

**Unintended Deviations of a Random Event Generator by Patients with Late Life  
Depression and Anxiety during a Direct Mental Influence Task**

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**Abstract**

The primary objective was to determine whether depression and anxiety influence the outcome of random micro-events in a non-random manner in the absence of any physical intervention by using a random event generator (REG). The secondary objective was to correlate other dimensions of consciousness with the REG's output. The experimental group ( $n = 30$ ) included individuals with depression, the control group ( $n = 15$ ) included individuals without depression, and the comparison group ( $n = 10$ ) included individuals with or without depression. It was hypothesized that those with depression or anxiety would significantly deviate the REG in the unintended direction but the whole sample did ( $t(49) = -2.37, p = .022$ , two-tailed). There was no significant difference between the group means, ( $F(2,50) = .12, p = .84$ ) and no robust correlations between dimensions of consciousness and REG activity. Further analysis is needed to understand negative emotions in mind-matter interactions.

*Keywords:* direct mental influence, random event generator, consciousness, psi, anomalous phenomena

Consciousness allows humans to experience reality in a meaningful manner. However, much remains unknown about the extent to which consciousness itself could influence physical reality. Engineers and scientists at the Princeton Engineering Anomalies Research laboratory (PEAR laboratory) designed multiple versions of random event generators (REGs) to investigate

direct mental influence (DMI). Direct mental influence is the phenomenon whereby an individual uses their mental processes to alter physical events (Barušs, 2021). The REG used in the present study was an electronic device that produces truly stochastic binary events, based on the reverse current across a diode caused by quantum mechanical tunneling (Psyleron, 2007). In the present study, experimenters generated empirical data regarding the potential relationship between DMI, aspects of perceived consciousness, and the direction in which a REG deviates in relation to those factors. In particular, the experimenters focused on whether depression and anxiety correlate with deviations of the REG opposite to deliberate intention, sometimes called “psi-missing.”

Currently, the mechanism behind DMI is unknown, but its existence has been repeatedly demonstrated. While significant results are repeatedly reported in REG studies, the mean difference between random events and intentional, non-random events tends to remain small. This in part could be due to the inability to control for the plethora of anomalous confounding variables, such as nonlocality and the experimenter effect. Therefore, seeing any effect at all is impressive. Moreover, when considered meta-analytically, the probability of repeatedly getting a small effect size by chance is extremely low (Radin & Nelson, 2003). One particular study that involved 33 participants and 250,000 trials concluded that participants had significantly deviated a REG from the expected value of zero,  $z = 3.61$ , ( $p = .0002$ , two-tailed; Dunne & Jahn, 1992). Additionally, a meta-analysis of 515 experiments found an effect size greater than 16 standard errors away from chance, which implies that consciousness influences physical matter (Radin & Nelson, 2003). While meta-analyses are one method of obtaining a substantial amount of data to support the existence of DMI, there is a potential bias towards including published articles that are favorable to the researcher’s goal (Maier, Moritz, & Pflitsch, 2018). However, it should be noted that this bias was statistically accounted for in Dean Radin and Roger Nelson’s 2003 meta-analysis.

Some researchers have suggested that the small effect sizes are due to the evasive nature of anomalous phenomena (Radin, 2019). For instance, there appears to be a decline effect in some large databases, so that repetition of trials results in the loss of an effect (Kennedy, 2003), possibly due to a corresponding loss of novelty for participants or experimenters (Maier et al., 2018). In some studies, even without overall effects, secondary patterns have been detected in the data (Maier et al., 2018; Kennedy, 2003; Radin, 2019; Jahn, et al., 2000). It is not clear how to interpret these.

Two other factors that further complicate the interpretation of DMI studies are nonlocality and the experimenter effect. For example, there was a study in which Therapy Practitioners had a vial of water in the same room as they were during a 5-, 10-, or 15-minute healing session for another individual. A Therapy Practitioner was described as anyone who used means outside of medicine to assist in the healing process of a participants' ailments (Schwartz et al., 2015). Using infrared spectrophotometry, they found changes in the molecular structure of the experimental water in comparison to the controlled vials of water. However, the length of exposure to healing made no difference (Schwartz et al., 2015). This suggests intra and inter variation in an individual's thought processes is less important than having an overall intention of influencing matter. Furthermore, the strength of DMI may not be time dependent, which supports the argument that DMI is nonlocal (Schwartz et al., 2015). The PEAR laboratory also did an experiment where participants did not need to be in the presence of the REG when mentally intending to interact with it. They found a strong correlation between a participant's intention to deviate REG activity and the participant's actual ability to deviate a REG. This suggests that the mechanism used in DMI is nonlocal and that the phenomenon will never be fully explained using biological and physical processes (Jahn et al., 1997). The nonlocal aspect of DMI is a confounding variable because it

suggests that anyone anywhere and at any time who is consciously or unconsciously focused on a study investigating DMI has the potential to affect the output of the REG. However, the nonlocal nature of DMI provides insight into its mechanism.

