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Extrasensory Perception, Dissociation, and Motor Automatisms

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Extended Abstract

The general hypothesis tested in the experiment is that psi is facilitated by dissociated states of consciousness. It was further assumed that the most dissociated form of psi expression is motor automatisms, such as automatic writing and dowsing, because conscious cognitive processes, both thought and imagery, are minimized.

The experiment is a follow-up of an earlier experiment by the author (Palmer, 2011) in which participants were asked to identify randomly selected homophones using a variation of the Ouija Board. The main significant finding was strong psi-hitting among a subsample that reported experiencing the hand being moved by an outside force from 1 to 40% of the time. One purpose of the present experiment was to interview participants to see if the experiences of those who had the experience less than 40% differed qualitatively from the experiences of those who had it more than 40%. A second major objective was to introduce an additional procedure to facilitate a dissociated state. A third major objective was to compare success with the right and left hand.

The sample consisted of 80 volunteers, most of whom had expressed interest in participating in research at the Rhine Research Institute (RRC) through its website. Prior to the session, they were asked to complete at home, in addition to the RRC's Participant Information Form, Watson's Dissociative Processes Scale, which includes Obliviousness, Imagination, and Detachment subscales. The ESP task apparatus consisted of a computer writing tablet and pen. Pasted on the underside of a transparent sheet cover the writing area of the pad was a 4 x 4" square of white paper on which was printed a grid of 16 one-inch squares. Printed in each square was a number 1 to 4. The grid was divided into four quadrants with each of the four squares containing one and only one of the four numbers, as in the Sudoku game. This arrangement allows for three kinds of hits: square hits ($P = 1/16$), quadrant hits ($P = 1/4$), and number hits ($P = 1/4$). The dependent variable was prespecified as location hits, an unweighted composite of square and quadrant hits. For each 36-trial run, the Marsaglia algorithm was used to generate 36 target squares, with replacement, one for each of the 80 participants. Each participant completed one run.

For each trial, the participant was instructed to explore the surface of the grid with the pen and indicate their response by stopping for 1 sec. Prior to the formal task, participants were asked to practice the procedure until both they and the experimenter were satisfied that the procedure was second nature. The formal ESP task was preceded by a taped modification of Jacobsen's progressive relaxation exercise, frequently used in ESP ganzfeld experiments, followed by suggestions for success and a review of the task instructions. This led directly into the ESP task.

The 80 participants were randomly assigned to four cells in a 2x2 factorial design. The two independent variables were the hand used to move the pen (Hand) and the additional method to facilitate dissociation (Method). For one of these methods (eyes-closed), participants were instructed to keep their eyes closed and blank the mind as much as possible, as in some forms of meditation, while moving the pen. They were specifically discouraged from generating target-related mental imagery. In the second condition (quotations), the intent was to distract the conscious mind by having participants read humorous (in most sessions) quotations that appeared in succession on a computer screen at the same time they were moving the pen. The four conditions were thus eyes-closed/right- hand (ER), eyes-closed/left-hand (EL), quotations /right-hand (QR), and quotations /left-hand (QL).

An examination of the response sequences and corresponding reaction times indicated that on some trials many participants jiggled the pen, causing registration of an unintended response. In the quotation conditions, the screen flashed every time a response was recorded so participants could adjust their responding accordingly. No such cues were available in the eyes-closed conditions. Examining individual record sheets trial by trial, I developed guidelines for determining when a response should be discarded. This led to the creation of new response sequences, which led to a reduced number of trials were altered. Because I viewed only responses and reaction times, I had no information about whether a trial was a hit, so the above decisions were unbiased. Hit scores were markedly different for the participants requiring the adjustment, especially in the eyes-closed conditions. I also developed criteria for eliminating participants from the eyes-closed conditions, because the jiggling problem was so pervasive that I questioned that the participant was performing the task competently.

I decided to compare the two sets of scores by applying them as dependent variables in the 2x2 design described above. The analysis with the original scores was called Model 1 and that with the revised scores Model 2. Five left-handed participants were removed from all analyses with Hand as an independent variable. Both models yielded a significant overall R^2, but R^2 was higher for Model 2. By prior decision, all subsequent analyses used the Model 2 response sequences. In the ANOVA, significant main effects for Method and Hand were superseded by a significant Method by Hand interaction. The nature of the interaction was significant psi-hitting in the combined ER, EL, and QR conditions and significant psi-missing in the QL condition. For subsequent analyses, the ER, EL, and QR conditions were merged to form the EQR condition. The only hypothesis tested by the ANOVA was more location hits with the left hand. This hypothesis was refuted. A separate ANOVA for number hits revealed no significant effects, although the mean for location hits was lowest in the QL condition.

The post-test interviews revealed no meaningful qualitative differences in the experience of an outside force between those who had the experience more or less than 40% of the time. Moreover, a substantially higher proportion of participants in Palmer (2011) reported experiencing an outside force than in the present study. This excess could be interpreted as some low scorers in Palmer (2011) improperly claiming the outside force experience, perhaps due to demand characteristics. The effect would be to lower the mean in the >40% condition. In any event, these two observations led me prior to data analysis to modify (and simplify) the outside-force/ESP hypothesis to simply state that those who experienced an outside force anytime during the study would score more location hits than those who did not. The hypothesis was suggestively confirmed. In the EQR condition, the experiencers scored significantly above chance and significantly higher than the non-experiencers. One would not expect this trend to hold in the QL condition because of the overall psi-missing.

The prediction that high scores on DPS Obliviousness would respond affirmatively to the outside force question was not supported by the data. The prediction was also not supported for DPS Imagination, but it was strongly supported for DPS Detachment. This discrepancy is particularly striking because the three DPS subscales are intercorrelated in the .4 to .6 range. Detachment makes sense as a predictor of outside force if one looks at the items comprising this subscale, which often reflect disconnection from the body, as in an OBE. This seems rather akin to the separation of the hand from the rest of the body in the present experiment, as if the hand were having an OBE.

Location hits were predicted to be significantly and positively related to DPS Obliviousness. This subscale was chosen because Watson described it as "the tendency to engage in mindless and automatic behaviors…." This hypothesis was not supported by the data. On the other hand, location hits correlated significantly with DPS Imagination and suggestively with DPS Detachment.

Finally, DPS Imagination and Detachment correlated significantly with number hits across all conditions.

This amalgamation of data was interpreted as reflecting the operation of two distinct processes mediating different trials in the ESP run: (a) a (primarily) motor process and (b) a (purely) cognition process. Motor hits were restricted to the EQR condition. They were predicted by the component of DPS Detachment that was not associated with DPS Imagination (which reflects obviously cognitive processes such as imagery) and they were associated with the perception of the hand as guided by an outside force. The cognition process operated across all conditions. It was predicted by the variance shared by DPS Imagination and DPS Detachment, with Imagination primary. The fact that only this portion of the DPS predicted number hits makes sense in light of the fact that number as such is the one target type for which motor information is useless. It is easy to see cognitive processes helping to guide location hits but much less easy to see motor processes guiding number hits. That is why number hits were excluded from the operational definition of location hits.

The psi-missing in the QL condition was interpreted as a response to the frustration engendered by the difficulty of the task in that condition compared to the EQR condition. Simultaneously performing the ESP task is more demanding when having to also read quotations rather than just blanking the mind, especially when having to perform the ESP task with the non-dominant hand. However, this cannot be the whole story, primarily because of the strong *positive* correlations between the DPS subscales and number hits in the QL condition. One would normally expect this correlation to be negative, because the psi presumably predicted by the predictor is psi-missing. Again, one can appeal to the model of different processes operating on different trials. Most of the psi-mediated trials were affected in the negative direction by task frustration for both the motor and cognition processes. However, participants with strong cognitive abilities were able to partially cancel this out by using the cognition process to generate hits, but only for number targets.

Possibilities for the intrusion of investigator psi, particularly in the adjustments on participant responses and exclusion of participants in the formulation of Model 2, are discussed. It was concluded that such intrusion of investigator psi was unlikely to have a major impact on the results.

To conclude, despite the rather dismal showing in confirmation of specific hypotheses, I was impressed, and frankly surprised, by the large number of significant and mostly sensible results I obtained in this study, particularly in light of the difficulties in identifying the proper response sequences. Overall, the results were stronger than in the original Palmer (2011) study. These results convince me that this research paradigm has promise, and I encourage other researchers to explore it. For my part, I hope to follow up by training the best individual participants in the study to develop proficiency in the procedure through extensive practice with feedback. The intent would be to increase the reliability of their ESP scoring.

Introduction

The general hypothesis tested in the experiment is that psi is facilitated by dissociated states of consciousness. Underlying this hypothesis is the more basic premise that the relative absence of overt manifestations of psi results not from the lack of psi information in the unconscious mind, but rather by the awareness of this information being blocked by psychological defence mechanisms. Evidence for this latter proposition is provided by the repeatedly demonstrated negative relationship between scores on various ESP tests and psychological defence mechanisms as measured by the Defence Mechanism Test (Haraldsson & Houtkooper, 1994). One vehicle by which these defence mechanisms might be circumvented is a dissociated state of consciousness, as exemplified by Ernest Hilgard's "hidden observer," which under hypnosis can recall mentation that is inaccessible to normal waking consciousness.

The widespread use of the term "dissociation" in psychology began with Pierre Janet, who applied this concept to the understanding of mental illness, particularly hysteria. The application of the concept of dissociation to psychic phenomena, on the other hand, can best be traced back to F. W. H. Myers, even though he did not use this term much himself. However, dissociation is clearly what he had in mind when he introduced the notion of the secondary self, which can function independently of the primarily personality or supraliminal consciousness. Myers is noteworthy and different from most of his contemporaries in that he was interested in dissociative processes primarily as they manifested in normal individuals.

The secondary self often manifested through what Myers called psychological "automatisms," which can be either sensory or motor. Myers included under motor automatisms automatic writing, automatic speaking, automatic drawing, and use of the pendulum. Sensory automatisms included apparitions, hallucinations, dreams, anesthesias, automatically manifested creative productions (such as literary or musical compositions), most hypnotic phenomena, and savant phenomena. I consider motor automatisms to represent a purer form of dissociation than sensory automatisms, because motor automatisms in their unadulterated form to do not involve any conscious cognitions.

Dissociative manifestations of psi can be traced back to the origins of hypnotism, which has its roots in Mesmerism. For example, it was reported that persons in a state of "magnetic rapport" could read the thoughts of the "magnetizer" from a distance. In modern times, both the hypnotic state and hypnotic susceptibility have been shown to correlate positively with scores on various tests of ESP. Although some of these successful results may be due to demand characteristics resulting from the use of within-subject experimental designs, such demand characteristics can often be viewed as suggestions, which, of course, are a component of most hypnotic inductions. Thus, there is some question whether these demand characteristics should be viewed as artifact or essence with respect to hypnosis.

Motor Automatisms and Psi

Because the experiment specifically involved motor automatisms (movement of a pointer over a target grid), I limit the remainder of this Introduction to a review of studies that provided for the manifestation of motor automatisms. I use the term "provided for" intentionally, because it is not necessarily the case that all, or even some, of the responses in these studies were automatic. Interest in automatisms in relation to psi has waned in recent decades. Most of the relevant research is old, and much of this old research is not well controlled.

Automatic writing. True motor automatisms were most likely to have manifested in the automatic writings of famous mediums of the late 19th and early 20th Century, especially Leonore Piper and Hélène Smith. The automatic writing of Piper, in particular, was thought to have demonstrated ESP, although the source of the acquired information is a topic of ongoing debate.

