

## Study Registration for the KPU Study Registry

The registration information for the study is given below. Each section can be expanded as needed.

### 1. The title or name of the experiment (for listing the experiment in the registry).

Attitudes and Beliefs as Predictors of Psi Effects in a Pseudo-Gambling Task

### 2. The name, affiliation, and email address for the lead experimenter(s) for the study.

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### 3. A short description or abstract of the purpose and design of the experiment.

Most parapsychological studies are designed with a single psi outcome as the dependent variable, but two dependent variables—measured as two diametrically opposed outcomes—might serve as an indicator of how psi functions for sheep, on the one hand, and for goats on the other. It is understood that sheep will use psi to hit a target, but as far as goats are concerned, the conventional understanding is that they will inadvertently use psi to avoid the target. In other words, goats do not tend to psi-hit; they tend only to score at chance or occasionally psi-miss, and since the sheep-goat effect is sufficiently demonstrated when goats score significantly lower than sheep, little thought is given to the fact that goats are never specifically asked to psi-miss *per se*. This is because experimenters think such an option would be counter to the typical goat's belief system (i.e., goats would rather avoid a target so as not to prove any kind of psi; even psi-missing). Thus, although psi-missing from goats demonstrates target avoidance, the effect is not optimized in standard psi tests, as target avoidance is never encouraged (hypothesized) explicitly so that goats (noncompliant participants) too can have a legitimate aim or goal.

In this study, predictors of psi-hitting, psi-missing, and displacement are sought in an on-screen forced-choice card identification experiment run on computer. Paranormal belief, gambling attitudes, and beliefs about luck are investigated as predictors of psi outcomes. Paranormal belief is measured on the Australian Sheep-Goat Scale (ASGS; Thalbourne, 1995). Attitudes towards gambling are measured on the Gambling Attitude Scales (GAS; Kassinove, 1998), and Attitudes Towards Gambling scale (Canale et al., 2016). Beliefs about luck are measured on the Belief in

Good Luck Scale (BIGL; Darke & Freedman, 1997a,b), and the Questionnaire of Beliefs about Luck (QBL; Luke, Sherwood, & Delanoy, 2003).

**4. A statement or list of the specific hypothesis or hypotheses being tested, and whether each hypothesis is confirmatory or exploratory. ([confirm/explore guidance](#))**

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

H1a: For the whole sample, the spade-hitting and club-hitting effects will replicate those found in Storm and Thalbourne (2005, p. 36, 42), which were both above chance (not significantly). The differences are not expected to be different from  $ES = 0.008$  (for spade-hitting) and  $ES = 0.028$  (for club-hitting), which were calculated from the data collected by Storm and Thalbourne (2005, p. 42). See Section 7 for formula and details about calculations.

NEW: H1b: The number of correctly identified Aces of Spades (spade-hitting) is above chance for sheep ( $P_{MCE} = 1.00$ ), and the number of correctly identified Aces of Clubs (club-hitting) is above chance for goats ( $P_{MCE} = 1.00$ ). See Section 7 for formula and details about calculations.

NEW: H1c: A sheep-goat effect is expected for spade-hitting as performance differences (expressed as critical ratios, CR) both (i) *within the data of the present study*, and (ii) *as replications of past findings* (reported in Storm & Tressoldi, 2017, p. 89): “ $CR(z) = 0.40$ ,  $CR(ES) = 0.077$ ” (p. 89). See Section 7 for formula and details about calculations.

H2. There is a negative relationship between spade-hitting and club-hitting.

NEW: H3. Scores on the RASGS scale correlate (i) positively with spade-hitting, and (ii) negatively with club-hitting.

H4. Scores on (a) the four GAS subscales (General, Lottery, Horse Races, Casino), and (b) the ATGS-8 (NEW), correlate positively with spade-hitting, and negatively with club-hitting.

H5. Scores on the BIGL scale correlate positively with spade-hitting, and negatively with club-hitting.

NEW: H6. Scores on four QBL measures (Luck, Providence, Fortune, and Perceived Personal Luckiness) correlate (i) positively with spade-hitting, and (ii) negatively with club-hitting (NB: the two relationships are reversed in direction for the Chance measure; see Luke et al., 2008, pp. 201-202).

