (2022). Women and parapsychology. *Journal of Anomalistics, 22*(2). A special issue on past and present cardinal contributions of women with various contributors. It also discusses a "feminine" complementary perspective to the experimental one in the study of anomalous cognition and the paranormal. Can be downloaded free from https://www.anomalistik.de/en/janom/contents/janom-22-2

Mayer, G. (Ed.). *Single case studies in anomalistics.* Lit. An anthology with various contributions on the importance and examples of single case studies in the general area of anomalistics (a concept only partly overlapping with those of anomalous cognition and experience).



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