During the same period, two sets of experiments were conducted with the purpose of demonstrating automatic writing in normal individuals. While simultaneously reading prose, participants wrote text that had been previously memorized or in response to dictation (e.g., Solomons & Stein, 1896). The research adopted the phenomenological or introspective methodology characteristic of that period in psychology and thus focused on an examination of the subjective experiences of the participants while engaged in the automatic writing. No evidence of psi was sought or reported. This is also true in a much later series of follow-up experiments that were evaluated more objectively (e.g., Spelke, Hirst, & Neisser, 1976). One of their findings was that when meaningful material was introduced without warning to participants trained to respond to the dictation of random words, the participants were unable to recognize the meaningfulness of the new stimuli.

Forced-choice ESP experiments. The first laboratory experiment that attempted to demonstrate ESP through motor automatisms was reported by Brugmans (tr. Murphy, 1961), who tested a purportedly gifted male university student named Van Damm. The participant was seated in front of a grid consisting of eight columns and six rows. Each square in the grid referred to a letter/number combination (e.g., A5), one of which was randomly selected as the target for each trial. Van Damm's task was to point to the square on the grid corresponding to the selected target for the trial. He was blindfolded and surrounded by a cubicle, which included a curtain under which he thrust his arm to reach the board; thus he could not see the grid. The three experimenters, who were located either in the same room or in separate room located above the test room and allowing sight of the grid, attempted to guide Van Damm's hand to the target square. There were an astounding 60 correct guesses in the 187 trials (31%). Results were slightly better when the experimenters were in a different room and significantly better when Van Damm had consumed alcohol prior to the test. In addition to the possibility of auditory cues from the experimenters, the methodology can be criticized for an inadequate method of random target selection and apparently non-blind scoring of the results.

In the early days of J. B. Rhine's Duke Parapsychology Laboratory, motor automatisms were provided for in card-guessing experiments that involved matching procedures. In these clairvoyance experiments, five "key cards" were laid out in a row in front of the participant, who held a separate, shuffled pack of ESP cards face down. Participants then placed each card, still face down, opposite the key card they thought had the identical symbol on its face. If the key cards were face-up, the procedure was called *open matching* (OM); if they were face down, it was called *blind matching* (BM). There also were more tightly controlled matching tests in which the experimenter and the participant were separated by a screen, with the key cards hung on the participant's side of the screen. The participant tapped the table directly below the chosen key card; the experimenter, who was holding the deck of cards, could see this action because of a slit cut in the bottom of the screen. He then placed the top card of the deck in a pile opposite the key card the participant indicated.

Significant results using all of these matching methods were found in several of these experiments, most consisting of many thousands of trials. The OM procedure was generally more successful than the BM procedure. The BM procedure is more conducive to automatisms because the key-card symbols are hidden, but it is also more susceptible to cheating or sensory-cue artifacts. On the other hand, the Pratt and Woodruff (1939) experiment, which used open matching with a screen, is considered to be one of the best controlled of all the early card-guessing experiments.

Eye fixations. Starting in the 1980s, I conducted a series of ESP experiments with the Perceptual ESP Test (PET), a procedure in which the responses are eye fixations. A square matrix consisting of multiple replications of four different symbols (letters or typewriter carets pointing in different directions) in quasi-randomly assigned locations is flashed on a screen for 150 msec. Participants choose as their response for each trial the symbol on which their eyes happen to fixate when the matrix flashes. When participants follow the instruction to just look straight ahead and make no attempt to focus on a particular location in the matrix, each individual symbol seems to have an equal likelihood of being picked. Thus, responses in this task are likely to be automatic in this sense.

Another feature of these experiments is that the PET was preceded by several subliminal presentations of pictures or words that were usually emotionally evocative. In the first and most successful of these experiments, the subliminal presentations of potentially threatening TAT-like pictures from the Defence Mechanism Test produced highly significant tight variance in the ESP scores (Palmer & Johnson, 1991). This tight variance effect was suggestively confirmed in an attempted replication.

Several subsequent PET experiments with more positive subliminal stimuli led to several significant post-hoc effects, none of which were replicated. When overall significant results were obtained in the experimental subliminal conditions, they were either psi-missing or tight variance. The fact that negative manifestations of psi continued with more positive subliminal stimuli suggests that the content of the stimuli was not responsible for the negativity. Perhaps the presentation of subliminal stimuli per se made the participants uncomfortable. Also the PET is probably difficult for participants to relate to as a psi task.

Ouija-board-type experiments. A popular vehicle for the expression of motor automatisms in contemporary Western society, although its roots can be traced to 19th century Spiritualism, is the Ouija board. Sargent (1977) reported two experimental series in which groups of volunteers played with a Ouija board in an informal atmosphere, mostly unaware that an ESP test was involved. The characters on the board (the 26 letters of the alphabet, the digits 0–9, "yes" and "no") had been arbitrarily designated as odd or even. The sequences of characters thereby chosen by the participants were compared to randomly generated sequences of binary digits. In both series, below-chance scoring was obtained when the sequences of characters from the board were "structured" (e.g., meaningful words) and above chance when they were unstructured, with the difference being statistically significant each time.

Seeking an ESP test related to motor automatisms that participants could relate to more easily than the PET, Palmer (2011) likewise decided to employ the Ouija board concept in a psi experiment. However, in view of the fact that use of the Ouija board for conjuring spirits has been shown to have adverse psychological effects in some cases, he decided to make the association to the Ouija board somewhat more distant. As part of this effort, the Ouija board was replaced by an alphabet board consisting of the 26 letters arrayed on the four outer sides of the board. To control for possible side preferences, the letters were distributed so that the average frequency of the words in the English language (estimated by their frequencies in the target pool of 100 English words) on each side of the board was approximately the same. The target words were one-syllable homographs divided into 20 sets of 5 each, the words within each set being matched for familiarity. The participants were instructed to repeatedly move a pointer or planchette (which was taken from the commercial Ouija board game but covered with black felt) randomly around the board until they felt the impulse to stop on a particular letter, at which time they were to record the letter on a notepad. They were given up to 30 minutes, during which time they could record multiple letters. In the meantime, a sender in another room on a different floor of the building was asked to send the target while listening to a pink noise tape with or without barely audible binaural beats superimposed on the noise.

At the end of the session, participants were shown the five words in the target set and asked to rate each word on a 0–20 scale based on its correspondence to letters they had gotten from the board, any mental imagery they had spontaneously experienced at any point during the session, and a composite of the two previous ratings, all weighted any way they wished. The composite ratings, converted to *z*-scores, were predefined as the main dependent variable. Prior to these ratings, participants completed a questionnaire asking for their experiences during the session. The question of primary interest to the researcher was the proportion of time during the session that participants felt their hand was being guided by an outside force (a measure of motor automatism). Examination of the distribution of these estimates prior to comparing them to the ESP ratings showed that they fell into three natural categories: 0%, 1–40%, and 41–100%. Surprisingly, the 11 of 40 participants in the 1–40% category demonstrated a very strong ESP effect ($p = 2.4 \times 10^{-5}$), whereas participants in the other groups averaged close to chance. I have no explanation for this puzzling finding, although I speculate that the subjective experiences of dissociation in the 1–40% group tended to differ qualitatively from those in the 41–100% group. Additional research is needed, of course, to address this speculation, and I explored this in the current experiment.

Trait Measures of Dissociation

If responses in an ESP test that provide for motor automatisms are mediated by dissociative processes, one should expect that participants with dissociative tendencies should score better on such tests than those lacking such tendencies. Thus, one should expect a positive relationship between scores on this type of ESP test and appropriate trait measures of dissociation.

Testing this hypothesis is complicated by the fact that dissociation is a particularly diffuse and murky concept in psychology, and some aspects of it have little or nothing to do with motor automatisms or, for that matter, even divided consciousness. Psychologists interested in dissociation are aware of the problem, and in recent years attempts have been made to provide some conceptual clarity. Several authors have introduced a distinction between two broad classes of dissociative events (e.g., Holmes et al., 2005), and Holmes et al. (2005) reviewed studies that provide empirical support for this dichotomy. One category, customarily referred to as "detachment," is defined by Holmes et al. (2005) as "...an altered state of consciousness characterized by a sense of separation...from certain aspects of everyday experience, be it their body (as in out-of-body experiences), their sense of self (as in depersonalization), or the external world (as in derealization)" (p. 5). The second category, which is often referred to as "compartmentalization," is defined by Holmes et al. (2005) as "a deficit in the ability to control processes or actions that would normally be amenable to such control" (p. 7). Motor automatisms seem to fit more naturally into this second category.

Dissociative Experiences Scale. In practice, the crucial definitions of dissociation are the operational definitions represented by the tests used to measure it. Such tests have been designed primarily to serve as screening devices for pathological manifestations of dissociation, but they have sometimes been applied to nonclinical samples, which was the population of interest for the current project. By far the most commonly used of such tests is the Dissociative Experiences Scale (DES). A sophisticated factor analytic study of the DES in two large samples of college students by Stockdale, Gridley, Balogh, and Holtgraves (2002) found that the optimal solution comprised three factors, which the authors labelled as "Absorption," Amnesia," and "Depersonalization." Comparable classifications have been found in several less definitive studies using both clinical and nonclinical samples.

How do these three components of the DES rate as measures of tendencies toward motor automatisms? Absorption may indeed be a precursor of many dissociative experiences, as has been noted with respect to out-of-body experiences. However, given its definition as a focus of primary waking consciousness on a particular set of thoughts or perceptions, it seems to be the virtual antithesis of any meaningful concept of dissociation, and it is not represented in the dichotomous classification scheme discussed above. Depersonalization clearly represents the detachment category, but as noted above, this is the less relevant of the two categories of dissociation to motor automatisms. This leaves amnesia as the representative of the compartmentalization category, and it is an unfortunate one for present purposes. Although in cases of divided consciousness the primary consciousness is often amnesic with respect to the secondary consciousness (and sometimes vice-versa), amnesia does not necessarily imply the existence or manifestation of a second consciousness, as would, for example, the exhibition of motor automatisms. Of course, this problem simply reflects the (surprising) fact that direct manifestations of a secondary consciousness are simply not addressed well enough in the DES to define one of its factors.

Dissociative Processes Scale. A somewhat better choice for the present experiment is the Dissociative Processes Scale (DPS; Watson, 2003). The DPS also has three factors, comparable to those of the DES: "Obliviousness" for DES "Amnesia," "Detachment" for DES "Depersonalization," and "Imagination" for DES "Absorption." Watson (2003) defines obliviousness, which represents the compartmentalization component of dissociation, as "the tendency to engage in mindless and automatic behaviors and to enter into naturally occurring trance states" (p. 300). This seems more relevant to motor automatisms than amnesia does. Although many of the items on the DPS Obliviousness subscale do reflect amnesia or forgetfulness, the forgetfulness is generally of very recent, trivial events, whereas the Amnesia subscale items on the DES focus more on important and less recent events. As the title of the Obliviousness subscale suggests, its items seem to capture "doing things without thinking" more than classic amnesia. Correlations between DPS Obliviousness and DES Amnesia have not been reported to my knowledge, but the overall DPS and DES correlated .58 and .61 in two large samples of college students (Watson, 2001).

Another advantage of the DPS for present purposes is that "it was explicitly designed to assess normal-range individual differences in dissociative tendencies, rather than pathological forms of dissociation" (Watson, 2003, p. 299). This intention is reflected in the normative values for college students of the DPS Obliviousness subscale as compared to the DES Amnesia subscale. The mean item score is 2.8 on the 5-point DPS Obliviousness subscale (Watson, 2003), compared to 8.0 on the 100-point DES Amnesia subscale (Stockdale et al., 2002). Thus, the extreme skewness of the DES with nonclinical samples is expected to be less severe with the DPS.

Hypnotic susceptibility scales. A potentially good predictor of dissociative responding in an ESP experiment providing for motor automatisms is hypnotic susceptibility. As noted above, scales that measure hypnotic susceptibility typically include suggestions for motor automatisms. However, in a sense these measures are too good for the current experiment, because participants are asked to actually perform a motor automatism in response to a hypnotic suggestion. Because such movements are similar to the hand movements in the ESP task, success or failure in responding involuntarily to the arm-raising suggestions prior to the ESP test could influence participants' performance in the latter by, for example, affecting their confidence. Conversely, if the hypnotic susceptibility task is given after the ESP test, performance on the ESP test could influence performance on the hypnosis task. I wanted a task that *predicts* ESP performance but does not *interact* with it; therefore, a hypnotic susceptibility scale was not used in the current experiment.

