European Journal of Parapsychology
Volume 20.1, pages 22-49

ISSN: 0168-7263

The Effects of Intuition and Attitudes Towards Gambling on ESP Performance During a Gambling Task

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Abstract

In the present study, evidence was sought for the presence of compliant and noncompliant pro attitudes in a forced-choice card-identifying experiment. The pro attitude is an orientation of the self towards a specific and preferred paranormal outcome or goal (Thalbourne, in press). The experiment was designed to encourage participants to adopt a pro attitude towards only one of two card outcomes (spade-hitting or club-hitting). This protocol would yield evidence in the form of psi effects that indicated ***by inference*** *that participants either acted with compliance (they followed the experimenter's instructions) or noncompliance (they did not follow the experimenter's instructions). The modifying effects of three attitudes/dispositions on paranormal performance were also investigated – (i) attitudes towards gambling, (ii) belief in good luck, and (iii) intuition. High scores on the above-mentioned attitudes/dispositions were hypothesised as being conducive to, and necessary for psi. There was (i) a significant negative relationship between the compliant psi outcome (i.e., spade-hitting) and the noncompliant psi outcome (i.e., club-hitting), and (ii) a negative relationship between club-hitting and attitude toward horse racing. There was post hoc evidence of significant relationships between psi and Intuiting (introverted and extraverted) for moderate scorers on the Gambling Attitude Scales (using aggregate scores), and evidence of a replicated forced-choice psi effect.*

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Introduction

The pro attitude concept is a key element in Thalbourne's theory of psychopraxia (*psyche* = 'soul' or 'mind' or 'self' + *praxia* = 'do' or 'accomplish'). The theory emphasises four fundamental aspects of action, whether it occurs endosomatically (within the body) or exosomatically (outside the body).

1. "The self, not defined further than that it is inclusive of the "I" – the common denominator of all experience and the co-agent of all action (this description allows for additional agency of the unconscious component of the self).

2. "The 'pro attitude': A person may be said to have a pro attitude towards state **S** when they would prefer **S** rather than **–S** [not **S**] if those two alternatives were to be brought to their attention. Under this heading fall goals, desires, wishes, intentions, needs, preferences, and dispositions, be they conscious or unconscious. Psi-missing is also postulated to be the result of a pro attitude, perhaps unconscious, toward obtaining low scores. It is postulated that there is a hierarchy of pro attitudes, and the most potent one wins out. The self is said to "adopt" a pro attitude.

3. "The goal-state **S** that is to be brought about, whether in the so-called "mental" sphere or in the "physical" sphere is irrelevant.

4. "The set of intervening necessary conditions mediating between the self and its pro attitude and the goal-state **S**." (Storm & Thalbourne, 2000, p. 280)

Thalbourne (2004) hypothesised that the self, holding a so-called 'pro attitude', plays an initiating role in bringing about psi effects. A pro attitude is not the same as a positive attitude because the latter is held in consciousness and is based on a conscious decision, whereas the former can be unconscious and may, for example, work as a deeply entrenched core belief of which the participant is barely aware, or not always aware.

In the present study, it is theorised that there are two specific forms of pro attitude (viz., *compliant* and *noncompliant* pro attitudes), and evidence is sought to indicate that these pro attitudes exist. It is pro-

posed that compliance and noncompliance can actually be used to inform us about the nature of the pro attitude. More importantly, if researchers can gain an understanding of the dynamics of the compliance/noncompliance relationship, they may gain some control over psi in the laboratory.

The present study is also an investigation into the related effects that individual differences may have on the outcomes of paranormal tasks. Three attitudes/dispositions[1] are therefore investigated: (i) attitude towards various types of gambling, (ii) belief in good luck, and (iii) the personality variable, Intuiting. It is hypothesised that pro attitudes are modified by these attitudes/dispositions, and may even be necessary in bringing about paranormal effects. Consequently, attitudes/dispositions, pro attitudes, and compliance/noncompliance may all be related. Before reviewing the literature on these above-mentioned attitudes/dispositions, the nature of compliance in the experimental situation needs consideration.

The Pro Attitude and the Problems of Compliance and Noncompliance

In the experimental situation, if the participant adopts a pro attitude, then it is usually understood that they have a goal state or target in mind at the time of instruction by the experimenter. Usually, a participant willingly follows the requirements of an experimenter's instructions, which is in accord with the requirements of the experimental task. We call this participant's state of mind 'compliance'. In conventional psi testing, a significant result is indicative of a psi effect and we adopt this convention. Furthermore, whenever psi hitting is elicited, we argue that a compliant pro attitude can be inferred from that effect. That is, we make the assumption that a sufficient number of participants have *complied* with the experimenter's instructions at some level – conscious or unconscious – and that sufficient numbers of participants must therefore have adopted the appropriate pro attitude.[2]

[1]There is some conceptual overlap in the meanings of the nouns 'attitude' and 'disposition'. Attitude is taken to mean a particular 'position' or 'standpoint' (hence, *attitude* towards gambling), while 'disposition' refers to 'tendency' or 'inclination' (hence, a *disposition* to believe in good luck). Both can be long-standing characteristics of the individual (i.e., they may be *pre*-dispositional), and many a state or trait could be described unequivocally as both an attitude and a disposition.

[2]Note that this argument does not concede that a participant who is *consciously* compliant (and therefore has a compliant pro attitude) could, on occasion, produce psi-missing *as a result of that same pro attitude*. If such a relationship was 'evident', we would posit that the cause be ascribed to a stronger unconscious pro attitude of the participant, and/or other persons (in the form of, say, an experimenter effect).

However, many parapsychologists expect some participants to hold a hidden agenda, and they will not follow the instructions of the experimenter. They do not act in accordance with the requirements of the experimental task. We call this participant's state of mind 'noncompliance'. When participants (or groups of participants) act this way, we say they have adopted a *noncompliant* pro attitude. Usually, these types of participants are skeptics, but they do not necessarily attempt psi-missing. They may, however, hold 'strategies' aimed at producing anything other than psi-hitting. Experimenters in the past have attempted to identify these strategies—many of them theorised as producing various types of psi—and we suggest that these forms of psi are products of noncompliant pro attitudes.[3]

Some forms of the noncompliant pro attitude can be investigated. For example, Thalbourne (2005) has indicated the possibility that pro attitudes may be mutually opposed to one another. This 'oppositionalism' can be derived from his statement in which he subsumes under the umbrella-term 'pro attitude', not only "motives, desires and goals on a full-blown conscious level, but also their less conscious counterparts" (Thalbourne, 2004, p. 65). Experimenters must be alert to the possibility of noncompliant pro attitudes that come about as a result of ulterior motives or unconscious agendas.

