

COMPARISON OF OUTCOMES WITH NONINTENTIONAL AND INTENTIONAL PRECOGNITION TASKS

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ABSTRACT: Stanford's psi-mediated instrumental response (PMIR) model proposes that psi is an evolutionarily adaptive function that largely works in the service of the organism but which operates at an almost completely unconscious level. A series of successful experiments conducted by Luke and associates have explored the PMIR model with an automated nonintentional precognition task with postexperimental outcome-contingent tasks that vary in pleasantness commensurate with psi task success. Until now this test paradigm explored only nonintentional tasks so this study compares nonintentional with intentional psi task conditions to explore the unconscious psi proposition of the PMIR model. A sample of 40 psychology student participants completed 10 trials each of the automated precognition task, with 20 participants randomly allocated to the nonintentional condition and 20 to the intentional condition in an independent groups design. Contrary to previous findings psi scoring overall was below mean chance expectation (MCE), although nonsignificant. In line with predictions based on the PMIR model, however, task participants in the nonintentional condition scored above MCE and scored higher than those in the intentional condition, though these differences were not significant. Measures of belief in psi, openness to experience, and emotional creativity were found not to correlate with psi scores. The findings are discussed in light of previous studies with suggestions for future research.

Keywords: precognition, PMIR, intention, decline effect

Spontaneous psi experiences tend to be rather fleeting and rare, which would seem at odds with attempts to induce psi experimentally. However, a number of successful psi research paradigms have recently explored nonintentional and unconscious tests of precognition utilising time-reversed psychological (e.g., Bem, 2011) and psychophysiological (e.g., Mossbridge, Tressoldi, & Utts, 2012) measures, indicating that psi may be a largely unconscious process. Such successful test paradigms fit rather well with Stanford's (1974) psi-mediated instrumental response (PMIR) model, which proposes that psi is an evolutionarily adaptive function that largely works in the service of the organism's needs but which operates at an almost completely unconscious level.

Testing Stanford's model Luke, Delanoy, and Sherwood (2008) developed an automated nonintentional precognition task to explore the supposedly unconscious psi processes proposed by Stanford (1974). Furthermore, to fulfil and test the supposedly need-serving and evolutionarily adaptive nature of psi within a PMIR model, the protocol utilised postexperimental outcome contingent tasks that varied in pleasantness commensurate with psi task success. The initial study used erotic images as the pleasant "reward" task for positive psi scoring, and a boring task alternative as a deterrent for below chance psi scoring and found a significant psi effect overall (Luke, Delanoy, & Sherwood, 2008). Later studies utilised this same protocol but exchanged the erotic images for apparently funny cartoons taken from Gary Larsen's *Far Side* series (Hitchman, Roe, & Sherwood, 2012a; Luke & Morin, 2014; Luke, Roe, & Davison, 2008) or images predetermined to be pleasant (Hitchman, Roe, & Sherwood, 2012b). Of the six experiments (two studies are reported by Luke, Roe, & Davison, 2008) the first three were independently significant, and all six studies combined, with a total sample size of 298 participants, found above chance psi scores overall, giving a combined Stouffer $Z = 4.13$ ($p = .00004$).

An assessment of the success of this paradigm for testing Stanford's (1974) PMIR model thus far indicates that having an unconscious contingent reward/punishment for successful demonstration of nonintentional psi appears to have some utility, insofar as psi has been demonstrated overall and that psi scores have tended to correlate with subjective task pleasantness regardless of whether there is a contingent task or not. Furthermore, psi scores also correlated significantly with the participants' erotic reactivity in the first experiment, in which erotic images were used as the pleasant contingent task (Luke, Delanoy & Sherwood, 2008), indicating that participant desires

were rewarded for their unconscious psi task performance. What remains to be explored further regarding the PMIR model is the salience of unconscious psi tasks, and so the same paradigm begs exploration in both a covert and an overt manner. In the revised version of the PMIR model, Stanford (1990, p. 94) gave priority to unconscious psi, and perhaps hence nonintentional psi processes, by indicating that the “. . . adaptive response to implicit knowledge is extremely important . . . because it provides an economical base for adaptive response of the organism,” thereby implying “. . . that PMIR occurs in ways that make minimal demand on the individual’s processing capacities.” By these means conscious awareness of psi information “. . . might in many circumstances be disruptive, nonproductive, and even maladaptive if a more economical form of response [i.e., one driven unconsciously/non-intentionally] would be fully adaptive” (Stanford, 1990, p. 94). In this regard it would be reasonable to hypothesise that nonintentional psi would be superior to intentional psi, all else being equal.