Hemisphericity, Response Hand, and Psi

As early as the 19th century, F. W. H. Myers suggested that automatisms are primarily a function of the right hemisphere, and that they might more readily emerge when the left hemisphere is damaged, inhibited, or otherwise prevented from functioning fully. Modern research on the different primary functions of the two cerebral hemispheres likewise suggests that the nonlinear cognitive processes that seem to underlie motor automatisms are most characteristic of the right hemisphere. Two distinct kinds of procedures intended to neutralize left hemisphere functioning, although not labelled as such at the time, were characteristic of the early research on automatic writing discussed above. The first of these procedures was for the participant to enter an altered state of consciousness or trance state, exemplified primarily by research with mediums. The second, represented by laboratory experiments of automatic writing in normal participants, was to occupy the left hemisphere with an irrelevant distractor task such as reading (e.g., Solomons & Stein, 1896). Both of these principles were incorporated in the present experiment.

An altered state induction and a distractor task may seem to operate at cross-purposes in the current experiment, in that the former is intended to reduce cognitive arousal and the latter is intended to increase it. However, that is not the case if one accepts the premise on which the experiment is based, namely active dissociation. The altered state induction would be expected to affect both right-hemisphere and left-hemisphere processing. The distractor task would be expected to cancel out the effect of the induction for left-hemisphere processes, but, assuming dissociation, it would have no effect on the right-hemisphere processes that are hypothesized to govern the motor automatisms expected to mediate ESP. Indeed, most parapsychologists consider psi to most likely be a primarily right-hemisphere process.

In the context of motor automatisms, this focus on the right hemisphere raises the question of whether motor automatisms are more likely to be vehicles of psi if they are performed by the left hand. Spitzer et al. (2004) found that transcranial hemispheric stimulation produced lower excitability in the left hemisphere than in the right hemisphere in students who scored high on the DES. There was no difference for the low DES scorers. Also, transcallosal conduction times inferred from EMG recordings were faster for the high dissociative students. The authors interpreted their findings as suggesting that left-hemisphere functioning might actually be superior to right-hemisphere functioning in high dissociators, with the right hemisphere perhaps exhibiting a "lack of integration" (Spitzer et al. 2004, p. 167). However, it is possible that this "deficit" in the right hemisphere is what allows psi to emerge.

Of more direct relevance to motor automatisms are psychological studies involving hand movements. Hand reaction times have been found to be faster when light flashes or numerical stimuli are presented to the ipsilateral rather than to the contralateral visual field, a finding which is attributed to the extra time required to traverse the corpus callosum in the contralateral case. However, speed of response does not necessarily translate into accuracy of response. A more relevant study was reported by Benton, Varney, and Hamsher (1978), who asked university students to match the directional orientation of stainless steel rods mounted on wooden blocks to other rods with diverse orientations in a multiple-choice response array. The participants could not see the rods, so correct matching could be accomplished only on the basis of touch. There were significantly more correct responses when the left hand was used for the task compared to the right hand, suggesting right-hemisphere mediation of the process.

In the 1970's there were a few ESP experiments in which the guesses were made in response to tactile stimuli. For whatever reason, which hand made the responses often had a significant influence on the results. Broughton (1976) asked participants on each trial to lift one of five differently shaped wooden objects. For half of the participants, the left hemisphere was occupied with a verbal task. In general, ESP results were, as predicted, best when participants made their responses with the left hand while engaged in the distracting task. In a second series of experiments, Broughton tested whether reaction times to a tone also being transmitted by a sender would be faster if the response to the tone was made with the left hand than with the right. Again this was the case, and again only when the participant was engaged in a distracting task. On the other hand, Maher and Schmeidler (1977) had participants, while engaged in a distracting task, draw from a bag 1 of 25 tactilely identical cubes that encased either a word or picture. Significant ESP performance was found only when a "verbal" type of discrimination response was made by the right hand while the left hand was engaged in a pattern-tracing (right-hemisphere) task. In contrast to Broughton's findings, these results suggest mediation by the left hemisphere. Each author subsequently criticized the appropriateness of the procedure used by the other for testing hemisphericity and psi. As the targets were tactilely discriminable in the Broughton (1976) experiments but not in the Maher and Schmeidler (1977) experiments, the mechanisms mediating the responses must have been fundamentally different in the two studies, so it is perhaps not too surprising that the results were different.

In the current experiment, I revisited this issue by manipulating the hand that participants use to make their ESP responses. Both theoretical considerations and the brunt of thc psychological and parapsychological evidence suggest that psi is more likely to manifest when responses are made with the left hand (right-hemisphere mediation) than with the right hand.

Hypotheses

Hypothesis 1: Performance on an ESP test providing for motor automatisms will be positively and significantly related to participants' tendencies toward dissociation as measured by the Obliviousness subscale of the Dissociative Processes Scale (DPS).

Hypothesis 2: Among right-handed participants, performance on an ESP test providing for motor automatisms will be significantly better if the ESP responses are made with the left hand than with the right hand.

Hypothesis 3: Performance on an ESP test providing for motor automatisms will be significantly better for participants who have the experience that the associated hand is being moved by an outside force from 1 to 40% of the time during the test than for other participants.

Hypothesis 4: Performance on an ESP test providing for motor automatisms will be significantly better in participants who are successful in keeping attention focused on the distraction task (and not on the ESP task) than for other participants.

In addition, the following secondary, psychological hypotheses were tested:

Hypothesis 5: Dissociative tendencies as measured by the Obliviousness subscale of the DPS will be significantly greater in participants who feel their hand was being moved by an outside force 1 to 40% of the time during the ESP test than in other participants.

Hypothesis 6: Dissociative tendencies as measured by the Obliviousness subscale of the DPS will be significantly higher in participants who claim success in keeping their attention focused on a distraction task during the ESP task than in other participants.

Method

Participants

Eighty mentally healthy adult volunteers were recruited to serve as participants. An announcement was sent out to the RRC mailing list of more than 3,000 persons who had contacted the RRC in the past, but almost all the respondents were from the local area. The letter indicated that we were especially interested in testing people who found the rationale behind the experiment congenial. The letter is reproduced in Appendix A. Participants were contacted, usually by email but occasionally by phone, in the order I received their responses. An attempt was then made to arrange a convenient time for the test session. Once a time had been established, I emailed them the two questionnaires described below. They either returned these to me by email or brought them along to the session.

Questionnaires and Measures

Participant Information Form (PIF). Some version of the PIF is routinely given to participants in experiments at the RRC. In addition to basic demographic information, the PIF asks about such things as dream recall, belief in psi, practice of a mental or physical discipline (e.g., meditation), artistic pursuits, and certain personality characteristics. For this experiment, it included a question about which hand the participant uses for writing, as this seems to be the most relevant measure of handedness to the ESP task. Finally, it includes screening questions about mental health and any treatment for mental illness.

Dissociative Processes Scale (DPS). The DPS consists of 33 items (Watson, 2003). Responses are made on a 5-point scale from *strongly agree* to *strongly disagree*. Chronbach's alpha was .93 at original testing and .94 at retest. The scale consists of three factorially derived subscales: Obliviousness (14 items), Detachment (6 items), and Imagination (7 items). The other six items are presumably buffers. Cronbach alphas for the subscales range from .85 to .89. The DPS is reproduced in Appendix B.

Semi-structured interview. Following the test session, the experimenter asked the participants a series of questions concerning their experience during the session. The questions were presented in a semi-structured interview format, which allowed me to better understand the participant's experiences and to detect any misunderstandings of the questions by providing for follow-up questions, such as requests for concrete examples of relevant experiential elements. The most important question was taken directly from Palmer's (2001) alphabet board experiment: "Did you have the impression at any time during the session that the pen was being guided by an outside force? (yes; no). If yes, about what percentage of the movements were caused in this manner? (1–20%; 21–40%; 41–60%; 61–80%; 81–100%)." The complete sets of questions that I read to the participants (post-test questionnaire) are presented in Appendix C. The two questionnaires differed slightly depending on the experimental condition to which the participant was assigned (see below).

The ESP Task

The ESP task required three pieces of "equipment": a Dell GX240 desktop computer and monitor, a computer writing tablet (Addesso Cyber Tablet 1200), and a pen that came with the tablet. The basic idea is that participants move the pen over the surface of the tablet and stop at a particular location to register their "guess."

Target Board. The tablet is 13.5" x 16.5" and has a writing area of 9" x 12". The writing area is covered by a sheet of flexible transparent plastic attached to the back side of the writing area. A 4" square piece of writing paper was taped to the underside of the plastic cover so as to cover the middle of the writing area. This target area will be referred to hereafter as the grid. Three strips of soft wood (5 cm. high) were attached to the outside of the plastic cover along the right, left, and back sides of the grid. The purpose was to keep the participant from moving the pen outside the target area. For the same purpose, a 1mm thick piece of picture-hanging tape was placed along the front side of target area. It was not as steep as the other barriers to allow the participant to reach the bottom of the grid with the pen without making it uncomfortably vertical. The tablet and grid are illustrated in Figure 1.

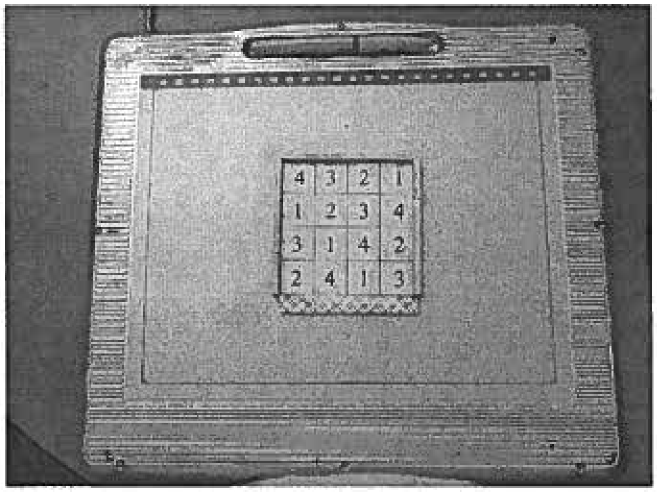

Figure 1. Target board with pen

The grid was formatted as a 4 x 4 square matrix consisting of 16 smaller squares, each 1" x 1". The matrix was divided into four quadrants, with each quadrant consisting of four squares. In each square was printed a single digit from 1 to 4, such that within each quadrant each number appeared once and only once. The numbers were distributed in a quasi-random fashion such that they were balanced with respect to their locations in the matrix. The format follows solutions to the Soduko game that frequently appears in newspapers, at least in the US.

For each trial, the participant explores the grid by moving the pen over the surface of the cover, in contact with it at all times. The participant makes a response by stopping the pen at the chosen location for 1 sec. The identity of the square under the tip of the pen is then sent to the computer as the participant's response for the trial.

Target sequences. The targets were multiple-aspect, in that each could identified by quadrant (P = 1/4), number (P = 1/4), and square (P = 1/16). The higher probability targets provided a distribution of scores suitable for group analyses, whereas the lower probability target allowed for the identification of participants who intermittently show high levels of accuracy.

At the beginning of the experiment, John Kruth, Executive Director of the RRC, generated 80 successive random sequences of 36 square targets (1 to 16). To do so, he used an algorithm developed by Marsaglia and Zaman (1987), which has been thoroughly tested for randomness. To avoid intuitive decisions, Kruth was instructed to use 1 and 2 as seed numbers. This sequence was emailed to the programmer, Daniel Ruszaj, who incorporated it as a file in the software package he was developing to create the ESP scores. This program, written in Java script, compared the targets with participant responses to calculate how many square, quadrant, and number hits each participant obtained. This procedure allowed the experimenter to remain blind to the targets throughout the experiment.