The experimenter effect is the idea that the experimenter's mindset can inadvertently skew the results of the experiment (Barušs, 2021). The experimenter effect is especially applicable for the study of DMI since that involves investigating the influence of one's mindset. For example, Marilyn Schlitz seems to be an effective experimenter when it came to the study of anomalous phenomena, repeatedly finding significant results using the same protocols as other experimenters in the field. However, Richard Wiseman, a skeptic of the existence of anomalous phenomena, who was reported to be somewhat hostile by participants, was unable to produce significant results while using the same protocol as Marilyn Schlitz (Wiseman & Schlitz, 1997). This suggests that an experimenter's mood and expectations play a role in the formation of results regarding the investigation of anomalous phenomena.

Another study, with the initial objective of supporting the existence of precognition in the absence of higher cognitive processes, also investigated the experimenter effect as an additional objective, concluding that higher cognitive processing was responsible for what appeared to be lower processing precognition in planarians, a flatworm (Alvarez, 2018). Experimenters placed planarians into a trough which contained an LED light on both ends. A REG was used to assign which light would turn on. The first part of the experiment tested precognition by measuring the distance of each planarian's head prior to and at the time one of the lights was turned on. Since planarians are photophobic, it was hypothesized that, in the seconds leading up to the event, a planarian's head would be farther from the light that was about to turn on. The first portion of the study supported the existence of precognition without the need for higher cognitive processing.

However, Fernando Alvarez continued his investigation and proposed an alternative explanation that the experimenter effect had taken place which did involve higher cognitive processing (Alvarez, 2018).

Alvarez (2018) completed a follow-up experiment to test these hypotheses. A within-group design was used, with the first two groups involving human mediation and the second two groups without human mediation. In the first group, the experimenter used a random number generator (RNG) to determine which light to manually turn on. In the second group, the experimenter also used a RNG to determine which light to turn on but the lights were disconnected from a power source. In these two groups, the planarians were significantly farther from the light that the experimenter intended to turn on. In the third group, the RNG automatically controlled which light to turn on without the experimenter mediating the process. Lastly, in the fourth group, the lights were disconnected from the RNG but the RNG continued to run trials as if the lights were still connected. In the latter two groups, the planarians showed no preemptive signs of avoiding the noxious stimuli. Therefore, it was concluded that the planarians were acting in response to the experimenter's intention. Furthermore, the result itself could be due to an experimenter effect, if the experimenter thought that experimenter effects existed.

In previous studies, intentionality, cognition, and certain emotional states have been correlated with DMI. Intentionality refers to an individual attending to an event with a specific desire for a certain outcome. For instance, desire may be expressed through positive, negative, or neutral thoughts about the object of interest. The intentionality hypothesis states that those who purposely try to mentally influence physical matter in a particular way will be more likely to do so (Lai et al., 2018). Lai et al. (2018) tested this hypothesis by designing a triple blind study in which participants were told to think positive, negative, or neutral thoughts in the presence of a

bowl of rice. After 30 days, participants rated nine bowls of rice, three per group, on aesthetic appearance. The rice bowls in the positive intention group were rated significantly higher on aesthetic appearance than the negative and control groups. The negative group and control group showed no significant difference from each other. Also, *Escherichia coli* (*E. coli*) levels were measured in each group of rice and it was found that the negative group and control group had significantly higher levels of *E. coli* than the positive group. However, due to high toxicity and low nutrient levels, the last viable measurement of *E. coli* took place on day four. Based upon this analysis, in a practical sense, positive intentionality has the potential to enhance one's physical health and physical reality. It is also unknown whether neutral and negative thoughts, did not affect, or had a deleterious effect on the rice's appearance and edibility. Since depression and anxiety are associated with negative thinking patterns, this study emphasizes the need to further investigate how negative thoughts can impact the outcome of events. Also, this study supports the therapeutic importance of psychotherapy to develop a healthier and more positive mindset in people with depression and anxiety (Cuijpers et al., 2014).

