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Psi and the Problem of Consciousness

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In this paper, I consider what the growing evidence in parapsychology can tell us about the nature of consciousness. Parapsychology remains controversial because it implies deviations from the understanding that many scientists and philosophers hold about the nature of reality. However, given the difficulties in explaining consciousness, a growing number of philosophers have called for new, possibly radical, explanations, which include versions of dualism or panpsychism. In this spirit, I briefly review the evidence on psi to see what explanation of consciousness might best be supported. After a brief survey of the evidence, I conclude that the best explanation would probably be neutral monism. I then explore a framework for neutral monism, using well-known features of quantum mechanics, to develop a ground or bridge between consciousness and matter. This framework, which I believe helps explain the psi evidence, suggests that a non-local proto-conscious field of potential or seed stuff underlies both matter and consciousness.

Keywords: parapsychology, consciousness, psi, neutral monism

As many theorists have noted, consciousness, while both familiar and intimate, remains deeply mysterious. The problem of explaining consciousness persists despite all attempts from the pre-Socratic Greeks to modern day philosophers at illuminating this perplexing subject. Throughout history many great thinkers supported the notion that consciousness or some sort of spiritual reality is distinct from matter, and indeed might be the fundamental source of all reality. However, the dominant view in the twentieth century settled on a more materialistic argument: consciousness most likely emerges from complex biological processes, which in turn are based ultimately on complex interactions between subatomic particles.

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This view remains unsatisfactory for some philosophers of mind. While advances in neuroscience have led to improvements in our understanding of how processes within the brain work, we still are no closer to understanding experience at the most basic level. This is what Chalmers (1995) has termed the "hard problem" of consciousness. According to Chalmers, materialistic explanations of consciousness would be consistent with a world populated by zombies acting like people in the world, yet devoid of interior experience. Tackling the hard problem of consciousness, Chalmers argues, likely requires abandoning a purely materialistic view of consciousness.

The various theories of consciousness can arguably be grouped into five categories: materialism, dualism, panpsychism, neutral monism, and idealism. As noted above, the current mainstream view looks for materialistic explanations. This typically takes the form of arguing that consciousness must be a higher level activity that has emerged from lower level processes, such as complex biological processes. Another view, associated with Dennett (1991), is that explanations toward the "what is it like" aspect of consciousness are inherently misguided; hence, emergence explanations are unnecessary. Critics of this view insist that qualia and inherently subjective experiences are necessary data that require explanation.

Dualism has historically been the most important alternative to materialism, at least since Descartes. Material dualism holds that matter and consciousness are two substances that differ fundamentally in a number of ways.[1] This and other differences lead to the perhaps unsolvable problem of how such fundamentally different substances can interact. Historically, support for dualism fits well with such religious notions as the soul or supernatural agency. Dualism has attracted fewer adherents, however, as philosophy gravitated toward more naturalistic explanations.

Two closely related alternatives are panpsychism and neutral monism. Panpsychism holds that matter and mind are joined as one. The usual view of panpsychism holds that all matter, even electrons, has some aspect of mind, albeit at a rudimentary level. While panpsychism has relatively few adherents today, this class of explanations has had a long history in philosophy, being a close relative to animism that was common in early cultures (Skrbina, 2007). Neutral monism holds that matter and consciousness are aspects of some more neutral and fundamental reality. The two primary objections for these two categories of explanations are (1) the unappealing implication that non-biological objects such as rocks possess some level of "what it is like to be" and (2) the perplexing question of how small units of consciousness might combine to create richer, unified conscious experiences.

[1]Property dualism is another form of dualism, where mind and matter are two distinct categories of a single underlying substance of the physical type. Thus property dualism can be considered another version of materialism.

One last alternative is idealism, which holds that the physical universe is composed of mind. The Berkeleyan version of idealism is that the foundation of physical reality requires an observing agent. The existence of galaxies far beyond our perception would require something like a god. Theist philosophers or ancient believers in a pantheon were drawn to some version of idealism. Of all the alternatives, idealism is viewed as the least compatible with naturalistic explanations and hence has few proponents today.

While a majority of scientists and philosophers currently favor materialism, most who study this problem acknowledge the great difficulty in attempting to understand how non-conscious particles of matter can somehow lead to subjective experience. Searle (1992) provides a critical review of various versions of materialism which evolved over the course of the twentieth century. These include logical behaviorism, type identity theory, token identity theory, functionalism, strong AI, and eliminative materialism. Searle (1992, p. 53) argues that none of these explanations has anything to say about the subjective experience of mind. He argues in favor of a theory of biological naturalism, where consciousness is a natural product of complex biological processes. While he admits that we do not know how consciousness could have emerged this way, he argues that such an explanation must exist and we must therefore persevere until we have it.

While many probably share Searle's view, his metaphysical assumption that consciousness must be based solely from biological processes is not sufficient given the profound depth of the explanatory gap. Chalmers (1995) has argued that a naturalistic version of substance dualism is a possible candidate for making progress on the hard problem. McGinn (1991) presents a more pessimistic argument that the human mind is likely to be innately unable to understand the origins of its own subjective experience. Griffin (1998), Strawson (2006), and Nagel (2012) have argued that the emergence explanations will not succeed, given the inherent differences between matter and consciousness, and therefore more radical explanations are required.[2]

Nevertheless, most scientists and philosophers are understandably reluctant to give up on materialistic explanations, given its overall success throughout the physical sciences. Further, technologies and empirical methods are continuing to advance in neuroscience, which should provide important revelations for our understanding of consciousness. Indeed, the history of philosophy and science has been unequivocal on one central point: the crucial role that empirical methods must play in advancing our understanding of the world. However, there is one especially relevant category of empirical investigation that has played virtually no role in mainstream debate on consciousness: psi phenomena.

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[2]Griffin (1998) and Strawson (2006) both favor panpsychic explanations. Nagel (2012) argues in favor of neutral monism.

