Field Effects, Experimenter Effects, and Bohm's Implicate Order (or Does Roger Nelson Possess Secret Superpowers?)

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September 15, 2016

ABSTRACT

In this paper I explore what Bohm's implicate order might suggest with respect to understanding different facets of psi. In particular, I focus on the recent debate on interpreting the findings for the Global Coherence Project, where alternative explanations include a psi field effect and some version of goal oriented psi. This debate has recently received more attention with Bancel's argument that XOR masking within the GCP network likely removes correlation between random number generator devices. After examining two specific studies, I focus on whether a psi field effect or a psi experimenter effect best explains the GCP findings. I advocate that an integrated approach that incorporates both field effects and experimenter effects as the best explanation. In addition, I argue that Bohm's implicate order provides an attractive conceptual framework for such an integrative approach.

Introduction

In earlier work, I've argued that Bohm's implicate order provides a useful and rich framework for explaining psi phenomenon (Williams 2013, 2016). I've also argued that some categories of psi that pose difficulty for various models or explanations are easily accommodated by a framework that incorporates something like Bohm's implicate order. One potentially problematic psi category I have focused on is what some have termed field psi. Field psi presumably appears with groups of participants sharing attention or emotion and in turn anonymously influencing the output of random number generators. A highly prominent exploration of field psi is the Global Consciousness Project, a planetary network of random number generators. Statistical analysis of over 500 events over a period of 17 years demonstrates highly significant correlation between pairs of the random number generators. These events have included important tragic events, weather disasters, celebrations, and various kinds of group meditation.

What sets field psi apart from other types of psi is that the participants are typically unaware of the devices used to detect deviations from randomness. Thus no information transfer occurs between the consciousness of the participants and the test device. Presumably, field psi is associated with shared emotion (or shared attention) of a group of participants (perhaps a population), rather than the conscious attention of a test subject. However some have challenged the field psi interpretation of the GCP. May and Spottiswoode (2011), for example, have argued

that the GCP results are likely attributable to precognitive bias; that is, the experimenter who selects an event may simply be choosing via precognition a stream of output that has relatively more 1s (or 0s) than an average stream.

Bancel (2015, 2016) has also recently challenged the field interpretation of the GCP, arguing that the results are most likely the result of the engagement of the team of researchers with the network of RNGs. The problem, Bancel argues, has to do with the way the random output is filtered to remove possible biases due to the age or temperature of the devices. This filtering process, according to Bancel, destroys any correlation between devices that might be due to a field effect. If Bancel is correct, the GCP research team is driving the results, either through precognitive bias or an experimenter effect.

In this paper, I'll try to explore some of these issues in this debate. Along the way, I will also explore insights we might gain from a framework that incorporates a version of Bohm's (1980) implicate order. To do this I will first discuss how such a framework is useful for understanding various categories of psi, including field psi. I will then explore Bancel's arguments against interpreting the GCP results as evidence for field psi. I will proceed to examine two studies that appear to rule out the possibility of precognitive bias as well as provide reasonable evidence of a psi field effect. However, ultimately I find that Bancel is likely correct that the GCP findings cannot be solely attributable to a psi field effect. However for various reasons I argue that the GCP findings are best understood as the result of a combination of psi effects, such as both field effect and experimenter effect. I also advocate an integrative approach for understanding various aspects of psi. Further,

this integrative approach is strongly supported by Bohm's implicate order framework.

Psi and Bohm's Implicate Order

Bohm's (1952) early work provided an interpretation where subatomic particles such as electrons have definite positions and trajectories and behave deterministically. According to Bohm's (1952) theory, they are guided by a quantum potential function in a way that conforms to the statistical predictions of the standard theory. Thus the Schrödinger's cat paradox associated with the Copenhagen interpretation is avoided. By providing an ontology more congruent with classical physics and by removing the role of measurement from the theory, Bohm's approach arguably offered a substantial improvement over the standard (Copenhagen) interpretation.

More specifically, Bohm (1952) provided a guidance equation that describes the movement of particles as a function of quantum potential function, as well as the configuration or the position of all particles in the system. However, Bohm's approach does not allow isolating subsystems from the larger environment due to entanglement. Thus Bohm's guidance equation depends on the configuration of the universe. However, through its dependence on the position of all particles in the universe, Bohm's "hidden variables" theory embraces an inherently holistic and nonlocal approach. Its description of particle behavior cannot be completely

captured within a mathematical structure, as is the case with most equations within physics.

In later work, Bohm (1980, 1993) posited an inherently nonlocal and holistic strata of reality composed of pure information, which guided the behavior of subatomic particles. This he termed "implicate order" which he also described as a neutral foundation, the proto-conscious seed stuff underlying both matter and experience. As pure information and potentia, this stratum contains both the quantum mechanical probabilities governing subatomic particles, as well as the non-local relationships among them. Thus this nonlocal, field-like, version of neutral monism provides us a means to capture the nonlocal features of psi. This underlying ground of proto-conscious (or pure awareness) through which our experience of the world operates perhaps allows telepathy and other psi-related transfer of information.[1]

Now let's turn to the implications for various modes of psi. With respect to presentiment or precognition, Bohm's implicate order framework suggests a solution: rather than perceiving future events, we can perhaps perceive current probabilities of future events. This interpretation should be more palatable than explanations that posit information traveling backward in time, raising the possibility of a causal paradox. Quantum mechanics puts on the table the idea that

[1] "Proto-consciousness" is a term some advocates of neutral monism and panpsychism use to denote a rudimentary level of consciousness at the basis of all kinds of experience. William James (1904) in an essay advocating neutral monism used the term "pure experience" to denote an ultimate reality beyond categories. I will not attempt to resolve the question of what is the best term here. I will simply proceed by using the term "proto-consciousness," which is perhaps more commonly used than "pure experience."

probabilities underlie the most foundational aspects of matter. Precognition and presentiment could reflect an ability to perceive such probabilities residing within a non-local field of awareness.[2]

Mind-matter interactions could be explained within this framework as well through exploiting the intimate relationship between our conscious experience and a non-local proto-conscious field containing the probabilities underlying physical systems.[3] Simply put, this model suggests that our intentions can affect those probabilities. Indeed, the bulk of studies on mind-matter interactions suggest a link between intentions and random processes rooted in quantum mechanics.

