

RESEARCH ARTICLE

**Imagination and Reactance in a Psi Task
Using the Imagery Cultivation Model
and a Fuzzy Set Encoded Target Pool**

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Abstract—A psi-conductive altered state of consciousness can be induced through a shamanic-like journeying protocol in accordance with the Imagery Cultivation (IC) model proposed by Storm and Rock (2009a). Storm and Rock (2009b) found that the protocol helped *cultivate* psi-related mental *imagery*. Alternatively, it is hypothesized that individuals who do *not* believe in psi or paranormal phenomena (i.e. ‘goats’) are prone to so-called reactance (Brehm 1966). Reactance is a motivational state aimed at restoring one’s sense of freedom when one feels threatened (Silvia 2005). A reactance treatment in the form of an opinionated communication (perceived as a threat to freedom) can raise reactance, which remains high if no outlet is provided. This induced effect can result in a noncompliant attitude and response, purely as a knee-jerk reaction to the threat. It is hypothesized that higher noncompliant behavior (e.g., psi-missing) can be induced in goats. Storm, Ertel, and Rock (2013) and Storm and Rock (2014) found support for the reactance hypothesis. IC and Reactance principles were used in the present study to manipulate psi in positive and negative directions, respectively. Four groups (total $N = 240$) were formed: (i) IC/Reactance, (ii) IC/No-Reactance; (iii) No-IC/Reactance, and (iv) No-IC/No-Reactance. The IC treatment produced a non-significant but slightly higher psi effect than the control condition. The reactance treatment had a stronger psychological effect on goats compared with sheep, indicated by a significantly greater discrepancy in goats over the opinionated communication. Significant reactance effects were not found, but specific effects were in the directions expected, with reversals of effects probably due to goats and ‘indecisives’ (mid-range scorers on paranormal belief) in the No-IC/Reactance group. A marginally significant sheep–goat effect was found. Replication attempts would be worthwhile that include refinements to the various IC conditions, and a less persuasive (more challenging) reactance communication.

Keywords: imagery cultivation—paranormal belief—reactance—psi—precognition—sheep–goat effect

Introduction

The psi-conduciveness of an altered state of consciousness known as imagery cultivation (IC) needs validation through further testing. This IC state is induced through a shamanic-like journeying protocol which, in this planned study, is a modified form of the standard protocol advanced by Storm and Rock (2009a) in their IC model. The protocol is designed to facilitate and stimulate the imagination, thereby encouraging and cultivating the production of images from the unconscious, said to be the source of psi images. In two studies (Rock, Storm, Harris, & Friedman 2012, Storm & Rock 2009b), psi (clairvoyance) effects above mean chance expectation (MCE) were produced following the IC treatment, whereas control hit rates were at chance. In fact, IC is argued to be suitable for facilitating any kind of ESP effect including precognition and, insofar as a participant is engaged in a psi task requiring (in this planned study) the paranormal identification of a future target image, it is theorized that real-time cultivated images correlate with their respective future target images to a degree greater than MCE.

It is also theorized that sheep comply with experimenter's instructions, whereas goats do not, which is why psi believers ('sheep') and skeptics ('goats') tend to psi-hit and psi-miss, respectively. Noncompliance from goats may explain psi-missing as a so-called 'boomerang effect' which is a form of 'reactance'. According to Reactance Theory (Brehm 1966), an individual's freedom, if threatened by coercion by way of a reactance prime, may result in reactance, which is "a motivational state aimed at restoring the threatened freedom" (Silvia 2005:277). The reactance prime is a persuasive, vaguely threatening communication or message (see Silvia 2005) presented surreptitiously as basic information about a relevant task. The threatening messages usually take the form of statements such as ". . . when you think about it you are really forced to agree with me because this is a universal student issue" (Silvia 2006:676).

Storm, Ertel, and Rock (2013) were the first to explore reactance effects in parapsychology. In a forced-choice study, they found that the psi performance of reactance-treated goats was significantly worse than control goats. Storm and Rock (2014) replicated the effect in an *I Ching* study using an RNG-PK task. In addition, Storm and Rock (2014) and Storm (2016) have found that trait reactance tends to moderate the relationship between paranormal belief and psi. Reactance effects, however, have not been tested in a free-response design.

In this present study, the positive effects of imagery cultivation on psi performance, and the negative effects of reactance on psi performance, were sought in a precognitive picture identification task, which required

participants to identify future target pictures, after being randomly administered (or not) the shamanic-like journeying protocol (i.e. imagery cultivation treatment) and/or a reactance treatment. That is, in a 2×2 factorial design, it was planned that participants would be randomly assigned to one of four groups: (1) IC/Reactance; (2) IC/No-Reactance, (3) No-IC/Reactance, or (4) No-IC/No-Reactance (controls). All participants would complete a precognition trial with success indicated by a direct hit (where the randomly generated future target picture is ranked #1 by the participant). Participants in the IC group should perform the best; and participants in the Reactance group should perform the worst. Sheep-goat effects are also hypothesized.