It is curious that those debating the nature of consciousness rarely consider the evidence on psi. Such evidence is surely relevant on the question of whether reality is best described by materialism, dualism, or something else. Of course, evidence on the existence of psi remains controversial, especially among academic psychologists. Despite the substantial empirical studies investigating psychic phenomena, serious discussion of parapsychology remains taboo among many circles of philosophers, scientists, and psychologists. Although the reasons are not clear, perhaps it's likely that many critics of psi are strong believers in a materialistic worldview and tend to believe that research findings consistent with psi must therefore be invalid (Alcock 2010; Hyman 2010). Many of the most hostile critics are firm believers in a materialistic worldview and understandably expend great effort to undermine, if not ridicule, those who advocate that psi is real.

However, those who are genuinely interested in comparing the arguments for different views on consciousness and are not too invested in materialistic explanations may wish to consider the evidence for psi and what this evidence might imply for the discussion on the nature of consciousness. If we accept the difficulty of the problem at hand, we could conceivably benefit from research that does not more or less assume from the outset that physical particles and processes must account for all reality. I will provide a summary of some of the psi evidence below. This is followed by a discussion of the current debate on the nature of consciousness. I then consider what light might be shed from this evidence.

The Evidence on Psi

I attempt here only a brief survey of the psi literature.[3] My assessment relies heavily on meta-analysis, which allows effects and statistical importance to be gauged across numerous relevant studies. Utts (1991) argues that much of the early literature on psi paid little attention to statistical power, which has in turn contributed some confusion regarding replicability. The available meta-analyses strengthen the power of the data at hand for a number of categories of psi. Further, I include here only studies that rely on statistical and quantitative methods, and thus I exclude methodologies that rely on anecdotes and interviews.[4]

Laboratory investigations of telepathy began with J.B. Rhine with his specially designed ESP cards, and eventually evolved into the ganzfeld method. The ganzfeld method involved quieting the senses of sight and hearing in the recip-

[3]See Radin (1997, 2006) for a broader presentation from an advocate of the evidence of psi within the laboratory. Also see Utts (1991), especially for a discussion on the evolution of criteria for evaluating psi. Krippner and Friedman (2010) provide arguments from both skeptics and advocates on the current state of psi.

[4]Many interesting studies rely heavily on interviews and anecdotes, and it may well be that such methods are a necessary part of what is needed to understand this phenomena. However, for purposes of this brief survey, I include only methods that utilize statistical testing.

ient; cut ping-pong balls are placed over the eyes and light static noise fills the ears. Bem and Honorton (1994) conducted a meta-analysis of ganzfeld studies and found overall a hit rate of 32.2%, significantly above the 25% expected by chance, with a p value of 0.002. Utts (1996) reported replications for Bem and Honorton from sessions conducted at three separate laboratories, each finding comparable hit rates. Milton and Wiseman (1999) challenged the results of Bem and Honorton with a follow up meta-analysis of 30 more recent ganzfeld studies and concluded that these studies did not provide significant effects. Bem, Palmer, and Broughton (2001) then found that when ten new studies were added to the database, the overall test results were significant, although with a lower average effect size than their original meta-analysis.[5] But Bem et al also found that the lowering of the effect size could be accounted for by the degree to which ganzfeld studies followed the protocol stated in their original meta-study.

Most recently, Tressoldi, Storm, and Radin (2010) examined all the ganzfeld evidence reported in 108 publications, conducted from 1974 through 2008 by laboratories in six countries. Subsets of this evidence have been analyzed in six meta-studies, including the skeptics Milton and Wiseman (1999). Hit rates that exceed chance with statistical significance were found in each study. The overall hit rate across all of the data was 31.5%, above chance expectation of 25%, and z statistic produces a p value of 1.0×10^{-11}. Tressoldi, Storm, and Radin report that the "overall results now provide unambiguous evidence for an independently repeatable ESP effect" (p. 581). Overall, the ganzfeld results demonstrate consistent support for the telepathy hypothesis, albeit at hit rates of a modest degree above chance.

A parallel investigation explored telepathy in dreams. The methodology for dream telepathy was established and refined by psychiatrist Montague Ullman and psychologist Stanley Krippner. The procedure employed two participants, a sender and a receiver (the dreamer), the experimenter, and judges. The experimenter monitored the EEG of the receiver, and when he judged him to be in the dream state, he would notify the sender. The sender would at that time open a sealed envelope, which contained a target picture (which had been randomly selected and was unknown to the experimenter and judges) and began "sending" the image to the participant in the dream state.

From 1966 to 1972, Ullman and Krippner conducted at total of 450 dream-telepathy sessions at the Maimonides Medical Center in Brooklyn (Krippner, 1991, 1993; Ullman et al., 1989). Meta-analysis of these studies has found an overall success rate at 63%, substantially above the hit rate that chance alone predicts (50%). Radin calculated the odds that such a high hit rate for the

[5]Milton and Wiseman (1999) actually find statistically significant results once one corrects a mistake in their calculation (Radin, 2006, p. 118).

combined results could be attributable to chance to be 1 in 75 million (1997, pp. 71–72). Sherwood and Roe (2003) examined 21 dream-telepathy studies published between 1977 and 2002 and compared them with the Maimonides studies. They found significant results overall, however with smaller effect sizes, which they attributed to slightly different methods and protocols. These differences included using homes rather than a facility such as Maimonides and eschewing EEG monitoring. Overall, the authors concluded that a small or modest dream-telepathy effect appears to be robust across a wide range of laboratories and variations in methods.