There are also individual differences to be investigated. The initial five experiments explored the possibility that unconscious psi phenomena in the service of the organism might be considered euphemistically as lucky events, and so beliefs about luck and self-perceived luckiness were explored with the *Questionnaire of Beliefs About Luck* (QBL). However, despite some initial success none of the five QBL subscales consistently correlated with psi scores. A number of other individual difference measures were also explored as covariates of psi scores, with belief in psi (the “sheep-goat” measure) providing significant positive correlations in two of the three studies in which it was explored, and openness to experience—as a proxy measure for latent inhibition—produced significant positive correlations in two of the four studies in which it was examined. However, other purported measures of latent inhibition, such as the *Creative Cognition Inventory* (two studies—Hitchman et al., 2012a; Luke, Roe, & Davison, 2008) and an auditory discrimination task (one study—Hitchman et al., 2012b) failed to correlate with psi scores significantly, calling into question the utility of latent inhibition in regards to this paradigm.

Extending the research of the PMIR model using this automated paradigm, the current study aims to “destruction test” (whereby the parameters at which the effects disappear are systematically tested one at a time) the protocol in line with PMIR predictions and explore the salience of the nonintentional dimension of the psi task by having half the participants perform the task intentionally and the other half, as previously, unintentionally. Furthermore, the individual difference measures of openness to experience and belief in psi were further explored, along with a novel measure of creativity that may tap into latent inhibition, termed emotional creativity.

Formal Hypotheses

Hypotheses One: Participants will score significantly above mean chance expectation (MCE) in the precognition task overall.

Hypothesis Two: The number of mean hits in the precognition task will be greater for the nonintentional condition than the intentional condition.

Exploratory Hypotheses

Hypothesis Three: Scores on the precognition task will be correlated with scores on measures of openness to experience, belief in psi (sheep-goat), and emotional creativity.

Method

Participants

Psychology students were recruited to the study as part of their degree course research participation scheme and invited to take part via a standard e-mail sent to all first year psychology students and posters (with the same information) in the Psychology Department. Participants were invited to take part in an experimental study exploring precognition in relation to personality factors. Of the 40 participants, 20 were randomly assigned to the intentional condition and 20 to the nonintentional condition. As an incentive for taking part in the study, participants received 30 min worth of research participation points, which is a standard practice in studies utilising the research participa-

tion scheme. Students participating in the research scheme get to use the same scheme to recruit participants in their third-year projects as an incentive, and most participating students complete their required 10 hours of participation. The number of participants was prespecified. No data from participants with complete responses were rejected, and no participants returned incomplete data.

Materials

PMIR Visual Basic program. A software program in Visual Basic (v. 6) was written specifically for this series of experiments by the first author and was identical to one used in the second study reported by Luke, Roe, and Davison (2008). The program comes with its own step-by-step instructions for the participants and consists of a fully automated, nonintentional precognition task with 10 trials, with reward/penalty tasks contingent on psi scores (see Procedure for details). The program has a pool of 40 fractal images as the decoy and target images for the forced-choice psi task. No images were repeated in any run.

All 40 images for this program were selected previously via a standardisation procedure from a pool of 72 such images, which had themselves been created randomly using the freeware fractal generator program Fractalus v. 4.02. Images had been presented to five independent judges via a presentation program written in Visual Basic and standardised using a similar rating process to that used in the creation of the International Affective Picture System (IAPS; Lang & Greenwald, 1993). Images had then been grouped together into the 10 best pools of four images each, based upon the homogeneity of their individual scores on scales of pleasantness and arousal (Luke, 2007).

Belief in psi (sheep-goat) questionnaire. This short questionnaire presents four items corresponding to the various criteria of the sheep-goat variable of belief in psi (Palmer, 1972)

Openness to experience questionnaire. A 20-item positively/negatively balanced measure with a 5-point Likert scale for each item was derived from the international personality item pool (IPIP; Goldberg et al., 2006) and designed to measure the openness to experience personality trait. The scale has satisfactory internal consistency, factor structure, and external validity (Buchanan, Johnson, & Goldberg, 2005). The questionnaire assesses an individual's openness to experience pertaining to imagination, emotionality, adventurousness, intellect, and liberalism through statements such as "I believe in the importance of art," "I enjoy wild flights of fantasy," and "I have a vivid imagination."