The experiment described in the present study was partly designed to identify psi outcomes that may have been the product of compliant pro attitudes. We follow the convention that statistical evidence for a 'planned' psi-hitting effect can be found. From that effect, we would infer the presence of a sufficient number of compliant pro attitudes. Evidence for this type of pro attitude supports the pro attitude concept, but failure to detect the effect could lead to a premature dismissal of the pro attitude concept as a workable theoretical premise in parapsychology insofar as there is *no* statistical evidence of noncompliance. In many parapsychological experiments, it *cannot* be inferred that an insufficient number of noncompliant pro attitudes were present. The only way we could make that inference is to stipulate in advance that a specific counter-task (e.g., targeting a decoy) is to be *avoided* by participants. If participants target the decoy, they are said to hold noncompliant pro

[3]The form of the noncompliant pro attitude is indeterminate if the effect is also indeterminate – that is, if there is no evidence of *displacement effects* (both in kind and/or 'steps' or 'removes'), *position effects*, or *serial-position effects*, etc. (see Thalbourne, 2003, pp. 31, 89, 113, respectively, for definitions of these effects).

attitudes. We therefore make the assumption that compliant and noncompliant pro attitudes are *incompatible* (i.e., mutually opposed). Compliance and noncompliance are thus qualitative states of mind that characterise the nature of the pro attitude.

The experiment described in the present article was designed to test the hypothesised relationship between compliant and noncompliant pro attitudes. The experiment was also designed to test the 'gambling' nature of individuals (i.e., as a believer in good luck, and/or as an intuitive type), since it is theorised that belief in good luck and intuition may facilitate psi effects.

In the next section, the gambling literature is reviewed, since paranormal effects may be involved in the gambling process.

Gambling

Recent research on gambling has shown that it is significantly related to individual differences in risk taking, liberalism, and previous gambling experience (Kassinove, 1998; Peltzer & Thole, 2000). Scales that measure attitudes towards gambling have been used to indicate a readiness to participate in gambling tasks and to take risks, and even to identify pathological gamblers (Kassinove, 1998; Lesieur & Blume, 1987). Therefore, some research into gambling using gambling scales has been carried out, and the sociological and psychological issues associated with gambling are well recognised, but no use whatsoever has been made of gambling scales as predictors of paranormal ability (e.g., Radin & Rebman; 1998; Etzold, 2001).

Only three studies were found that featured psi tasks using gambling techniques (Brier & Tyminski; 1970; Don, McDonough, & Warren, 1998; Kugel, 1990-1991). None of these studies used gambling scales. Insofar as a limited number of researchers have used participants in gambling situations to test paranormal ability, it remains to be seen whether 'gamblers' *per se* (i.e., gamblers characterised as such on the basis of scores on gambling scales) are predisposed towards gambling success (or failure), since, as stated, no study yet has sought a relationship between attitude towards gambling and paranormal ability.

There are those gamblers who are professional (they are generally successful and may, for example, be strongly influenced by intuition when they gamble), and there are those who lose habitually – the so-called 'problem gamblers'. Others have merely a social interest in gambling as a form of harmless entertainment. However, anyone may be

nominally referred to as a gambler if they participate in a gambling task. Individuals who are supportive of gambling (specifically referring to successful gamblers here) may be so oriented because they have certain dispositions, which encourage a pro attitude towards gambling success when they participate in gambling tasks (for an example, see Rhine, 1967, pp. 166-168). In fact, based on Thalbourne's (2004, pp. 65-66) statements, it could be argued that a pro attitude towards the goal of success at gambling may contribute to gambling success. This pro attitude may be tempered by the attitude or personality trait of the participant towards gambling. That is, gambling success may be *at least* partially attributable to the paranormal influence of the gambler in interaction with the personality of the gambler.

The next section looks at belief in good luck, which may be concomitant with a positive attitude towards gambling.

Belief in Good Luck

Smith, Harris and Joiner (1996) found that the term 'luck' was associated with events in one's life that worked out well, but were essentially attributable to chance. They also found that people tended to hold one and only one belief about the nature of luck: (i) luck was "an attribute that was either present or absent at birth," or (ii) the "level of luck" could be controlled by "superstitious behavior," or (iii) "luck was given to them (and taken away from them) by a 'powerful other' " (p. 37).

The so-called 'unlucky' person tended to believe (i) or (iii) above, and thought that their bad luck was outside their control, whereas the 'lucky' person tended to believe (ii) above, and thought that they were the 'cause' of their good luck.

Smith, Harris and Joiner (1996) noted that the cause of luck could come from (a) *cognitive biases* (i.e., selective memory, where optimists tend to remember the good, i.e., 'lucky' events, and pessimists tend to remember the bad, i.e., 'unlucky' events), (b) *motivational biases* (illusions of control could be set in place such as soft throws of dice to get low numbers, or personally selecting one's own lottery ticket), (c) *implicit learning* (with practice, strategies are learned unconsciously, and these, and not luck, account for improved performance), and (d) *psi* ("individuals might be using psi to create favorable situations" (p. 38)). The focus of the present study is on (d), where it is hypothesised that outcomes attributed to 'luck' are actually caused by paranormal means.

Greene (1960) was one of the first to investigate the concept of luck in paranormal research. She used the Greene Luck Questionnaire, which measures perceived luckiness, to determine a relationship between participants' perceptions about their own luck and success at a PK task involving the throwing of a ten-sided die. No relationship between luckiness and PK success was found. Ratte and Greene's (1960) variation on Greene's (1960) task used throws of a die to determine outcomes in an imaginary basketball game, and this time, scores on the luckiness scale correlated significantly with PK scores.

Generally, studies on luck are few and far between. Only in the 1990s has there been a renewed interest. Wiseman, Harris and Middleton (1994) administered a 2-trial 4-choice free-response clairvoyance test to participants who rated themselves on luckiness, but the correlation between perceived luckiness and actual ESP performance was not significant. They did find a significant positive correlation between perceived luckiness and actual paranormal performance for those participants who believed the paranormal task to be dependent on non-chance factors. Non-chance factors may include the perception that luck was involved.