NEW: H7. RASGS, BIGL, ATGS-8, GAS, & QBL subscales (+ Sex & Age) predict spade-hitting (Multiple Regression Analysis).

NEW: H8. RASGS, BIGL, ATGS-8, GAS, & QBL subscales (+ Sex & Age) predict club-hitting (Multiple Regression Analysis).

\* \* \*

In the original H1, Storm and Thalbourne (2005) did not specify a sheep-goat difference. *Generally*, however, and ignoring the distinction of paranormal belief, H1a above would be *confirmatory* just as the effects in the original H1 for spade-hitting and club-hitting (whole sample) replicated the generally weak effects in forced-choice designs. That is, the  $ES$ s of 0.008 (for spade-hitting) and 0.028 (for club-hitting) reported in Storm and Thalbourne (2005, p. 42)

were in the range 0.01 to 0.05 reported in the meta-analyses for forced-choice designs undifferentiated by paranormal belief (Cardeña, 2018; Storm, 2006; Storm, Tressoldi, & Di Risio, 2012). The same effects are expected to replicate for the whole sample in this proposed study. This procedure follows Rosenthal's (1986) advice that a replicated effect does not solely have to mean the new finding is independently significant (i.e.,  $p < .05$ ); but rather it is not significantly different from previous findings.

*Specifically*, H1b is *confirmatory* in that a sheep can be expected to spade-hit which is underpinned by a compliance protocol like standard psi tests (see Storm & Tressoldi, 2017). In the case of club-targeting, that may result in club-hitting, the protocol to avoid has, to my knowledge, never been used or tested before, so that part of H1 is *exploratory* in that it speaks to goats' outcomes in an avoidance task. Also, we don't know how the combined instructions (especially to avoid clubs) will affect sheep.

Finally, H1c is *confirmatory* (i.e., a sheep-goat effect on spade-hitting)—differences are expressed as critical ratios (CR) both (i) *within the data of the present study*, and (ii) *as replications of past findings* (reported in Storm & Tressoldi, 2017, p. 89): “CR( $z$ ) = 0.40, CR(ES) = 0.077” (p. 89).

H2 is *confirmatory* because the spade-hitting/club-hitting correlation was significant and negative as hypothesized.

H3, H4b, H5, H6, H7, & H8 are essentially *exploratory*, either (i) because the ASGS (H3), the ATG-8 (H4b), and the QBL (H6), have not been tested in this design as possible correlates of psi; or (ii) the BIGL was not a significant correlate (H5) in Storm and Thalbourne (2005); or (iii) none of the measures have been tested as predictors in multiple regression analyses (H7 & H8). However, one sub-hypothesis (H4a) in the initial study (Storm & Thalbourne, 2005) was significant—namely, horse-races/club-hitting, so H4a<sub>Horse-Races</sub> is a *confirmatory* hypothesis.

## **5. The planned number of participants and the number of trials per participant.**

Students from University of Adelaide ( $N = 120$ ). Five trials per participant. Total trials = 600.

## **6. A statement that the registration is submitted prior to testing the first participant, or indicating the number of participants tested when the registration (or revision to the registration) was submitted.**

Testing is scheduled to start May 1, 2021 and conclude April 30, 2022. It is planned that testing will not commence until after registration at KPU.

**The following additional information is needed for studies that include confirmatory analyses:**

**7. Specification of all analysis decisions that could affect the confirmatory results, including: the specific statistical test for each confirmatory hypothesis, whether the test is one-sided or two-sided, the criterion for acceptable evidence, any transformations or adjustments to the data, any criteria for excluding or deleting data, and any corrections for multiple analyses. Checklists and examples**

for registering classical analyses, permutation and bootstrap analyses, Bayesian analyses, and classification analyses are provided in the [statistics registration document](#). (This information can be included in section 4 above for simple experiments.)

The *confirmatory* hypotheses are H1 (partially), H2, and H4a (horse-races/club-hitting). All tests are one-tailed. The level of significance is set at  $\alpha = .05$ . Data is not transformed, permuted, or boot-strapped. There can be no excluded (e.g., missing) data as the online pages do not permit continuation to another questionnaire unless and until all items are answered.