Emotional Creativity Inventory. This 30-item self-report questionnaire (Averill, 1999) measures three facets of emotional experience: novelty (e.g., "I have felt combinations of emotions that other people have probably never experienced"; $\alpha = .84$), preparedness (e.g., "I think about and try to understand my emotional reactions"; $\alpha = .81$) and authenticity and effectiveness of emotions experienced (e.g., "The way I experience and express my emotions helps me in my relationships with others"; $\alpha = .82$). The items are scored on a 5-point Likert scale ranging from "much less" to "much more." The overall ECI scores range from 30–150 and for the purpose of this paper the scales will be considered together. ECI's construct validity indicates that the scale is a reliable predictor of creative behaviour (Ivcevic, Brackett, & Mayer, 2007).

Task-evaluation questionnaire. A single item presented after the experimental phase and before debriefing asked participants to rate the pleasantness of the experimental task (after the fact) on a scale of 1 to 10 ("very unpleasant" to "very pleasant").

Procedure

The project was given ethical approval by the University of Greenwich Departmental Research Ethics Committee. The procedure of this study is identical to that of the second experiment in Luke, Roe and Davison (2008), except that participants were randomly assigned to intentional/nonintentional conditions and completed some different questionnaires.

Prior to commencement the experimenter determined by true-RNG (via www.random.org which uses atmospheric noise as the randomisation source) which condition the next participant would be in. Using open-deck allocation, by chance 20 participants were allocated to each condition. The participant was then briefed, with those in the intentional condition being told what the exact protocol was and that they should try and intuit what the target

image was in each trial. Participants in the nonintentional condition were informed that they would be doing a psychic test at some point, but the first task was presented as an activity that was intended to gauge their preferences. They were told to follow the instructions and that there would be a number of judging or response tasks to follow. The exact standardised wording for the nonintentional task was:

Now you have the computer task. First of all there is a preparation task to gauge your preferences. The preparation task consists of a number of images of fractals (geometric patterns). You are to select the one you most prefer (i.e., the one that you like the most). There will be a few rounds of this task, but this is a preparation task so just whiz through the fractals as fast as you can. Once you've done them there will be some further instructions given to you by the computer at this point but, because the nature of the task varies with each participant, I can't tell you exactly what this next task will be but it will involve a simple psychic test. You are asked to follow the instructions and complete the tasks as well as you can, and the computer will inform you when the tasks are complete. Any questions?

The wording for intentional task participants was similar but informed them of the nature of the task:

Now you have the computer task. The first task is the psychic test. The instructions on the computer will tell you it is a preparation task but actually the choices you make will be used to gauge your psychic ability. This task consists of a number of images of fractals (geometric patterns). You are to select one of the images and when you do so the computer will then select one at random. Your task is to try and guess, in your own time, which one the computer will select; however you do not receive any feedback on your success. This is the psychic task. There will be a few rounds of this task. Once you've done them there will be some further instructions given to you by the computer at this point but, because the nature of the task varies with each participant, I can't tell you exactly what this next task will be. You are asked to follow the instructions and complete the tasks as well as you can, and the computer will inform you when the tasks are complete. Any questions?

All participants were informed that their data would be recorded anonymously but that they could withdraw from the study at any time and withdraw their data by citing their unique participant identification number. Participants then signed a consent form and completed the questionnaires in the order they appear in the Materials section above, except for the fractal experimental task-evaluation questionnaire, which was filled out after all tasks were completed, but before feedback. Participants were informed that they should complete the following belief and attitude questionnaires and that the instructions and examples for completion were on the forms (so as to keep instructions standardised). Required item responses were self-evident from the questionnaires, but participants were informed that they could ask questions if they had any misgivings. Participants were then left in the private test area alone until they had completed the PMIR precognition computer task and were given detailed task instructions via the computer.

The initial screen of the PMIR-task computer program asked participants to relax and to follow the instructions and explained that they would be informed when they needed to try and use any psychic (psi) ability—although participants in the intentional condition had been informed that this was the actual psi task. Further instructions described how to indicate which one of four presented images they most preferred for each of a series of 10 “preparatory” trials. Images were fractal patterns, displayed in a random square arrangement (see Figure 1) from a unique pool of four images for each of the 10 trials.

Unknown to participants in the nonintentional condition, the 10 “preparatory” fractal trials were actually a nonintentional precognitive psi task. In each trial, once the participants had made their target selection, the computer randomly selected one of the four fractal images as the (post factum) precognition target. Thus, randomised selection of the target occurred each time an image preference was selected by the participant. This randomisation and that of the image position arrangement was achieved using the RND function in the Visual Basic program, which is seeded by the computer's internal timer, which is not accessible to the participant and remains independent of the participant's activity on the computer. No immediate feedback was given to the participant on target success.