How would this proto-conscious ground of probabilities help us understand telepathy and clairvoyance?[4] First we should recognize that 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 the notion of monism that we've developed. In fact, probabilities are inextricably linked with all of the psi data obtained laboratory research. This is generally assumed to be the result of extracting information from a noisy process.

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[2] See Bem et al (2016) for a recent meta-analysis on the evidence of several kinds of precognition exercises. For presentiment, see Mossbridge et al (2012).

[3] For recent meta-analysis on mind-matter interaction experiments see Bosh et al (2006) et al and Radin et al (2006).

[4] See Bem and Honorton (1994), Bem, Palmer, and Broughten (2001), and Radin (1997) for a review of the evidence on ganzfeld telepathy experiments; see Sherwood and Row (1993) for an overview of the evidence on dream telepathy. Utts (1996) provides a meta-analysis on the evidence for remote viewing (clairvoyance).

Our framework suggests another interpretation: probabilities, as quantum mechanics suggests, may be intrinsic to the underlying reality that binds us together.

Let us now summarize the implications of all of this in the simplest way possible. Using Bohm's version of neutral monism, our minds, as well as everything in reality, are connected via a field of proto-conscious potentia or seed stuff. An inherent component of this information dense field is the set of probabilities associated with the possible manifestations of reality. *And by virtue of our connection with this field, we can both perceive and affect those probabilities, albeit in most cases by a small degree.*

Field Random Number Generator Experiments and the Global Consciousness Project

This framework can perhaps help us understand an additional class of experiments that use random number generator (RNG) devices. Nelson et al (1998) and others have extended mind-matter research to investigate the effects of shared emotions of groups as well as group attention the output of random number generating devices. That is, the hypothesis explores the link between shared emotion or coherent attention, rather than the intentions of participants, with the random output of RNG devices. In a number of field studies, groups of various kinds, including meditation and sacred ceremonies, have registered small but significant shifts in the output of RNG devices. Radin (2006) notes that over a hundred 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 with a variety of groups and venues, including group rituals, healing sessions, sacred sites, and theater. The statistic from the combined results corresponds to a p value of 2.2×10^{-6}.

Nelson and others have expanded this research to a global scale through the Global Consciousness Project (GCP). Over the past 17 years a network of RNG devices have been implemented across the globe to measure deviations from chance in response to collective emotions or attention triggered by important world events. Radin uses the metaphor of a system of water buoys, all tied together, and rising and falling to the waves on an ocean, to illustrate this collective effect for large populations. While the global design of Nelson's field RNG experiments may not eliminate the role of the project's designers from having an effect, it seems reasonable to assume it likely reduces their importance. Presumably, the global scale of the experiment prevents Nelson or any of his assistants from excessively influencing participants, and the populations presumably affecting the devices have no knowledge they are participants.[5] As we will discuss, this assumption has

[5] This claim has been subject of much debate. May and Spottiswood (2011) have argued that the experimenter (Nelson for example) unconsciously uses precognition to select events that are found to be significant. Nelson (2011) and Bancel (2011) respond that the data demonstrate real effects within the RNG network that cannot be accounted for by fortuitous selections of events. However, recently Bancel (2015, 2016) has argued that some sort of goal oriented form of psi such as what May and Spottiswood (2011) argue or a global experimenter effect is a better explanation for GCP than a field effect. I will examine Bancel's arguments in the following section.

recently been strongly challenged. In any case, to date a cumulative deviation from randomness has been detected over the duration of the project, producing a Z statistic of 7.31. The probability that these findings could be attributed to chance is an astronomically low $1.333 \times 10^{-13.6}$ Bancel and Nelson (2008) report that the event effect sizes are small (0.3) and broadly distributed; however, the large number of observations from the global network provide sufficient statistical power to confirm the overall effect. They also report that the effect is due almost entirely to variation between RNG units, rather than individual RNG devices.

The interpretation for these GCP results has been subject of some debate. May and Spottiswood (2011) have argued that the experimenter (Nelson for example) unconsciously uses precognition to select events that are found to be significant. Nelson (2011) and Bancel (2011) respond that the data demonstrate real effects within the RNG network that cannot be accounted for by fortuitous selections of events. However, recently Bancel (2015, 2016) has reversed course and has argued that some sort of goal-oriented form of psi must be operating after all. I will explore Bancel's arguments in the following sections.

Nelson's interpretation of the GCP implies that emotions shared by a large number of people are influencing the output of devices producing a stream of random bits. However, unlike other psychokenisis experiments, the participants are not intending anything other than going about their lives. The supported hypothesis is that their shared emotion is affecting these devices through a psi field effect. Just

[6] The Global Consciousness Project website: global-mind.org/results.html#alldata

like Radin's metaphor of a rising ocean waves lifting up buoys, shared emotions or attention within a population may have an effect on the subtle processes within RNG devices.

This means that with no conscious intention involved (again for the moment ignoring the intention of the experimenters such as Nelson), shared emotion is affecting the outputs of physical devices that exploit quantum processes to produce true random numbers. This implies a link between emotion and these devices at the quantum level. But the quantum level represents the most fundamental level of physics that governs subatomic particles. And because conscious intentions are not involved, there is no reason to think that the RNG devices are the only things being influenced. The implication here is that shared emotion is affecting, albeit by a tiny amount, *virtually everything in the area of influence at the quantum level according to our understanding of physics.*

Within the context of Bohm's implicate order framework, an increase in the coherence of a particular emotion across a population can be seen as a shift or disturbance applied across this proto-conscious field as well, given its non-local ontological status. This rippling within the underlying strata of reality, which within this framework also sustains the processes described by quantum physics, could thus impact the probabilities governing the behavior of subatomic particles (as well as all matter). Thus shared emotion within a framework based on Bohm's implicate order 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 RNG devices producing streams of random numbers through quantum processes.