- In the original H1, the Single Samples *t* test was used to test both types of hitting (Spades and Clubs) separately (Storm & Thalbourne, 2005, p. 36), but not sheep and goats specifically. All three parts of H1 (a, b, & c) are underpinned by a standard (compliance) protocol; participants are generally expected to *target* Ace-of-Spades (expected effect = spade-hitting).
- H1a: For the whole sample, the spade-hitting and club-hitting effects will replicate those found in Storm and Thalbourne (2005, pp. 36, 42). The differences are not expected to be different from  $ES = 0.008$  (for spade-hitting) and  $ES = 0.028$  (for club-hitting), which were calculated from the data collected by Storm and Thalbourne (2005). Respective ESs will be compared using the VassarStats online calculator (Lowry, 2001-2021). The programme compares *r* values; Rosenthal (1986, p. 319) equates ES with *r* by using the same formula used in the meta-analyses (i.e.,  $ES = r = z/\sqrt{n}$ ).
- H1b: It is expected there will be a sheep effect (above MCE scoring) on spade-hitting, so this ‘sheep’ part of H1b would be confirmatory of the *general* literature finding for sheep (e.g., Storm & Tressoldi, 2017, p. 90). Sheep can be expected to hit on card-guessing (e.g., Zener cards) in the vicinity of  $ES = 0.021$  ( $N = 6$ ). The new ES will be tested against 0.021 as the test statistic in a Single Samples *t* test (in SPSS).
- H1c: A sheep-goat effect is expected for spade-hitting as performance differences both (i) *within the data of the present study*, and (ii) as *replications of past findings* (reported in Storm & Tressoldi, 2017, p. 89). For both (i) and (ii), the sheep-goat difference is expressed as a critical ratio (CR) given by Formula #10 in Edge et al. (1986, p. 154; also used by Lawrence, 1994, p. 76; and Storm & Thalbourne, 2017, p. 106) for change in scoring as hit totals of two groups of trials:

$$CR(z) = \frac{(H_1/n_1) - (H_2/n_2) \pm 0.5(1/n_1 + 1/n_2)}{\sqrt{[(pq/n_1) + (pq/n_2)]}}$$

where  $CR(z)$  is the critical ratio difference as a *z* score,  $H_1$  and  $H_2$  are the total number of hits in each group,  $n_1$  and  $n_2$  are the corresponding numbers of trials,  $p$  = chance probability of a hit (the reciprocal of the number of target alternatives),  $q$  = chance probability of a miss (i.e.,  $1 - p$ ), and  $\pm 0.5$  means adjust towards zero. A significant  $CR(z)$  indicates a sheep-goat effect. A  $CR(ES)$  can be calculated,  $ES = z^*(\sqrt{1/n_1} + \sqrt{1/n_2})$  where  $n_1$  and  $n_2$  are the number of trials for sheep and goats. Stouffer *Z* and Confidence Intervals will also be reported (Storm & Tressoldi, 2017, p. 89).

- For (ii), CR( $z$ ) and CR(ES) calculated in the present study are to be compared with the Storm and Tressoldi (2017) values of CR( $z$ ) and CR(ES) for their sub-sample of studies with actual sheep and goat trials and hit-counts ( $N = 16$ ), as reported in their meta-analysis of past sheep-goat forced-choice studies dating from 1994 to 2015 (actual data appears in APPENDIX A2, p. 105). The past (earlier) values determined from this data are: “CR( $z$ ) = 0.40, ... CR(ES) = 0.077” (p. 89), though the 95% CIs embraced zero in both cases (p. 89). The Stouffer  $Z = 1.58$  ( $p = .057$ ) was considered marginally significant. The two CR( $z$ ) pairs can be tested against each other to determine replication using Rosenthal’s (1986, p. 317) formula for a  $z$ -score difference,  $(z_1 - z_2)/\sqrt{2}$ . The same applies to the two Stouffer  $Z$ ’s. The CR(ES) pairs can be tested against each other using the VassarStats online calculator (Lowry, 2001-2021).
- In the original H2, the test used was Pearson’s  $r$ . The test result was negative and significant for spade-hitting/club-hitting (as hypothesized),  $r(98) = -0.23$ ,  $p = .011$ .
- In the original H4a, the GAS<sub>Horse-Races</sub>/club-hitting correlation in the initial study (Storm & Thalbourne, 2005) was negative and significant (as hypothesized),  $r(98) = -0.26$ ,  $p = .005$ .