Distractor Tasks

The first of two methods used to facilitate a dissociated state was to have participants engage in another task at the same time as they were taking the ESP test. The purpose of these tasks was to occupy the participants' consciousness and direct it away from the ESP task. There were two such tasks.

Eyes-closed. In this condition, participants were asked to neutralize their primary consciousness by blanking the mind and waiting for an impulse to stop the hand movement and make a response. It was emphasized that this impulse should be a feeling in the hand, not a mental or cognitive image.

Quotations. In this condition, participants were asked to read a series of quotations on the computer screen while taking the ESP test.

A pool of 100 quotations was created from *Bartlett's Famous Quotations* (Bartlett, 2002). In the book, the quotations are arranged by the birth year of the author of the quote. I started at 1900 and worked forward. The list was long enough so that no participant would read any quote twice. A separate list of six quotations was created for the practice sessions. These quotes did recycle. The long list was randomized before testing began.

The 19th participant indicated during the post-test interview a marked dissociative feeling related to her hand movements after reading quotes she found humorous. This struck me, as the participant in one of the early 20th century automatic writing experiments mentioned that she felt the text she was reading as a distraction task had to be entertaining to be effective (Solomons & Stein, 1896). This participant's experience changed my mind about the best quotes to use to achieve the experimental objective. Because I was not keeping track of the ESP scores, precisely so I would not be biased by them if I wanted to make a methodological adjustment after the experiment began, I decided to immediately create a new pool of quotes taken from the *Dictionary of Modern Humorous Quotations* (Metcalf, 2009). I chose the ones that were most humorous to me. The same adjustments for length were made as with the original quotes, but overall the new quotes were shorter than the original ones. To compensate, I increased the number of quotes in the test list to 144. Some of them are sexual in nature (but not pornographic; they resemble jokes one finds on late-night television talk shows in the U.S.). Participants were given the opportunity to view instead the original quotes if they indicate that they might be offended by the humorous ones. No one requested the original quotes. Lists of humorous quotes were also created for the practice trials.

The quotes were presented on the computer screen one-at-a time. As it would be distracting to require the participant to press a button to make the next quote appear, I had the computer replace each quote with the next quote after a fixed number of seconds. The intent was for each quote to disappear as soon as the participant had finished reading it. I took two steps to achieve this. First, I tried to make all the quotes of approximately the same length. To accomplish this, I would often choose only some of the sentences from multi-sentence quotations and occasionally omitted trivial words within sentences. Second, before the test, I had participants time themselves reading a typical quote (not in the test list) using a stopwatch. I then set the duration of each quote to match that number. Participants were given the option to change this number after the practice session. Participants were told that if they finished a quote before it changed, they should begin rereading it. If, on the other hand, the quote changed before they finished reading it, they should not worry about it but just move on to the next quote.

Whenever an ESP response was registered, the screen briefly flashed. This single flash was intended to assure the participant that a response had registered, without distracting the participant from reading the quotes.

During the instruction period, participants were told that following the ESP test they would take a short quiz to measure how well they remembered the quotes they saw. The quiz was a recognition task in which they were shown 10 quotes that were presented during the ESP task and 10 unseen control quotes, all in random order. They had to indicate by a mouse click whether they thought the quotation was one of those they had read during the ESP task. The quiz was given immediately after the ESP task. It was used solely to motivate the participants.

Altered State Induction

The second method used to facilitate a dissociated state of consciousness during the ESP test was to induce a mild altered state of consciousness immediately before the ESP task. The induction consisted of an abbreviated form of the Jabobsen progressive relaxation technique. This induction is frequently given at the beginning of ESP ganzfeld tests, but it has been shown to enhance free-response ESP performance by itself. Progressive relaxation is particularly appropriate for a task that provides for motor automatisms, because it stresses tension and relaxation of the muscles, although it also includes suggestions for mental relaxation. In my experience it induces a trance-like state. Specifically, participants are invited to alternately tense and relax various muscle groups and to notice the contrast between the tension and the relaxation.

The relaxation suggestions were followed by a review of the instructions for the ESP task and suggestions that the participant would succeed in the task. The entire exercise was recorded on tape by the experimenter and played over speakers to the participants.

Design

The experimental design was a 2 x 2 factorial with Method (eyes-closed vs. quotations) and Hand (left vs. right) as the independent variables. Hand refers to whether participants were asked to hold the pen with the right or left hand during the ESP task. Twenty participants were randomly assigned to each of the four cells, which are abbreviated ER (eyes-closed, right hand), EL (eyes-closed, left-hand), QR (quotations, right hand), and QL (quotations, left hand). Condition assignments were made by Ruszaj, who performed a random permutation of the numbers 1-80, with 20 of the numbers coded as representing each of the four conditions. The list was then sent to me so that I could be informed immediately before a session which condition that participant should be in.

Lab Room Layout

The participant was seated in front of a table in a padded chair that could be tilted backwards and adjusted for height. In the left-hand conditions, the tablet was located to the left of the computer screen, whereas in the right hand condition these positions were reversed. Two small audio speakers were located at the back of the table facing the participant. I was seated to the left of the participant (when in the room), with the keyboard on the table in front of me. Before the ESP test, the participant was given the choice to have the room illuminated by the overhead lights or a small table lamp with a 40W bulb located at the far right end of the table.

Procedure

When participants arrived for the session, I first asked them to turn off their cell phone if they had one. I then collect the questionnaires if they brought them, specifically checking the mental illness items on the PIF to be sure the participant met the participation criterion. (Everyone did.) Next, I gave them a more detailed description of the procedure than was provided in the solicitation letter. I illustrated how to take the ESP task by moving the pen around the grid and stopping for 1 sec. In an effort to minimize response biases, I emphasized that they should explore the entire grid before making a selection. I also described the three methods of scoring (square, quadrant, and number) and told them that they would receive feedback of their scores at the end of the session. Finally, I described the distractor task (quotations or mind-blanking).

Next, I set up the practice session on the computer. After this, I had participants adjust the location and orientation of the tablet as well as the height of the adjustable chair for maximum comfort and ease in moving the pen around the grid. Participants in the quotation conditions then timed their quotation reading speed as described above. The practice session had two stages. In the first stage, I began by having participants look at the grid while moving the pen around. When I was comfortable they could do this easily, I asked them to continue with their eyes closed for a few more trials. To get them adjusted to how long they needed to stop the pen for a response to register, a beep sounded after the pen was motionless for 1 sec, the interval used for the formal experiment. In the second practice stage, participants practiced the procedure to be used in the formal experiment, which did not include the beeping sound. I asked them to continue practicing until they felt they could do the task correctly and effortlessly and I agreed. This practice was particularly important in the quotation conditions, where participants had to learn to make their ESP responses independent of where they were in the process of reading the quotations; the common tendency at the outset is to make the ESP response at the time they finish reading a quotation. Participants varied widely in how long they practiced, and the number of practice trials often exceeded the 36 trials in the formal experiment.

After the practice was completed, I set up the main experiment, asking participants in the quotation conditions if they wanted to change the length of time each quotation appeared on the screen. I told participants in the eyes-closed conditions that a beep would inform them when the 36 trials were done but that they would not hear a sound after each ESP response. I was not present during the formal experiment but seated in the adjacent room doing professional reading. I closed the door between this room and the test room as I left. Participants were instructed at the end of the ESP task (eyes-closed conditions) or the quotation recognition quiz (quotation conditions) to knock on the door to retrieve me.

When I returned, I immediately had participants fill out the post-test questionnaire, and I discussed their answers with them afterwards. I focused especially on their subjective experience while taking the ESP task. I then described the ESP feedback screen, which consisted of trial-by-trial scores, total scores, and number of hits needed for a statistically significant ESP score for all three scoring modalities (square, quadrant, and number). I told them that because I did not want to see the scores myself, after I left the room they could see their ESP scores (and quiz score, if applicable) by pressing the <enter> key on the computer keyboard. They should then press the <enter> key again to clear the screen. A paper tablet was available on which they could write down their ESP scores; they could take the sheet with them if they wished. After asking if they have any further questions about the experiment, I paid them $15 in cash and had them sign a receipt. Finally, I thanked them for their participation and left the room.

Pilot Testing

Eight pilot sessions were conducted with six individuals to determine if it was necessary or desirable to make refinements in the procedures and materials as described above. The participants were drawn from people closely associated with the RRC, and none were included in the formal experiment. By far the most important outcome of the pilot sessions was the decision to add the eyes-closed condition.

Data Analysis

Although there were three separate ESP scores, to obviate multiple analysis issues I decided to compute a single ESP *z*-score to test the hypotheses. I wanted a composite score but I wanted it to reflect the application of a motor automatism as opposed to a strictly cognitive mechanism. For that reason, I omitted the number scores from the conglomerate, treating them in effect as controls. Specifically, for each run, the two remaining component scores (quadrant and square) were combined to produce a single z-score, the computation of which is described in Results.

The statistical tests used to test the hypotheses included ANOVAs, *t* tests, chi-squares, and Pearson correlations. The need for nonparametric alternatives for the parametric tests was eliminated by applying normalization procedures to highly skewed distributions. The statistical analyses were performed using SPSS software.

Left-handed and ambidextrous participants were removed from analyses involving the Hand variable.

All *p*-values are two-tailed expect for tests of the outside-force/ESP relationship, which was considered a replication of Palmer (2011).

Results

ESP Scores

Performance errors is one of the hazards of asking participants to perform a task over which they are supposed to have minimal conscious control. In this case, the concern was mechanical errors in moving the pen around the tablet. To minimize these errors, participants were given extensive practice before the official task. I told them I wanted the task to be "second nature" so that they could perform it without devoting a lot of attention to it. The practice session did not stop until both the participant and I agreed that the goal had been achieved. However, I was not completely convinced this learning would completely carry over to the formal session. One reason is simply that it was the formal session; they were now trying to use psi to obtain a good score. The second reason is that they were presumably in a different state of consciousness as a result of the intervening relaxation exercise.

As I did not observe participants performing the formal task, I could only get information about possible errors by looking at the data, which I did not do until data collection had been completed. Useful information would be reaction times (the time from the end of trial t to beginning of trial t+1), so I had the computer record this information in milliseconds.

After the experiment, I printed out a sheet for each participant with two columns of data. The first column gave the 36 square responses for the run and the second column gave the corresponding reaction times. I noticed that for many participants some of the reaction times were quite low, as little as 750 ms. In most of these cases the response square was the same for this trial and the preceding trial; in almost all other cases the two response squares were adjacent. During the practice sessions, participants were encouraged to "explore the grid" before each response by moving the pen randomly around the tablet, so I expected the reaction times to be at least several seconds. On the other hand, my feedback during debriefing suggested that during the actual test participants would often go directly from one response to the next, which could be done quite quickly. But if that were going on, I would expect the response squares for the two trials to be nonadjacent much more frequently than they in fact were.

Instead, I concluded that most of these responses were inadvertent jiggling of the pen in the area of the first response (despite my efforts to warn participants to keep the pen still between trials). This would cause a response to register that was unintended by the participant. I had noticed this behavior during the early stages of the practice sessions, but by the time the session ended it had vanished. However, as noted above, there is reason to fear that it might have re-emerged during the formal task.

In the quotation conditions, the screen flashed after each response, so participants knew, consciously or unconsciously, that a trial registered and they could use this information, consciously or unconsciously, to correctly identify the proper target for the next trial by jumping one target ahead. However, this information was not available to participants in the eyes-closed conditions. I had considered continuing the beeps after each response in the eyes-closed conditions, which would have functioned like the flashes in the quotation conditions. I decided against this, partly because I was afraid the beeps would bring them out of the meditative state that I expected to be optimized in the eyes-closed conditions, but also because Mr. Ruszaj and I were unable to get the beeps to occur reliably.