Bohm (1985) explores a process of information exchange based on his neutral monism framework that may give us a deeper understanding here. He describes a simultaneous enfolding and unfolding between various levels of reality, one example being between the implicate order and explicate order. He terms the information flow from biological processes within our body to apprehensions of meaning in our consciousness as soma-significant. This happens to be congruent with an unfolding from the implicate order to the explicate order. The reverse flow of information, which Bohm terms signa-somatic, involves how our apprehended meaning influences our biological processes, as well as the underlying, fundamental (nonlocal and holistic) strata of reality. Thus in the soma-significant phase, meaning is apprehended through an unfoldment from lower (deeper) levels of reality, while during the signa-somatic phase, our experience of meanings enfolds information into the lower (deeper) levels of reality.

Bohm's description of information exchange between different strata of reality suggests an interpretation of the field RNG and GCP results. Collective emotional responses generated by a galvanizing world event, for example, will likely result in a shared meaning across a relatively large population. Bohm's framework, briefly outlined, suggests this shared meaning enfolds into more foundational strata, including biological and subatomic processes. With a sufficiently large number of people sharing a powerful emotion, this signa-somatic phase could impact the inherently holistic processes governing subatomic particles of the affected system.[7]

An Alternative Interpretation of GCP

[7] For more discussion see also Pylkkänen (2007), pp. 31-33.

Peter Bancel (2015, 2016) has recently cast doubt on the interpretation that a field psi phenomenon is responsible for the GCP results.[8] Because Bancel has worked closely with Nelson throughout much the duration of the GCP, his arguments carry some weight. He notes that the random output produced by each device within the network is filtered to remove persistent bias due to the device age or temperature. The filter involves an exclusive-or (XOR) operation on the random output with a mask, also comprised of 1's and 0's. The masks are designed to remove such persistent bias by ensuring that the probabilities associated with the 1's and 0's remain 50-50 in the long-run.

However, Bancel (2015) argues that application of the XOR masking procedure may remove the correlations between RNG devices due to a psi field effect.[9] Even more problematic, he notes that the XOR masking procedure is not synchronized across the GCP network. Bancel (2016) reports the correlations between the various types (Orion and Mindsong) RNG devices within the GCP network, which I reproduce in Table 1. These correlations according to Bancel cannot be explained by a field effect; the non-synchronized XOR masking obliterates the correlations between the RNG devices. How then do we explain the observed correlations? Bancel argues that these correlations must be connected with the engagement that researchers have with the GCP equipment rather than shared

[8] Bancel however does not address interpretation for the field RNG class of experiments outside of the GCP.

[9] Scargle (2002) made an earlier argument that the XOR filtering might remove the correlations associated with a psi field effect.

Table 1
Correlations, Z-Score, and Number of RNG Pairs Between RNG Devices

	Correlation ρ ($\times 10^{-5}$)	Correlation Z -Score	N RNG pairs ($\times 10^{9}$)
All Event Data	4.3 ± 0.7	6.5	23.3
Orion - Mindsong	5.2 ± 0.9	5.6	11.7
Orion - Orion	4.0 ± 1.2	3.4	7.1
Mindsong-Mindsong	2.2 ± 1.5	1.5	4.5

emotion or attention of the respective populations, who are ignorant of the RNG devices and the intentions of the GCP research team. Therefore the correlation must reflect the goals or intentions of the experimenter(s) through two possible goal oriented psi effects: 1) selection bias and 2) experimenter effect.[10]

Nelson (2016) has responded by noting that the GCP data to date contains a great deal of structure that none of the GCP researchers planned or hoped for at the beginning of the project, yet remains consistent with a psi field effect. In one example, Nelson discusses distance effects that are observed between pairs of RNG devices. Psi phenomena do not generally exhibit distance effects; Nelson and his colleagues had no goals or intentions to seek them. However, what has emerged is a pattern where relatively small or localized events exhibit correlations between pairs, which diminish as the distance between RNG pairs increases. On the other hand, large and global events, which attract the interest of a global population, do not show diminishing correlation over greater distances. Nelson argues that this

[10] Bancel (2015, 2016) also proceeds to determine whether the goal oriented selection bias or experimenter effect provides the best explanation. However, here I will focus only on Bancel's arguments against the field effect due to XOR masking.

pattern is consistent with a psi field effect that is sensitive with distance, but not with goal oriented experimenter effect or selection bias.

Another example Nelson provides is that the GCP effect is stronger during times when people are awake than when they are sleeping. Again, this result appears consistent for a field effect generated through groups of people sharing emotion or attention, yet is not a pattern predicted or considered by the GCP team until relatively recently. Nelson also notes that there is a pattern of autocorrelation in the data; that is, values of the data several minutes into the future are predictable given current values. Again, the goal behind the GCP project was not to observe this structure, yet there it is.

Bancel has responded that such post hoc correlations may be unreliable and more time is required to gauge whether these descriptions are true features of the data.[11] However, now that such predictions are on the books, can we exclude a goal oriented psi effect as an explanation, even if such patterns were to persist? If we follow through on the logic of such a powerful goal oriented psi effect, it's not clear it can be falsified. This raises a highly problematic aspect with goal oriented psi effects: they may be consistent with any result of the GCP.

In considering the question of a psi field effect, experimenter effect, or selection bias, I wish to turn for the moment away from the analysis of the global network as a whole, and focus on a couple of two smaller studies that examine a possible field effect. The GCP data to date includes over 500 events, the nature of which may vary considerably. Included among these events are powerfully tragic

[11] Email correspondence, 2016.

events such as the 9/11 terrorist attack, smaller violent attacks, and weather catastrophes that affect a relatively local area. The events also include meditation events and celebrations. Something may be lost through imposing a common statistical structure upon such a diverse set of events. Therefore, I think it's advisable to pursue a complementary strategy that includes a focus on a few unusually powerful events.