## 8. The power analysis or other justification for the number of participants and trials.

This design is to be governed by time constraints and participant availability. Given a 1/4-time work load and other commitments, 120 participants with five trials each (total trials = 600) was deemed the largest number of participants/trials that I could reasonably expect to test in the seven-month testing period (the remaining five months are for data entry, analysis, and write-up).

However, it is expected that the hit rates (for spade and club counts) will be *just above* chance (whole sample), but probably non-significantly, where MCE = 20% ( $k = 5$ ). Based on meta-analyses and reviews featuring forced-choice studies (Cardeña, 2018; Storm, 2006; Storm & Tressoldi &, 2017), effect size ES (as  $ES = z/\sqrt{n}$ ) has been reported to be as low as 0.01, but as high as 0.05. The original study (Storm & Thalbourne, 2005) gave comparable ESs in that range: rounded up to 0.01 (for Spade-Hitting) and 0.03 (for Club-Hitting) with only 500 trials. A basic power analysis (G\*Power) suggests that, for 600 trials, with effects in that range (0.01 and 0.05), power ( $1 - \beta$ ) would only be 0.08 to 0.18, respectively. Ideally, power could reach roughly 0.80, if effects were expected in the region of 0.10 (a ten-fold increase), or the sample was raised to  $N = 7000$ . I therefore do not expect significant hit-rates, but I will follow Rosenthal’s (1986) assertion that replication is evident if a subsequent effect size is not significantly different from a prior effect size: “A replication is successful to the degree that the second study obtains an effect size similar to the effect size of the first study” (p. 334).

There is no need for a power analysis—Appendix A2 (p. 105) shows that the marginal Stouffer  $Z$  was derived from 12,000 trials for sheep, and 6,600 trials for goats, which is beyond the scope of this study.

H2 and H4a—If these effects are real (i.e., these two hypotheses are true), they will replicate, since the new sample will be bigger ( $N = 120$ ) than previously ( $N = 100$ ). A basic power analysis (G\*Power) suggests that, for 120 participants, with effects  $r = -0.23$  (H2), and  $r = -0.26$  (H4a), power ( $1 - \beta$ ) would be 0.82 and 0.89.

## **9. The methods for randomization in the experiment. If a pseudorandom generator is used, specify how and when the seed(s) will be obtained.**

Randomization to determine assignment to one of two groups (treatment or control) is done by pseudo-random program written into the code for the study which is presented on a computer monitor. Randomization of targets is conducted using a true-noise RNG (Schmidt, 1970, 1973). Details about his machine are in Thalbourne (2006).

## **10. A detailed description of the experimental procedure.**

For the proposed study, a simultaneous two-task design would sufficiently demonstrate a more balanced differential effect for sheep and goats. The advantage to process-oriented parapsychology of the present study is that: (i) it caters to a participant's goal orientation, whether the individual is a sheep or a goat, and (ii) noncompliance in goats can be tested at more than one level, thus attaining evidence of sheep-goat effects in both degree and kind. Degree refers to a unidimensional effect along a continuum of psi-hitting usually in relation to paranormal belief. Kind refers to a sheep/psi (approach) response vs. a goat/psi (avoidance) response, differentiated by a simultaneous two-task test that has two corresponding psi-outcomes—that is, spade-hitting (preferential to sheep) and club-hitting (preferential to goats)—as options that take into account the factors of compliance and noncompliance in sheep and goats.

Also, it is proposed that putting participants in a gambling situation may encourage psi because of the added incentive to gain in the process if psi is focused to help the participant win. Therefore, by measuring gambling outcomes, along with gambling attitudes, paranormal belief, and beliefs about luck as possible psi predictors, we may be better able to understand the psi process (and even the motivations underlying gambling).

### *The Pseudo-Gambling Experiment*

Participants will be required to complete five scales (see Measures below). They will then be told that they will be participating in a forced-choice 'pseudo-gambling' card-identifying experiment, so called because they will not be required to make bets using their own money, although the decisions they make in the task will be made as if they were gambling (i.e., it 'costs' each time they guess wrong). They will be instructed to use hunches, guesswork, their 'sixth sense', and any other 'faculty' or mode of behaviour or apprehension they consider helpful in making a correct (spade) card selection.