Similarly, Stephan Schwartz and colleagues investigated the effects of intentioned awareness of meditators on water and wine. He found that participants rated the 'treated' drinks as more aesthetically pleasing and better tasting (Schwartz, 2019). Because the participants in this study successfully influenced water in a positive manner, the present study questions whether people struggling to obtain control over emotions, such as depression and anxiety, may have an impact on physical objects in a negative manner.

Emotion is another factor of consciousness that has been correlated with deviations of a REG. Most previous studies have focused on the correlation between positive emotions and the ability to deviate a REG in the intended direction, but there is still limited data regarding the

correlation between negative emotions and deviation of a REG in the unintended direction. Collesso et al. (2021) conducted a study whereby relaxation meditation and visualization exercises were used to reduce tension and promote feelings of love. They found that the experimental group ( $n = 30$ ) significantly deviated the REG in the intended direction while the control group ( $n = 30$ ) did not significantly deviate the REG. As the relaxation meditation was used to decrease feelings of fear, frustration, and anxiety, this study aligns with the limited published data focusing on the relation between feelings of frustration, stress, and anger that correlate with the REG deviating in the unintended direction. However, the extent to which negative psychopathological emotions correlate with deviations in REG activity has not previously been investigated.

Helmut Schmidt conducted a two-stage study that demonstrated the correlation between one particular negative emotion, which was frustration, and a REG deviating in the unintended direction (Schmidt, 1971). The first stage involved a random sample of participants who were instructed to move a light around a circular REG in a clockwise direction. Participants who unintentionally moved the light in the counterclockwise direction were included in the second stage of the study. Participants were once again instructed to deviate the REG in the clockwise direction. All 15 participants ended up unintentionally deviating the REG in the counterclockwise direction, finishing with a group score of 49.1 as opposed to the expected value of 50.0,  $p < .001$  (Schmidt, 1971). The reported frustration need not be a personality trait but could be an emotional state resulting from an inability to deviate the REG in the intended direction (Schmidt, 1971). While Helmut Schmidt's study supports the present study's hypotheses, it also highlights the importance of using an appropriate sample.

While emotions are supported as a component of DMI, mixed results have been reported on the extent to which cognition plays a role. Cognitive factors, such as attending to a REG and

intending to alter its function, tend to significantly correlate with deviations in REG activity more frequently than other cognitive processes (Dobyns, 2015). A REG study in which participants were preoccupied with alternative tasks, instead of focusing on the REG, were still able to deviate the REG in relation to their emotional state (Dobyns, 2015). This suggests that attention and intention are not a necessity to engage in DMI. Regardless of the extent to which cognition is needed for DMI, Lumsden-Cook (2003) pointed out the importance of affect infusion. Affect infusion is the theory that emotion and cognition work in conjunction with one another, whereby more complex situations require higher cognitive processes and an increase in affect. This could mean that previous correlations between DMI activity and cognition could be the residual effects of emotions influencing the REG. However, it could also mean that cognition simply plays a role in DMI as well.

Overall, the existence of DMI has been proven despite the small effect size and evasive nature of the phenomenon. When running a DMI experiment it is important to be aware of anomalous factors such as nonlocality and the experimenter effect. While intentionality, emotions, and cognition have been studied in relation to DMI, the impact of depression and anxiety on the outcome of REG activity remains limited. Therefore, the purpose of this study was to determine whether participants who score high on measures of anxiety, depression, and certain subcategories of the consciousness inventory, such as fear and sadness, will affect the REG in the unintended direction. It is expected that, for the participants in the experimental group, as a group, the REG would deviate in the unintended direction. It is also hypothesized that participants who score low on other subcategories of the consciousness inventory, such as love and joy, will also affect the REG in the unintended direction. Furthermore, it is expected that there will be a positive correlation between strongly believing that influencing the REG is possible and actually affecting



the REG. Lastly, it is hypothesized that there will be a positive correlation between reported empathy and deviation of the REG.