Two studies, Radin (2002) and Mason et al (2007), have a number of attractive features. First, in each case the experimenters do not select the time of RNG monitoring; thus the role of selection bias can arguably be ruled out. Also, for reasons that I'll discuss, I believe these studies center on events that are more powerful in ways than the considerably more heterogeneous set of events included in the GCP project. Powerful events, such as these, might arguably have a more powerful effect size than what we might expect than an experimenter effect or goal oriented model might predict. There are additional reasons why these papers are useful in this debate, which I'll discuss in turn.

Mason et al (2007) examine a possible field psi effect in the vicinity of a large group of meditators; thus it represents an example of field RNG, not the GCP. However there happens to be an independent body of research documenting an anomalous field effect from the groups practicing this form of meditation, which is Transcendental Meditation (TM). This field effect has been documented in approximately twenty-five refereed published articles to have a statistically

significant and beneficial relationship across a number of social indicators, including violent crime.[12]

There are a number of interesting features about this field effect that has similarities with claims that have been made regarding field effects within GCP (as well as other field RNG experiments). First, the TM meditators have no intention of influencing the social indicators, such as lowering the crime rate. In fact, no intentions are invoked at all beyond the instructions of their meditation practice, which include a mantra and a selected set of phrases from the Yoga Sutras of Patanjali.[13] According to the study authors, this effect, which is usually termed the Maharishi Effect, is not a product of anyone's intention, but is a pure field effect from the group practice. However given the intentions or goals of the researchers themselves, we might consider an experimenter effect is involved. However, to my knowledge no one has before has claimed that an experimenter effect could be solely responsible for lowering crime. In any event, we can note that the hypothesized GCP field effect (some of which include other types of meditation gatherings) is also generated by participants with no intentions regarding the RNG devices.

In addition, the Maharishi effect exhibits distance effects; that is, the effect is centered at the location of the group meditation and appears to diminish over

[12] For a list of these and other articles concerning the societal effects from the group practice of TM, see Orme-Johnson (2008) http://www.truthabouttm.org/truth/SocietalEffects/Rationale-Research/index.cfm#summary.

[13] Some meditation practices do invoke an intention. For example some Buddhist practices invoke an intention or wish for peace or happiness for all beings.

distance. As mentioned earlier, Nelson (2016) has noted some distance effects within the GCP data. Another similarity is the manner the effect is described. The authors often characterize the Maharishi effect as "strengthening the coherence" of the community. A similar characterization appears on the GCP website: "When human consciousness becomes coherent, the behavior of random systems may change."[14]

Although these different literatures use different methods to detect an anomalous field effect, we have reason to suppose that they are investigating different aspects of a single phenomenon. To test this proposition we might wish to investigate how an RNG device (like the ones used in other field RNG experiments as well as the GCP) behave in the vicinity of a relatively large group of TM meditators practicing their advanced technique.

Mason et al (2007) attempt to do this in Fairfield IA, where large groups gather on a daily basis practicing their group meditation. The authors set up the RNG devices within one of two meditation domes (men and women meditate in separate domes; only the first two study authors and one research official from the university were aware of the recordings taking place.[15] The test period was set to coincide with the meditation times; thus no subjective element of time selection allowed for possible selection bias. The period of meditation has two parts: 1) Transcendental Meditation, which involves silent repetition of a mantra and 2) yogic flying, which involves repetition of a particular sutra or phrase taken from the Yoga

[14] http://global-mind.org/.

[15] The university was Maharishi University of Management in Fairfield, IA.

Sutras of Patanjali.[16] The TM practitioners and scientists who study the Maharishi effect claim that the yogic flying phase is considerably more powerful in its calming effect on the environment than Transcendental Meditation alone. Most studies of the Maharishi effect focus on the effects of the yogic flying practice on various social indicators.

Table 2
Z Statistics, p values, and Number of Trials (Adjusted for Possible Drift)

	TM Meditation	Yogic Flying
Experiment A	Z = -4.726	Z= -12.60
	$p = 1.449 \times 10^{-6}$	$p = 1.061 \times 10^{-36}$
	11,360 trials	1728 trials
Experiment B	Z = -3.872	Z = -12.639
	$p = 5.397 \times 10^{-5}$	$p = 6.471 \times 10^{-37}$
	22,567 trials	2971 trials

The authors conducted two identical experiments (A and B) that focused on the group TM meditation and yogic flying in the large meditation hall. Concatenation of the data for TM group meditation for experiment A covered 32 hours; concatenation of the data for yogic flying covered 5 hours. For experiment B, a similar concatenation of the data resulted in times of 63 hours and 8 hours for group TM meditation and yogic flying, respectively. The authors adjusted their

[16] The authors also placed RNG devices at location within 5 kilometers from the meditation domes, called the Maharishi Vedic Observatory. While they also found significant results I do not report them here. I wish to focus on the effect of the large group of TM meditators.

findings by removing a possible mean drift and the results are displayed in Table 2.[17]

The authors report strongly statistically significant deviations from randomness for both TM meditation and yogic flying in both experiments. The authors did not construct effect sizes; however it is evident from the much more powerful statistics (and astronomically small p values) reported under yogic flying, as well as the considerably shorter number of trials (duration of time) that the yogic flying generated a considerably powerful effect than group TM meditation. Unless one attributes this to an unusually powerful experimenter effect, these results appear to support a field-like effect.

In addition, the direction of the deviation from randomness in all cases was negative (more 0s than 1s), unlike what is typically observed in the majority of GCP events. The authors speculate that events that are significantly calming or foster transcendental experiences or represent "flow" experiences may be associated with a more decreasing directional trend for the RNG. Also, Nelson has conducted analysis of other relatively large TM group meditation events from the viewpoint of the GCP network and has commented that negative deviations might be a common feature with these types of events. [18] However he has also suggested that caution is in order until we have additional data along these lines. These lines of analysis suggest that isolating particular kinds of GCP events for study might reveal

[17] The adjustment involved finding a linear regression slope of cumulative pre-test data (using the Orion) and subtracting it from the slope of the post-test data. Mason et al (2007) p.304.