Smith, Wiseman, Machin, Harris, and Joiner (1997) rated participants as 'lucky', 'unlucky', or 'uncertain' according to their responses on a Luckiness Questionnaire. Participants were asked to rate in advance their performance on a pseudo-RNG-based coin-flipping task, and then to perform the task. There were only chance differences between 'lucky' and 'unlucky' participants on psi scores, and ratings of predicted psi performance. However, a significant positive correlation was found between predicted psi performance and actual psi performance.

Darke and Freedman (1997a, 1997b) were also among the first to revive the interest in the phenomenon of luck. In terms of belief (and disbelief) in good luck, Darke and Freedman (1997a) define belief in good luck as "the [irrational] view that luck is a somewhat stable characteristic that consistently favors some people but not others and is especially likely to favor oneself," whereas disbelief in luck is defined as "the tendency to agree with the rational view of luck as random and unreliable" (p. 490). Darke and Freedman (1997b) found that scores on the Belief in Good Luck (BIGL) scale predicted positive expectations for the outcome of everyday situations that are typically associated with luck. They also found that those who believed themselves to be lucky were more confident and bet more money on a betting task, while those who believed

themselves to be unlucky, were less confident and bet less money.

Watt and Nagtegaal (2000) administered the BIGL scale to participants who then purchased tickets in the UK National Lottery. They found that 'lucky' participants (based on total BIGL scores) did not do significantly better than 'unlucky' participants at the lottery task. However, those who specifically believed their luck could affect their lottery success (based on answers to Question 8 on the Lottery Questionnaire scale about luck and its effect on lottery success; see Watt & Nagtegaal, 2000, p. 51) had significantly greater lottery success than those who did not believe their luck could affect their lottery success. In a dice-throwing task, again using the BIGL scale, there was no significant relationship between BIGL scores and success at the task.

While the results of the above studies are encouraging, more research on belief in luck is needed. In the present study, the focus is on belief in good luck. The tacit understanding will be maintained that belief in good luck has the irrational dimensions already described (viz., Darke & Freedman's, 1997a, definitions given above). The parapsychological experiment in the present study necessarily and legitimately eliminates the first three biases (a), (b), and (c), given above as the cause of luck (Smith, Harris & Joiner, 1996).

Intuition

In Jung's (1987) theory of Psychological Types it was proposed that intuition (the dominant personality function in consciousness of the so-called 'intuitive type') serves the purpose of determining the potential (i.e., the efficacy, the possibility, or the future state) of the object under observation, or the outcome of an event. Intuition is one of four functions of Jung's typology, along with Thinking, Feeling, and Sensation. Jung (1971) defines Intuition as:

> "...the function that mediates perceptions in an *unconscious way*...In intuition a content presents itself whole and complete, without our being able to explain or discover how this content came into existence. Intuition is a kind of instinctive apprehension. . . . Intuitive knowledge possesses an intrinsic certainty and conviction, [which] rests equally on a definite state of psychic "alertness" of whose origin the subject is unconscious."
>
> (Jung, 1971, para. 770).

Jung (1977) saw intuition, especially extraverted intuition, as being the function that assisted gamblers the most in their decision-making. Introverts are too concerned with inner (personal) processes to make judgments about external events. Jung may also have been responding to earlier research in parapsychology that found introverts tended not to score as high on psi tasks as extroverts.

Thalbourne (2004) too has hypothesised that intuition may be a condition conducive to exosomatic psychopraxia (i.e., psi). He refers to a special form of "infallible intuition" that keeps one in "a condition or state of consciousness" where "no information is inaccessible" (p. 117).

Daniels (1996) defined intuition as "the non-paranormal ability to grasp the elements of a situation or to draw conclusions about complex events in ways that go beyond a purely rational or intellectual analysis." However, we do not know yet whether successful (i.e., efficacious) intuition is an exclusively normal function, and it would be presumptuous to regard it as such. In fact, it is possible that valid intuitions can be the result of paranormal processes. Many decades ago, Hart (1948) noted the possibility of "practical applications of intuition for more rapid and successful development of research in the field of parapsychology" (p. 12). Since then, some efforts have been made towards incorporating the idea of intuition into parapsychological theory and experimental design (for examples, see Edge, 1977; Steinkamp, 1998; Targ, 1993; Tobacyk & Nagot, 1994; Weiner, 1982).

Intuitive types may have an advantage in paranormal tasks and they may more often be gamblers than the other three Jungian types. The professional gambler may even be more successful at gambling tasks than nonprofessionals due largely to a reliance on intuition. The function of intuition as a Jungian concept has been poorly researched in regard to the paranormal. Only two studies (Alexander, 2000; Parker, Grams & Pettersson, 1998) were found that looked at Intuition as measured on the MBTI, a test based on the 'bi-polar' assumption that Jung made in his theory about types. Neither study produced results indicating the use of intuition in the psi process.

Loomis and Singer (1980) found evidence that undermines Jung's 'bi-polar' assumption. The Singer-Loomis Type Deployment Inventory (SL-TDI) allows for ostensibly more realistic responses to the functions by not forcing participants to treat them as polarised constructs (i.e., as dimensional pairs: viz., thinking-feeling and sensing-intuiting). Instead, the four functions are measured on eight separate scales (i.e., the

extraversion and introversion dimensions are measured on each function). These scales are used in the present study.

There is little support for the hypothesis that intuition may be a conducive condition for a paranormal effect. Nevertheless, it has become a surrogate term for paranormal process, and has gained sufficient appeal for some researchers, leading them to establish research organizations devoted almost exclusively to research into intuition as a faculty of the human personality.[4] Research by these organizations may lead to further knowledge about intuition and its ostensible twofold (normal and paranormal) function.