## **Methods**

### ***Participants***

The present study was conducted in Canada at the London Health Sciences Centre Geriatric Mental Health Program (GMHP) clinic, in accordance with the Western Health Science's Research Ethics Board (REB # 112157), Lawson's Compliance Waiver and Privacy and Confidentiality agreement, and St. Joseph's Privacy and Confidentiality Education Program. The present study was the third in a series of REG experiments completed at King's University College. Experimenters in the present study included 30 participants to match the two prior experiments in the series. The first experiment had a sample size of 30 as the goal was to replicate the PEAR protocol. Furthermore, a sample size of 30 is traditionally used in feasibility studies like this as the sample size is large enough to represent the population and allow the investigators to obtain data within a timely manner. Participants in the experimental group ( $n = 30$ ) were recruited from a convenience sample of psychiatric outpatients at the GMHP clinic that were diagnosed with clinical major depressive disorder with or without comorbid anxiety. These patients were currently experiencing at least some symptoms of depression as confirmed by scores greater than three on the self-rated PHQ-9 (Kroenke et al., 2001). While collecting data from the participants in the experimental group, it was decided to extend the number of participants by choosing age matched individuals as a control group. A control group of 15 was chosen because this amendment was made part way through recruitment, and it was assumed that finding 30 more participants was unrealistic. Participants in the control group ( $n = 15$ ) were also recruited from the GMHP clinic and were self-diagnosed healthy relatives or friends of the depressed participants and scored three or less on the PHQ-9.

Because ethics approval for the experimental group took a long time, and some results were necessary for the completion of a student project, 10 participants came to the lab to participate as a comparison group with separate ethics approval from the King's University College Research Ethics Review Committee. The comparison group ( $n = 10$ ) included individuals who were part of a consciousness discussion group, or in an undergraduate consciousness class, at King's University College at Western University in London, Ontario. The comparison group had PHQ-9 scores ranging from zero to 25. Data were collected from the comparison group first followed by the experimental group and control group.

A total of 55 individuals participated in the present study ( $n = 36$  females,  $n = 19$  males). Participants ages ranged from 20 to 87 years with a mean age of 64 years. Seventy-three percent of participants reported having a high-school diploma or higher and 27% reported "other." The majority of participants were Christian and almost half of participants reported practicing their religious or spiritual beliefs at least once a week. In terms of personality traits, over 90% of individuals described themselves as being at least somewhat empathetic. Furthermore, participants believed it was more likely that others could engage in DMI than themselves. Only 6.7% of participants had recently lost a spouse. Participants reported varying lengths of time with depression, ranging from not currently having depression to having depression for over five years.

### *Materials*

**Random Event Generator (REG).** The REG used in this study was a Psyleron REG-1 with serial number #RGZD71. It is an electronic device that uses the reverse current in a diode to produce a series of truly random binary events based on quantum tunneling. The events are then represented by zeros and ones and displayed on a computer screen using Psyleron programming. The difference between participants high-going and low-going intentions were used as participants'

scores. By using a relative measure, any external biases that may alter a mechanical device's outcome are effectively eliminated.

**Notebook Computer.** An Asus Zenbook UX31A-DB72 was used for capturing and displaying the output from the REG using programs that had been developed for the REG.

**Letter of Information (LOI).** The LOI was used to explain the purpose of the study and the tasks that participants would be completing if they decided to participate. The experimental group, control group, and comparison group all received varying versions of the LOI. Participants were given an opportunity to ask any questions before signing the LOI to confirm valid informed consent.

### *Measures*

**Psyleron Software.** Two Psyleron programs were used for capturing and displaying the output from the REG. One was the Psyleron – Field REG (Pro Edition) – Beta Version 1.64d, used for capturing and displaying the output in a passive mode when there was no explicit intention to influence the REG. In this case the raw score from the cumulative deviation of the REG was used. The second was the Psyleron Reflector PEAR Classic – Version 2.1, which was used for capturing and displaying the output when participants are intentionally trying to influence the REG. With this program, while interacting with it, participants were given instant feedback in the form of a line graph of the cumulative deviation. In this case, the raw score from the cumulative deviation of the low-intention runs and the raw score from the cumulative deviation of the high-intention runs were recorded. The difference, as the variable HILO, of high minus low scores, was the criterion measure used in this study. It is important to note that this measure is a relative measure and thus is free from mechanical biases (Psyleron, 2007).

**Demographics and Additional Information (DAI) form.** The DAI form was used to gather information regarding the participants' demographics, beliefs regarding human-machine interactions, self-reported empathy, and any recent loss of a romantic partner.

**Phenomenology of Consciousness Inventory (PCI).** The PCI was used to measure a participant's subjective states of consciousness before and after interacting with the REG. The PCI is made up of 53 opposing statements and participants used a 7-point scale to rate the degree to which they agreed with one statement or the other. The PCI statements are categorized into 21 different aspects of consciousness, including volitional control, rationality, altered state, sadness, attention and 11 more categories. Participants took approximately 30 minutes to complete the PCI. The PCI was used to see whether aspects of consciousness could predict deviations of the REG (Pekala & Kumar 2000).