[18] See Nelson's analysis at http://global-mind.org/tm.resonance.html.

unpredicted patterns of a real effect beyond what might emerge from goal oriented psi.

Radin (2002) has performed an analysis for one particularly important GCP event: the September 11, 2001 terrorist attack on the World Trade Towers. He constructs a Z (normal) statistic that captures the variance of the output of the RNG devices in network.[19] The maximum of this statistic (representing the maximum variance for all the device output) occurred by a wide margin on September 11, 2001.[20] Along similar lines, Radin constructs a statistic reflecting the correlation among all possible pairs of RNG devices. Again, the statistic's maximum value occurs on September 11, 2001; Radin reports that the probability of such a large deviation could be due to chance is nearly 1 in 10,000.

However given that GCP investigators choose the event times, the question remains whether the data might reflect selection bias. Radin pursues some additional analysis that appears to refute this possibility. He constructs an objective measure of newsworthy events by selecting all events reported in a year of review for 2001; he then produced a count for the number of stories associated with those events. In order to incorporate the relative importance of the event, he also included the number of characters for each story. Radin found that this measure

[19] This statistic is based on summing the chi-squares for each device, which in turn was constructed over the random output for each device, over a six hour time window. For more details, see Radin (2002), pp. 536-537.

[20] On September 11, 2001, this constructed z exceeded both 3 and -3 standard deviations from its mean.

was correlated with the RNG correlation values with probability due to chance less than 1 in 1000.

This analysis also appears to damage the case for an experimenter effect. Radin's analysis using his measure of newsworthy was not part of the GCP design. However, an advocate for an experimenter effect might have a counter response. If an experimenter effect is responsible for generating correlations between RNG devices as important events are selected over time by the GCP research team (which according to that hypothesis would be congruent with the team's goals) then perhaps such correlations would also be statistically related to the various news events of 2001, and therefore Radin's newsworthy measure as well.[21]

One other possible way that this analysis does not fit with the experimenter effect is the unusual power of the results for the September 11 event. Radin's own analysis demonstrates September 11 as by far the most important event that year.[22] Under a goal oriented experimental effect, (especially selection bias) there is no compelling reason to think that the some events selected are any stronger or more powerful than others. However an especially strong result would be consistent with a field psi effect, which would reflect the unusual dominance the terrorist attack had in media around the world on September 11, 2001. An advocate for an

[21] The possible link between the selected GCP events and Radin's newsworthy metric for year 2001 seems tenuous to me. There were 33 GCP selected events for 2001. By my count 14 were significant news events; the remaining events appear to be various world or large group meditation events, as well as religious celebrations that would not receive much publicity on mainstream media outlets.

[22] Also, out of 33 GCP events in 2001, the September 11 terrorist attack received the highest reported Z score, except for one other event associated with an unusual astrological configuration. Global-mind.org/results.html#alldata.

experimenter effect might respond arguing that the investigator might wish to find more powerful results for powerful events. Of course, this appears to be another example how an experimenter effect can account for any outcome.

These two studies both demonstrate a powerful effect where selection bias is ruled out. The hypothesis of experimenter effect appears to be an awkward fit for the Mason et al (2007), given the presence of a strong effect that moves in a direction against prediction from previous field RNG experiments. Perhaps we cannot rule out an experimenter effect for Radin (2002); perhaps unusual size of the effect could well have been predicted. Finally, the presence of a field effect manifesting different characteristics in a separate line of research (the effects of TM group meditation on social indices) that also produces deviations in randomness leads me to conclude that we do have reasonably strong evidence of a psi field effects in some cases.

The Experimenter Effect

I believe that my brief examination of two relevant studies illustrates the importance of complementing analysis of the GCP data with studies that focus on particular events. Given the results and my conclusions, I'll proceed considering only goal oriented experimental effect as the alternative to a psi field effect in explaining the GCP data.

The experimenter effect is generally thought to operate through two channels: 1) behavioral characteristics of the researcher that somehow induce stronger (or weaker) psi results, and 2) an experimental psi effect through which

the experimenter or principal investigator directly influences the results. Given the planetary scale of the GCP, we can presumably dispense with the first category. Thus we can understand that Bancel's claim refers to a psi effect generated by the GCP research team or principal investigator, Roger Nelson, who is responsible for the experimental results.

Let's take a moment to let that possibility sink in: Roger Nelson (perhaps with his volunteers) has manifested through a mind-matter psi effect correlations between RNG devices scattered across the planet for more than seventeen years. The cumulative results reject the null by 7 standard deviations. If true, this would most likely qualify as the most astonishing display of a mind-matter effect in the history of psi. Perhaps it is the most important finding in the history of science. Needless to say, this is something that merits our attention.

The applicable psi literature, however, suggests that experimenter effects are most likely mixed together with some other psi effects under study (Palmer and Miller 2015). That is, while an experimenter or principal investigator conducts her study on telepathy or precognition, there is good reason to think she is influencing her results through either behavioral (Rosenthal) or psi experimenter effects. Up to this point, there may have been little standing in the way from assuming experimenter effects are small. However, Bancel's claim is that a psi experimenter effect for the GCP is the sole driver (again ignoring the possibility of selection bias). There is no other psi (in this case field) effect. And at a planetary level, the experimenter cannot create an effect through providing a environment or interact with participants in a friendly way.

So if we go with just experimenter effect, Bancel's interpretation has a considerable downside. If experimenter psi is strong enough to maintain the results of a planetary wide experiment over seventeen years, then perhaps the interpretations of most psi experiments—at least those that focus on mind-matter interactions-—are in doubt. There are other troublesome questions. How do we test or isolate such a strong psi experimenter effect? Any result that is congruent with the goal or intention of the researcher can be attributed to experimenter psi. The scientific requirement of separation between the observer and the experiment is destroyed. Needless to say, this problem extends into more mainstream areas of psychology that have nothing otherwise to do with psi.