The Pseudo-Gambling Experiment

Participants were first required to complete three scales (see below). They were then told that they would be participating in a forced-choice 'pseudo-gambling' card-identifying experiment, so called because they would not be required to make bets using their own money, although the decisions they made in the task would be made as if they were gambling. They were instructed to use hunches, guesswork, their 'sixth sense', and any other 'faculty' or mode of behaviour or apprehension they considered helpful in making a correct card selection. They were also informed that they would win or lose according to those decisions. In five trials, participants had to identify the correct location of five Aces of Spades while avoiding five Aces of Clubs. 'Instant Scratchies' tickets were paid-out for correctly identified Aces of Spades only (see *Procedures* below for details). The present study has three aims:

1. To gain insight into the nature of compliant and noncompliant pro attitudes.

2. To discover attitudes/dispositions conducive to a psychopractic (i.e., psi) effect using scores on the Kassinove's (1998) Gambling Attitude Scales (GAS), Singer and Loomis's (1996) Type Deployment Inventory (SL-TDI), and Darke and Freedman's (1997b) Belief in Good Luck (BIGL) scale.

3. To determine relationships between the three scales and subscales used (viz., the GAS, the SL-TDI, and the BIGL).

[4]For example: (1) Physics Intuition Applications, Inc., (online at: http://www.p-i-a.com/), (2) Richard Broughton's Intuition Laboratories, Inc., in Durham, NC, USA, and (3) the Perrott-Warrick Research Unit, Psychology Department, University of Hertfordshire, England (intuition research).

Parapsychological Hypotheses

The following parapsychological hypotheses were proposed. (The tests used are given in parentheses with each hypothesis.):

1. The number of correctly identified aces of spades (spade-hitting) is above chance, and the number of correctly identified aces of clubs (club-hitting) is below chance (P_{MCE} = 1.00; single-sample t test, one-tailed).

2. There is a negative relationship between spade-hitting and club-hitting (Pearson r).

3. Scores on the four GAS subscales correlate positively with spade-hitting, and negatively with club-hitting (Pearson's r).

4. Scores on the BIGL scale correlate positively with spade-hitting, and negatively with club-hitting (Pearson's r).

5. Scores on Extraverted Intuition (EN) correlate positively with spade-hitting, and negatively with club-hitting (Pearson's r).

6. Scores on Introverted Intuition (IN) correlate positively with spade-hitting, and negatively with club-hitting (Pearson's r).

All hypotheses are concerned with compliance (indicated by spade-hitting) and noncompliance (indicated by club-hitting).

Psychological Hypotheses

As discussed above, gambling, intuition, and belief in good luck may be interrelated. Therefore, the following specific hypotheses were proposed (Pearson r tests are used to test all three hypotheses):

1. Scores on the four GAS subscales correlate positively with EN scores, and negatively with IN scores (Pearson's r).

2. Scores on the four GAS subscales correlate positively with BIGL scores (Pearson's r).

3. BIGL scores correlate positively with EN scores, and negatively with IN scores (Pearson's r).

Method

Participants

A total of 100 participants volunteered for the experiment. The majority of the sample was comprised of University of Adelaide students at all levels, but mainly undergraduates, all of whom were invited to participate by lodging tear-off acceptance slips in a ballot box located in the Barr Smith Library on the University of Adelaide city campus. There was a minority of non-students found by word of mouth, including a subset of 12 members from the paranormal investigation group, PRISM International.[5] The total sample consisted of 45 males (45%) and 55 females (55%). The mean age was 26 years (SD = 10.75).

Measures

Three measures were used in the experiment:

1. Kassinove's (1998) Gambling Attitude Scales (GAS), which comprises four subscales measuring attitude towards gambling in 'general', 'casino', 'horse-racing', and 'lotteries'.

2. Singer and Loomis's (1996) Type Deployment Inventory (SL-TDI). The SL-TDI has eight subscales as follows: Introverted Sensing (IS), Introverted Intuiting (IN), Introverted Thinking (IT), Introverted Feeling (IF), Extraverted Sensing (ES), Extraverted Intuiting (EN), Extraverted Thinking (ET) and Extraverted Feeling (EF).

3. Darke and Freedman's (1997b) Belief in Good Luck Scale (BIGL), which is a 12-item scale designed to measure the level of belief in the concept of good luck.

Apparatus

Ten sets of material were used in the experiment: (1) four corkboard panels with wooden frames measuring approximately 450 x 600 mm (18 x 24 inches; each panel consisting of a 5 x 5 array of clips suitable for holding playing cards in place); (2) 20 packets of 'Queen's Slipper' brand playing cards (52 cards/deck); (3) five cards/hand comprised of

[5]PRISM International (Paranormal Research Investigation Services and Monitoring) is an amateur group of individuals interested in claims of the paranormal, and it conducts investigations into such claims. Members of PRISM International tend to believe in paranormal phenomena and to report paranormal experiences. There is anecdotal evidence that some members have psychic ability. L.S. thanks the president of PRISM International, Mr. Laurie Pearce, for his assistance in acquiring volunteers for the gambling experiment.

1 x Ace of Spades, 1 x Ace of Clubs, 3 x Kings, laid face-down in a row, each row constituting a trial (there are 5 rows, thus 5 trials); (4) 'Cling Wrap' clear plastic sheeting; (5) small, circular 'quik-stik' self-adhesive labels (colour: yellow); (6) Pagano's (1986, pp. 479–480) random number tables; (7) card selection record sheet; (8) information and instruction sheet; (9) picture chart showing the Ace of Spades and the Ace of Clubs; and (10) debriefing letter to participants.

Procedure

Stage 1 (questionnaires): Participants were required to complete the four measures (GAS, SL-TDI, and the BIGL scale).

Stage 2 (the gambling task): Participants were then required to complete the gambling task. The participant was presented with a 5 x 5 array of playing cards face-down (i.e., card pattern on top) and completely covered in clear plastic sheeting (total number of cards = 25). In a total of five trials (each row represents a trial), participants were required to locate in each trial the Ace of Spades in a 'hand' of five cards, all cards of which were face down so that their faces could not be seen with the naked eye (for each trial, p = .20).

Five 'Instant Scratchies' tickets of small cash value (but with high potential cash reward) were presented to the participant before 'gambling' commenced. Each time the participant won, s/he retained a ticket, but a failure to find the Ace of Spades meant the participant had to 'pay' out a ticket. The participant was free to stop the task at any time and take the winnings accrued as of the time of cessation of the task. Structured this way, the 'pseudo-gambling' task took on the dynamism of a real gambling task because the participant felt and/or thought that s/he was 'winning' or 'losing' without actually making a personal investment in the task.