The present study uses a target pool of 300 pictures compiled by May (2007; see also, May et al. 2012). May et al. (2012) argued that a quantitative description of imprecise (conceptually vague or ‘fuzzy’) target material is possible by applying a mathematical analysis to analysts’ ratings of photographic images. The images were encoded on a range of descriptive elements, and then cluster analysis was used to make sure images fell into distinctive categories. Categories within a group are orthogonal to (independent of) each other, so that each target set comprises five pictures that bear virtually no similarity to each other, yet pictures within a category are strongly related. If, for example, the randomly selected target picture is one of five pictures from the Canyons Category (Category 2, Group 1), then each of four decoys (for a “ $k = 5$ ” design) must be randomly drawn from each of the four remaining categories in Group 1 (i.e. Bridges, Cities, Oriental Structures, and Waterfalls). Thus, orthogonality facilitates the judging and ranking processes by eliminating the idiosyncrasies present in conventional target sets which complicate the judging and ranking processes.

The Imagery Cultivation Model

Shamanic-like journeying treatments may facilitate a creative process in the unconscious—arguably a reservoir of psi images. Following that principle, the imagery cultivation (IC) protocol (Storm & Rock 2009a) encourages cognitive activity in the form of generating visual images. In two clairvoyance studies (Rock, Storm, Harris, & Friedman 2012, Storm & Rock 2009b), psi effects above MCE have been produced using the protocol, whereas control hit rates were at chance. The psi test in both studies was a picture-identification task featuring simple hand-drawn images first used by Thalbourne (1981). It is noted, too, that Rock, Storm, Harris, and Friedman (2012) made variations to the protocol that initially featured voiced instructions plus a shamanic-drumming component and relaxation. The two

modified IC treatments were voiced instructions without drumming, and drumming without voiced instructions. These two variations also yielded psi responses above chance.

The closest current parapsychological procedure that is methodologically comparable to IC is the Ganzfeld procedure (Storm, Tressoldi, & Di Risio 2010), and psi effects in both designs are comparable in strength (see Rock, Storm, Harris, & Friedman 2012, Storm & Rock 2009b). However, there are theoretical divergences (e.g., ganzfeld is a cognitively passive process, whereas IC is a cognitively active process). Also, IC is more cost-effective and less labor-intensive to implement in the laboratory.

The Sheep–Goat Effect

Schmeidler (1945) proposed that participants in psi experiments either believed in the demonstrability of ESP (so-called ‘sheep’), or they rejected the possibility (so-called ‘goats’)—‘sheep’ tend to psi-hit; ‘goats’ tend to psi-miss (see the meta-analysis by Storm & Tressoldi 2017, for evidence of such effects; see also Palmer 1971, 1977). Although Storm (2003, 2006, 2008) also found significant sheep–goat effects with the Rasch-scaled version of the Australian Sheep–Goat Scale (RASGS; Lange & Thalbourne 2002, Thalbourne 1995), it is a mostly untested assumption that psi-missing is the product of goats attempting to disprove the psi hypothesis by avoiding the psi target. Parapsychologists agree that sheep tend to comply with the experimenter’s instructions and thus seek to psi hit, but psi studies are not designed to elicit the worst possible performances from goats because experimenters never ask goats *not* to comply (they merely expect it). The disadvantage to parapsychological knowledge is that the sheep–goat effect is never demonstrated to its full effect.

The issue that then arises from this disparity has been pointed out by Steinkamp (2005) who wondered whether the sheep–goat effect could be attributed to “goats tending to perform significantly badly, with sheep scoring at chance, or to sheep performing significantly well with goats scoring at chance (or something in between these two alternatives)” (pp. 152–153). If the experimenter seeks to measure psi-hitting in sheep and *psi-missing in goats*, the experimenter must refrain from using biased protocols that only encourage sheep to perform in the direction of psi-hitting, but do nothing to push goats’ psi-performance in the direction of psi-missing. Until that is done, experimenters will draw false conclusions about goats’ psi performance based on studies clearly designed to get the best out of sheep.

Evidence that goats can be manipulated into changing their psi performance comes from a study by Storm and Thalbourne (2005). They found that goats who adopted a newfound belief in psi produced a shift from

chance scoring to psi-hitting. Conversely, a way to test psi-missing in goats would be to manipulate reactance (discussed next). If this manipulation is successful, then the assumption is supported that goats have a motive that is antithetical to that of sheep.