I decided to make up a set of alternate response sequences that would take this bias into account. Specifically, I wanted to capture the response sequences the participants intended, not necessarily the one's they actually sent to the computer. To do so, I perused each sheet individually to detect trials on which the bias was likely to have occurred. Because the sheets did not include the target sequences, I could do this with no sensory information about hits, and thus I was not biased. I assumed that the quotation participants adjusted for the bias and the eyes-closed participants did not. Thus, for quotation participants, I simply removed the response, meaning that the suspect trial was declared missing. For eyes-closed participants, however, I needed to adopt a more complicated strategy. Starting at the top of the run, for each suspect trial, I removed the response for that trial and moved all the remaining responses up one space; for example, if Trial 6 was suspect, the response to Target 6 would now become the previous response to Target 7, the response to Target 7 would become the previous response to Target 8, and so forth. This left a number of missing trials at the end of the run (fewer scored trials) corresponding to the number of suspect trials, as the sequence of *registered* responses had been prematurely exhausted. This resulted in marked changes in the ESP scores in the eyes-closed condition but trivial changes in the quotation condition..

I also decided to remove from subsequent analyses the run scores of 9 participants who made a large number of such errors. All these participants were in the eyes-closed condition; 5 used the right hand and 4 used the left. I did this because I felt the chances were high that at least one of my guesses about whether a response was erroneous or not would be wrong, rendering the resulting sequence especially unlikely to be a valid representation of the participant's intent. (I fully expect that some of my guesses are incorrect even in the other cases, but I believe that overall the revised sequences are closer than the original sequences to participants' intended responses.) I also questioned whether the removed participants were performing the task competently overall. Changes were made to the response sequences of 40 of the remaining 71 participants (56%). Details about the criteria used for removing trials and participants are given in Appendix D.

To create for each participant hit totals adjusted for the number of trials, I applied the formula $Y = X*36/N$, where Y is the adjusted score, X is the original score, and N is the number of valid trials. I then converted all scores to z scores using the formula $(X-M)/SD$, where X is the number of hits, and M and SD are the mean and standard deviation of the distribution of hits for all valid participants. These z-scores were obtained for the square, quadrant, and number hits for all trials of all participants (Model 1) and for the corresponding hits obtained using the revised response sequences as described above (Model 2). The hit scores used to test the predictions were an unweighted combination of square and quadrant scores using the Stouffer formula $(z_s+z_q)/\text{SQR}(2)$, where z_s is the z-score for squares, z_q is the z-score for quadrants, and SQR(2) is the square root of 2. Hereafter, these scores will be referred to as "location hits," whereas the others will be referred to as "square hits," "quadrant hits," and "number hits."

Normalization. All the hit distributions with the exception of number hits were positively skewed due to the presence of outliers on the right tail. I am strongly opposed to removing outliers just because they are outliers, as doing so grossly violates the integrity of the distribution. To remove the excess skewness, I have developed a procedure for systematically moving the outliers toward the mean. Specifically, I find the largest distance between any two outliers and move this value and all more extreme values half this distance toward the mean. I repeat this process until the value of the skewness statistic is less than 2.0. This method was applied to all the skewed distributions and the resulting distributions were used for all analyses.

Model 1 vs. Model 2. Model 1 is represented by the original 36 trials of all 80 participants. This model is preferable if either of two assumptions is valid. The first assumption is that even in the eyes-closed conditions, participants were not set off course by their invalid responses, because either (a) they knew, presumably by psi, that their last registered response was not an intended response and adjusted their responses accordingly to match the real targets for all future trials, or (b) through some less mechanical means they simply "made things turn out right." The latter has been referred to as psi being "goal-oriented." Often cited as evidence for goal-orientation is an REG experiment by Schmidt in which results were equally strong regardless of the internal complexity of the REG (Schmidt & Pantas, 1972). Model 1 is also valid if the operational theories (Millar, 1978) were operative, because the Model 1 scores were the ones shown to the participants at the end of the session. Model 2 is preferable if participants in the eyes-closed condition were not aware that they had registered an unintended response and attempted to match their response to the target of the preceding trial. This is the more "common-sense" assumption.

I decided to choose between the models empirically. The first test one normally does in evaluating data is a global analysis (e.g., an ANOVA) that registers the effects of the manipulated independent variables, in this case, Method (eyes-closed vs. quotations) and Hand (right vs. left), on the dependent variable, Location Hits. I decided to do the same ANOVA for Model 1 and Model 2 and compare the results. If the total F for one or both models is significant, I would choose for subsequent analyses the model that is most significant (highest R^2). If neither model is significant, I would choose the model that yields the highest magnitude mean z-score (hitting or missing direction) across all participants in the model. If there is no psi in the data, it doesn't matter which model I choose; all I will get from either one are type-1 errors, and there is no reason to expect more of these from one than from the other. If there is psi in the data, then the best guess is that the model that shows the stronger results at this stage is the best fit to the data. The only hypothesis tested by these ANOVAs is the handedness hypothesis (H2). All the other hypotheses involve individual-difference measures as predictors and are not dependent on the ANOVA. These were to be tested using only one model, thus eliminating the multiple-analysis problem insofar as it relates to the dependent variable.

ANOVAs

The ANOVAS represent a 2 x 2 factorial, between-subjects design, with Method (eyes-closed vs. quotations) and Hand (right vs. left) as the independent variables. The four cells are ER (eyes-closed, right hand), EL (eyes-closed, left hand), QR (quotations, right hand), and QL (quotations, left hand). Location hits was the dependent variable. Because one of the independent variables represented which hand was used for the test, the 5 left-handed participants were removed from the ANOVAs.

Hits: Model 1 vs. Model 2. The means and standard deviations for location hits in each cell are reported in Table 1 for both Model 1($N = 75$) and Model 2 ($N = 68$). The Model 1 ANOVA was significant overall, $F(3,71) = 3.56$, $p = .018$($R^2 = .13$). The only significant effect was the Method x Hand interaction, $F(1,71) = 6.66$, $p = .012$. Inspection of the means reveals that the interaction consisted of positive scoring (psi hitting) in the ER, EL, and QR conditions, offset by negative scoring (psi missing) in the QL condition.

Table 1

Mean z (N) for Model 1 ESP Location and Model 2 ESP Location and Number as a Function of Method and Hand

	Location1		Location2		Number2	
	E	Q	E	Q	E	Q
R	-0.07 (18)	0.38 (19)	0.46 (14)	0.39 (19)	-0.01 (14)	0.21 (19)
L	0.14 (19)	-0.75 (19)	0.41 (16)	-0.76 (19)	-0.11 (16)	-0.21 (19)

Note. E = Eyes-closed. Q = Quotations. R = Right hand. L = Left hand.

Model 2 was also significant overall, $F(3,64) = 5.34$, $p = .002$ ($R^2 = .20$). Significant main effects for Method, $F(1,64) = 5.38$, $p = .024$, and Hand, $F(1,64) = 5.08$, $p = .028$, were superseded by a significant Method x Hand interaction, $F(3,64) = 3.56$, $p = .018$. As with Model 1, the interaction reflected positive scoring in the ER, EL, and QR conditions offset by negative scoring in the QL condition. Because the overall F was more significant in Model 2 than in Model 1, Model 2 was chosen for the subsequent analyses. Model 1 will not be discussed further in the report. Also for subsequent analyses, conditions ER, EL, and QR were combined to form condition EQR, which was contrasted with QL. The mean number of location hits for the 49 participants in the EQR condition was 0.42(*SD* = 1.12), *t*(48) = 2.62, *p* = .012. The mean for the 19 participants in the QL condition was -0.76 (*SD* = 0.94), *t*(18) = 3.53, *p* = .002.

Square hits. The ANOVAs were repeated for the subcategories of square, quadrant, and number. Recall that location hits are a combination of square and quadrant hits. The overall model for square hits was significant, *F*(3,64) = 4.74, *p* = .005. Only the main effect for Hand was significant, with positive scoring for the right hand and negative scoring for the left hand, *F*(1,64) = 9.03, *p* = .004. Despite the nonsignificant interaction, the pattern of means was similar to what was found for location hits. Scores were significantly positive in the EQR condition (*M* = 0.31; *SD* = 0.94), *t*(48) = 2.31, *p* = .025, and significantly negative in the QL condition (*M* = -0.54; *SD* = 0.74), *t*(18) = 3.20, *p* = .005.

Quadrant hits. The overall model for quadrant hits was significant, *F*(3,64) = 3.37, *p* = .010. A significant main effect for Method, *F*(1,64) = 0.26, *p* = .026, was superseded by a significant Method x Hand interaction, *F*(1,64) = 5.64, *p* = .021. Scores were significantly positive in the EQR condition (*M* = 0.28; *SD* = 0.87), *t*(48) = 2.24, *p* = .030, and significantly negative in the QL condition (*M* = -0.53; *SD* = 0.98), *t*(18) = 2.36, *p* = .030.

Number hits. Because number hits are independent of location hits, the cell means were added to Table 1. The overall model for number hits was nonsignificant, *F*(3,64) = 0.58, *p* = .627. Neither the main effects nor the interaction was significant. Because the QL mean was the lowest of the four ESP cell means, I compared the EQR and QL conditions on number hits. The result is nonsignificant, *t*(66) = 0.92.

Outside Force

Change of hypothesis. The state measure of dissociation was the question "Did you have the impression that at any time during the session the pen was being guide by an outside force?" Based on the results of Palmer (2011), it was predicted that performance would be significantly better for participants who had the experience that the associated hand is being moved by an outside force from 1 to 40% of the time during the test than for other participants (H3).

Based on data I had observed prior to looking at the ESP scores, I decided to modify the hypothesis to state simply that performance would be significantly better for participants who have the experience that the associated hand is being moved by an outside force (for any percentage of the time) during the test than for other participants. There were two reasons for the switch. First, based on the results of Palmer (2011), I decided for the present study to interview participants at the end of the session about their experience during the session. I had expected that the reason for the curvilinear effect in Palmer (2011) is that those who experienced the outside force < 40% of the time were in a qualitatively different state of consciousness than those who experienced it > 40% of the time. I found no evidence of such a difference in the interviews in the present study. Second, a smaller percentage of the participants said they had experienced an outside force in the present study (44%) than in the Palmer (2011) study (65%).

My new interpretation of the low ESP mean among participants who reported an outside force > 40% of the time in Palmer (2011) is based on the fact that many of the participants in that study were college students, whereas almost none were college students in the present study. Even though I was not the students' professor, I had a similar enough role as an "authority figure" that some of them might have wanted to please me, a common malady in mainstream psychology research, which is labeled "demand characteristics." A good way to accomplish this objective would be to assure me that they had the "expected" and "hoped for" experience of their hand being moved by an outside force, even when it was not. To do this fully, they would not only want to acknowledge having the experience but to have it a high percentage of the time. I think more likely than an outright lie is adoption of an overly liberal conception of what the experience of an outside force would be like. This hypothesis can explain why 21% more participants claimed the force effect in Palmer (2011) than in the present study.

To conclude, if the participants in the > 40% force condition who presumably acquiesced to demand characteristics were shifted from that condition to the 0% force condition, the relationship would conform to the revised hypothesis for the present study.

ESP. The 28 participants who reported experiencing guidance by an outside force had a mean location hit score of 0.32 ($SD = 1.32$), whereas the 43 participants who did not report this experience had a mean location hit score of -0.11 ($SD = 1.06$). For the difference, $t(69) = 1.51, p = .068$, one-tailed. Thus, Hypothesis 3 received suggestive support. Neither mean differed significantly from chance. In the EQR condition (left-handers removed), the 19 participants who answered the force question "yes" scored significantly above chance ($M = 0.78, SD = 1.22$), $t(18) = 2.79, p = .006$, one-tailed, and significantly higher than the 30 participants who answered it "no" ($M = 0.19; SD = 1.01$); for the difference, $t(47) = 1.83, p = .037$, one-tailed. On the other hand, there was a negligible, nonsignificant difference in the QL condition. The 6 participants who answered the force question "yes" had an ESP mean of -0.64 ($SD = 1.22$) compared to a mean of -0.82 ($SD = 0.84$) for the 13 who answered it "no," $t(17) = 0.37, p = .72$.