Meta-analysis also appears to support remote-viewing, a form of psi that falls in the category of clairvoyance. Utts (1996) surveyed the evidence on remote viewing for the American Institutes for Research. Analyzing the results of Stanford Research Institute from 1973 to 1988, she reported the statistical effects were so overwhelming that the probability that chance alone could account for the effects was 10^{-20}. Utts concluded:

> . . . remote viewing has been conceptually replicated across a number of laboratories by various experimenters and in different cultures. This is a robust effect that, were it not in such an unusual domain, would no longer be questioned by science as a real phenomenon. It is unlikely that methodological problems could account for the remarkable consistency of results . . . . (p. 22)

Another interesting literature has emerged on precognition and presentiment. Honorton and Ferrari (1989) report a meta-analysis of forced-choice precognition experiments between 1935 and 1987. The authors found, across 309 studies and 62 investigators, a small, but highly significant effect ($p = 6.3 \times 10^{-25}$). They also found that although the research designs improved with time, the effect size remained stable. Presentiment studies focus on physiological effects indicating emotional arousal as participants view pictures on a computer screen. These also suggest sensitivity of future events. In addition to the expected strong emotional arousal resulting when highly arousing negative or erotic images appear on the screen, some studies have shown increased arousal shortly before the picture to be displayed is even selected. There has not yet been a formal meta-analysis of presentiment studies; however, in his literature review, Bem (2011) reports that out of 24 studies conducted before 2009, nineteen were in the predicted direction and about half were statistically significant. Bem himself conducted nine precognition experiments, which essentially "time-reversed" well-known psychological effects so that the individual's response was obtained before the casual stimulus occurred. He reported that all but one of the experiments yielded statistically significant results, and the corresponding statistic across all of the experiments was $p = 1.34 \times 10^{-11}$.[6] More recently,

[6]Efforts are underway to replicate Bem's results.

Mossbridge, Tressoldi, and Utts (2012) conducted a meta-analysis of reports published between 1978 and 2010 and found evidence of shifts in physiological activity prior to stimulus, indicating an "unexplained anticipatory effect."

The evidence for telekinesis or mind–matter interaction is substantial, yet more mixed than the previous categories discussed above. These include dice tossing experiments, tests on the effects of intentions on random number generator devices, and tests on double slit diffraction. Radin and Ferrari (1991) conducted a meta-analysis on all random dice tossing experiments to investigate the question of whether human intention can influence movement of macroscopic objects in our world. The authors combined the results from 73 publications representing 52 investigators from 1935 to 1989. Overall, they found small but statistically significant results; the odds that chance alone could produce the results were 1 in 10^{-96}. The results remained significant when the authors altered the analysis by selecting subsets of investigators, discarding studies with unusually strong effects, and compensated for possible file-drawer omissions.

Important innovations in mind–matter interactions were led by the Princeton Engineering Anomalies Research Laboratory (PEAR) in the late 1990s. Experiments there were designed to test the mental influence on devices which produce streams of random 1s and 0s, generated by quantum processes.[7] Robert Jahn and colleagues published a review of 12 years of experiments of attempts to mentally influence these random number generators. Although the effect size was small (one bit out of 10,000 being shifted away from chance expectation), the *p* value for the composite effect across the databases over a 12-year investigation was reported to be approximately 6.99×10^{-5} (Jahn, Dunne, Nelson, Dobyns, and Bradish, 1997, p. 349). However, a joint effort by three labs (including PEAR) at replication using similar design and equipment failed to find significant results (Jahn et al., 2000).

Other attempts to explore mind–matter interactions have incorporated beams of light aimed at a double-slit apparatus. The double-slit experiment is one of the cornerstone investigations that have led to our understanding of quantum mechanics. Some arguments for mind–matter effects have invoked the "consciousness collapses the waveform" explanation from quantum mechanics; thus the double-slit experiment arguably provides an especially interesting arena for testing. Ibsison and Jeffers (1998) investigated the effects of participants' attempts to influence through intention the interference pattern within Young's double-slit experiment. Ibison and Jeffers conducted the experiment at York University, while Jahn and his colleagues used the same setup at

[7]This random number generating process is based on a microelectronic diode creating noise signals, which in turn are processed into random 1s and 0s. The quantum nature of the circuit is responsible for the true randomness of the output. I will discuss quantum mechanics in more detail in a later section of the paper.

Princeton. Ibison and Jeffers reported the results from both laboratories. The interference fringe pattern observed at York University was statistically indistinguishable from typical interference patterns, while the results at the Pear lab showed a marginally significant deviation (p value of 0.05). Recently, Radin et al (2012) conducted another version of the double-slit interference pattern; their results were strongly significant with a p value of 6×10^{-6}.

This brief survey suggests that while some evidence supports mind–matter interaction, there is a replication issue. Advocates of psi have argued that experimenter effects, such as the beliefs and expectations of the researchers, as well as those of the participants, must be assessed. Indeed, a casual reading of the studies presented here reveals that researchers (in most cases) made little effort to maintain consistency of training and general atmosphere with participants in their experiments.

Rosenthal's (1976) review of "experimenter effects" across a wide range of experimental psychology and clinical research has demonstrated that experimenter's expectations and attitudes can affect the outcome of experiments. Research into experimenter effects has revealed a number of interesting patterns through which experimenters may communicate with participants in ways that influence their behavior. The possibility for some psi mechanism to be the result of artifacts is certainly consistent with Rosenthal's findings, although these effects have seldom been explored.

However, the examinations Wiseman and Schlitz (1997, 1999) and Schlitz et al. (2006) have been an exception. In these studies, Wiseman (a skeptic) and Schlitz (a psi advocate) collaborated, using identical procedures and participants, to test whether simply observing participants without their knowledge could induce a physiological response. The participants' galvanic skin response was electronically recorded while being watched by either Wiseman or Schlitz from a separate room linked by closed-circuit television. Schlitz obtained results significantly different from normal readings in two of the three experiments; however Wiseman found no differences in any experiments.

Smith (2003) explored the likelihood of the experimenter effect in the psi literature. He found that explanations such as errors or fraud could not explain the existing data. Smith also reported studies of successful attempts to increase psi performance through affecting the expectations of the participants (Parker 1975; Taddonio 1976). In a study where experimenters were guided to be "friendly" and "supportive" or "unfriendly" and "abrupt," participants in the former scored significantly better in ESP tasks than in the latter condition (Honorton et al., 1975). Overall, Smith argued that psi mechanisms may account for some experimenter effects and that the matter requires more investigation.