Reactance Theory and Goats' Behavior

It is found that if attitudinal or behavioral freedom is threatened or reduced, a person becomes motivationally aroused (Kraus 1995, Smith 1978, Worchel & Brehm 1970, Wright 1986). This arousal generates psychological reactance where the individual adopts a noncompliant attitude, or engages in noncompliant behavior on the assumption that freedom will be restored (Brehm 1966, Brehm & Brehm 1981, Dillard & Shen 2005, Miller et al. 2006, 2007, Silvia 2005, 2006). Silvia (2005) showed that reactance was highest in the group that felt the most threatened by the content of an opinionated communication (i.e. a reactance prime). Silvia (2006) then found that disagreement directly motivated by a threat declined when the threat was removed.

To test reactance theory on goats, parapsychologists will also need a reactance treatment (i.e. reactance prime) in the form of an opinionated communication. According to reactance theory, the treatment will raise reactance, which will remain high if no outlet is provided, and since there is a relationship between attitude and behavior (Ajzen 1985, Kraus 1995), we can expect increased noncompliant behavior in goats under threat due to a change in attitude toward psi, which may thus yield increased target avoidance and therefore shifts from chance hitting to psi-missing.

Storm, Ertel, and Rock (2013) and Storm and Rock (2014) found support for their hypothesis: A reactance treatment, which is a priming communication read by participants before psi testing, brought about a significant reactance effect—reactants scored significantly lower than controls on a psi test (also, reactant goats generally scored lower than control goats, control sheep, and reactant sheep).

The same free-response procedure used by Rock, Storm, Harris, & Friedman (2012) and Storm and Rock (2009b) will be followed in this planned study, but the target pool created by May et al. (2012) will be used (see also May 2007). Also, the IC procedure will include the vocal treatment only (no drumming; also known as 'sonic driving'), since it was found that voiced instructions (also known as 'guided imagery') produced the strongest psi effects. Meditative musical tonalities will also be featured as background to the voiced instructions.

Hypotheses

Hypothesis 1. There is (i) an IC Main Effect (i.e. IC-treated individuals score higher than No-IC-treated individuals on Direct Hitting, which is the Dependent Variable [DV]); (ii) a Reactance Main Effect (i.e. reactance-treated individuals score lower than no-reactance-treated individuals on the DV); (iii) a Sheep–Goat Main Effect (i.e. sheep score higher than goats on the DV); and (iv) a Discrepancy Main Effect (i.e. ‘Discrepant’ score lower than ‘non-discrepant’ on the DV). (Trait Reactance is controlled as a covariate in a Univariate ANCOVA test.)¹

Hypothesis 2. There is a positive relationship between psi scoring and RASGS scores (data tested using Pearson’s *r*).

Methods

Participants

First-year psychology students, who signed up online, were tested, and they received credit for participation as part of their curriculum program (the recruitment method used is the Research Participation System set up by the School of Psychology, University of Adelaide).

There were a number of participants who became aware of the project through online advertisements on various university websites. They contacted the principal investigator (L.S.) via SMS or email so that a suitable day and time for testing could be arranged.

Also, a ‘ballot box’ and invitation letters were placed in various locations on the University of Adelaide campus. Participants dropped contact slips into the box, and L.S. collected these slips on a daily basis. The study was approved by the School of Psychology Human Ethics Subcommittee (Approval Code Number 16/96).

Median score was used to demarcate the ‘goats’ group from the ‘sheep’ group. Reactants and Controls were randomly assigned (see **Procedure** section for details).

Measures

(1) Australian Sheep–Goat Scale (Thalbourne 1995): An 18-item scale measuring belief and alleged experience of paranormal phenomena. Each item scores: 0 points = False, or 1 point = Uncertain, or 2 points = True (Raw Range is 0 to 36; Raw Mean = 18). The ASGS data are then top-down purified (two items are removed; items #9 and #10) to eliminate age and gender bias from the scale (Lange & Thalbourne 2002), and this procedure alters the scoring range and mean. In this study, Cronbach’s alpha = 0.94.

(2) Hong's Psychological Reactance Scale (Hong & Faedda 1996): An 11-item scale measuring individual differences in reactance proneness (i.e. trait propensity to experience psychological reactance). For example, "Regulations trigger a sense of resistance in me." For each item, participants respond on a 7-point Likert scale ranging from 1 = Strongly Disagree to 7 = Strongly Agree. Hong and Faedda reported a Cronbach's alpha of 0.77. In the present study, Cronbach's alpha = 0.83.

(3) Discrepancy Scale (Smith 1978): A single-item, "Which position best reflects your position on the previous statement", scored on a 31-point scale, ranging from Strongly Agree = 0 [least discrepant] to Strongly Disagree = 31 [most discrepant]. The score indicates the degree to which a percipient's initial attitude is discrepant from the recommended position regarding the threatening communication.