An Ace of Clubs (a decoy) was also concealed in each of the five hands (for each trial, p = .20). Participants were instructed not to target Aces of Clubs. The decoy was necessary to test the hypothesis that significant overall success at the paranormal task of identifying aces of spades is evidence of a compliant pro attitude toward winning. Participants were thus requested to maintain a pro attitude towards the detection of the Ace of Spades only. However, should there be a significant number of hits on the decoy (i.e., the Ace of Clubs), then evidence would exist that undermines the assumption of sufficient compliance,

by showing that noncompliant pro attitudes can exist as well, and these can lead to psi-missing.

Playing cards were covered entirely with Cling-Wrap, and card selection was made by sticking an adhesive label onto the Cling-Wrap over the card of choice. Thus, the possibility of cheating was eliminated because the participant could not touch the cards, but could only indicate his/her choices with adhesive labels. The 5 x 5 card arrays were not prepared by the experimenter (L.S.), but by an assistant (either M.T. or A.B.).[6] The experimenter was not present during the randomised card-positioning process, and the locations of the cards were not made known to the experimenter prior to the trial. Positioning of the aces (spades and clubs) was by a random process using Pagano's (1986, pp. 479-480) random number tables. The cards were squared up in the 5 x 5 grid so that no single card stood out by way of a skew or tilt that might be regarded as a cue for, or a clue to, the participant.

Feedback by e-mail was given to all participants at a later date after questionnaires were scored.

Results

Preliminary Analyses

All 100 participants in the gambling experiment completed the GAS and BIGL scales, and five trials each in the forced-choice component of the experiment. All but one participant completed the SL-TDI. Using independent samples t tests, it was found that there were no significant differences on scoring between the PRISM group (n = 12) and the rest of the sample (n = 88) on the following measures: Ace of Spades hitting, Ace of Clubs hitting, the four GAS subscales, and the BIGL scale. There were significant differences on introverted intuiting, $t_{(97)} = -2.32$, p = .022, two-tailed, and extroverted intuiting, $t_{(97)} = -2.19$, p = .031, two-tailed. Hays (1963) formula[7] was used to calculate estimated effect sizes (omega-squared; ω^2) using the t statistic. It was found in both cases that approximately 4% only of the variance in the dependent variables was explained by group affiliation. This value falls short of the critical

[6]The experimenter, L.S. thanks M.T. (Michael Thalbourne) and A.B. (Alison Bruer) for their assistance. Both are researchers in the Anomalistic Psychology Research Unit, Department of Psychology, University of Adelaide.

[7]Hays (1963) recommends that omega-squared (ω^2) accompany the result of an independent-samples t test. When $t \leq 1$, the estimate of ω^2 = 0; when $t > 1$, estimated $\omega^2 = (t^2-1)/(t^2 + N_1 + N_2 - 1)$, where N_j is the size of each sample.

value of 9%, which is here deemed the minimum level of variance explained that would be functionally important (this convention has been used elsewhere in the first author's work—for examples, see Storm & Ertel, 2001; Storm & Thalbourne, 2001). Therefore, the two groups were treated as coming from the same population.

Parapsychological Hypotheses

Hypothesis 1: The number of correctly identified aces of spades (spade-hitting) is above chance, and the number of correctly identified aces of clubs (club-hitting) is below chance (P_{MCE} = 1.00). The number of aces of spades was above chance (M_{spades} = 1.02, *SD* = .82), but it was not significant, $t(99) = .245$, $p = .807$. The hypothesis was not supported, though the result was in the direction hypothesised. The number of aces of clubs was not below chance (M_{clubs} = 1.06, *SD* = .93). The directional hypothesis was not supported.

Hypothesis 2: There is a negative relationship between spade-hitting and club-hitting. Due to the two variables being semi-independent, the relationship between spade-hitting and club-hitting is likely to be negative, since the outcome on one variable limits the outcome of the other variable. That is, within-trial hitting is not independent, but between-trial hitting is independent. A negative relationship, however, is not guaranteed. For example, given that participants are expected to comply, it could be hypothesised that club-hitting is constant. Alternatively, although unlikely, club-hitting and spade-hitting could pair off for a majority of trials and/or cases due to approach-avoidance conflicts – the upper limit for spades and clubs would be 2.5 hits of each outcome (club or spade) per participant. Thus, even given the likelihood of 'ceiling' and 'floor' effects, it is possible that the relationship could be near constant, or even positive, so that, theoretically, the directional hypothesis could be rejected.

As it happened, there was a negative and significant correlation between the two types of hitting, $r_{(98)} = -.23$, $p = .011$, one-tailed. Thus, the relationship between the two types of hitting, although weak, was not constant in one variable for any given value in the other variable.[8]

By inference, the finding supports the earlier conjecture that if compliance is present, noncompliance tends not to be present. That is, if a

[8]Please note that the authors recognise the fact that a more valid result might be determined using the Monte Carlo method.

compliant pro attitude dominates, the noncompliant pro attitude tends to subside, and vice versa. However, a related-samples t test was performed with the participant as the unit of analysis and it was found that, taking into account the correlation between spade and club hitting, that neither variable significantly exceeded the other, $t_{(99)} = -.29$, p = .771 (two-tailed).

Hypothesis 3: Scores on the four GAS subscales correlate positively with spade-hitting, and negatively with club-hitting.

1. The relationship between *general gambling* and spade-hitting was not positive, but a negative relationship between *general gambling* and club-hitting *was* found. However, the correlation was not significant, $r_{(98)} = -.11$, p = .148, one-tailed. The hypothesis was not generally supported, although the direction was as hypothesised for the general gambling/club-hitting correlation.

2. The relationship between *horse racing* and spade-hitting *was* positive, but it was extremely weak and not significant, $r_{(98)} = .04$, p = .342, one-tailed. The relationship between *horse racing* and club-hitting *was* negative and significant, $r_{(98)} = -.26$, p = .005, one-tailed. The hypothesis was partially supported, with directions being correctly hypothesised for both correlations, and significant in one. The less positive participants were towards horse racing, the more they tended to hit on clubs. From this result, we infer a noncompliant pro attitude.