They will be informed that they will win or lose according to those decisions. In five trials, participants are expressly asked to identify the correct location of Aces of Spades (five in total), and they are expressly asked to avoid Aces of Clubs (five in total). Participants will be told that they will win 'Instant Scratchies' tickets if they correctly identify Aces of Spades only (see *Procedure* below for details). The present study has two aims:

1. To gain insight into the sheep-goat effect manifesting in both degree and kind.
2. To discover correlates and predictors of psi effects using (as DVs) RASGS, GAS, ATGS-8, BIGL, and QBL, in bivariate correlational analysis and multiple regression analyses.

### *Participants (see Section 5)*

### *Measures*

Four measures are to be used in the study:

1. Rasch-scaled Australian Sheep-Goat Scale (RASGS; Thalbourne, 1995): an 18-item scale, each item scoring 0 (false), or 1 (uncertain), or 2 (true). ASGS data are top-down purified to eliminate age and gender bias from the scale (Lange & Thalbourne, 2002);
2. Gambling Attitude Scales (GAS; Kassinove, 1998): comprises four subscales measuring attitude towards gambling in ‘general’, ‘casino’, ‘horse-races’, and ‘lotteries’ (9 items per subscale; Total: 36);
3. Attitudes Towards Gambling Scale (ATGS-8; Canale et al., 2016): comprises eight items to measure general attitude to gambling, not subject to “specific gambling activity” (p. 71).
4. Belief in Good Luck Scale (BIGL; Darke & Freedman, 1997a): a 12-item scale (scored on 5-point Likert scales; 1= strongly disagree to 5 = strongly agree) designed to measure the level of belief in the concept of good luck;
5. Questionnaire of Beliefs about Luck (QBL; Luke, Sherwood, & Delanoy, 2003): a 41-item questionnaire scored on 7-point Likert scales. There are four polar concepts of 10 items each (Luck, Chance, Providence, and Fortune), and a one-item Perceived Personal Luckiness measure.

### *Procedure*

Stage 1 (Questionnaires): Via on-screen computer monitor, participants are required to complete the five measures (ASGS, GAS, ATG, BIGL, & QBL).

Stage 2 (Gambling Task):

On a computer monitor, five frames (rows) are presented one by one, each frame consisting of a row of five (5) playing cards (images drawn from a standard 52-card deck). Each row represents a ‘hand’ of five concealed cards comprised of 1 × Ace of Spades, 1 × Ace of Clubs, 3 × Kings—all face-down; each row is a trial (total: 5 rows = 5 trials).

All cards appear face down so that their values are not identifiable. Participants are required to complete the gambling task trial by trial. Participants are required to locate, in each trial, the Ace of Spades in the ‘hand’ of five cards by using the mouse, placing the cursor over the card of choice, and left-clicking (for each trial,  $P_{MCE} = .20$ ). An ‘Instant Scratchies’ ticket (AUD\$1.00) of small cash value (but with high potential cash reward) is issued by the experimenter each time the participant finds an Ace of Spades (each participant can win up to five tickets). Targeting this card tests the hypothesis that significant overall success at the paranormal task of identifying Aces of Spades is evidence of compliance and a desire to win.

An Ace of Clubs is also concealed in each of the five hands (for each trial,  $P_{MCE} = .20$ ). Participants are instructed not to target Aces of Clubs. This card is necessary as a test of noncompliance. Should there be a significant number of hits on the Ace of Clubs, then evidence would exist that undermines the assumption of sufficient compliance, by showing that noncompliance can exist in psi studies as well, which can lead to psi-missing. Structured this way, noncompliance in goats is optimized possibly to the same degree that compliance is optimized in sheep. Thus, this procedure is a more balanced test of the sheep-goat effect. (NB. Since club-targeting is considered noncompliant, it is not rewarded, as that could have adverse effects on compliance in sheep, some of whom would have no incentive to stick to spades, and some goats may see it as coaxing and even displace to Kings.)

The experimenter (L.S.) can have no knowledge of the outcomes as they are generated live during each trial. After each trial, the participant is given immediate feedback on the trial page; at the end of five trials (which also marks the end of the experiment) a total hit rate is given, so that the participant can receive the correct number of ‘Scratchies’ tickets. Feedback on trial outcomes is live, but questionnaire feedback will be by e-mail and sent to participants at a later date once questionnaires are scored.

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