Materials

Computer program containing the following pages: (1) Instruction page; (2) Consent page; (3) Demographics page; (4) Australian Sheep-Goat Scale (ASGS); (5) Hong Psychological Reactance Scale (HPRS); (6) Short Communication (two versions: Reactance condition and No-Reactance condition—only one is displayed randomly per participant, plus the Discrepancy Scale at the bottom of the page; and (7) Page for five photographs with rank scoring boxes for each photo (see Step 4 in *Procedure* below). Pages (4) and (5) are presented randomly.

Apparatus

(1) A gallery of 300 photographs compiled by May (2007) from the Corel Stock Photo Library of Professional Photographs. The picture set consists of 12 Groups \times 5 Categories \times 5 photographs = 300 photographs;

(2) A true-noise Random Number Generator (Schmidt 1970, 1992). The RNG was purpose-built by Helmut Schmidt (dimensions: 25 \times 30 \times 7.5 cm). On the face side are 12 green lamps in a circular array and a red LED score-display in the centre.

Procedure

Step 1 (all 240 participants): Instructions outlining the experiment were presented onscreen, and if participants chose to participate they moved to another page that listed a series of consent statements. Participants then completed the ASGS and the HPRS.²

Reactance Stage (all 240 participants): Participants read the onscreen communication (see Storm, Ertel, & Rock 2013). This communication is a modified version used by Silvia (2005), and was presented surreptitiously as basic information about participating in a psi study:

This short communication was written by a university professor: This Picture ID Task has been developed in parapsychology over many decades and I claim that it is the best of all procedures that have hitherto been applied in parapsychology. I am utterly convinced that psi exists and that participants cannot avoid letting their psi power come to the fore when they correctly predict a randomly generated target picture. Every person, I claim, is expected to display such power. *I know I have persuaded you about this. I know you agree with my opinion. In fact, you're really forced to agree because university students can't have differing opinions on this issue.*

The additional italicized sentences are the threatening elements; they were not italicized in the study, and were only presented in the reactance condition ($n = 120$). All 240 participants rated their reactions to the communication by completing the Discrepancy Scale.

IC Stage (all 240 participants): Via on-screen message, 120 participants were (i) informed that they would undergo the IC visualisation procedure (duration: 9½ minutes; the 120 participants who did not go through the IC treatment went straight to Step 2); (ii) instructed to wear an eye mask and recline in their chair; and (iii) listened to pre-recorded instructions on CD adapted from Harner (1990:32)—e.g.,

You are now reaching the end of the Tunnel . . . you will see a set of doors . . . now visualise the doors in front of you . . . Now push open the doors . . . Now visualise the future target photograph before you . . . Study the photograph in all its detail . . . Remember this information for later.

After the IC procedure, via an onscreen message, participants were instructed to make notes (mentation) about their impressions of the future target. Of course, at this stage, neither the participant, nor L.S., knew what the target was since it had not yet been generated.

Step 2 (all 240 participants): This procedure encouraged direct conscious participant interaction using a Schmidt RNG to generate target sets and targets. While ostensibly precognitive (target selection came before target generation) and not overtly psychokinetic, operationalizing the task this way encouraged crossover psi effects where “precognition could actually be psychokinesis” (Millar 2015:165, see also Storm & Rock

2014). The design may therefore be more facilitative of psi compared to conventional psi tasks.

The target set was generated using the RNG in “Roulette Mode” (i.e. the green lights switch from ‘on’ to ‘off’ in a clockwise motion, and randomly stop on a number, thus mimicking the movement of a roulette wheel). The selection procedure followed May et al.’s (2012) recommendation. The RNG was used to select randomly one group of twelve, followed by one photo from each of five categories in that group, from the fuzzy set encoded target pool totaling 300 photographs (May et al. 2012). The RNG lights were numbered G1 to G12 for Group, two rounds of C1 to C5 for Category (only RNG outcomes between C1 and C5 inclusive were used for Category, so some participants had to repeat the run as two of the 12 lights were necessarily excluded and said “Spin Again”). In total, six randomly generated numbers ($G + C1 + C2 + C3 + C4 + C5$) were entered into the computer, thus identifying the target set of five photos for automatic onscreen presentation for participants to rank (target selection was not performed until Step 4).

Step 3 (all 240 participants): Ranking—once the set of five photos appeared onscreen, the experimenter instructed the participant to rank the five photographs from 1 to 5 (#1 = ‘most likely’ photo the RNG will select, to #5 = ‘least likely’ photo the RNG will select). Those in the IC-procedure ranked photos according to how well they matched the mentation; participants were permitted to re-read their mentation, in order to prompt their memory, thereby assisting them in the ranking. The experimenter (L.S.) did not offer personal interpretations of the mentation as this might have misled participants. The experimenter made sure that the participant typed the respective rank number under each of the five photos.