3. The relationship between *casino gambling* and spade-hitting was not positive, but a negative relationship between *casino gambling* and club-hitting *was* found. However, this correlation was very weak and not significant either, $r_{(98)} = -.07$, p = .250, one-tailed. The hypothesis was not supported, although the direction was as hypothesised for the casino gambling/club-hitting correlation.

4. The relationship between *lotteries* and spade-hitting was not positive, but a negative relationship between *lotteries* and club-hitting *was* found. However, this correlation was very weak and not significant either, $r_{(98)} = -.10$, p = .161, one-tailed. The hypothesis was not supported, although the direction was as hypothesised for the lotteries/club-hitting correlation.

Hypothesis 4: Scores on the BIGL scale correlate positively with spade-hitting, and negatively with club-hitting. The relationship between BIGL scores and spade-hitting was not positive, but the relationship between BIGL scores and club-hitting *was* negative, but not significant, $r_{(98)} = -.08$, p = .230, one-tailed. The two-part hypothesis was not supported, although the direction was as hypothesised for the BIGL scores/club-hitting correlation.

Hypothesis 5: Scores on Extraverted Intuition (EN) correlate positively with spade-hitting, and negatively with club-hitting. The relationship between EN and spade-hitting *was* positive, but not significant, $r_{(98)} = .09$, p = .192, one-tailed. The relationship between EN and club-hitting was not negative. The hypothesis was not supported, although the direction was as hypothesised for the EN/spade-hitting correlation.

Hypothesis 6: Scores on Introverted Intuition (IN) correlate positively with spade-hitting, and negatively with club-hitting. The relationship between IN and spade-hitting *was* positive, but not significant, $r_{(98)} = .13$, p = .104, one-tailed. The relationship between IN and club-hitting was not negative. The hypothesis was not supported, although the direction was as hypothesised for the IN/spade-hitting correlation.

Psychological Hypotheses

Hypothesis 7: Scores on the four GAS subscales correlate positively with EN scores, and negatively with IN scores. There were no significant correlations between the subscales of the GAS and EN, although they were in the direction hypothesised. There were no significant correlations between the subscales of the GAS and IN, although they were in the direction hypothesised.

Hypothesis 8: Scores on the four GAS subscales correlate positively with BIGL scores. There were four correlations to be tested in this hypothesis, and all four were positive and significant. Table 1 lists these correlations.

While the correlations listed in Table 1 do not suggest a causal relationship between attitudes towards gambling and belief in good luck, a common-sense relationship is evident in the fact that pursuing an indulgence in various forms of gambling (at least as measured on the GAS

Table 1: Pearson's r Correlations between the Four GAS Subscales and BIGL Scores

Variable	r	p^a
General Attitude	.25	.006
Casino Gambling	.21	.020
Horse Racing	.17	.048
Lotteries	.24	.008

[a] df = 98; p values are one-tailed.

subscales) would carry with it a desire in the typical gambler to win, and since chance plays such a big part in winning, a corollary of wishing to win would be a concomitant belief in good luck.

Note that the four subscales correlate highly with each other, so it is to be expected that the four significant correlations in Table 1 may be artifacts due to the interrelatedness of the subscales (see Table 2). This result is also a possible explanation for the general failures of the sub-hypotheses in Hypothesis 3 to be confirmed.

Table 2: Pearson's r Correlation Matrix for the Four GAS Subscales

Variable[a]	General Attitude	Casino Gambling	Horse Races
Casino Gambling	.88	-	-
Horse Races	.67	.58	-
Lotteries	.51	.42	.37

[a] df = 98; all correlations are significant at the .01 level (1-tailed).

Hypothesis 9: BIGL scores correlate positively with EN scores, and negatively with IN scores. The relationship between BIGL scale and EN scores was positive, but not significant, $r_{(98)} = .01$, p = .486, one-tailed. The relationship between BIGL scale and EN scores was also positive, but not significant, $r_{(98)} = .09$, p = .183, one-tailed.

Post Hoc Analyses

Attitude towards horse-racing as a necessary condition: The negative and significant horse-racing/club-hitting correlation warranted a median-split analysis of the sample to determine if low scores on attitude towards horse-racing were a necessary condition in bringing about significant club-hitting (as a necessary condition, it is taken as completing the ensemble of necessary conditions that constitutes a sufficient

condition for psi in this experiment).

The median score for horse-racing in the moderate group was 24. Low scorers (< 24) produced a mean hit-rate of 1.27 clubs (*SD* = .804; *ES* = .13), which was significant, $t_{(48)} = 2.10$, p = .041, two-tailed. It appears that a negative attitude (scores below 24) elicits noncompliant psi-hitting.

High scorers (> 24) produced a mean hit-rate of .78 clubs (*SD* = .704; *ES* = $-.10$), which was also significant, $t_{(44)} = -2.12$, p = .040, two-tailed It appears that a positive attitude (scores above 24) elicits avoidance of noncompliant psi-hitting.

A Reconsideration of the GAS: The present study sought to find relationships between scores on the subscales of the GAS and psi performance. These relationships were thought to be linear. However, from the mostly nonsignificant results relevant to the GAS subscales found above, there seemed to be good reason to reconsider the GAS, with particular emphasis on the underlying influence of gambling attitudes on the correlations tested in this hypothesis.

It was conjectured that extreme attitudes on gambling may inhibit other functions, including the psi function – low scorers would have an uncooperative attitude, which may interfere with psi, whereas high scorers, even with a cooperative attitude, may suffer the negative consequences of 'heightened anxiety' as a result of trying too hard (for a similar case, see Broughton & Alexander, 1997).

'Moderate' scores on the GAS scales, however, might reflect a type of individual who is even-keeled on the subject of gambling. Such a participant, free from the constraints of bias for or against gambling, *general* or in its various forms (i.e., *horse-racing*, *casino*, and *lotteries*), may be able to use his or her psi function in an unencumbered manner. Thus, moderate scores may still show a linear relationship with psi scores, as originally hypothesised, and this group of 'gambling moderates' may produce different results from those already found in Hypothesis 5 and 6 (Testing Hypotheses 3 and 4 would not be wise as the low n and limited variance of each subscale would adversely affect the outcomes).

Following this rationale, scores for the four scales were combined into an unbiased aggregate gambling score by totalling the four scores of the four GAS subscales. The aggregate score absorbs the diverse effects of the various attitudes on the subscales. The sample was then divided

into three groups ('low' scorers: n = 34; 'moderate' scorers: n = 33; and 'high' scorers: n = 33) based on aggregated scores.