Let's examine Bancel's argument again in more detail. Recall that the output of each RNG device within the GCP network is fed through an XOR mask in order to remove persistent biases. As it turns out, the masking procedure is different depending on the types of devices, Orion and Mindsong. The Orion device has internal hardware that creates two random outputs that are XORed together. However, to remove persistent bias, an XOR mask is applied via software within the PC that receives the Orion's output. This mask happens to be a stream of alternating 1's and 0's.

Bancel argues that the GCP network cannot hope to synchronize masks applied to devices scattered around the globe, even those applied with software. And this is certainly true. However, I do not believe this presents a problem for the Orion devices. The simple structure of these masks means that any Orion device in the network will receive either an alternating stream of 1's and 0's or a flipped

version of the same. Thus the two different (and non-synchronized) masks that will used to filter the Orion device's output will be perfectly negatively correlated. It's important to note that the statistics that are generated to measure a possible psi effect within the GCP involve squaring the deviations from the mean. Thus the differing XOR masks for the Orion devices should not affect the generated statistics.

Unfortunately, things are more complicated for the Mindsong RNG devices. These use a considerably more complex mask: 560 bits containing 72 8 bit segments (bytes); each byte consists of a possible 50-50 distribution of 1's and 0's. Complicating things further, these masks are XORed within Mindsong's hardware, making synchronization impossible. As a result, the correlation between the masks of any two Mindsong devices in the network (as well as between any Orion and Mindsong device) is obliterated.

How then to explain the correlations displayed in Table 2? Because the XOR masks have not been synchronized within the GPC network, Bancel argues that correlations between devices cannot be attributed to a field psi (global consciousness) effect. As I've said, I don't believe this argument applies to pairs of Orion devices, but it appears to hold up for other possible pairs. Bancel argues that only a goal oriented, psi effect can account for this.

I'll explore here a framework that supports Bancel's argument with respect to a possible experimenter psi effect (but, again, not selection bias). As I've mentioned, the psi effect of the experimenter, or perhaps especially the principal investigator, may differ in important ways than direct mind-matter interaction. A principal investigator (in the GCP's case Roger Nelson), while integral to the design

of the experiment, will not necessarily be focused on the activity of the experiment as it unfolds. In addition, the intention or goal will not simply be something connected to a single experiments; it will likely evolve out of research activity spanning several years, perhaps an entire career. Intentions and goals of a principal investigator in some respects belong into a category distinct from the intention a participant might have to change the output of a RNG device. Plus, while the participant may be focusing on somehow affecting RNG output, it's likely he doesn't have much emotional investment; however many principal investigators may have quite a great deal of strong emotional investment.

In addition to the emotional investment of the principal investigator (perhaps spanning years), her goal will likely have an unconscious component. That is while no doubt some sort of goal will receive considerable conscious attention, the investigator's unconscious processes will be affected as well. For this reason I believe that psi explanations that focus on conscious attention (such as Observational Theory) will not be able to fully capture what's happening.

Perhaps we might profitably return to the Bohm's framework discussed earlier that describes simultaneous processes of enfolding and unfolding between the implicate and explicate order. Consider a principal investigator investing a research goal with attention and emotion over a span of years. Within Bohm's framework, such a goal or attention involves a flow of meaning for the investigator, which in turn influences the biological and physical unconscious processes within her body (signa-somatic). These enfold with a deeper, nonlocal and holistic strata (Bohm's implicate order). From this more foundational level of reality an unfolding

(soma-significant) also ensues that informs the investigator through intuition or other unconscious impulses, and these ultimately guide her to think and act in ways that are congruent with her intentions. This unfolding may also manifest through shifts in the probabilities underlying quantum mechanical processes.

However Bancel's argument concerning the GCP is highly unusual. Consider two RNG devices whose XOR masks are unsynchronized. The correlations we see between such devices are a product of correlations between devices of raw data prior to masking in addition to the XOR masking. If the XOR masking destroys any correlation in the raw data, in order for us to detect the correlation that we ultimately observe requires that the stream of 1s and 0s in the raw data must be arranged in a way that application of the mask itself ends up producing the correlation detected. Drawing on the framework sketched above, the goal or intention which presumably has been enfolded or "communicated" within the implicate order, which also "knows" the deterministic XOR sequence being applied, influences the process of random output in order to yield the correlation we ultimately detect emerges.

The prospect of a planetary experimenter effect, as Bancel argues and that we cannot rule out, deserves an additional comment. Again, let's be clear about distinguishing the case of a goal or intention that has received years of investment from instances where a participant attempts to influence a RNG device through conscious, mental effort only for the duration of the experiment. The intentions and motivation of the principal investigator likely reflects years of emotional investment linked with career goals, fundamental beliefs, and perhaps altruistic aspirations for

revealing knowledge. They may evolve but on the whole remain relatively stable over time. To some degree, they are observable through the pattern of research that emerges; however this obviously has its limitations. But the investigator cannot switch them on and off for the sake of experiment. For this as well as other reasons I've discussed, determining the importance of such an effect within experimental investigation is highly problematic.

That said, ruling out or dismissing an experimenter effect from playing a major role within the GCP, a global project that has a delivered stable, statistically significant psi effect over nearly two decades, seems difficult, given the non-synchronization of the Mindsong devices. If a goal oriented experimenter effect is a driving force (as well as a psi field effect in my opinion) to delivering such a stable effect, then we appear to be dealing with something nomological. That is, Roger Nelson's goals and motivations (perhaps in conjunction with those of his volunteers and colleagues) appear to be producing a stable, law-like pattern of tendencies that are influencing RNG devices across the planet. It would seem that Roger Nelson (perhaps with the help of his volunteers) has induced a kind of programming into the metaphorical (or perhaps not) global psyche.