As for the location hit components, the force-ESP relationship was stronger for quadrant hits, $t(69) = 1.75, p = .043$, one-tailed, than for square hits, $t(69) = 0.85, p = .20$, one-tailed. For quadrant hits in the EQR condition (left-handers removed), the 19 participants who answered the force question "yes" ($M = 0.61, SD = 0.80$) scored significantly above chance, $t(18) = 3.34, p = .002$, one-tailed, and significantly higher than the 30 participants who answered it "no" ($M = 0.07$; $SD = 0.85$), $t(47) = 2.24$, $p = .015$, one-tailed.

How participants answered the force question had no effect on the number hits. The 28 participants who answered the force question "yes" had a mean of -0.06 ($SD = 0.84$) compared to a mean of -0.03 ($SD = 1.10$) for the 43 "no" responders. The difference is nonsignificant, $t(69) = 0.10$.

Dissociation

The Dissociative Processes Scale (DPS) that we used to measure trait dissociation has three subscales: Obliviousness, Imagination, and Detachment. Descriptive data for the three scales are as follows. Obliviousness ($M = 43.62$; $SD = 11.10$): Imagination ($M = 23.02$; $SD = 6.90$): Detachment ($M = 15.35$; $SD = 5.44$). In our sample, the intercorrelations among the scales ranged from .44 to .63. The intention from the outset was to analyze the three scales individually. All the scales had acceptable skewness and kurtosis. The correlations of these scores with the ESP measures are summarized in Table 2.

ESP. ***Obliviousness***. Hypothesis 1 predicted a significant positive correlation between location hits and scores on DPS Obliviousness. This hypothesis was not confirmed, $r(69) = -.10$, $p = .42$. There were no significant correlations between Obliviousness and any of the other ESP measures.

Imagination. There was a significant positive correlation between location hits and DPS Imagination, $r(69) = .27$, $p = .02$. The correlation was significant in the EQR condition, $r(47) = .35$, $p = .01$, and of comparable magnitude, although not significant, in the QL condition, $r(17) = .30$, $p = .21$.

As for the location hit components, there was a significant positive correlation between square hits and DPS Imagination, $r(69) = .35$, $p = .003$. The correlation was significant in both the EQR condition, $r(47) = .34$, $p = .02$, and the QL condition, $r(17) = .61$, $p = .006$. On the other hand, the correlation between quadrant hits and Imagination was nonsignificant for the total sample, $r(69) = .12$, $p = .33$, suggestive for the EQR condition, $r(47) = .26$, $p = .07$, and slightly reversed for the QL condition, $r(17) = -.05$, $p = .84$.

Detachment. There was a suggestive positive correlation between location hits and DPS Detachment, $r(69) = .20$, $p = .09$. The correlation was significant in the EQR condition, $r(47) = .30$, $p = .03$, and of comparable magnitude, although not significant, in the QL condition, $r(17) = .25$, $p = .30$.

As for the location hit components, there was a significant positive correlation between square hits and the DPS Detachment $r(69) = .25$, $p = .03$. The correlation was suggestive in the EQR condition, $r(47) = .24$, $p = .10$, and significant in the QL condition, $r(17) = .59$, $p = .008$. On the other hand, the correlation between quadrant hits and Detachment was nonsignificant for the total sample, $r(69) = .09, p = .46$, suggestive for the EQR condition, $r(47) = .28, p = .06$, and slightly reversed for the QL condition, $r(17) = -.10, p = .67$.

Table 2

Pearson Correlations Between Continuous Predictor Variables (DPS and Relaxation) and the Four ESP Hit Types Overall and in the EQR and QL Conditions

<table>
<tr><th></th><th colspan="2">Location</th><th colspan="2">Square</th><th colspan="2">Quadrant</th><th colspan="2">Number</th></tr>
<tr><th></th><th>EQR[a]</th><th>QL[b]</th><th>EQR[a]</th><th>QL[b]</th><th>EQR[a]</th><th>QL[b]</th><th>EQR[a]</th><th>QL[b]</th></tr>
<tr><td>Obliviousness</td><td colspan="2">-.10</td><td colspan="2">-.03</td><td colspan="2">-.14</td><td colspan="2">.07</td></tr>
<tr><td></td><td>-.07</td><td>.19</td><td>-.12</td><td>.55**</td><td>-.01</td><td>-.16</td><td>-.03</td><td>.46**</td></tr>
<tr><td>Imagination</td><td colspan="2">.27**</td><td colspan="2">.35***</td><td colspan="2">.12</td><td colspan="2">.26**</td></tr>
<tr><td></td><td>.35**</td><td>.30</td><td>.34***</td><td>.61***</td><td>.26*</td><td>-.05</td><td>.19</td><td>.56**</td></tr>
<tr><td>Detachment</td><td colspan="2">.20*</td><td colspan="2">.25**</td><td colspan="2">.09</td><td colspan="2">.31***</td></tr>
<tr><td></td><td>.30**</td><td>.25</td><td>.24*</td><td>.59***</td><td>.28*</td><td>-.10</td><td>.23</td><td>.62***</td></tr>
<tr><td>Relaxation[c]</td><td colspan="2">.18</td><td colspan="2">.16</td><td colspan="2">.15</td><td colspan="2">-.03</td></tr>
<tr><td></td><td>-.05</td><td>.24</td><td>-.06</td><td>.30</td><td>-.03</td><td>.11</td><td>-.16</td><td>.08</td></tr>
</table>

Note. Left-handers were removed from the EQR and QL correlations.
[a]$N = 49$. [b]$N = 19$. [c]Scores were double-log transformed to achieve normality.
*$p < .10$. **$p < .05$. ***$p < .01$. All two-tailed.

Number hits. ***Obliviousness***. The correlation between DPS Obliviousness and number hits was nonsignificant, $r(69) = .07, p = .54$. The correlation is also nonsignificant in the EQR condition, $r(47) = -.03, p = .87$, but surprisingly significant in the QL condition, $r(17) = .46, p = .05$.

Imagination. There was a significant positive correlation between number hits and DPS Imagination, $r(69) = .26, p = .03$. The correlation is nonsignificant in the EQR condition, $r(47) = .19, p = .19$, but significant in the QL condition, $r(17) = .56, p = .01$.

Detachment. There was a significant positive correlation between number hits and DPS Detachment, $r(69) = .38, p = .009$. The correlation is nonsignificant in the EQR condition, $r(47) = .23, p = .11$, but significant in the QL condition, $r(17) = .62, p = .005$.

Outside force. Hypothesis 5 was modified to predict that participants who reported feeling their hand being moved by an outside force would score higher on DPS Obliviousness than those who did not. The mean Obliviousness score for the 35 participants who answered the force question "yes" was 45.26 (SD = 10.97), whereas for the 45 "no" responders the mean was just slightly lower (M = 42.71; SD = 11.21). The difference is nonsignificant, $t(78) = 1.02, p = .31$. The finding is similar for the Imagination scale. The "yes" responders scored slightly higher (M = 23.34; SD = 7.57) than the "no" responders (M = 22.78; SD = 6.41), but the difference is nonsignificant, $t(78) = 0.36, p = .72$.

However, the effect was markedly stronger for the Detachment scale. The mean for the "yes" responders was 17.86 (SD = 5.38) compared to 13.40 (SD = 4.26) for the "no" responders. The difference is highly significant, $t(78) = 3.96, p < .001$.

Relaxation

An item on both post-test questionnaires asked participants how relaxed they felt during the session on a 10-point (1 to 10) scale, with 10 being the most relaxed (see Appendix C). The mean for all 80 participants was 6.71 (SD = 1.97). However, the distribution is highly skewed to the left, so for analysis a double log transform (log of the log) was applied, which reduced the skewness statistic to less than 2.0. The mean was adjusted to match the original mean, but the standard deviation was reduced to 0.48. (The means and standard deviations of the original scale will be reported below, even though the log scores were used for the reported analysis.) The correlations of these scores with the ESP measures are summarized in Table 2.

ESP. There were no significant relationships between relaxation and any of the ESP measures.

Outside Force. The 35 participants who reported feeling their hand moved by an outside force reported being more relaxed during the ESP task (M = 7.26; SD = 1.50) than the 25 that did not (M = 6.39; SD = 2.02). The difference is significant, $t(78) = 2.01, p < .05$.

Method. The same Method by Hand ANOVA applied to the ESP scores was applied to the transformed relaxation variable (with left-handers removed). There was a significant main effect for Method, $F(1/71) = 8.94, p = .004$. Participants were more relaxed in the eyes-closed conditions (M = 7.36; SD = 1.66) than in the quotation conditions (M = 6.05; SD = 2.05).

Task Success

An item on each of the post-test questionnaires asked about success in implementing the ESP task instructions. In the quotation conditions, task success was defined as keeping attention focused on the quotes during the ESP task. In the eyes-closed conditions, success was defined as keeping the mind blank. As both questions were answered using the same 5-point scale, the items were pooled under a variable named "Success" for the overall evaluation. This variable was then broken down into two categories: participants who reported being completely, or almost completely successful were labeled "successful"; those who reported being somewhat successful, mostly unsuccessful, or completely or almost completely unsuccessful were labeled "unsuccessful." The questions and response alternatives can be found in Appendix C.

Hypothesis 4 predicted that the successful participants would score more location hits than the unsuccessful participants. The 49 "successful" subjects had a mean hit score of 0.13 (SD = 1.21). The 22 "unsuccessful" participants had a mean hit score of -0.98 (SD = 1.13). Although in the predicted direction, the difference is not significant, $t(69) = 0.73$, $p = .47$. Thus, Hypothesis 4 was not supported. Task success was not significantly associated with any of the other ESP measures.

Dissociation. Hypothesis 6 predicted that participants who report success in implementing the ESP task instructions would have higher scores on DPS Obliviousness than low scorers. The Obliviousness mean for the 56 successful participants was 43.43 (SD = 11.84) compared to 44.75 (SD = 9.34) for the 24 unsuccessful participants. This slight difference is opposite to prediction and nonsignificant, $t(78) = 0.49$, $p = .63$. Differences were similarly slight and nonsignificant for the Detachment and Imagination subscales.

Expectation of Success

The post-test questionnaire asked participants to estimate what kind of ESP score they expected to get immediately after the relaxation exercise (pre-test) and at the time of answering the question (post-test). There were five response alternatives for each question (see Appendix C). Those who estimated scoring strongly or somewhat above chance were classified as "high expectation" (N = 42 pre-test, 35 post-test) and those who estimated scoring at chance or very close to chance, or somewhat or strongly below chance were classified as "low expectation" (N = 29 pre-test, 50 post-test). Thus, there was a tendency to be less optimistic after completing the test than before, which is significant by the McNemar chi-square test ($p = .02$).

Pre-test. *ESP scores*. Thirty-eight participants with high expectations of success had a higher location hit score (M = 0.37; SD = 1.07) than 30 participants with low expectations (M = -0.26, SD = 1.23). The difference is significant, $t(66) = 2.27$, $p = .03$. For number hits, the high expectation group (M = 0.20; SD = 0.97) also scored higher than the low expectation group (M = -0.19; SD = 0.91), but in this case the difference is only suggestive, $t(66) = 1.71$, $p = .09$.

Dissociation. Forty-two high expectation participants scored higher on DPS Detachment (*M* = 16.95, *SD* = 5.47) than 35 participants in the low expectation group (*M* = 13.51; *SD* = 4.99). The difference is significant, $t(75) = 2.86$, p = .006. The trends for the other dissociation scales were in the same direction as for Detachment but nonsignificant.