When Hypotheses 5 and 6 were retested for the three groups, only the 'moderate' group produced significant correlations, of which there were four: (i) spade-hitting with EN, $r_{(31)} = .31$, p = .042, (ii) spade-hitting with IN, $r_{(31)} = .32$, p = .037, (iii) club-hitting with EN, $r_{(31)} = -.28$, p = .05, and (iv) club-hitting with IN, $r_{(31)} = -.34$, p = .027 (all tests were one-tailed).

Note that scores on the IN and EN sub-scales correlate significantly so that there is some degree of nonindependence between these two variables, $r_{(31)} = .65$, $p < .001$, two-tailed. This fact may account for these four significant correlations. When partial correlation analyses were conducted controlling for and EN and IN, the aggregated score of Intuiting (EN and IN combined) correlated positively and significantly with spade-hitting, $r_{(31)} = .34$, p = .025, and negatively and significantly with club-hitting, $r_{(31)} = -.34$, p = .025 (both tests were one-tailed). These results suggest that Intuiting (provided that the measure is the aggregated score on Intuiting) is a predictor of psi effects, but only when the score on aggregated attitude towards gambling is a moderate one.

Effect sizes, spade-hitting and club-hitting: The gambling experiment is a typical forced-choice experiment, the domain of which has a very low, but significant effect size (*ES* = .012; see Milton, 1998). Therefore, Hypotheses 1 and 2 were not likely to be supported, given the relatively small sample size (N = 100), and the fact that only a participant-based calculation of the numbers of hits was tested. On this basis, hit-rates, trial-based z scores, and effect sizes for the two types of hitting were calculated (see Table 3). Note that the use of trial-based z scores and effect size estimates follows Honorton and Ferrari's (1989) observation that "most parapsychological experiments . . . have used the trial rather than the subject as the sampling-unit" (p. 283). These comparisons are made against Honorton and Ferrari's calculation of the z score and *ES* norms for the forced-choice domain (viz., z = .38; *ES* = .012).

Rosenthal (1986) recommended that the "conceptual confusion" (p. 316) over replication can be eliminated by focusing on "effect size as the more important summary statistic" (p. 319) because degree of success or failure is more useful than a misleading "dichotomous decision" (p. 319) set up by a dependence on the value of p. Thus, if an effect size

Table 3: Trials, Hit-Rates, Trial-Based Z Scores and *ES* Scores for Spade Hitting and Club Hitting (N = 100)

Hitting Variable	Total Trials	Total Hits	Proportion of Hits	Z score	*ES*[a]
Aces of Spades	500	102	.204	.170	.008
Aces of Clubs	500	106	.212	.615	.028

[a]The estimate of effect size $z/n^{1/2}$ is used here, where z scores are 'exact'

in one study is not significantly different from that of a previous study, replication has been achieved.

From Table 3 it can be seen that the *ES* is higher on club-hitting than spade-hitting. The *ES* norm for the forced-choice domain falls between these two rates of hitting, with spade-hitting below the mean *ES* norm, and club-hitting above the norm, but the two forms of hitting were not significantly different from each other, $\chi^2_{(1,N=1000)} = .019$, p = .891 (for the formula used to calculate the chi-squared value, see Rosenthal & Rubin, 1989). Without further testing, it is logical to conclude that these two effect sizes are not only comparable with the significant psi effects reported for the forced-choice domain, but are replications of those effects as well. These results also suggest that the noncompliant pro attitude had more influence than the compliant pro attitude, although the difference appears to be a chance fluctuation only.

Success Rates (Planned Analyses Only)

Thirty-one planned tests were conducted in the present study. Only six were significant (19%). Seventeen tests were conducted for the parapsychological hypotheses—only two were significant (12%; above chance, although two significant outcomes is only one above what would be expected by chance), but 11 were in the directions hypothesised (65%), which is more than half that would be expected by chance.

Fourteen tests were conducted for the psychological hypotheses—four were significant (29%; well above chance), and all were in the directions hypothesised (100%).

One major disadvantage to the experiment was the strong interrelatedness of the four GAS subscales (see Table 2). Thus the tendency for failure to reach significance in one Pearson's r test where a GAS subscale was a variable, virtually guaranteed failure in Pearson's r tests where other GAS subscales were variables.

Discussion

There were three aims in the present experiment:

1. To gain insight into the nature of compliant and noncompliant pro attitudes.

2. To discover attitudes/dispositions conducive to a psychopractic (i.e., psi) effect using scores on the GAS, the SL-TDI, and the BIGL scale.

3. To determine relationships between the three various scales and subscales used (viz., the GAS, the SL-TDI, and the BIGL).

These are now discussed.

Compliance and Noncompliance

The problem of compliance rests hand-in-hand with the concept of the pro attitude because the experimenter can play a pivotal role in the construction of the participant's pro attitude, and he or she does this under the expectation of compliance in the participant. Compliance was proposed as being an important concomitant of the pro attitude. Take away compliance, and the possibility exists that the goal, on which the concomitant pro attitude is meant to be focused, may not manifest. It would then only be possible to *infer* the presence of a pro attitude if a measurable effect did not manifest. A mere inference, however, would be inadequate for parapsychology, and on that basis some researchers might prematurely dismiss the pro attitude concept altogether. Hence the importance of *sufficient* compliance in a sample, in the sense that its presence underscores a sufficient number of compliant pro attitudes, which may lead to a psi effect that we argue is indicated by a significant result.

Given the hypothesis that some pro attitudes can be oppositional to each other, it was further proposed that evidence of psi-missing (i.e., noncompliant hitting) could be used to indicate the presence of noncompliant pro attitudes. This discovery would give the researcher a second chance at nailing down the presence of a pro attitude of sorts, even if it was a noncompliant one. The question that must therefore be asked is: "Was there evidence of compliant and/or noncompliant pro attitudes during the experiment?"