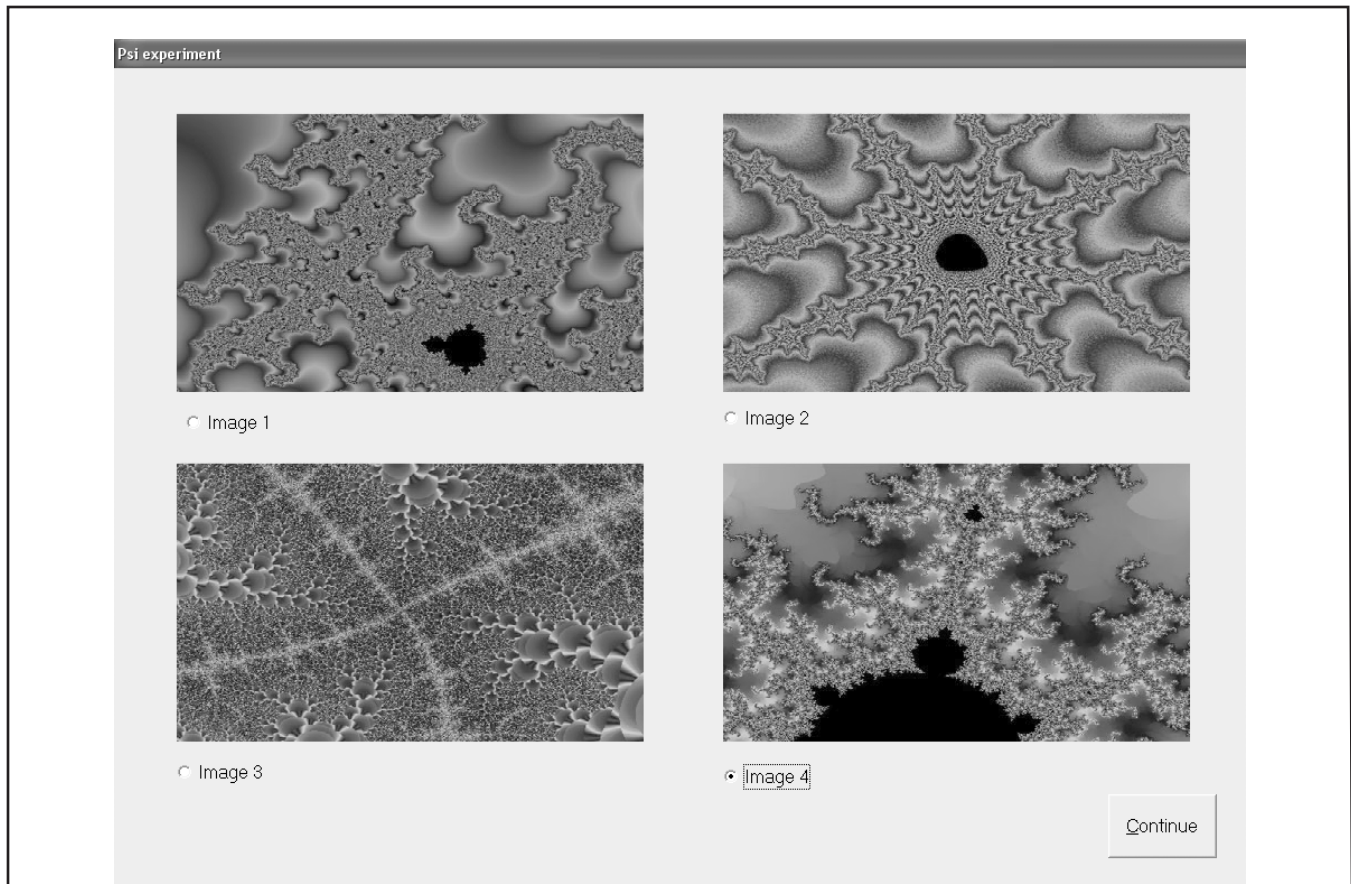


Figure 1. Screen shot of a typical fractal image-selection trial.

Following the psi covert/overt task there was an outcome task contingent upon the participant's psi task performance. Participants who correctly identified fewer than 3 (below $MCE = 2.5$) were directed by the computer towards a presumably unpleasant vigilance task, whereas those who correctly identified 3 or more targets were directed towards a presumably pleasant cartoon-preference task.