However there is another class of mind–matter experiments that merits attention. Roger Nelson and his colleagues have expanded mind–matter research to investigate the effects of shared emotions of groups on random number generating

devices (Nelson and Bancel, 2008; Nelson et al., 1996, 1998). While these experiments differ in a number of ways from Jahn's investigations, they use the same technology. Nelson's field experiments using random number generating devices might arguably be interpreted as an extension of Jahn and Dunne's mind–matter experiments. An interesting distinction, however, is that the hypothesis explores the link between shared emotion or coherent attention among groups of participants, rather than the intentions of individuals, with the output of these devices.

In a number of field studies, groups of various kinds, including meditation and sacred ceremonies, have registered small but significant shifts in the random output of these devices. Radin (2006, p. 183) notes that over 100 field-consciousness experiments have been reported in the United States, Europe, and Japan, strongly suggesting that "coherent group activity is associated with unusual moments of order in RNG output." In one particularly comprehensive study, Nelson et al. (1998) conducted field tests using a variety of groups and venues, including group rituals, healing sessions, sacred sites, and theater. The authors report results that yield a composite probability against chance for p values of 2.2×10^{-6} (p. 435). In another field study involving a large number of participants practicing transcendental meditation, the cumulated output of a random number generating device for over 94 hours was examined for possible effects. The reported deviations showed significant non-randomness with $p < 0.00001$ (Mason, Patterson, and Radin 2007, p. 295).

Nelson and others have expanded this research to a global scale through the Global Consciousness Project. Over the past ten years a network of random number generating devices have been implemented across the globe to measure deviations from chance in response to collective emotions or attention triggered by important world events. While the global design of Nelson's vast network of random number generators may not eliminate experimenter effects, its large scale most likely reduces the overall influence that any single experimenter might have. Not only does the global scale of the experiment prevent Nelson or any of his assistants from excessively influencing participants, the populations presumably affecting the devices had no knowledge they were participants.[8]

Nelson and Bancel (2008) reported the results of the Global Coherence Project, recording random streams generated during 256 events in its first nine years of operation. The results strongly support the hypothesis of coherent attention or emotional response corresponding to deviations in network output; the combined

[8]May and Spottiswood (2011) challenge the claim that the experimenter effect can play only a small role in explaining the Global Coherence Project result. They argue the case where the experimenter (Nelson, for example) unconsciously uses precognition to select events that are found to be significant. Nelson (2011) and Bancel (2011) responded that the data demonstrate real effects within the random number generating network that cannot be accounted for by fortuitous selections of events.

statistic exceeds what chance would predict by 4.5 standard deviations, with a corresponding *p* value of 3×10^{-6}. While the event effect size is small (0.3) and broadly distributed, the large number of observations from the global network provide sufficient statistical power to confirm the overall effect. Nelson and Bancel also report that the effect is due almost entirely to variation between random number generating devices, rather than to the individual devices themselves.

Thus the data from the field studies and the Global Coherence Project support the hypothesis that shared emotions do affect to a small degree the physical processes underlying the random number generating devices. This in turn appears to support the claim that, with the experimenter effect playing a smaller role due to the project design, consciousness can have influence on such devices. The field experiments have some additional interesting characteristics that I will explore later. However, the important point here is that the weight of the data appears to support mind–matter interactions. This class of psi experiments, however, still requires more investigation with serious attempts to incorporate the experimenter effect.

Psi and Theories of Consciousness

The evidence yielded by telepathy and clairvoyance research casts doubt against purely materialistic explanations of consciousness. Telepathy experiments have generally been designed to rule out any known sort of transmission of information, including electromagnetic radiation. In most ganzfeld experiments, for example, the shielding around the receiver blocks electromagnetic transmission. Yet the overall evidence on telepathy indicates that some sort of congruence between minds does occur, albeit at modest rates above chance. Further, the remote-viewing experiments suggest that minds have access to knowledge of the physical world that is equally anomalous. Perhaps consciousness might have field properties. However, the strength of physical fields, such as electromagnetic and gravitational fields, diminishes with distance. Yet distances appear to have no effect on the results reported in telepathy and remote viewing experiments. Taking seriously the cumulative evidence on telepathy and clairvoyance means exploring unconventional means through which are our minds are connected.

However, it is doubtful that telepathy and clairvoyance can help us choose the best alternative between dualism, panpsychism, neutral monism, or idealism. Tart (2009) and Carter (2012) have argued that the psi evidence on telepathy best supports some sort of view of dualism. Stapp (1993) incorporates the evidence from quantum mechanics (not psi) to also advance an argument for dualism. However, these authors do not consider alternatives such as panpsychism or neutral monism. According to Griffin (1997), the psi evidence does indeed favor panpsychism over dualism. Perhaps most importantly, the unsettled issues regarding how mind and matter interact under dualism make attempts to either accept the interaction or reject it problematic, given the psi evidence.

Let us consider again the random number generator field experiments, as well as the Global Coherence Project pioneered by Nelson and his colleagues. Recall that the evidence from the Project supports the hypothesis that shared emotions, triggered by important world-wide events, significantly affect the output of a global network of random number generating devices. I have already noted a number of interesting features that distinguished this class of experiments from other psi experiments. First, the scale of the Global Coherence Project experiments suggests that any possible experimenter effect plays a considerably smaller role. Second, participants (that is, the general population) are completely unaware of the experiment. Third, the experiments are designed to gauge the effects of emotions (or coherent attention) rather than intentions on physical random processes. The devices produce a stream of random output based on quantum noise. This implies a link between emotions, which are relatively unconscious states, and physical processes at the quantum level.

An important additional difference from other psi categories is revealed as the nature of these experiments is examined more deeply. The fact that conscious intention is absent calls into question what sort of information transfer (if any) is involved in the random number generator field experiments. As discussed above, most psi phenomenon can be understood as a process of anomalous information transfer. The ganzfeld studies, for example, attempt to test whether a receiver in a slightly altered state of consciousness can accurately receive images from a sender. Yet the underlying random number generator field experiments seem to imply a different underlying process. In these cases, shifts in shared emotion or meditative states are affecting physical random processes at subatomic levels. With conscious intention uninvolved, the effect appears to be a byproduct of shared emotional states by groups of people.