Step 4 (all 240 participants): The target photograph was generated using the “C1 to C5” procedure again on the RNG to generate an RNG light number (between 1 and 5 inclusive). This target was one of the five already selected and ranked (MCE = 20%). The RNG light number was typed into the computer. The computer found the associated rank number for that photo, and automatically presented it as feedback to the participant (if the photo was ranked #1, it was a Direct Hit). The participant was debriefed.

Results

The planned sample of 240 participants had a mean age of 25 years ($SD = 11$ years); 93 males; 147 females. The group divisions were:

- IC condition = 120 participants (61 in the Reactance treatment; 59 in the No-Reactance treatment);
- No-IC condition = 120 participants (60 in Reactance; 60 in No-Reactance).

Hit rates for the four groups in percent where Mean Chance Expectation (MCE) = 20%:

- IC + Reactance ($n = 61$): Direct hit rate = 18.0% (11 hits, $z = -0.22$, $p = .413$);
- IC + No-Reactance ($n = 59$): Direct hit rate = 23.7% (14 hits, $z = 0.55$, $p = .291$);
- No-IC + Reactance ($n = 60$): Direct hit rate = 26.7% (16 hits, $z = 1.13$, $p = .129$);
- No-IC + No-Reactance ($n = 60$): Direct hit rate = 15.0% (9 hits, $z = -0.81$, $p = .209$).

These results are included only for interest as all four groups are relatively small, so the power to produce significant outcomes is greatly reduced, given that effect sizes in psi experiments tend to be weak.

Statistics for the three measures are as follows:

- Australian Sheep–Goat Scale (Rasch-scaled) Mean score = 22.13 ($SD = 6.35$); minimum = 8.13 (which matches the theoretical minimum); maximum = 39.55 (theoretical max. = 43.39). The distribution was normal. Median score = 22.44; used to determine ‘goats’ group (≤ 22.44 ; $n = 118$) and ‘sheep’ group (> 22.44 ; $n = 122$);
- Hong’s Psychological Reactance Scale: Mean score = 32.93 ($SD = 6.24$); min. = 12 (theoretical min. = 11); max. = 47 (theoretical maximum = 55). The distribution was normal. Pre-experimentally, trait reactance was significantly higher for sheep (33.89) than goats (31.73), $t(2.70) = p = .007$ (two-tailed). This result contrasts with Storm’s (2016) finding that goats were higher on trait reactance;
- Discrepancy Scale: Mean score = 20.03 ($SD = 8.30$), min. = 0.31 (theoretical min. 0.00); max. = 31.00 (theoretical max. = 31.00). The distribution was significantly right-skewed. Goats (mean score = 23.92) expressed significantly greater discrepancy (i.e. stronger disagreement) with the reactance message than sheep (mean score = 16.00), $t(238) = 8.40$, $p < .001$ (two-tailed).

Planned Analyses

Hypothesis 1. There is (i) an IC Main Effect; (ii) a Reactance Main Effect; (iii) a Sheep–Goat Main Effect; and (iv) a Discrepancy Main Effect. (Data tested with a Univariate ANCOVA test.)

(i) The direct hit rate for the IC group was 21.0% which is higher than the hit rate of 20.7% for the No-IC group. These percentages are in the directions expected. However, the IC effect only approached significance, $F(1, 223) = 1.29, p = .128$ (one-tailed).

(ii) The direct hit rate for the Reactance group was 22.3% which is higher than the hit rate of 19.3% for the No-Reactance group. These percentages are *not* in the directions expected (see *Post Hoc Analysis* section which looks at possible sources of the disparity). The difference is not significant, $F(1, 223) = 1.84, p = .176$ (two-tailed).

(iii) The direct hit rate for sheep was 22.0% (above MCE), which is higher than the hit rate of 19.7% (below MCE) for goats. These percentages are in the directions expected. However, the sheep–goat effect is not significant, $F(1, 223) = 0.10, p = .376$ (one-tailed).

(iv) The direct hit rate for ‘discrepant’ was 16.8% which is lower than the hit rate of 24.8% for ‘non-discrepant’. These percentages are in the directions expected. The difference is marginally significant, $F(1, 223) = 2.27, p = .067$ (one-tailed).

Hypothesis 2. There is a positive relationship between psi scoring and RASGS scores (data tested using Pearson’s r). For the whole sample, the relationship was positive, but weak and only marginally significant, $r(238) = .10, p = .069$ (one-tailed).

Post Hoc Analysis

Storm and Rock (2014) and Storm (2016) have found that mid-range scorers on paranormal belief (measured on the RASGS), also referred to as ‘indecisives’, perform differently under the reactance treatment compared with sheep and goats condition. Sometimes indecisives even score better than sheep on psi tasks, and this difference is shown again in the present study (see dotted line in Figure 1 below).