**Geriatric Anxiety Scale (GAS).** The GAS was used to measure the severity of a participant's anxiety. The GAS is made up of 30 items and each item was rated on a 4-point scale. Items 1-25 are scorable, while items 26-30 are used to identify areas of concern and not used to calculate the score. Nine items are allocated towards somatic symptoms, eight are allocated towards cognitive symptoms, and eight more are allocated towards affective symptoms. Items 26-30 are listed to help determine potential life stressors (Segal et al., 2010).

**Patient Health Questionnaire (PHQ-9).** The PHQ-9 was used to determine the severity of a participant's depression. The questionnaire consists of 9 items and uses a 4-point scale. Participant scores were rated from 0 to 27 where a score of four or less indicated minimal to no depression, a score equal to or greater than 10 indicated moderate depression, and a score of 20 or more indicated severe depression. The PHQ-9 is often used in conjunction with a formal diagnosis by a mental health professional. In terms of reliability and validity, a study found that individuals

scoring 10 or more on the PQH-9 aligned with practitioners' diagnosis of depression 88% of the time (Kroenke et al., 2001).

**Exiting Form.** The Exiting Form provided open ended questions for participants to comment on their experience. The intent of the Exiting Form was to obtain feedback to improve the study design of future experiments that will be investigating similar topics.

### *Procedure*

After participants gave consent, the Field REG program ran in a passive mode while participants filled out a series of questionnaires. The Field REG program recorded 200 bits every five seconds and the real-time feedback was disabled to avoid potentially distracting participants. Participants started by filling out the Demographic and Additional Information (DAI) form, then the Patient Health Questionnaire (PHQ-9), followed by the Geriatric Anxiety Scale (GAS) for anxiety, and finally the Phenomenology of Consciousness Inventory (PCI). Once participants had finished the first set of questionnaires, the Field REG was turned off and they were instructed on how to interact with the REG using the PEAR Classic program. The experimenter reminded participants that they would be using their consciousness to try to influence the machine. Participants were advised that consciousness refers to the awareness of one's own internal dialogue, mental imagery, emotions, memories, and cognitions. Once the experimenter had confirmed that a participant understood the PEAR Classic program and was comfortable using the computer as required for the study, she left the room and returned when the participant had completed all 20 runs. However, the experimenter stayed in the room with participants who were not comfortable using a computer on their own, or who had trouble remembering the instructions. The PEAR Classic was set so that each participant had 10 high runs and 10 low runs. Each run consisted of 50 trials and each trial, a quarter of a second in length, consisted of 200 bits. After

interacting with the REG, participants filled out another PCI and then filled out an Exiting Form. Before participants left, they were debriefed and any remaining questions were answered. Participants in the experimental group and control group received compensation in the form of a \$10.00 gift card to a local cafe.

### *Data Analyses*

Analysis of variance was used to check group means against expected values and against one another. A linear regression and correlational design were used to test whether depression and anxiety correlated with the REG deviating in the unintended direction and to narrow down which factors of consciousness could be involved in direct mental influence. Statistical analyses were done using IBM SPSS Statistics Version 25.

### **Results**

Overall, three participants in the experiment group and two participants in the control group were unable to complete the study or provided unreliable results and were therefore excluded from data analysis. The PCI Reliability Index was used to identify unreliable results by comparing the level of agreement between participant answers to related questions within the same dimension of consciousness category. Twenty-one dimensions in the PCI were used and love, sadness, altered state of consciousness, rationality, and self-awareness are a few examples of these dimensions. If a participant's score matched the score someone would obtain if they answered randomly, then the participant's results were removed from the study.

The PEAR Classic scores, HILO, were calculated by using the difference between participants' high-going intention trials and low-going intention trials. HILO was the dependent measure in this study.

Because there was a preponderance of women participants, a two-tailed independent t-test was used to determine that there was no statistically significant difference between the 32 females' ( $M = -.13$ ,  $SD = .36$ ) and 18 males' ( $M = -.09$ ,  $SD = .36$ ) HILO scores,  $t(48) = -.39$  ( $p = .70$ , two-tailed, Cohen's  $d = -.12$ ).

Hypothesis One: Participants who score high on measures of anxiety, depression, and certain subcategories of the consciousness inventory, such as fear and sadness, will affect the REG in the unintended direction. It was expected that, for the participants in the experimental group, as a group, the REG would deviate in the unintended direction. Since this hypothesis is unidirectional, a one-tailed test was used. The one-tailed single sample t-test demonstrated that the experimental group significantly deviated the REG from the expected value of zero,  $t(26) = -1.718$  ( $p = .049$ , one-tailed, Cohen's  $d = .33$ ).