Note that this effect does not hinge on a particular technology or physical process. Deviations from randomness due to healing attention have been reported with random number generators using Geiger counters as well as astrocyte brain cells (Radin, Taft, and Young, 2004). Of course, there is no conventional theory why shifts in the emotional states of large numbers of people should have any effect on such random physical processes. And there is no reason to believe that the probability distributions governing these random processes used in the experiments are the only thing being affected. Such shifts in probability distributions are likely indicative of effects on a wide range of physical processes at the subatomic level. Thus these detections of deviations in probability distributions across a widely scattered network of devices imply that shifts in shared emotional and attentive states are likely affecting far more: the probability distributions governing the behavior of subatomic particles for (perhaps all) the physical matter in the area of influence, albeit by a tiny degree. Thus it appears that groups of people sharing a kind of experience are, without intending to, somehow shifting the probabilities in the world around us.

By affirming a link between the underlying processes of matter and emotion (rather than conscious intention or thought), the random number generator field effect suggests a remarkably intimate relationship between mind and matter. This demonstrates a more unified view of reality than other mind–matter experiments (as well as the rest of psi) suggest. Thus, overall the scales appear to tip in favor of panpsychism or neutral monism. In addition, these experimental results damage the case for idealism, or at least those versions where the physical world is supported by conscious attention. Below I will develop a model of neutral monism that I believe is most consistent with these results.

Neutral Monism and Quantum Mechanics

One of the most influential works advancing the argument for neutral monism is Bertrand Russell's (1927) *The Analysis of Matter*. Russell positioned his argument by noting that a growing gap has emerged between our most direct sense experiences (which he referred to as "percepts") and our understanding of the world based on physics, comprised of abstract formulas and equations. In his words: "Physics, in itself, is exceedingly abstract, and reveals only certain mathematical characteristics of the material with which it deals. It does not tell us anything as to the intrinsic character of this material" (Russell, 1927, p.10). Russell also argued that knowledge of objects such as subatomic particles is characterized by their relations to other physical entities or dispositional roles. Thus while this relational and dispositional view of physics provides an elegant understanding, it is silent on the essential stuff that comprises matter.

Russell disagreed with those who claimed that the phenomenal and the physical world must be distinct:

> To assert that the material must be very different from percepts is to assume that we know a great deal more than we do in fact know of the intrinsic character of physical events . . . . The gulf between percepts and physics is not a gulf as regards intrinsic quality, for we know nothing of the intrinsic quality of the physical world, and therefore do not know whether it is, or is not, very different from that of percepts. The gulf is as to what we know about the two realms. We know the quality of percepts, but we do not know their laws so well as we could wish. We know the laws of the physical world, in so far as these are mathematical, pretty well, but we know nothing else about it. If there is any intellectual difficulty in supposing that the physical world is intrinsically quite unlike that of percepts, this is a reason for supposing that there is not this complete unlikeness. And there is a certain ground for such a view, in the fact that percepts are part of the physical world, and are the only part that we can know without the help of rather elaborate and difficult inferences. (pp. 263–264).

Thus Russell argued that sense experience and matter are closely related. He argued that the phenomenal, or something close to it, is likely the intrinsic aspect of the physical world missing from our understanding from physics, based

on relational and dispositional frameworks. Thus matter and awareness are perhaps intermixed on the most basic levels of reality. Taking one step more, both matter and mind are aspects of some neutral substance. Our best route to understanding this foundational stratum underlying both mind and matter are to consider current theories of the subatomic realm, which is addressed by quantum mechanics.

Currently no clear consensus exists among physicists for a satisfactory explanation of quantum mechanics. While quantum theory possesses features that still puzzle us, copious experiments have confirmed the validity of its mathematical rules. The conventional or Copenhagen interpretation, due largely to Neils Bohr, frames a given quantum system as a wave function that represents a superposition of possible vector states of the system. Unlike classical systems, quantum systems are essentially probabilistic, with no way to predict which possible state will eventually manifest. According to this conventional interpretation, the wave function evolves smoothly in time until a measurement occurs. At this point the wave function instantaneously collapses into the state that is observed.

While the standard interpretation has been very successful in capturing the quantum behavior of subatomic particles, it remains unpalatable in a number of respects. The superposition of vector states suggests an ontology very different from our ordinary world. Schrödinger famously captured the awkwardness of the theory with his thought experiment of an unfortunate feline existing in a state of being both alive and dead. Putnam (2005, p. 624) describes Einstein's discomfort with this and reports that Einstein remarked to him on a visit: "Look, I don't believe that when I am not in my bedroom my bed spreads out all over the room, and whenever I open the door and come in it jumps into a corner."

Another problem is that in this interpretation, a measurement changes the state of a system in a way that cannot itself be described by the theory itself. Because whatever measuring apparatus we choose is also composed of particles like those within the system under investigation, there is nothing to suggest how a physical measuring apparatus can somehow instigate a collapse of the wave function. However, the special role that measurement plays in quantum theory has opened the door to an interesting, albeit controversial possibility: that the consciousness of the observer plays a role in the collapse. Von Neumann (1932) first suggested that the observer's consciousness is involved in the collapse, and Wigner (1967) expanded on this. Stapp (1993) has recently promoted this view, building on Von Neumann's framework. While this view currently attracts few physicists, it may yet provide some utility given the difficulties with alternative explanations, as well as the data I have reviewed that supports mind–matter interaction.

Einstein, Podolsky, and Rosen (1935) argued that quantum mechanics could not be complete because the theory implied nonlocal behavior among particles within a quantum system. Einstein et al. argued that quantum theory implied

that measurement of a particle that shared a quantum system with another particle would lead to the collapse of states for both particles, even if the two had moved some distance apart. This behavior, according to Einstein, would imply an instantaneous exchange of information between the particles in a way that violates special relativity. However, the work of Bell (1964) showed that particles within a quantum system are indeed entangled as quantum mechanics predicts.[9]

Naturally, attempts have been made to find a more attractive approach. One relatively prominent alternative is Everett's (1957) interpretation, which dispenses altogether with the wave function collapse due to measurement. That is, Everett proposed that Schrödinger's wave function provides a complete description of the physical state of the world. However, the implication this raises is that the world is in a superposed state, even at the macroscopic level. Thus Everett's many worlds proposal postulates that the world is in a superposition of states that are continuously evolving in different ways. While invoking multiple worlds to explain quantum mechanics may seem to be an extreme violation of Occam's razor, Everett's approach offers a simpler theoretical framework that is in some respects more congruent with aspects of classical physics than is the Copenhagen interpretation.