Having midway paranormal belief scores, indecisives are undecided about their beliefs, which may be reflected in their psi performance, and

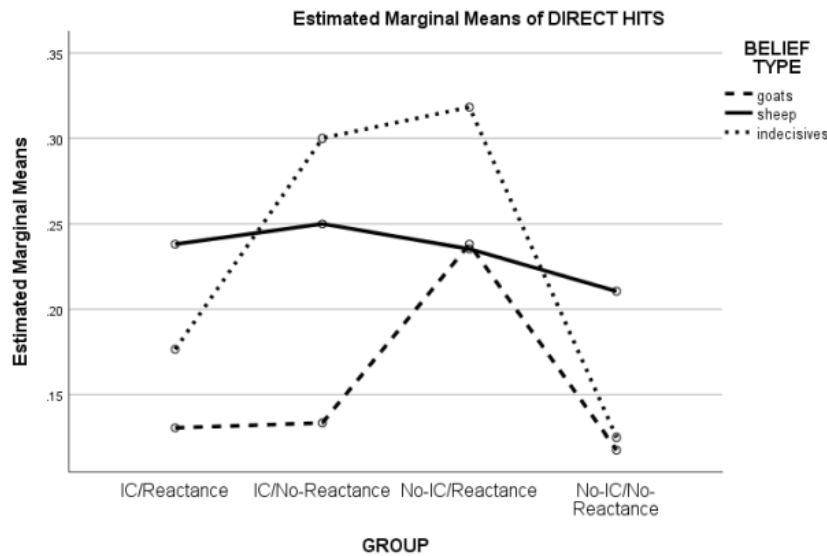


Figure 1. Direct hits rates for the four groups: (i) Imagery Cultivation (IC) + Reactance; (ii) IC/No-Reactance; (iii) No-IC/Reactance; and (iv) No-IC/No-Reactance.

how they respond to the reactance treatment—it is as if they are easily persuaded by a threatening message when we might expect that they would reject it. We see too that the IC treatment on its own (and no reactance treatment) appears to be effective for indecisives. In other words, the persuasive effect of the reactance treatment seems to be canceled out when IC is introduced. In future studies, it may be necessary to reword the message in the reactance treatment so that it is less persuasive, and more of a threat to freedom. Indeed, Wright (1986) introduced low-threat and high-threat communications to participants who originally expressed partial or full agreement with an attitudinal position, but only those participants who expressed full agreement, *and were in the high-threat condition*, indicated a reactance effect (i.e. negative attitude change).

Discussion

Using a Picture Identification Task, and the shamanic-like journeying protocol that accords with Storm and Rock's (2009a) Imagery Cultivation Model, and following the principles of reactance theory (Brehm 1966), this study sought insight into two factors: (i) the psi-enhancing effects of Imagery Cultivation; and (ii) the detrimental effects of Reactance on psi

performance (with special focus on goats). Hypothetically, participants who express extreme disagreement (Smith 1978) with a reactance prime should shift against the position advocated in a threatening message, so it was necessary to introduce another measure—discrepancy—in order to ascertain (by way of a self-report measure) the degree to which participants were affected by the reactance manipulation. It was also necessary to measure and control trait reactance using Hong's Psychological Reactance Scale (Hong & Faedda 1996), as trait reactance can vary significantly between sheep and goats.

Test results for Hypothesis 1 are mostly encouraging—three of the four effects are in the directions expected. Two effects ('Imagery Cultivation' and 'Discrepancy') are in the direction hypothesized and can be said to be approaching significance given that the groups are not large. Time constraints limited testing to 60 participants per group. Interestingly, a preliminary finding showed the reactance treatment had a stronger psychological effect on goats than on sheep, indicated by greater disagreement (bigger discrepancy) for goats. Thus, the discrepancy measure can indicate degree to which the reactance treatment affected psi—if the threatening message does not bother participants, they tend to perform significantly better. Even so, the reactance treatment showed a reversal in this study (not so in past studies; see Storm, Ertel, & Rock 2013, Storm & Rock 2014). The reversal is likely due mainly to indecisives and goats in the No-IC/Reactance group.

The IC treatment produced a slightly higher psi effect, but it was not strong enough to be significant. It cannot be ascertained at this stage whether the change in the protocol (shortening the duration of the treatment from 19 minutes to 9½ minutes, slight changes to the instructions, relaxing meditative musical tonalities, and deletion of the drumming component) had an adverse effect on psi performance. Comparisons of the two treatments should be undertaken in a future study.

The result for Hypothesis 2 suggests that the sheep-goat effect, though it is positive and marginally significant, is weaker than might be expected. It is noted that the corresponding sheep-goat difference reported in the results for Hypothesis 1(iii) was expected, but the effect was not significantly different. However, a salient sheep-goat effect is illustrated in Figure 1, mostly following expectations, particularly with regard to the two treatments. Sheep generally perform better than goats on the psi task. Also, the reactance treatment generally affects goats but not sheep whose psi performance is fairly consistent across treatment regimes.