Although the primary hypothesis was supported, participants in the control group and comparison group also deviated the REG in the unintended direction. Analysis of Variance was used to compare the means between the experimental group with  $M = -.13$  ( $SD = .38$ ,  $n = 27$ ), control group with  $M = -.080$  ( $SD = .35$ ,  $n = 13$ ), and comparison group with  $M = -.15$  ( $SD = .31$ ,  $n = 10$ ). Results revealed there was no significant difference between the group means, as shown in Figure 1, with  $F(2,50) = .124$  ( $p = .844$ ). Using a two-tailed single sample t-test, participants in the sample as a whole significantly deviated the REG in the unintended direction, with  $t(49) = -2.37$  ( $p = .022$ ; Cohen's  $d = .36$ ).

In addition, two-tailed bivariate Pearson correlations were used to test whether correlations existed between GAS scores, PHQ-9 scores, PCI scores, and PEAR Classic scores. As a whole sample, no significant correlation was found between GAS scores and HILO scores with  $r(48) = -.075$  ( $p = .60$ , two-tailed) or PHQ-9 scores and HILO scores with  $r(48) = -.002$  ( $p = .99$ , two-

tailed). As a negative correlation between depression and PEAR Classic scores was the main hypothesis, regression analysis was also calculated with  $F(1, 48) = .000$  ( $p = .99$ , two-tailed) revealing that there was no relationship whatsoever, as shown in Figure 2. While there were no robust predictors of the criterion measure, there was a negative correlation between HILO scores and fear scores from the second PCI with  $r(44) = -.35$  ( $p = .02$ , two-tailed).

Hypothesis two: Participants who score low on other subcategories of the consciousness inventory, such as love and joy, will also affect the REG in the unintended direction. A significant correlation was initially found between the whole sample's HILO scores and body image with  $r(48) = -.30$  ( $p = .036$ , two-tailed). To verify this correlation, the sample was split into two random subgroups and a Pearson correlation was calculated for each group. While a statistically significant correlation was found for one of the subgroups, this did not carry over to the other subgroup. Furthermore, the correlation was not found for the post-PCI body image and HILO scores. Thus, the body image and HILO correlation was likely due to chance.

Hypothesis Three: There will be a positive correlation between strongly believing that influencing the REG is possible and actually affecting the REG. Two-tailed bivariate Pearson correlations were used to test whether correlations existed between a belief that oneself and a belief that others could deviate the REG and actual deviation of the REG during intentional trials. No significant correlations were found with  $r(48) = -.01$  ( $p = .95$ , two-tailed), and  $r(48) = -.038$  ( $p = .80$ , two-tailed) respectively.

Hypothesis Four: There will be a positive correlation between reported empathy and a deviation of the REG. A two-tailed bivariate Pearson correlation was used to test whether a correlation between empathy and HILO scores of the sample with  $r(48) = -.03$  ( $p = .84$ , two-tailed). No significant correlation was found.



Post Hoc Analyses: There was no correlation between the initial passive activity of the REG with the later deliberately intended performance given that there was no statistically significant correlation between participants' Field REG scores and HILO scores,  $r(46) = -.05$  ( $p = .73$ , two-tailed)

## **Discussion**

Despite the plethora of confounding variables associated with consciousness research, it was theorized that dysphoric emotions were a large enough contributor to DMI that a small effect size would still be produced. The main hypothesis was supported in that the average criterion measure was below zero for the experimental group, which initially suggested that chronic depression and anxiety is associated with deviations of the REG opposite to intention. However, there were no differences between the experimental group and the comparison groups so that the entire sample resulted in displacement opposite to intention. Furthermore, there were no direct correlations between depression or anxiety with HILO scores as would be expected if either of those dysphoric emotions were predictors of REG influence. Therefore, the present study cannot conclude that those pathological emotions were responsible for the results. Moreover, there were no other robust predictors of the criterion measure.

The easiest explanation for the results in this study is that psychopathological emotions do not result in the physical manifestation of events opposite to intention. However, the validity of the sample and measures used in the present study are discussed as possible confounding variables. Regardless of whether psychopathological emotions contributed to the results, some factor or factors caused the REG to significantly deviate in the unintended direction for the entire sample. Some alternative theories as to why all three groups significantly deviated the REG in the unintended direction include the experimenter effect and the theory of meaning fields.