David Bohm (1952) provided another theory to avoid the collapse of the wave function by invoking hidden variables. This work led him to invoke a quantum potential function that governed quantum events deterministically; quantum uncertainty was rooted in the uncertainty of the particle's position. Despite its attractive features, Bohm's hidden variables features has not attracted a strong following, possibly because Bell (1964) showed that such frameworks still retained nonlocal features.

However, Bohm (1980, 1987) and Bohm and Hiley (1993) later expanded on this work in a way that is consistent with the neutral monism framework I wish to consider. Bohm and Hiley utilized the notion of wholeness within quantum systems to describe an "implicate order," the enfolded organizing source through which the physical world emerges. The implicate order contains "active information" that governs the quantum potential function and provides a bridge between mind and matter. Thus Bohm and Hiley (1993) concluded that mind and matter were two sides of one overall process. In their words:

> Active information can serve as a kind of bridge between these two sides. These latter are however inseparable, in the sense, for example, that information contained in thought, which we feel to be on the mental side, is at the same time a related neurophysiological, chemical, and physical activity . . . . (p. 384)

[9]However, nonlocality of entangled particles does not imply the possibility of transmission of information in a way that would violate relativity.

Aspects of this later work retain a deterministic flavor through Bohm's choice of metaphors to describe the implicate order.[10] However, he later clarified that the implicate order was a realm of possibility: "we are saying that the implicate order will have to contain within itself all possible features of the explicate order as potentialities, along with the principles determining which of these features will become actual" (Bohm, 1987, p. 41).

Stapp (1993) also explored a framework that supports an interaction between potential and actual aspects of reality. Building on interpretations of quantum mechanics that consciousness plays a role in the collapse or reduction of the waveform, Stapp developed a quantum mechanical theory of consciousness, which he associates with dualism. However, in a later work, Stapp explored a model that might be closer to the neutral monism described here.[11] To do this Stapp incorporated some aspects of Whitehead's process philosophy that he believed meshed with the relativistic quantum field theory. Stapp notes that Whitehead's ontology draws a distinction between "continuous potentialities" versus "atomic actualities," and the interaction of these two provides the foundation for the evolution of events. In Stapp's words: "This basic autogenetic process creates the new actual entity which, upon the completion of its creation, contributes to the potentialities for the succeeding actual entities" (Stapp, 2007, p. 90).

Bohm and Stapp each explore frameworks, grounded in quantum theory, which possess a stratum consisting of potentialities serving as a foundation for our familiar physical world. In both frameworks, this foundation possesses conscious or proto-conscious aspects and transcends the spatial dimension. Hameroff and Penrose (1996) developed another view of neutral monism, drawing on quantum mechanics. They describe a psycho-physical bridge as the quantum space-time geometry at the Plank scale, the ground state of all configurations of matter and energy. According to their model, conscious experience emerges from a sort of quantum computing within the brain's microtubules. Tegmark (2000) has argued that the brain's warm temperatures do not allow a sustained quantum collapse for the duration of time required for neural processing. However Hagan, Hameroff, and Tuszynski (2002) have replied that under reasonable conditions, the superposition within microtubules might be isolated from the brain. I will argue however that the sketches or proposals by Bohm and Strapp are

[10]For example, Bohm (1980) and Bohm and Hiley (1993) describe drops of color embedded in a fluid contained in a cylinder. The drops are invisible until the cylinder is rotated sufficiently to reveal the drops. Another metaphor Bohm uses is the holographic plate that can be used to construct a three dimensional object. The metaphors are interesting and illuminating but do not suggest an inherently probabilistic reality.

[11]Stapp (2007, p. 83) relates his correspondence with Heisenberg who encouraged him to pursue something similar to Platonic idealim, which might support ideas existing outside the human mind.

similar to the simple framework I've sketched above, and may be more useful than the model proposed by Hameroff and Penrose in explaining psi.

Toward building a serviceable model of neutral monism, a number of features of quantum mechanics suggest characteristics that a neutral ground underlying mind and matter might have. First, I will speculate that the probabilities described in the standard framework of quantum mechanics (which all corresponding theories must account for) must reside at this more fundamental level of reality. Like Bohm and Hiley suggest, this stratum can be seen as pure potentia, the seed stuff for reality itself, which in turn requires an information-rich domain that supports these probabilities and hence the possibilities of physical reality. While such a realm may possess randomness, especially within the framework of experiments, the phrase creative unpredictability might be a better description. In addition, this ground would exhibit the non-local features observed in quantum mechanical experiments. The relationship between information residing within this field and objects of the physical world would transcend space as we experience it.[12] Also, and this is crucial for our purpose here, this neutral stratum in some sense possesses mind-like attributes.

The question arises whether this neutral bridge itself is in some sense conscious. Or alternatively, since I am conjecturing potential matter stuff, the question might be whether this neutral stratum is potentially conscious (and thus not quite conscious). Those that have considered neutral monism have not suggested a clear path forward. Rather, they have typically acknowledged the possibility that something like consciousness resides within this foundational stratum or elements exist which combine to produce conscious states. As Chalmers simply puts it when describing the implications of Russell's monism, "On this view, phenomenal or protophenomenal properties are located at the fundamental level of physical reality and in a certain sense, underlie physical reality itself . . ." (2003, pp. 129–130). Hammeroff and Powell (2009) use nearly the same language: "Consciousness or its 'proto-conscious' precursors are . . . somehow built into the structure of the universe . . ." (p. 109).

Williams James, a proponent of neutral monism, used language suggestive of something conscious. James used the phrase "pure experience" to describe the state that is prior to any categorization, neither mental nor physical. As James describes, "The instant field of the present is at all times what I call the 'pure' experience. It is only virtually or potentially either object or subject as yet. For the time being, it is plain, unqualified actuality, or existence, a simple that" (James, 1904, p. 23).