It would be worthwhile to conduct a replication study that includes: (i) repeated-measures testing with at least two imagery cultivation conditions counterbalanced (including the one used in this study, and the one used

by Storm & Rock 2009b); (ii) a revision of the ‘threatening’ reactance communication so that it is less persuasive (more threatening); and (iii) more precise measures of reactance.

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Notes

- ¹ There is some evidence that goats may be more pre-experimentally reactive (Storm 2016), so trait reactance was controlled as a covariate. In the present study, trait reactance is measured using the Hong Psychological Reactance Scale (Hong & Faedda 1996).
- ² Other scales were administered for a later study: two versions of the Spiritual Emergency Scale—‘forced-choice’ (yes/no; Goretzki, Storm, & Thalbourne 2014) and ‘Likert scale’ (Storm & Goretzki 2016)—for psychometric purposes, and the Reality Testing subscale of the *Inventory of Personality Organization* (IPO-RT; Lenzenweger, Clarkin, Kernberg, & Foelsch 2001).

References

- Ajzen, I. (1985). From Intentions to Actions: A Theory of Planned Behavior. In *Action Control: From Cognition to Behavior* edited by J. Kuhl & J. Beckman, Heidelberg, Germany: Springer, pp. 11–39.
- Brehm, J. W. (1966). *A Theory of Psychological Reactance*. New York: Academic.
- Brehm, S. S., & Brehm, J. W. (1981). *Psychological Reactance: A Theory of Freedom and Control*. New York: Academic.
- Dillard, J. P., & Shen, L. (2005). On the nature of reactance and its role in persuasive health communication. *Communication Monographs*, 72, 144–168.
- Goretzki, M., Storm, L., & Thalbourne, M. A. (2014). Research Note: Updating the Spiritual Emergency Scale. *Journal of Transpersonal Psychology*, 46, 240–244.
- Harner, M. (1990). *The Way of the Shaman* (third edition). New York: HarperCollins.
- Hong, S.-M., & Faedda, S. (1996). Refinement of the Hong Psychological Reactance Scale. *Educational and Psychological Measurement*, 56, 173–182.
- Kraus, S. J. (1995). Attitudes and the prediction of behavior: A meta-analysis of the empirical literature. *Personality and Social Psychology Bulletin*, 21, 58–75.
- Lange, R., & Thalbourne, M. A. (2002). Rasch scaling paranormal belief and experience: Structure and semantics of Thalbourne’s Australian Sheep–Goat Scale. *Psychological Reports*, 91(3) (Supplement), 1065–1073.
- Lenzenweger, M. F., Clarkin, J. F., Kernberg, O. F., & Foelsch, P. A. (2001). The Inventory of Personality Organization: Psychometric properties, factorial composition, and criterion relations with affect, aggressive dyscontrol, psychosis proneness, and self-domains in a nonclinical sample. *Psychological Assessment*, 13(4), 577–591. DOI:10.1037//1040-3590.13.4.577