The vigilance task presented a set of instructions describing the task and requesting participants to observe a sequence of numbers and to press the left mouse key (or the return key) for every complete run of three consecutive odd numbers (e.g., 3, 7, 5) or three consecutive even numbers (e.g., 4, 2, 4). Once the task began, a series of singular random numbers ranging from 1–9 were presented in the centre of the screen; each digit was replaced every 500 ms. Duration of the unpleasant task was dependent on degree of success at the precognition task: those who correctly identified none of the precognition targets completed this unpleasant task for 4 min, those who identified only one correct target for 3 min, and those scoring two hits did this task for 2 min. Participants were not informed of how long the task would take nor did they receive any feedback on their performance. No record of the participant's performance on this task was made.

Participants who performed the cartoon-preference task were first notified that the task would now change but they should continue to select the image they preferred. However, like the vigilance task, this was not a psi task and the cartoon images (taken from Gary Larson's *Far Side*) were predetermined, not random. Two cartoon images were presented side by side with a tick box for the participants to indicate their favourite. Upon selection, a new pair of images was presented. Participants' previous nonintentional precognition task performance determined how long the cartoon-preference task continued, such that the task lasted 30 s if they obtained 3 direct hits and increased by 30 s for every additional direct hit based on the premise that seeing more cartoons was an increasingly pleasant task. The experimenters remained blind to all conditions, responses, and performance of the participants until after the participant had completed the entire automated task and questionnaires and had presented all their data.

Upon completion of both tasks participants were asked to rate the pleasantness of the entire computerised experimental phase on the experimental task-evaluation questionnaire. They were then asked by the experimenter, in a neutral manner, to describe what they thought was the purpose of the two tasks so as to determine if they suspected that the first task required them to use ESP. As with previous studies (Luke, Delanoy & Sherwood, 2008; Luke & Morin, 2014; Luke, Roe & Sherwood, 2008) participants gave no indication that they suspected the true nature of the task, given that they were primed for a psi task later—all except one professional parapsychologist who suspected a psi task had been involved but did not know where (Luke, Delanoy & Sherwood, 2008); however, no professional parapsychologists or psychologists were recruited in the subsequent studies. Furthermore, to counter concerns over the possible candidness of responses, a pilot study (Luke, 2007) aimed at destructive testing the design required blinded colleagues to respond critically about the design, yet none suspected the nonintentional psi task. A referee of the paper queried whether or not participants had any potential fears allayed as to whether or not the task was some kind of projective psychological task, but no such reassurance was given. However, the authors regard this matter as somewhat irrelevant given that the main concern was whether or not they knew they were performing a nonintentional task, which according to self-reports they did not; neither did those in the original pilot tests, for which we were explicit in seeking candid responses as to what they thought the tasks were genuinely measuring. Participants thinking the validation question might also be a projective test also seems somewhat irrelevant because candid responses are expected from at least a few respondents in this and previous studies, and yet none determined the true nature of the nonintentional precognition task. Following validation checks, the participants were given feedback on their psi task performance and fully debriefed, with the opportunity to ask questions, and requested not to divulge the nature of the task to other students, who may be later participants. Analyses were preplanned.

Results

A number of data checks were run to ensure against any systematic patterning. The randomised computer target selection was analysed using a chi-square goodness of fit test and was found to be evenly distributed, $\chi^2(3, N = 400) = .90, p = .82$. Additionally, the randomised computer image display arrangement, with 24 possible square arrangements of the four images, was analysed using a chi-square goodness of fit test and found to be evenly distributed, $\chi^2(23, N = 400) = 17.74, p = .77$. Finally participant target image position preference was analysed using a chi-square goodness of fit test and found to be evenly distributed, $\chi^2(3, N = 400) = 4.78, p = .18$.

Regarding Hypothesis One, a lower than chance psi score of 2.3 ($SD = 1.45$; $MCE = 2.5$) was found overall for all participants, counter to prediction; however, this was not significant, $t(39) = -0.87, p = .39$, two-tailed. As can be seen in Table 1, as predicted by Hypothesis Two, scores in the nonintentional condition ($M = 2.6, SD = 1.27$) in this experiment were higher than in the intentional condition ($M = 2.0, SD = 1.59$), but again the difference was not significant, $t(38) = 1.318, p = .20$, two-tailed (Levene's test for equality of variance nonsignificant). Further, the mean psi score for the nonintentional condition was above chance, although not significantly, $t(19) = .35, p = .73$, two-tailed. The intentional condition scores were well below mean chance expectation, although not significantly $t(19) = -1.41, p = .18$, two-tailed. Table 1 also shows the hit rates and inferential statistical values for the previous six studies (this being Study 7) also using this protocol.

Regarding Hypothesis Three, the three individual differences measures were correlated with the participants' psi scores, resulting in a number of small nonsignificant correlations. The sheep-goat correlation was calculated using Spearman's nonparametric test, given that this measure had a score range of less than 20 (Clark-Carter, 1997).