Post-test. *ESP scores*. Twenty-six participants with high expectations of success had higher location hit scores (*M* = 0.38; *SD* = 1.07) than 44 participants with low expectations (*M* = -0.12, *SD* = 1.23). The difference is only suggestive, $t(68) = 1.71$, $p = .09$, because the mean for the low expectation group was less negative than for the pre-test. For number hits, the difference is nonsignificant ($p = .23$)

Dissociation. Twenty-nine high expectation participants scored higher on DPS Detachment (*M* = 16.86, *SD* = 5.79) than 50 participants in the low expectation group (*M* = 14.50; *SD* = 5.14). The difference is only suggestive, $t(77) = 1.88$, $p = .06$, because the mean for the low expectation group is less negative than for the pre-test. The trends for the other dissociation scales were in the same direction as for Detachment but nonsignificant.

Questionnaire bias. Because participants completed the DPS at home prior to the session, I wanted to know if how they answered the questions might have influenced their expectations for ESP success at the session (see Appendix C). Twelve participants reported that this experience raised their expectation of getting a high score, 9 said it raised their expectation of getting a low score, and 59 reported that it made no difference. These groups did not differ significantly among themselves on their scores on DPS Detachment and Imagination.

Discussion

Only one of the six hypotheses was confirmed by the data (outside-force/ESP-hits) and that to only a suggestive degree. However, more attention should be paid to whether an effect is hypothesize*able* than whether it is hypothesiz*ed*. There were a surprisingly large number of significant unhypothesized effects, most of which make sense and could have been justifiably hypothesized were the investigator more prescient. Nonetheless, these effects must be interpreted cautiously unless and until they are replicated (which would be true even if they were hypothesized but not replications of previous work.)

The significant psi-missing in the QL condition (ESP responses made with the left hand while reading quotations on a computer screen) was surprising at first, but it makes sense in that this was the most difficult and demanding of the conditions for right-handed participants. Reading quotations is more cognitively demanding than blanking the mind, and any task is more difficult to perform with the non-dominant hand. This is even more true when one has to simultaneously perform a cognitive demanding interference task. Although I attempted to mitigate this problem by giving participants liberal practice under the conditions they would experience in the formal test, I never expected that it would be enough to completely solve the problem. Research with automatic writing indicates that proficiency requires more practice than I was able to provide. It also is obviously more difficult to perform a not-overlearned task when one is "on stage" as opposed to practicing. The difficulty of the formal task might have been further enhanced by the intervening relaxation exercise, which put participants in a different state of consciousness than in the practice task. In the other three conditions combined, the mean ESP score was significantly positive.

The reinterpreted-as-positive relationship I found in my previous motor automatism study (Palmer, 2011) between ESP hits and perception of the hand as being moved by an outside force at least some of the time during the ESP task was confirmed to a suggestive degree. "Suggestive" changes to "significant" if the analysis is limited to the EQR condition, in which those who answered the question "yes" also scored significantly above chance. Surely there is no reason for the effect to hold in the QL condition, where there was significant overall psi-missing. If anything, one would predict a reversal of the force/ESP relationship in this condition, for a reason that I discuss further below. An examination of the two components of location hit scores (square hits and quadrant hits) reveals that the hypothesis was supported only for quadrant hits. This makes sense, as it is easier to identify the correct quadrant ($P = 1/4$) than the correct square within the quadrant ($P = 1/16$).

In both the present study and Palmer (2011), the outside force question was intended as a measure of a dissociated state during the ESP task. Its validity in this regard is measured by whether it correlates significantly with an appropriate trait measure of dissociation capacity. In Palmer (2011), this dissociation measure was scores on Persinger's partial epileptic signs scale (Persinger & Makarec, 1993) with scores on Tellegen's absorption scale (Tellegen, 1978) partialled out. Although this measure did correlate significantly with the outside force question in Palmer (2011), for the present study I wanted a scale that was both a more direct measure of dissociation and a measure of the particular aspect of dissociation that I hypothesized to be operative. I chose for this purpose Watson's (2003) Dissociative Processes Scale (DPS), and I based the prediction (Hypothesis 5) on the Obliviousness subscale, which Watson (2003, p. 300) defines as measuring "the tendency to engage in mindless and automatic behaviors."

However, in the present study there was not a significant relationship between the force question and DPS Obliviousness. Instead, there was a quite strong positive relationship between the outside force question and another of the DPS subscales, Detachment. Although not predicted, this relationship makes sense. Watson (2003, p. 300) defines this scale as measuring "feelings of depersonalization and derealization," which doesn't seem very relevant. However, greater relevance can be found if one examines the six items that compose the subscale. At least three of the items reflect separation of the body, very much like an out-of-body experience. For example, Item 17 reads "At times I have felt disconnect from my body." (The entire DPS with subscale items identified can be found in Appendix B.) It is not a huge inferential leap to extend this concept to one's hand being outside of, and not controlled by, one's body and the mind that governs it. That many of the participants saw this connection is suggested by the fact that scores on DPS Detachment were strongly associated with expectation of success on the ESP task immediately following the relaxation exercise. It is also striking that the correlations between the outside force question and the other two DPS subscales, Imagination and Obliviousness, are nowhere near significant, despite the fact that the three subscales correlated with one another in the .4 to .6 range. Finally, DPS Detachment scores were directly and positively related to ESP hits, suggestively overall and significantly in the EQR condition. In short, the present study confirms that trait dissociation is indeed reflected by the tendency to experience one's hand being moved by an outside force during an ESP motor task, as well as by successful performance in such a task.

The suggestive correlation of ESP hits with DPS Detachment was matched by a significant correlation of ESP hits with DPS Imagination. For both DPS subscales, the effect was stronger for the square component than for the quadrant component. This is odd, because, as note previously, it is easier to get a quadrant hit than a square hit. Also, both DPS subscales correlated positively and significant with *number* hits. Recall that for number hits there was not the sharp difference between total scores in the EQR and QL conditions found with location hits. For both subscales, the correlation with number hits was actually stronger in the QL condition than in the EQR condition.

What might this complex pattern of results be telling us? First, note that accessing a number as such requires cognitive activity in the strong sense, whereas square and quadrant can be accessed simply by moving the hand to the proper location on the grid. The same cognitive processes used to access number could also be used to access square and quadrant , but they are not necessary. If participants followed the instructions properly, any such cognitive activity should have been unconscious. Second, note that Watson (2003; p. 300) describes the imagination scale as assessing "absorption, imaginativeness, and fantasizing." This describes activity that is more cognitive than for the other two subscales, even to the point of reflecting imagery.

My argument from all this is that there were two kinds of psi processes contributing to the ESP test outcomes. One was almost purely motor (which can be expressed metaphorically as the hand taking the ESP test) and the other as being primarily cognitive. For simplicity, I will hereafter refer to these as the "motor process" and the "cognition process." The low-magnitude results parapsychologists consistently find in ESP tests suggests that most individual responses to targets are not psi-mediated; they are simply "wild guesses." This leaves plenty of room for different processes to mediate the responses on different trials in a forced-choice ESP test such as the one used in this experiment. In the present case, that would mean that within a 36-trial test exhibiting some psi, most trials would be chance, a few would be motor-psi-mediated and a few others cognition-psi-mediated. It also assumes, as noted above, that the variance associated with DPS Detachment can be divided into two components: that which significantly predicted responses to the outside force question (Component A) and that which caused the .52 correlation with DPS Imagination (Component B).

The motor process was active only in the EQR condition and affected only location hits. It was predicted by Component A of DPS Detachment and was experienced by participants who felt their hand being moved by an outside force. This model is supported by the following specific findings: (a) the significant positive relation between DPS Detachment and the outside force question, along with the lack of correlation between the outside force question and DPS Imagination; (b) the significant relation between the outside force question and location hits exclusively in the EQR condition; (c) the significant correlations of DPS detachment with location hits and quadrant hits only in the EQR condition; (d) the lack of a significant relation between number hits and either DPS Detachment or the outside force question.

The cognition process was operative in all the conditions, including QL. It was predicted primarily by DPS Imagination, and only by DPS Detachment insofar as that was correlated with DPS Imagination (Component B). The model is supported by the following specific findings: (a) a significant correlation between DPS Imagination and location hits, and a suggestive correlation between DPS Imagination and quadrant hits, in the EQR condition; (b) a significant correlation between DPS Imagination and number hits in the entire sample. Although either the motor or the cognitive process could be used for location hits, only the cognitive process can achieve number hits; the ability of the "hand" to point to the correct spot on the grid is useless for identifying numbers per se.

Although square hits was interpreted primarily as a location variable (that is why it was selected as a component of location hits), it also correlated with number hits. The most likely explanation for this correlation for present purposes is that a number hit increases the probability of a corresponding square hit from 1/16 to 1/4. This is the most likely reason that high Imagination participants got a relatively large number of square hits, not that they were accessing location directly.

In my previous writings I have cited automatic writing as a good real-world analogue of the motor process. However, I now see it as a better analogue of the cognitive process (which still allows for some motor elements.) The reason is simply that the output of good automatic writing is highly meaningful in the verbal sense, which implies some cognitive mediation. Automatic writing can be seen as analogous to number hits in the present study. Think of an expanded grid with at least 26 squares, containing a number from 1 to 26. By making a succession of responses on the grid, a person could spell out a meaningful message by using the numbers as codes for letters. Of course, it would be more efficient to have letters in addition to numbers on the grid, which brings us to a second good example of the cognitive process, the Ouija board. Indeed, this was the model for the apparatus in Palmer (2011), so I now see that task as reflecting the cognitive process. In fact, the results in Palmer (2011) were best when participants were given the opportunity to supplement their alphabet board responses with any mental images they might recall from the session. In this sense, it is perhaps surprising that I got an ESP relationship with the outside force question at all. Perhaps this means there was some pure motor responding in Palmer (2011). In any event, it now seems to me that a better real-world analogue of the motor process is dowsing.

Some particular comments are needed about the QL condition. Neither the motor nor the cognitive processes as discussed so far can account for the psi-missing for location hits in this condition. Although the mean on number hits was also lowest in this condition, the interaction term in the ANOVA was nowhere near significant. Thus, I think it proper not to assume any unique psi-missing effect in the QL condition for numbers. On the other hand, the prediction of number hits by DPS Imagination was particularly strong in the QL condition. However, what is most surprising is that the direction of the relationship was positive. In an earlier paper (Palmer, 1975), I argued that when an ESP mean is below chance, one should expect a negative relationship between ESP and a predictor, and that is what I found in a series of OBE/ganzfeld experiments I conducted many years ago (e.g., Palmer, Bogart, Jones, & Tart, 1977). The rationale for this prediction is that the participants with the lowest scores are producing the most psi, with participants scoring low on the predictor averaging around chance. My explanation of the positive correlations between the DPS subscales (even Obliviousness got in on the act) and number hits in the (psi-missing) QL condition draws on my earlier observation about different processes operating on different trials. Specifically, high-Imagination participants were able to overcome on some trials the apparent frustration manifested on other trials by the difficulty of the QL procedure, but only for cognitive responding. In other words, the high-Imagination participants were able to partly balance out the psi-missing trials caused by frustration with psi-hitting trials mediated by their relatively good cognitive psi abilities. Why participants could not do that using the motor process remains unclear.

Finally, any psi researcher is required in my view to at least acknowledge the possibility of their results were contaminated to at least some degree by investigator psi (I-psi). Although I-psi can never be ruled out, it can be minimized by eliminating as much as possible intuitive or random investigator decisions. This is why I had my associate use the seed numbers 1 and 2 to activate the algorithm for target decision. It was my original intent to have the condition assignments made by a continuation of that number sequence, but due to logistical complications it was in fact done by my programmer, Mr. Ruszaj, using another algorithm. Mr. Ruszaj had no stake in the outcome of the study and showed no particular interest in its conceptual aspects, so I doubt he had the motivation I consider necessary for one to be an implicit psi source. In theory I could have influenced the process myself, but at the time I had no idea when Mr. Ruszaj did it or even that he was going to do it.