And this brings us to consider a rather exciting and entertaining possibility. Could Roger Nelson be in possession of secret super powers? Of course he has not otherwise given any indication that he possesses superpowers. Nelson has made his position quite plain that he does not believe that his goals or intentions could be the sole driver of the GCP. But superheroes rarely just come out in the open with their true powers. Superheroes or super villains (perhaps we can't really be sure) usually

choose to keep the true nature of their powers secret. This might be the case. Perhaps the entire GCP project could be a way for Nelson to carefully calibrate his abilities of shifting and altering quantum fluctuations at diverse points across the globe. The global events themselves might be a smokescreen to allow Roger, whether he is hiding in a secret lair or in plain sight at conferences, to calibrate and test his powers. Could there be others who are testing similar or wildly different kind of powers? If so, what could be their agenda? Could officials of the government be aware of this? Perhaps they are aware and cooperating at various levels. Obviously, many questions arise.

I suspect that this line of inquiry indicates that I've spent too much time watching movies or television programs set in the Marvel or DC based comic universes. The only data on superpowers that I'm aware exists only in movies, televisions, and comic books.

More seriously, I admit the prospect of a global experimenter effect is not a prospect I embrace easily. But what concerns me most is the difficulty of drawing a boundary between the effects of a given study (let's say your garden variety psychology experiment) and what might be driven by a psi effect of the experimenter. Especially with respect to the GCP, the experimenter effect may be used to account for far too much.

An Integrative Approach

I propose that the best interpretation of the GCP findings is one that integrates both psi field and experimenter effects. I acknowledge that attributing the GCP only as an experimenter effect is a more parsimonious explanation. But a

more integrative approach appears to me more consistent with the literature to date on psi and the experimenter effect. On this point, I follow Palmer's (2015) argument that experimenter effects work in conjunction with various types of psi under investigation, however in a fashion we currently don't understand. However Millar (2015) argues that much of the psi data may be more consistent with a pure experimenter effect.[23] But as I've discussed, a hypothesis that is consistent with virtually any result is rarely looked upon kindly within scientific circles. I believe that legitimate scientific investigation in general allows us to assume that an experimenter effect, while important in ways we do not fully understand, cannot in general be considered to be the whole driver, unless we are given compelling evidence otherwise. If we have separate reasons to believe that psi field effects exist, as I've argued we do, then I believe we are entitled to put weight on that when it makes sense.

In that regard I agree with Nelson's argument that the structure of correlations within the GCP data, not predicted in the early stages of the project, likely represent a field effect. I do not believe it should be so easy to dismiss such an interpretation in favor of an experimenter effect, which in theory could be consistent with almost anything. Those who insist that an experimenter effect is the sole driver should present more falsifiable predictions. In the absence of these, we need to find a way to constrain experimenter effects from becoming dominant.

[23] Palmer (2015) and Millar (2015) are two separate essays that comprise Palmer and Miller (2015).

Given all of this, we can note that the results for the Orion devices, unlike the case for Mindsong RNG devices, are consistent with the field psi hypothesis. It is true that we cannot exclude the possibility of an experimenter effect playing some role among the Orion devices. Yet as I've explained, I believe there are reasons to believe field effects are at play also.

Such an integrated approach may lead to a richer understanding of psi phenomena. And Bohm's framework, which as I've argued is consistent with a broad range of psi, provides a strong foundation for an integrated view. Bohm's inherently nonlocal and holistic framework suggests that experimenter and field effects could be intimately linked. Perhaps we might see them as two aspects of a deeper whole, like yin and yang.

Let's speculate around this. Perhaps a principal investigator's intention, emotionally invested over years as we've considered, and what has been described in the psi field literature as collective feeling, occupy a similar "space." If so, this might lead us to consider that what we call collective emotion or feeling as comprised in some fashion with shared intentions, wishes, or hopes. Could intentions or goals that we invest with emotion over time might in some sense be the tips of deeper waves for something more collective? And could this more collective feeling or emotion, as I've discussed earlier, be closely related with Bohm's underlying strata of implicate order? If so, perhaps both intentions and shifts in collective feeling may subtly affect the underlying probabilities that govern our world.

We can try to put this into the context of a psi investigation where there are two important considerations. First, there is the matter of the phenomenon under study—telepathy, precognition, and so forth—as well as various questions such as existence, methodology, size magnitude, etc. Second, there are issues of the environment around the experiment being performed. The non-local aspect of psi requires some thought on the underlying conditions, which include the characteristics of the investigator, such as friendliness, curiosity, optimism, and motivation. But we can also include qualities or characteristics that could apply to the underlying non-local psi field associated with the experiment. Thus the environmental considerations encompass both the motivations and characteristics of the experimenter, as well as the quality of an underlying "field."

It's probably not much of a stretch to argue that many of the noted characteristics of successful psi experimenters suggest evoking an emotional "space" that supports psi. And such an emotional space might be described as one that creates more "connection" between participants and experimenter. Crandall (1985) found experimenters who exhibited warmth, friendliness, and an enthusiastic manner produced stronger results than those who were cold, hostile, and indifferent. Schmeidler and Maher (1981) found that psi-conducive experimenters were rated as significantly more flexible, enthusiastic, free, likeable, playful, and warm. Psi-inhibitory experimenters were ranked toward the opposite end of the spectrum, with adjectives like rigid, cold, overconfident, irritable, egotistic, tense, and dull. All of this suggests that experimenters, either consciously

or unconsciously, set a tone that contributes (or not) to an overall feeling of connection that we might characterize as greater coherence or resonance.

Bohm's framework of course is perfectly consistent with all aspects of an experiment (including the experimenter) being parts of one system. The goals and motivations of the experimenter are thus entangled with the system in its entirety, which also include the underlying probabilities that ultimately govern the outcome of the experiment. Thus we must consider the relationship between the relevant parties of an experiment (experimenter, assistants, participants) and the deeper order that Bohm posits. Perhaps what we might describe as greater coherence or resonance between participants and experimenter resembles what Csikszentmihalyi terms 'flow.' Thus a sense of emotional connection or holistic awareness facilitates more nonlocal relationships between the various parties of an experiment through greater coherence or resonance with the inherently nonlocal and holistic underlying order.