Exploring subjective task pleasantness (Table 3), participants in the nonintentional condition found the task significantly more pleasant than those in the intentional condition, $t(38) = 2.24, p = .031$, two-tailed (Levene's test nonsignificant). However, differences between task pleasantness in the intentional versus the nonintentional condition were nonsignificant when inspected specifically for the penalty-contingent outcome, $t(21) = 0.44, p = .66$, two-tailed (Levene's test nonsignificant), and the reward-contingent outcome, $t(15) = 1.64, p = .12$, two-tailed (Levene's test nonsignificant). Nevertheless, there was a significant positive correlation between psi scores and subjective task pleasantness ratings overall, $r_s(38) = .61, p = .00003$, two-tailed, as would be expected if the outcome-contingent task was valid, because psi task success was intended to be directly related to contingent-task pleasantness via duration of the pleasant and unpleasant tasks. Further, the correlations between psi scores and subjective task

pleasantness ratings remained significantly positive when inspected by condition: intentional, $r_s(18) = .45, p = .046$, two-tailed; nonintentional, $r_s(38) = .71, p = .00042$, two-tailed. The difference between these correlations using Fisher's r is not significant, $z = 1.17, p = .12$ one-tailed.

Table 1
Hit Rates and Inferential Statistics Across Conditions and Previous Studies

	Sample	N	% Hit rate	t	p (two-tailed)	z	ES t/\sqrt{N}
Study 1 (Luke, Delanoy & Sherwood, 2008)	General public	100	28.5	2.51	.01	2.41	.25
Study 2 (Luke, Roe & Davison, 2008)	General public	25	34.0	2.60	.02	2.39	.52
Study 3 (Luke, Roe & Davison, 2008)	Students (volunteer)	32	29.0	2.01	.05	1.91	.36
Study 4 (Luke & Morin, 2009, 2014)	General public	41	28.0	1.19	.24	0.74	.19
Study 5 (Hitchman et al., 2012a)	General public	50	26.8	1.14	.26	1.11	.16
Study 6 (Hitchman et al., 2012b)	General public	50	26.5*	1.62	.12	1.55	.23
Study 7 - nonintentional	Students (required)	(20)	(26.0)	(0.35)	(.73)	(0.10)	(.08)
Study 7 – intentional		(20)	(20.0)	(-1.41)	(.18)	(-1.31)	(-.32)
Study 7 - overall		40	23.0	-0.87	.39	-0.84	-.14
Total		338	27.7**	-	.0005	3.51***	-

*Actually hit rate = 53.1 because MCE = 50% for this study as opposed to 25% in other studies. The hit rate has been converted to show the equivalent hit rate for comparison.

** All conditions. The hit rate for the 318 participants in the nonintentional conditions only is 28.2%

*** Stouffer Z for all studies and conditions. For nonintentional conditions only, Stouffer $Z = 3.86, p = .0001$, two-tailed.

Table 2
Correlations Between Psi Scores and Personality Scores

	r ($*r_s$)	p (two-tailed)
Emotional creativity	.16	.32
Openness to experience	.09	.59
Sheep-goat psi belief	-.09*	.58

Regarding possible intergroup personality differences (Table 3) there were no significant differences between the groups on the various individual differences measures, and the groups had equal variances as determined

by Levene's tests, both of which indicate that group allocation was suitably randomised. A medium-sized positive correlation was found (see Tables 4 and 5) between Emotional Creativity Inventory scores and openness to experience scores, as would be expected (Ivcevic et al., 2007).

Table 3
Comparisons of Mean Task Pleasantness (1 to 10 Scale) and Personality Measures for Different Intentional Conditions

Mean (<i>SD</i> in parentheses)		Intentional	Nonintentional	Overall
Task pleasantness	Penalty	2.92 (1.32)	3.22 (1.86)	3.04 (1.52)
	Reward	5.00 (2.28)	6.73 (1.95)	6.12 (2.18)
	Combined	3.55 (1.87)	5.15 (2.58)	4.35 (2.37)
Emotional creativity		94.70 (12.69)	99.60 (15.43)	97.15 (14.16)
Openness to experience		1.60 (1.39)	1.20 (1.32)	1.40 (1.35)
Sheep-goat psi belief		76.70 (8.29)	76.20 (7.95)	76.45 (8.02)

Table 4
*Correlation Coefficients (*p* Values) for Intercorrelations of Personality Variables Across Conditions*

Intentional condition (<i>n</i> = 20)	ECI	Psi belief
Psi belief	.26 (.26)	-
OTE	.40* (.076)	-.18 (.46)
Nonintentional condition (<i>n</i> = 20)		
Psi belief	.04 (.85)	-
OTE	.45* (.048)	-.08 (.72)

Correlation coefficient is r_s (Spearman) unless indicated by * as r (Pearson)

Using Fisher's test none of the differences between the correlations were significant, because the greatest difference across conditions, between psi belief and ECI, was not significant $z = 0.66$, $p = .51$, two tailed. Therefore there are no apparent concerns with randomization of participants across conditions.