By far the most likely source of I-psi in the study was my adjustment of the response sequences for some participants in the eyes-closed conditions. Even though I did my best to make these decisions rationally, more than one option could often be defended on rational grounds, and it is possible that psi could have tilted my decision process in a favorable direction in some cases. Clearly, the results in this condition were better for Model 2 than for Model 1. However, there were equally strong results in the QL condition, where the impact of my decision-making was minimal. Finally, I am not known as a psi-conducive experimenter.

Conclusion

This last point brings me to my conclusion, which is simply to reiterate what I said at the beginning of this section. I was impressed, and frankly surprised, by the large number of significant and mostly sensible results I obtained in this study, particularly in light of the difficulties in identifying the proper response sequences. Overall, the results were stronger than in the original Palmer (2011) study. These results convince me that this research paradigm has promise, and I encourage other researchers to look into it. For my part, I hope to follow up by training the best individual participants in the study to develop proficiency in the procedure through extensive practice with feedback. The intent would be to increase the reliability of their ESP scoring.

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Table of Appendices

Appendix A
Participant Solicitation Letter

Title of Study: ESP and Motor Automatisms

Our aim in this study is to explore ESP in dissociated states of consciousness. The word "dissociation" is often linked to mental illnesses such as schizophrenia and dissociative identity disorder (multiple personality), but all of us experience milder versions of it in everyday life. A simple example is keeping your car on the road while talking to the person sitting next to you. It is this more normal type of dissociation that we are interested in for the study.

What we are seeking to do is split participants' consciousness into rational and intuitive components. The idea is to have the intuitive mind take the ESP test while the rational mind is kept from getting in the way. We will employ two procedures to accomplish this. The first (a version of a technique popular with Spiritualist trance mediums) is to distract the rational mind by having it read a series of quotations while the intuitive mind takes the ESP test. The second is to blank the rational mind while the intuitive mind takes the ESP test. Participants will be asked to apply one of these procedures based on random assignment. We also aim to facilitate the dissociation by inducing a meditation-like altered state of consciousness. We will accomplish this by having participants listen to a recorded progressive relaxation exercise.

The ESP task will consist of moving a pen around a grid divided into squares like a checkerboard. For each trial, thc idca is that the intuitive mind will guide the participant's hand to the square randomly selected by the computer as the target for the trial. There will be 36 trials in all. This type of performance is referred to in parapsychology as "motor automatism" because your body makes the guesses unaided (or, as I would put it, unhindered) by conscious thoughts or images. In parapsychology, the best example we have of a motor automatism is the "automatic writing" displayed with great success by the famous trance mediums of the late 19th and early 20th Century. A modern example is the Ouija board. Note, however, that the ESP test will in no way involve conjuring spirits.

Participants will also be asked to complete at home, prior to the test session, a general information questionnaire and two personality questionnaires. We expect the single test session to last about one to one-and-a quarter hours. Everyone who completes the experiment will be given $15 at the end of the session as a reward for participating.

Anyone who is 18 years of age or older and has never had or been diagnosed as having a serious mental illness is welcome to participate. We are especially interested in people who find the rationale of the experiment congenial, whether or not they have had psychic experiences in the past or consider themselves psychic.

The sessions are conducted at the Rhine Research Center, 2741 Campus Walk Ave., Bldg. 500, Durham, NC 27705. If you would like to participate or have any questions about the experiment prior to making a decision, please contact the experimenter (Dr. John Palmer) by email at experiment@rhine.org., indicating when you would be free to participate. Weekends are possible. Dr. Palmer will then set up an appointment time and email you the questionnaires.

Appendix B
Dissociative Processes Scale

ID #____________

This questionnaire contains a series of statements. Read each statement carefully, then mark the appropriate response in the space in front of that item. Use the following scale to record your responses:

1 = *strongly disagree*; the statement is definitely false
2 = *disagree*; the statement is mostly false
3 = *neutral* or *cannot decide*; the statement is about equally true and false
4 = *agree*; the statement is mostly true
5 = *strongly agree*; the statement is definitely true

[O] Obliviousness; [I] Imagination; [D] Detachment

_____ 1. I like to fantasize about doing interesting and exciting things. **[I]**

_____ 2. At times I have gone into a trance-like state in which I was unaware of what was happening around me. **[O]**

_____ 3. There are certain events or blocks of time for which I have no memory. **[O]**

_____ 4. I have felt as if I were in a dream, when I was actually wide awake.

_____ 5. I have such a vivid imagination that I really could "become" someone else for a few minutes. **[I]**

_____ 6. I sometimes feel somewhat distant from my own thoughts and actions.

_____ 7. At times people have told me that I seemed to be off in a world of my own. **[O]**

_____ 8. I will sometimes walk into a room, and not remember why I went in there. **[O]**

_____ 9. Sometimes the things around me do not seem quite real.

_____10. I sometimes will be driving a car, and later realize that I don't remember part of the trip. **[O]**

_____11. I have an interesting fantasy life. **[I]**

_____12. I sometimes "step outside" of my usual self and experience a different state of consciousness. **[D]**

____ 13. If I want to, I can imagine some things so vividly that they hold my attention like a good movie or book does. **[I]**

_____14. Sometimes when I am looking in the mirror I feel like I am seeing someone else. **[D]**

_____15. I daydream a lot. **[I]**

_____16. When I am doing a routine task, I sometimes can wander off into my own thoughts and actually forget that I am doing it, only to find a few minutes later that I have completed it. **[O]**

__ 17. At times I have felt disconnected from my body. **[D]**

_____18. I often have been unsure if I have actually done something, or simply thought about doing it. **[O]**

_____19. I often put things down without thinking, so that later on I have no idea of where I put them. **[O]**

_____20. I have often been told that I did or said something that I don't remember doing or saying. **[O]**

_____21. I have a very active imagination. **[I]**

_____22. I can get so involved in a movie that I'm unaware of what is happening around me.

_____23. I sometimes find myself staring off into space without thinking about anything. **[O]**

_____24. I have had blank spells or periods of missing time (that were not caused by alcohol or drugs). **[O]**

_____25. I can get so caught up in music that I don't notice anything else.

_____26. I often seem to do things without really paying attention to what I am doing. **[O]**

_____27. Sometimes I feel like I am someone else. **[D]**

_____ 28. At times I cannot remember whether or not I did something that I intended to do. **[O]**

_____29. Sometimes I can get so absorbed in a daydream or fantasy that it seems real to me. **[I]**

_____30. There have been occasions when I felt I was outside of my body. **[D]**

_____31. I have been uncertain about whether something actually happened, or whether I only dreamed it.

_____32. Sometimes when someone is talking to me, although I can hear their voice, I find that I haven't really listened to what they are saying. **[O]**

_____33. I sometimes feel as if I were more than one person. **[D]**

Appendix C
Post-test Questionnaires

Eyes-closed

ID:

Please circle your choice for each question. We will discuss your answers afterwards.

1) Was your expectation of your ESP score when you came to the session influenced at all by the questionnaires you filled out at home?

Yes, toward a high score
Yes, toward a low or chance score
No

2) Immediately after the relaxation exercise, what kind of ESP score did you expect?

Strongly above chance
Somewhat above chance
Chance or very close to chance
Somewhat below chance
Strongly below chance

3) What kind of ESP score do you think you got?

Strongly above chance
Somewhat above chance
Chance or very close to chance
Somewhat below chance
Strongly below chance

4) Did you have the impression at any time during the session that the pen was being guided by an outside force?

Yes
No

5) If yes, about what percentage of the movement was caused in this manner?

1–20%
21–40%
41–60%
61–80%
81–100%.

6) Did you ever open your eyes during the ESP task?

Yes
No

7) How successful were you in keeping your mind blank during the ESP task?

Completely or almost completely successful
Mostly successful
Somewhat successful
Mostly unsuccessful
Completely or almost completely unsuccessful

8) On average, how much of an altered state of consciousness did you feel you were in during the ESP task, on a scale from 1 to 10? (1 = normal waking consciousness; 10 = deepest relaxed, meditative state I can imagine)

1 2 3 4 5 6 7 8 9 10

Quotations

ID:

Please circle your choice for each question. We will discuss your answers afterwards.

1) Was your expectation of your ESP score when you came to the session influenced at all by the questionnaires you filled out at home?

Yes, toward a high score
Yes, toward a low or chance score
No

2) Immediately after the relaxation exercise, what kind of ESP score did you expect?

Strongly above chance
Somewhat above chance
Chance or very close to chance
Somewhat below chance
Strongly below chance

3) What kind of ESP score do you think you got?

Strongly above chance
Somewhat above chance
Chance or very close to chance
Somewhat below chance
Strongly below chance

4) Did you have the impression at any time during the session that the pen was being guided by an outside force?

Yes
No

5) If yes, about what percentage of the movement was caused in this manner?

1–20%
21–40%
41–60%
61–80%
81–100%.

6) How successful were you in keeping your conscious attention on the quotations and away from the ESP task?

Completely successful
Largely successful
Somewhat successful
Largely unsuccessful
Completely unsuccessful

7) How much was when you stopped the pen influenced by where you were in reading the quotations?

Very much influenced
Somewhat influenced
A little influenced
Not at all influenced

8) On average, how much of an altered state of consciousness did you feel you were in during the ESP task, on a scale from 1 to 10? (1 = normal waking consciousness; 10 = deepest relaxed, meditative state I can imagine)

1 2 3 4 5 6 7 8 9 10

9) On average, how funny did you find the quotes, on a scale from 1 to 10? (1 = not funny at all; 10 = hilarious)

1 2 3 4 5 6 7 8 9 10

Appendix D
Crieria for Removing Responses, Trials, and Participants (Model 2)

The most challenging part of reconstructing the Model 2 response sequences was determining millisecond cutoffs for removing trials and "error trial" cutoffs for removing participants from further Model 2 analyses. Although I tried to approach the task rationally, it was subjective as well. In looking over each sheet, I paid particular attention to the distribution of reaction times, particularly whether there was a large gap between a set of rapid responses and a set of slower responses. If I found such a gap, the highest number of milliseconds in the "rapid" set became a good candidate for the cutoff for that participant. I also compared the locations of the squares on the suspect trial and the next trial. If I found a pair of trials where the two response squares were nonadjacent, I did not eliminate trials with millisecond values within 500 ms of the value for that trial anywhere in the run. For the sake of maximizing objectivity, I wanted a uniform cutoff point across the sample (while allowing for exceptions in extreme circumstances). Thus, as I went through the sample I noted the highest number of milliseconds I rejected for each participant. This number was 2000 ms, so that is what I chose as the cutoff; trials of 2000 ms or below were removed. However, I made an exception for Trial 1. This was the beginning of the run, when the participant was transitioning into the task and an error was particularly likely. My analysis led me to choose a cutoff that was 3/4 second longer for this trial than for the other trials (i.e., 2750 ms).

There were a few exceptions:

Trials 2-36:

P10: I excluded 2 trials with 2250 ms because the participants' other reaction times tended to be quite high.

P55: I excluded 2 trials of 2500 and 2750 ms because the participants' other reaction times tended to be unusually high. In each case, the response squares for the trial in question and the preceding trial were identical.

Trial 1:

P1: Trial 1 was omitted because its reaction time (4422 ms) was at least twice as long as the reaction times for all the other trials ($M = 22{,}396$ ms).

I rejected the entire run in 9 cases in the eyes-closed conditions where the number of errors was 5 or greater as I thought that in these cases the chances of getting a response sequence that matched the participant's intent was quite low. There was one exception:

P8: This participant had 6 suspect trials but I decided to include the run because it seemed clear to me that an error was made in each case, based on examination of the response squares and reaction times of the suspect and adjacent trials.