- May, E. C. (2007). Advances in anomalous cognition analysis: A judge-free and accurate confidence-calling technique. In *Proceedings of the 50th Annual Convention of the Parapsychological Association*. Petaluma, CA: Parapsychological Association, pp. 31–47.
- May, E. C., Faith, L. V., Blackman, M., Bourgeois, B., Kerr, N., & Woods, L. (2012). A target pool and database for anomalous cognition experiments. *Journal of the Society for Psychical Research, 76*, 94–103.
- Millar, B. (2015). Quantum theory and parapsychology. In *Parapsychology: A Handbook for the 21st Century* edited by E. Cardeña, J. Palmer, & D. Marcusson-Clavertz, Jefferson, NC: McFarland, pp. 165–180.
- Miller, C. H., Burgoon, M., Grandpre, J., & Alvaro, E. (2006). Identifying principal risk factors for the initiation of adolescent smoking behaviors: The significance of psychological reactance. *Health Communication, 19*, 241–252.
- Miller, C. H., Lane, L. T., Deatrack, L. M., Young, A. M., & Potts, K. A. (2007). Psychological reactance and promotional health messages: The effects of controlling language, lexical concreteness, and the restoration of freedom. *Human Communication Research, 33*, 219–240.
- Palmer, J. (1971). Scoring in ESP tests as a function of belief in ESP: Part I. The sheep–goat effect. *Journal of the American Society for Psychical Research, 65*, 373–408.
- Palmer, J. (1977). Attitudes and personality traits in experimental ESP research. In *Handbook of Parapsychology* edited by B. B. Wolman, New York: Van Nostrand Reinhold, pp. 175–201.
- Rock, A. J., Storm, L., Harris, K., & Friedman, H. (2012). Shamanic-like journeying and psi-signal detection: I. In search of the psi-conducive components of a novel experimental protocol. *Journal of Parapsychology, 76*, 321–347.
- Schmeidler, G. R. (1945). Separating the sheep from the goats. *Journal of the American Society for Psychical Research, 39*, 47–49.
- Schmidt, H. (1970). Quantum mechanical random number generator. *Journal of Applied Physics, 41*, 462–468.
- Schmidt, H. (1992). Progress and problems in psychokinesis research. In *The Interrelationship between Mind and Matter: Proceedings of a Conference Hosted by the Center for Frontier Studies* edited by B. Rubik, Philadelphia, PA: Temple University, pp. 39–55.
- Silvia, P. J. (2005). Deflecting reactance: The role of similarity in increasing compliance and reducing resistance. *Basic and Applied Social Psychology, 27*, 227–284.
- Silvia, P. J. (2006). Reactance and the dynamics of disagreement: Multiple paths from threatened freedom. *European Journal of Social Psychology, 36*, 673–685.
- Smith, M. J. (1978). Discrepancy and the importance of attitudinal freedom. *Human Communication Research, 4*(4), 308–314.
- Steinkamp, F. (2005). Forced-choice ESP experiments: Their past and their future. In *Parapsychology in the 21st Century: Essays on the Future of Psychical Research* edited by M. A. Thalbourne & L. Storm, Jefferson, NC: McFarland, pp. 124–163.
- Storm, L. (2003). Research note: The pro attitude and the ‘sheep–goat’ effect in the *I Ching* database. *Australian Journal of Parapsychology, 3*, 147–152.
- Storm, L. (2006). A parapsychological investigation of the *I Ching*: The relationships between psi, intuition, and time perspective. *Journal of Parapsychology, 70*, 121–141.
- Storm, L. (2008). Investigations of the *I Ching*: I. Relationships between psi and time perspective, paranormal belief and meaningfulness. *Australian Journal of Parapsychology, 8*(2), 103–127.
- Storm, L. (2016). Conformity and reactance in the *I Ching* using a Q-Sort/RNG-PK method: A pilot study. *Australian Journal of Parapsychology, 16*(2), 133–162.
- Storm, L., & Goretzki, M. (2016). A defense of the Spiritual Emergency Scale: Emergency vs. emergence. *Journal of Transpersonal Psychology, 48*(2), 190–209.
- Storm, L., & Rock, A. J. (2009a). Imagery cultivation vs. noise reduction: Shamanic-like

- journeying as a psi-conductive alternative to the Ganzfeld protocol. *Australian Journal of Parapsychology*, 9, 5–31.
- Storm, L., & Rock, A. J. (2009b). Shamanic-like journeying and psi: I. Imagery cultivation, personality, and the picture-identification task. *Australian Journal of Parapsychology*, 9, 165–192.
- Storm, L., & Rock, A. J. (2014). An investigation of the *I Ching* using the Q-Sort Method and an RNG-PK design: II. The effect of reactance on psi. *Australian Journal of Parapsychology*, 14, 163–190.
- Storm, L., & Thalbourne, M. A. (Editors) (2005). *Parapsychology in the 21st Century: Essays on the Future of Psychological Research*. Jefferson, NC: McFarland.
- Storm, L., & Tressoldi, P. E. (2017). Gathering in more sheep and goats: A meta-analysis of forced-choice sheep-goat studies, 1994–2015. *Journal of the Society for Psychical Research*, 81(2): 79–107.
- Storm, L., Tressoldi, P. E., & Di Risio, L. (2010). Meta-analysis of free-response studies, 1992–2008: Assessing the noise reduction model in parapsychology. *Psychological Bulletin*, 136(4):471–485. American Psychological Association.
- Storm, L., Ertel, S., & Rock, A. J. (2013). The sheep-goat effect as a matter of compliance vs. noncompliance: The effect of reactance in a forced-choice ball selection test. *Journal of Scientific Exploration*, 27(3), 393–411.
- Thalbourne, M. A. (1981). *Some experiments on the paranormal cognition of drawings with special reference to personality and attitudinal variables*. Unpublished Ph.D. thesis, Department of Parapsychology, University of Edinburgh, Scotland.
- Thalbourne, M. A. (1995). Further studies of the measurement and correlates of belief in the paranormal. *Journal of the American Society for Psychical Research*, 89:234–247.
- Worchel, S., & Brehm, J. W. (1970). Effects of threats to attitudinal freedom as a function of agreement with the communicator. *Journal of Personality and Social Psychology*, 14, 18–22.
- Wright, R. A. (1986). Attitude change as a function of threat to attitudinal freedom and extent of agreement with a communicator. *European Journal of Social Psychology*, 16, 43–50.