Table 5
*Correlation Coefficient (and *p* Value) for Intercorrelations of Personality Variables for Both Conditions Combined*

Both conditions (<i>N</i> = 40)	ECI	Psi belief
Psi belief	.15 (.37)	-
OTE	.42* (.006)	-.04 (.79)

Correlation coefficient is r_s (Spearman) unless indicated by * as r (Pearson)

Discussion

Unlike the previous six experiments using this test paradigm, and counter to prediction, the overall psi score was below chance; however, this finding was not significant. Nevertheless, as predicted, the psi scores for the nonintentional condition were higher than for the intentional condition, although the difference was not significant. Furthermore, upon comparing the two conditions it can be seen that—as with the previous six studies—the mean psi score for the nonintentional condition was above chance, although not significantly, and the intentional condition scores were well below mean chance expectation, although not significantly. This is the first time in the seven studies conducted so far that scores on this task have dropped below mean chance expectation, but only for this intentional psi condition, as would be partially predicted by the PMIR model. However, none of the scores or differences between them were significant in this study, so any positive interpretation must be treated with caution.

Concerning the individual difference measures, there was no significant correlation between psi scores and any of the three measures, thereby failing to replicate the previous findings in two of three studies of a relationship with belief in psi. Furthermore, the previous positive relationship between psi scores and openness to experience found in two of the four previous studies was not replicated, and neither was there evidence of a relationship between emotional creativity and psi scores. However, as with all previous studies, there was a positive relationship between subjective task pleasantness ratings and psi scores overall, indicating that the contingent tasks were valid. Further, these positive correlations remained significant for both the intentional and nonintentional conditions, and somewhat more so in the nonintentional condition, though not significantly so.

The discrepancy in overall score between this and previous studies appears, in part, due to the introduction of the intentional task, which was anticipated to have a negative effect on scoring. The mean in the nonintentional condition was in the same positive direction as in our previous studies. Our interpretation of the PMIR model partially predicted that performance on the psi task would be lower in the intentional condition than in the nonintentional one; however, the below chance scoring wasn't necessarily predicted by the model, although this might occur in certain circumstances. In any case psi scoring in the intentional condition, although above chance expectation, is still just slightly so (26% hit rate) and nonsignificant. One possible explanation for the lack of significant difference in precognition scores between the intentional and nonintentional conditions could involve the assumption that intentional tasks necessarily consume more cognitive processing capacity than nonintentional tasks. This is not necessarily explicit from Stanford's (1990) PMIR model and is the authors' interpretation of his model.

One reason for the reduced psi scoring in this study relative to previous studies in this series may have to do with the sample. As can be seen from Table 1, all but one of the previous six studies (Study 2 of Luke, Roe, & Davison, 2008) either partly or wholly utilised members of the public, often attending psi- or psychology-related events, who volunteered without reward to take part out of curiosity and personal interest. By contrast the present study used university students who gained research participation points for taking part and may have been somewhat less motivated to achieve a high score than participants in previous studies using this test paradigm, who were all unrewarded volunteers and scored higher on the precognition task.

In any case, an inspection of the percentage hit rates across all seven studies (Table 1) shows that after an initial peak for Study 2, psi scores have declined slowly in a relatively linear fashion. Taking the overall scores for all seven studies, there is a significant decline in effect size as the studies progressed, $r_s = -.79$, $p = .04$, conforming to the supposed decline effect within parapsychology (e.g., for a review see Colborn, 2007). Given that the protocol has remained essentially the same across studies, and that the controls have not been increased (the paradigm was already tightly controlled), at least considerations of increased quality can be fairly safely ruled out, so the effect appears likely to be either psychological, such as the motivation of the researcher, or a physical property of psi, such as some kind of quantum-mechanical factor perhaps due to the violation of information transfer limitations with quantum systems (for an overview see Colborn, 2007).