In the context of the GCP, perhaps some types of large scale events, especially those that trigger powerful emotions in a population, also create a kind of shared emotional space, which in turn allows for greater interaction and influence with the more foundational order, the basis for consciousness and matter. However, Nelson's goals and motivation (as well as his volunteers and colleagues) appear to be playing a significant role. Obviously many of the characteristics listed above for a successful experimenter effect do not seem to apply here, given the lack of interaction between the GCP research team and the population (again, assuming a

significant field effect). However, we need to consider how Nelson and his tem of volunteers play a role, perhaps facilitating a shared intention.[24]

How can the GCP results be explained using such an integrated approach within Bohmian framework? Advocates of field psi suggest that powerful events that influence the emotions (or focus attention) through broadcasts over relatively large populations trigger deviations from randomness in RNG devices. As I've suggested before, perhaps the experimenter's intentions and shared emotions or feelings occupy the same "space," which in turn is intimately linked with a deeper strata of reality, foundational to both consciousness and matter. This all suggests that shifts in shared emotion or attention could impact the underlying probabilities governing the intrinsically random processes of RNG devices. The portion of the network composed of Orion RNG devices could detect this.

However, the portion of the GCP network composed of Mindsong devices requires something else, perhaps a goal oriented experimenter effect, as Bancel has argued. I've speculated how this might play out in the previous section on experimenter effects. However, with a pure psi field being the sole driver, there isn't a clear indication for the direction of the shift in probabilities. We might simply posit a deviation in randomness occurred, as the GCP researchers. However an integrated approach suggests something else: shifts in potentia (induced by shifts in

[24] Of course this story is a little more complicated now that Bancel (and perhaps others) share a different view of the GCP effect. Will we perhaps see a change in the GCP findings if Bancel makes a different contribution to shared intention? Or does the intention of Nelson, the primary investigator, remain dominant? Difficult questions such as these as well as others arise out of the problematic aspect of an experimenter effect playing such a powerful role.

collective feeling or attention) within the underlying order will likely lead to an unfolding congruent with an intended goal or direction. I speculate that an integrative approach implies the goals of the experimenter(s) are more likely to manifest throughout the system the greater 1) the more resonant or coherent the system (i.e. enhanced field) is, which is likely indicated by a higher degree of shared feelings or attention and 2) the extent that the experimenter(s) are engaged with the system, including the enhanced field component (perhaps through the feelings of the experimenter).

We can note that the GCP system contains Orion devices (displaying correctly a field effect), Mindsong devices with poorly synchronized XOR masks displaying something similar but probably not representing a pure field effect, the population, the experimenters, and the underlying strata of orderly potentia. Perhaps the presence of a field effect occurring throughout all RNG devices (even those whose output are corrupted), will create a greater than usual opening for intentions from experimenters who happen to be engaged (or entangled) with the system. Thus the detected output of RNG devices throughout the system reflects the goals of the researchers, but this is supported by the coherence (field effects) of the overall system as well.

Of course, an integrative approach could very well incorporate some degree of precognition on the part of the experimenter. A primary weakness of my analysis is that I have arguably not given sufficient attention to precognitive bias. I have chosen to focus on field effects and an experimenter effect based on two studies. This might be defensible for arguing that precognitive bias in event selection cannot

account for the entire GCP results; however it is unlikely to be sufficient for dismissing it entirely. The integrative approach I explore here accommodates the possibility that the intuition of the researcher might lead to some biasing in favor of an underlying goal. As I discussed earlier, what Bohm terms the signa-somatic phase or unfolding from the implicate order could manifest through unconscious processes an intuitive guidance for the investigator. All of this suggests that while an integrative approach may suggest a richer, more holistic view of psi, parsing what factors are the most important may be more challenging.

Conclusion

As I have argued, I believe the current debate regarding interpretation of the GCP effect will profit from a complementary approach that includes close examination of particularly important events, as well as field RNG experiments. I believe the heterogeneity within the set of GCP events may resist our ability to find the answers solely through statistical analysis on the entire network. Obviously finding sufficiently powerful events may be challenging and require some care. There is likely benefit from additional studies of TM group meditation events, which has its own literature documenting a field effect, or other group meditation practices that could display similar effects.

As I've shown, Bohm's implicate order framework appears to provide a good fit across a wide range of psi phenomenon. In addition, its inherently holistic aspect provides a good foundation for an integrative approach to psi. Within this framework, we might consider how the experimenter effect and field effects are

intimately linked, not just within GCP and field RNG experiments, but across the range of psi phenomenon. Of course, an integrative approach cannot exclude precognitive bias as well. This suggests of course that parsing different aspects of psi, such as field and experimenter effects, will be challenging. But this might reflect an inherently holistic feature that makes distinguishing different aspects of psi (telepathy versus clairvoyance for example) so difficult. The surprising integration between experimenter and field effect on a global scale suggests this may be something we need to learn to live with.

Some might view what I have described as the ease with which Bohm's framework accommodates various interpretations (field effect, experimenter effect, some combination of both) as a flaw rather than a virtue. While I have raised a red flag regarding explanations where an experimenter effect drives everything, arguably a similar criticism applies Bohm's framework: it is compatible with nearly any outcome. This may be the price to be paid for using an inherently holistic (and nonlocal) framework rather than more traditional theories rooted in more mathematical structure. Bohm's framework provides great explanatory power: it suggests a way of moving forward with respect to the problem of consciousness and the ontology underlying quantum mechanics. Its framework is consistent with a wide range of psi phenomenon. But at some point we will probably wish to impose additional structure that can give us testable predictions.

I am not sure we will soon resolve how best to interpret the findings from the Global Consciousness Project. Whatever the correct explanation happens to be, however, Roger Nelson, Peter Bancel and others through this remarkable project

have challenged us to extend what we think is possible about psi. And if nothing else, it looks like how we formulate and set our intentions is a pretty big deal!

Acknowledgements

I am grateful for helpful comments from Roger Nelson in writing this paper.

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