*Validity of sample and measures*

As mentioned in Helmut Schmidt's study, using the appropriate sample is an important factor for producing robust and significant results (Schmidt, 1971). A study done at the PEAR laboratory found that 15% of the participants within their sample were largely responsible for the significant deviations in a REG (Dobyns, 2015). Furthermore, a meta-analysis of 499 studies found that certain individuals were more successful at repeatedly deviating a REG than other individuals (Lumsden-Cook, 2003). For future studies, it is suggested that an appropriate sample be found prior to testing any specific experimental questions. For example, the experimental group could include only participants who have already been successful in repeatedly deviating a REG.

Regarding the experimenters' use of appropriate measures to test the main hypothesis, it is possible that no correlation was found between the PHQ-9, GAS, and HILO scores because these inventories were measures of personality traits rather than of a participant's present emotional state. To investigate this distinction, sub-categories of the PCI were compared to participants' PHQ-9 scores and GAS scores. This was done because the PCI was used to measure a participant's subjective consciousness, including some aspects of emotional states. Participants' PHQ-9 scores and GAS scores significantly and positively correlated with stated feelings of anger, sadness and fear, using an alpha value of .01. Furthermore, rationality and volitional control significantly and negatively correlated with PHQ-9 and GAS scores, using an alpha value of .01. Because participants' emotional states matched their behavioral traits, this idea does not explain the absence of a significant correlation between depression, anxiety, and the direction in which the REG deviated.

Experimenters in this study also predicted that empathy would positively correlate with the ability to deviate the REG, but this hypothesis was not supported. Participants were asked to rate

themselves on being empathetic, using a 5-point Likert scale, so it is suggested that the measure used to rate empathy of participants might not have been accurate. Perhaps a correlation would have been found if a more extensive questionnaire regarding individuals' empathetic tendencies had been used.

### *Discussing Secondary Hypotheses*

While there were no robust predictors of the criterion measure, there was a positive correlation between participants HILO scores and reported fear on the PCI given after interacting with the REG. Perhaps seeing direct feedback of an anomalous phenomenon increased levels of fear and created a limiting factor in a participant's ability to continuously engage in DMI or exercise control over the direction in which the REG deviated. It is also possible that the correlation was due to type one error.

Additionally, there was no correlation between the belief that the REG could be deviated, by oneself or another person, and actually being able to deviate it. In other words, those who did not believe that DMI was possible were just as likely to deviate the REG. Mixed results have been reported in other studies. For example, Sargent et al. conducted a study on extrasensory perception with 16 experienced participants and 16 naive participants as a control group; the experienced group produced significant results while the control group did not (Sargent, et al., 1982). Since extrasensory perception and DMI are both nonlocal aspects of consciousness, the same principle may apply to the present study. In the present study, it should be noted that the comparison group, comprised of individuals familiar with and interested in anomalous phenomena, more significantly deviated the REG in the unintended direction than people in the experimental and control group. Those in the experimental and control groups were likely novel learners about anomalous events related to consciousness. While the extent to which participants deviated the REG may have been

related to exposure to such phenomena, the direction the REG deviated in may be a result of experimenters' expectations. However, other studies provide evidence that belief in anomalous phenomena is not related to the ability to engage in DMI (Bengston & Krinsley, 2000).

In the present study, the comparison group deviated the REG more than the experimental group who deviated the REG more than the control group, although, as noted, there were no statistically significant differences in HILO scores for the three groups. This is of interest because decline effects have been reported in previous REG studies (Broderick & Goertzel, 2015; Radin, 2019). Data were collected from the comparison group before data collection started for the experimental group. Furthermore, data collection for the control group began when data collection for the experimental group was halfway done. While this trend appears to be a reverse decline effect, the present study does not have enough data points to compare over time to draw a meaningful conclusion.

### ***Theories about Results***

With all REG studies, the experimenter effect is an important concern because it is not yet possible to disentangle the effects of the participant's mental influence on the REG from the mental influence of the experimenters. The data from previous research reveal a clear possibility that an experimenter could cause the directional effect rather than the participants (Alvarez, 2018). The experimenters have expectations, in the form of hypotheses, that they consciously or non-consciously intend on supporting. Furthermore, the amount of energy that goes into affirming one's hypothesis may inadvertently have a stronger impact on the outcome of the experiment than the independent variables under investigation. This suggests that an experimenter's expectations play a role in the formation of results regarding the investigation. Fernando Alvarez's study on planarians provided good empirical support for the experimenter effect.