From his studies of anomalies in consciousness and psychological case studies, F.W.H. Myers developed a framework that handled the question of conscious

[12]With respect to the neutral ground, I use the word "field" differently from its conventional use, which conveys a physical quantity with definite mathematical properties extending throughout space. In this case, I am using the word to describe the non-locality of the proposed ground.

or unconscious with respect to deeper levels of reality, in an innovative way. While it's unclear whether Myers embraced neutral monism as did James — his contemporary — nevertheless his approach isn't inconsistent with James's in many respects. Myers argued that the brain functions as a filtering mechanism for a "a more comprehensive consciousness, a profounder faculty, which for the most part remains potential only . . ." (Myers, 1903, p. 12). However, Myers preferred to avoid such terms such as "unconscious" or "subconscious" when referring to this more comprehensive level. Believing such words to be inadequate, he proposed the term "subliminal" to distinguish those portions of consciousness not identifiable with ordinary awareness. Thus Myers' provocative ideas suggest we are connected to something conscious that is nevertheless inaccessible to our ordinary consciousness.[13]

A key problem in making progress with this question is the fact that we simply do not perceive consciousness outside our own experience. Philosophers of mind cannot deduce where to draw the line between conscious and non-conscious within the animal and plant kingdom.[14] Thus discussions on the phenomenal or proto-phenomenal properties remain abstract speculation. However, the framework I am outlining does suggest a possible way forward. The neutral bridge, the foundation of both mind and matter, is by definition in direct contact with our own consciousness. Thus, first person inquiries or phenomenological approaches might yield insights about this most basic stratum that elude more objective, scientific methods. Subjective techniques to directly inquire into the nature of this stratum might include meditation or entheogens. While such approaches may be unconventional with respect to conventional methodologies, they should not be dismissed lightly if this monism framework should prove useful in other respects. Nevertheless, this opens up many questions and issues that deserve careful consideration in a separate piece. For purposes here, I will follow Chalmers and Hammeroff and use the term proto-conscious to convey the precursors of conscious experience, while also acknowledging that such precursors might also be conscious in some sense.

Neutral Monism and Psi

Here I wish to examine how a version of monism based in a non-local proto-conscious field of potential can aid us in understanding the random number generator field effect and other categories of psi. With this view, the underlying stratum of potentia contains both the quantum mechanical probabilities governing subatomic particles, as well as the non-local relationships among them. This field

[13]Kelly et al. (2009) have reviewed and summmarized the work of Myers and present considerable evidence, not available in his time, that support much of his framework.

[14]Additionally, panpsychists might suppose that minerals possess rudimentary levels of awareness.

of proto-consciousness is also the basis for various sorts of conscious experiences. This is not an atomistic view of panpsychism advocated by Griffin (1998), where complex aggregates of consciousness emerge from smaller units. Rather, I am suggesting that the spectrum of different states of experience or consciousness emerge as various biological structures engage with this proto-conscious field.

This nonlocal, field-like, version of neutral monism provides to us a means to capture the nonlocal features of psi. That is, the proto-consciousness through which the consciousness of individuals operate, presumably allows telepathy and other psi-related transfer of information. Of course it has already been suggested that the non-local features of quantum mechanics might hold important clues toward understanding psi. However, we have to be careful with such explanations. Quantum entanglement does imply a faster than light action between particles; however, entanglement cannot be used to send messages between physical particles. But this neutral foundation I am proposing need not be subject to this constraint. Minds rooted in this base stratum need not either.

Another important feature is that this framework allows us to sidestep the combination problem, a serious obstacle facing more atomistic versions of panpsychism. Instead of having to explain how aggregates of psycho-matter units lead to various rich, unified states of consciousness, the proposal here is that such experiences are produced by this non-local stratum of proto-consciousness, functioning through organic structures.[15] In addition, we avoid the implication that inorganic materials such as rocks must have some experiential component. The proto-conscious field aspect of our framework gives us some flexibility that allows us to avoid such counterintuitive possibilities.

Discussions about the nature of consciousness generally focus on the lived experience of the individual (human or animal). The evidence on psi suggests an aspect of our consciousness that is shared. In the case of the random number generator field experiments, shared emotions across a population have an effect on material processes at the quantum level. The deviations from chance observed across the network of devices are correlated with events that trigger an unusual amount of shared emotion. How and why emotion plays such a key role is important to understand. Emotion is arguably that part of our experience that is most closely connected to our bodies, and this is of interest because our exercise here has been something of an exploration of the junction between matter and consciousness. In addition, a much wider spectrum of living organisms experience emotion rather than cognition, which only we experience. Emotion is also undeniably rooted in our more unconscious processes. Finally, emotion is part of our being through which we appear to experience events such as football games, weddings, and inspirational speeches, collectively with others. Through

[15]Such organic structures, of course, in this framework are rooted or emerge from the underlying protoconsciousness through some means which we do not here specify.

emotion we not only have experiences, we share experiences. Taking all this together suggests that emotion encapsulates that portion of mental life that is primitive, basic, and rooted in a deeper part of ourselves. The proto-conscious field must be intimately linked with emotion.

An increase in the coherence of a particular emotion across a population might naturally result in a shift or disturbance being applied across this proto-conscious field, given its non-local ontological status and its close relationship with emotion. This shift at this neutral foundation of mind and matter, which according to our reasoning also sustains the mechanisms described by quantum physics, could thus impact the probabilities governing the behavior of subatomic particles, and therefore all matter. Thus shared emotion within a framework of neutral monism could conceivably affect outcomes of probability processes at the root of the physical systems within the vicinity of the disturbance. And these shifts would be detected by a network of devices producing streams of random numbers through quantum processes, such as the Global Coherence Project.