It must first be stated that some degree of effort was made in the present experiment to limit the outcomes to two types of psi. Participants were thus set up, as it were, to choose between two alternative forms of targeting. This protocol encouraged certain types (most likely

believers in the paranormal) to adopt a compliant pro attitude (it is tacitly understood that believers would endeavour to adopt a compliant pro attitude), whereas certain other types (most likely skeptics naïve to statistical testing of psi) had the opportunity to adopt alternative but noncompliant pro attitudes of their own devising (extreme skeptics, for example, might target aces of clubs, even though they stood to lose 'Instant Scratchies' tickets, while moderate skeptics might default to king cards). Structured this way, the protocol attempted to eliminate a number of possible strategies on the part of skeptics by 'forcing' them to adopt only one of a limited number of noncompliant pro attitudes. (Note that it is assumed that both skeptics and believers were present in the experiment, as is the case in randomised psi experiments.) This protocol was meant to help participants focus their psi, thereby giving the experiment more power.

In the present study, a successful hit-rate in the 'Ace of Spades' task could be taken to mean that the assumption of *sufficient* compliance had been met, and therefore, that a compliant pro attitude had been held by a *sufficient* number of participants (see again, our *caveat* in footnote 2). Likewise, a successful hit-rate in the 'Ace of Clubs' task could be taken to mean that noncompliant pro attitudes had been held by a *sufficient* number of participants.

In either case, the sample did not produce a significant number of hits on spades or clubs as measured on participant-based counts, although the effect sizes for both forms of hitting, as measured on trial-based counts, were not significantly different from the mean effect size norm for the forced-choice domain. There appeared to be evidence of replicated psi effects, so that both forms of 'hitting' (spade-hitting and club-hitting) suggested that compliant and noncompliant pro attitudes, respectively, were present during the experiment. We argue that this conclusion is a sound theoretical inference.

It was also shown that the presence of a compliant outcome (i.e., spade-hitting) tended to indicate the absence of noncompliant pro attitudes (i.e., club-hitting; see Hypothesis 2). Thus is inferred an inverse relationship between the compliant pro attitude and the noncompliant pro attitude, although we are aware of the fact that the two types of hitting are only partially independent. Notwithstanding that limitation, this negative relationship is an important one. It indicates that there may be a negative relationship between compliant psi and noncompliant psi.

Attitudes and Dispositions as Necessary Conditions for Psi

This study attempted to find necessary conditions for paranormal performance. No relationships were found between (a) psi scores and belief in good luck (BIGL), (b) psi scores and Extraverted Intuiting (EN), or (c) psi scores and Introverted Intuiting (IN). Only one of the four GAS subscales (horse racing) correlated negatively (as hypothesised) and significantly with club-hitting, suggesting that the more negative the attitude is towards horse racing, the greater the tendency towards noncompliant psi targeting (i.e., in traditional terms, psi-missing). It is possible that this trend did not extend into a significant relationship between horse racing and compliant psi targeting (i.e., psi-hitting) because participants may have been disturbed by cognitive dissonance in the form of a movement against the use of animals in sport, and benefiting financially from that arrangement.

In the post hoc analysis, a median-split analysis revealed that a negative attitude towards horse-racing was a necessary condition that made complete the ensemble of conditions that was sufficient for bringing about psi-missing (i.e., club-hitting).

It was also argued (post-hoc) that a moderate attitude towards gambling (measured using an aggregated score of the four gambling scales) would be psi-conducive because the 'moderate' participant was free from the inhibitory effects of extreme viewpoints about gambling, which might 'scramble' the psi function, and/or the intuitive function, and/or belief in good luck. Insofar as 'low' and 'high' scorers were excluded from the analysis, the assumption that relationships between the relevant variables are linear ran counter to the proposed hypotheses where Pearson's r tests were conducted.

It was also found (post-hoc) that EN and IN were predictors of both spade-hitting and club-hitting, but further analysis revealed that EN and IN were non-independent variables. Partial correlation analyses and further bivariate analyses revealed that aggregated Intuiting scores correlated positively and significantly with spade-hitting and negatively and significantly with club-missing. Thus, it appeared that the relationship between psi and Intuiting seemed to be tempered by the effect of a moderate attitude towards gambling. In terms of psychopraxia, if the participant held a moderate attitude towards gambling, an exosomatic effect (either psi-hitting or psi-missing) seemed more likely if the participant scored high on aggregated Intuiting. Thus,

Jung's (1977) claim that intuition was a function that assisted gamblers in their decision-making is supported by our findings, but it is not clear what factor determines hitting from missing since Intuiting scores predict both.

The Relationship between Gambling, Belief in Good Luck, and Intuition

Psychological relationships between seven scales (i.e., four GAS subscales, IN and EN on the SL-TDI, and the BIGL scale) were hypothesised (see Hypotheses 7, 8 and 9). There was no evidence that EN and IN are related to the GAS (Hypothesis 7), but relationships were found consistently between gambling and belief in good luck – all four GAS subscales correlated significantly with the BIGL scale and in the directions hypothesised (Hypothesis 8). Therefore, gambling and belief in good luck seem to be related in a way that common sense would dictate. There was no evidence that EN and IN are related to the BIGL scale. However, tentative support for all the hypothesised relationships discussed in this subsection came in the form of a 100% success rate in regard to directions hypothesised.

Conclusion

While the parapsychological results are mainly inconclusive, some findings relating to intuition and attitude towards gambling warrant further investigation. In regard to those findings, we inferred the relationships between pro attitudes (compliant and noncompliant) and psi. However, the natures of these two types of pro attitude need further clarification through continued empirical research. This research should necessarily include administering direct measures of pro attitude, which should be both *self-attributed* and *implicit* in form. That is, given the hypothesised nature of the pro attitude, it is important to consider, and attempt to measure conscious *and* unconscious pro attitudes. These possibly incompatible pro attitudes may give answers to the nature and mechanism that underlies compliance and noncompliance in psi testing.

The pro attitude may also prove to be an important concept for parapsychology in another sense. In the present study, it was hypothesised to be an initiating force that underlies psychopractic action, since it would be integrated within the ego/Self structure. The pro attitude (especially that of the skeptic), on the one hand, and the experimenter effect, on the other, are often noted to be in an antagonistic relationship.

Still to be determined is the degree to which each contributes towards the psi effect.

Acknowledgements

This article was adapted from a chapter in the first author's Ph.D. thesis. Research reported in this article was made possible by a grant from the Bial Foundation, Portugal. We would like to thank Bob Willson for statistical advice.

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