Another variable that may factor into the present study's results is the idea that intensity of emotion is responsible for significantly deviating the REG, while the ability to maintain emotional stability gives an operator, or experimenter, control over the direction in which the REG deviates. Schwartz (2018) says that anyone can engage in DMI by attaining and sustaining a meditative state in which that individual can resonate with the matter they intend to alter. A REG study comparing meditators with non-meditators found that the meditators significantly deviated the REG in the intended direction while non-meditators produced non-significant results (Lumsden-Cook, 2003). While the type of meditation used was unspecified, Stephan Schwartz reports that individuals who practice intentioned focused awareness as a meditative practice are more successful at nonlocal tasks (Schwartz, 2018). In relation to the present study, one experimenter is a psychiatrist and another is a psychologist who studies consciousness, and both are highly devoted to meditative practices and emotional well-being. Thus, the combination of heightened emotions under controlled conditions (i.e., meditation) and the mutual expectation of the REG deviating in the unintended direction may have nonlocally contributed to the strength and direction of the sample's overall HILO score outcome. However, this is speculative and the results could be interpreted in a variety of ways.

Moreover, Imants Barušs' theory of meaning fields may offer some insight about the results found in this study. Broadly speaking, meaning fields are nonlocal fields that have the capacity for denotative meaning, interact with human meanings, and structure events within physical manifestation (Barušs, 2018, 2019, 2021). This raises the question whether there is a meaning field for this experiment so that an overflow of conscious output, through DMI, goes beyond affecting an event that a person is intentionally or unintentionally focused on. An example of this can be seen in a series of studies using DMI as a treatment intervention for mice with

mammary adenocarcinoma, a cancer that has a fatality rate of 100% in mice. Researchers used a technique called “laying on of hands” to heal the treatment group and 91% of this group went into remission. Furthermore, 87.5% of the control mice within the same facility went into remission but 0% in a second control group located in another city went into remission (Bengston & Krinsley, 2000). This is similar to how all three groups in the present study deviated the REG in the unintended direction, and suggests that conceptual proximity creates boundaries that can lead to an overflow of DMI from the experimental group to the control group within the same meaning field.

### ***Importance of research***

Continuing to investigate DMI has the potential to create immense opportunities for improving health and well-being. Those opportunities could include facilitating positive events or learning the importance of attending to and altering negative emotions to avoid negative events. Lumsden-Cook (2003) suggests that the dissipation of negative emotions can lead to DMI. A study on psychoneuroimmunology found a significant correlation between participants who visualized the replication of white blood cells (WBCs) within their body and an actual increase in WBC count after the imagery exercise. The study concluded that the results were caused by a decline in stress as a consequence of performing the mental imagery exercise (Donaldson, 2000). A reduction in stress levels facilitates the body’s ability to increase the functioning of the immune system (Donaldson, 2000). While this is a logical explanation, studies on DMI suggest that consciousness is also involved in the healing process, as seen in studies where DMI is used to treat mice with cancer (Bengston & Krinsley, 2000). Since one’s mental state is the result of neurochemistry, and since neurochemistry, or any cellular functioning within the body, can be affected by the result of an individual’s intention to alter their mental state, then that suggests that consciousness provides

the link between one's mental state and physical healing. Because consciousness has non-physical aspects but can alter physical matter, the connection between an individual's psychological system on their neurological, and immunological systems might not result exclusively from ordinary physical processes.

### *Conclusion*

Because the mechanism behind DMI is unknown, there is a multitude of possible explanations that may account for the results in this study. It becomes hard to deduce one explanation with absolute certainty as some of the confounding variables are also intrinsically anomalous. The results of this study have left us with more questions than answers but continuing to conduct REG research could help tease apart the factors responsible for DMI. While there was no significant difference between the three groups' numerical deviations of HILO scores, what can be said is that the comparison group had the largest numerical deviation in the unintended direction. One factor that may have contributed to this outcome was the group's familiarity and interest in DMI studies. It should also be noted that based on the wide range of PHQ-9 and GAS inventory scores within the comparison group, it is likely that some participants had depression and anxiety and others did not. Moreover, the experimental group, where all participants were diagnosed with depression with or without comorbid anxiety, deviated the REG in the unintended direction to a greater extent numerically than the control group. Because both the comparison and experimental groups included at least a portion of individuals with depression and anxiety, and numerically deviated more than the control group, perhaps a selected sample of individuals who are familiar with DMI studies, already successful at significantly deviating the REG, and score high on PHQ-9 and GAS inventories would produce more robust results. If these effects are not

due to chance, then this research has serious implications for the effect depression has on a person's physical health and offers a potential means to help alleviate unintended manifestations.

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