An appealing feature of this model is its simplicity. My explanation of the random number generator field effect is essentially driven by a view of consciousness that at some level is unified with the probabilities underlying matter itself. Thus any shifts or disturbances in the underlying proto-conscious foundation as proposed also affect the probabilities underlying matter. Of course this rather simple model may eventually require additional structure and refinement. However, simplicity is an important virtue, and we should take stock of what this simple model can help us understand before going further. Helping to conceptualize a link between shared emotion and quantum probabilities is a good first step.

Two categories of psi that have provoked the strongest opposition are mind–matter interaction and precognition (or presentiment). The problem with the former is the claim that actions at a distance can occur that appear to be completely at odds with our experience and the laws of physics as we currently understand them. The problem with the latter is even more serious, suggesting that information of future events can somehow travel backward in time to the present. Such a finding could lead to problems and paradoxes with notions of causality.

This framework suggests that mind–matter interactions can be explained by exploiting the intimate relationship between conscious experience and a non-local proto-conscious field containing the probabilities underlying physical systems. The framework suggests that intention can affect those probabilities. Indeed, Jahn and Dunne (2011) explored various experiments that demonstrate such a link between intention and random processes rooted in quantum mechanics. Other random experiments, such as throwing dice, might be explained through intrinsic randomness that is nevertheless involved. Essentially, an individual's intention must be linked with the underlying probabilities residing within the proposed proto-conscious field that are associated with the event. This interpretation linking conscious intention with the probabilistic world of quantum

mechanics may help place testable restrictions on observations for future mind–matter experiments.

The model also suggests a more palatable interpretation of the precognition and presentiment experiments than one arguing that we can perceive future events; rather, this framework suggests we can perceive current probabilities of future events. This interpretation should be more palatable (although still controversial) because quantum mechanics already puts on the table the idea that probabilities underlie the most foundational aspects of matter. Precognition and presentiment may reflect an ability to perceive such probabilities residing within a non-local field of awareness.

This version of neutral monism, depicting the foundation of reality as potential mind–matter stuff, also helps us understand telepathy and clairvoyance. Relevant probabilities for future events must contain accurate information of the world as it is. Thus there is nothing about the experimental results regarding telepathy and clairvoyance that runs counter to this notion of monism. In fact, probabilities are inextricably linked with all of the psi data obtained through laboratory research. This is usually understood as an inevitable result of extracting information from a noisy process. The present framework suggests another interpretation: probabilities, as quantum mechanics suggests, may be intrinsic to the underlying reality that binds us together.

This interpretation is congruent with Carpenter's (2012) comprehensive psychological theory of psi. Carpenter uses the extant psi evidence to present a model of the mind where unconscious mechanisms evaluate and weigh various streams of information at stages as they rise in our consciousness. Processing information through psi occurs at an early stage in Carpenter's framework. As he describes, "The initial psi stage of the process involves an access to potential knowledge that is indefinite in extent. We cannot know its boundaries, or anything else about it, since it is thoroughly unconscious" (2012, p. 116).

Implications for Quantum Mechanics

Recall that while both versions of neutral monism via Bohm and Hameroff were rooted in quantum mechanics, neither was developed with the intention of explaining psi phenomena. Further, it isn't clear that the Hameroff and Prenrose theory can be expanded to allow for the kind of mind–matter interaction I reviewed earlier. Hameroff and Penrose describe objective reduction as a process originating from the Plank scale within the brain's microtubules that creates the experience of consciousness. With causality running this direction, it is not clear how conscious intention might affect the probabilities residing within the neutral stratum underling mind and matter.

On the other hand, the frameworks of Bohm and Stapp appear flexible enough to accommodate psi experiments. Those sympathetic to a view of reality

that supports mind–matter interactions often invoke the conventional theory of quantum mechanics, which invokes the waveform collapse. However, as I have noted, Bohm's later work describes an implicate order as a foundation of wholeness embracing both mind and matter. While he does not invoke the waveform collapse, the underlying unity between mind and matter within his framework nevertheless supports psi phenomena. In fact, Bohm (1990) himself has speculated how his notion of the implicate order could be used to understand the psychokinesis data.

It is less clear how this model fits with the conventional waveform collapse descriptions of quantum mechanics. Like the proposed framework, waveform collapse models see indeterminism as an inherent aspect of reality. There are different mechanisms of collapse, however. Wigner (1967) and Stapp (1993) have argued that the consciousness of the observer plays an essential role in the collapse of the waveform. As noted, this interpretation has natural appeal for a theory of psi. However, the theory does not just imply that consciousness affects matter or provides a mechanism for information transfer; the theory implies that the stable feature of matter that we experience requires the consciousness of the observer. However, the random number generator field effects suggest that collective or shared emotions (which might be unconscious) may affect quantum mechanical probabilities. Thus the role that consciousness plays in psi may not be congruent with the waveform collapse theories favored by Wigner and Stapp.

The interpretation proposed here is likely most problematic to the Everett or many-worlds explanation of quantum mechanics. Recall for this theory that the probabilistic feature of quantum mechanics implies multiple worlds or universes; every possible state described by the quantum mechanical equations exists. This interpretation clashes with the view developed here (based on psi evidence) that groups sharing emotions can affect quantum probabilities. Thus it appears (perhaps ironically) that taking the psi evidence seriously leads us toward accepting a more common sense view of reality.

Conclusion

The intractable nature of the explanatory gap between subjective experience and everything we know about matter will likely remain until more radical views on matter are considered. I argue here that the literature on psi helps to provide some useful direction for this problem. While serious discussion of psi remains taboo in many quarters of academia, the cumulated evidence does confirm significant effects (albeit small or modest). Thus a strong attachment to purely materialistic explanations of consciousness appears unwarranted. Including the results from random number field experiments field experiments and the Global Coherence Project, we must confront a view where the most subtle processes of matter are deeply intertwined with consciousness.

Skeptics of psi have often argued that accepting such evidence requires a revision of everything we know. Such arguments assume, however, that more orthodox theories completely and satisfactorily explain our world. This is of course not the case for two areas of interest most closely related to psi: consciousness and quantum mechanics. As I have attempted to show, an examination of psi will likely help shed light on the mysteries in those areas as well. We must consider the possibility that the mysterious natures of each of these are rooted in a common source.

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