Ultimately the large decline in scores for this series of studies can be seen to occur partly as a consequence of the destructive testing of the PMIR model with this test paradigm, as can be seen in the discrepancy of scores between the intentional and nonintentional conditions. However, in part, a steady decline effect across studies is also still evident even when the intentional component is considered (see Table 1).

In summary, this study failed to find clear evidence for a psi effect nor a superior effect of nonintentional

versus intentional psi task, despite finding a nonsignificant effect of intention in the predicted direction. Furthermore, none of the individual difference measures were found to be related to psi score either. Tentative explanations put forward for the lack of significant results include the destructive testing of the test paradigm, a nonmethodology-based decline effect (e.g., due to the experimenter motivation or quantum-based decline effects across studies), and motivational factors related to the use of a student sample with a motive other than to get a good psi score. Factors relating to statistical power might also be considered, because, even though the effects were in the opposite direction overall, power analysis using G*Power (Faul, Erdfelder, Buchner, & Lang, 2009) indicate that with a mean effect size of $d = .23$ a total sample size of 79 is recommended for power = .8 so, with 40 participants power = .55, this study is somewhat underpowered. Power issues aside, finally, however, this test paradigm for exploring the PMIR model of psi continues to demonstrate utility as the overall nonintentional psi task performance was Stouffer $Z = 3.86$ ($p = .0001$) across seven studies, making this a somewhat robust measure of nonintentional precognition, which deserves further exploration. Currently, however, although the previous studies have demonstrated, to some extent, the utility of the intrinsic reward (e.g., Luke & Morin, 2014) inherent within the PMIR model, the utility of the nonintentional psi task paradigm, explored here, needs further testing, ideally with a larger and more motivated sample.

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Abstracts in Other Languages

Spanish

COMPARACIÓN DE RESULTADOS EN TAREAS DE PRECOGNICIÓN INTENCIONAL Y NO INTENCIONAL

RESUMEN: El modelo de Stanford de respuesta psi mediada instrumentalmente (PMIR) propone que psi es una función evolutiva adaptativa que trabaja en gran parte en servicio del organismo, pero que opera a un nivel casi completamente inconsciente. Una serie de experimentos exitosos de Luke y asociados han explorado el modelo PMIR con una tarea de precognición no intencional automatizada con tareas de resultado contingente postexperimental que varían en agradabilidad de acuerdo con el éxito en la tarea psi. Hasta ahora este paradigma sólo había explorado tareas no intencionales por lo que este estudio comparó condiciones de prueba intencional y no intencional para evaluar la proposición de psi inconsciente del modelo PMIR. Una muestra de 40 estudiantes de psicología completaron 10 pruebas de la tarea automatizada de precognición, con 20 participantes asignados al azar a la condición no intencional y 20 a la condición intencional en un diseño de grupos independientes. Contrariamente a los estudios previos los resultados psi en general estuvieron por debajo de la expectativa media de azar (MCE), aunque no significativamente. En línea con las predicciones basadas en el modelo PMIR, sin embargo, los participantes de tareas en la condición no intencional puntuaron más alto que la MCE y que el grupo con la prueba intencional, aunque estas diferencias no fueron significativas. Las medidas de creencia en psi, apertura a la experiencia, y creatividad emocional no correlacionaron con las puntuaciones de psi. Discutimos los resultados a la luz de estudios previos con sugerencias para futuras investigaciones.

French

COMPARAISON DE RESULTATS AVEC DES TACHES DE PRECOGNITION NON-INTENTIONNELLES ET INTENTIONNELLES

RESUME : Le modèle de Stanford de la réaction instrumentale médiatisée par le psi (PMIR) propose que le psi est une fonction adaptative et évolutive qui serait en grande partie au service de l'organisme, mais qui opérerait à un niveau d'inconscience presque totale. Une série d'expériences réussies conduites par Luke et ses associés ont exploré le modèle du PMIR avec une tâche de précognition non-intentionnelle automatisée avec des tâches post-experimentales dépendantes des premiers résultats, tâches étant d'autant plus plaisantes que le succès à la tâche psi était élevé. Jusqu'à présent, ce paradigme avait été exploré seulement en utilisant des tâches non-intentionnelles ; c'est pourquoi la présente étude compare des conditions avec des tâches psi non-intentionnelles et intentionnelles pour explorer la proposition concernant le psi inconscient dans le modèle du PMIR. Un échantillon de 40 étudiants

en psychologie ont complété 10 essais chacun d'une tâche de précognition automatisée, avec 20 participants aléatoirement placés dans une condition non-intentionnelle et 20 placés dans la condition intentionnelle dans un protocole avec des groupes indépendants. Contrairement aux précédents résultats, les résultats pour le score psi global étaient inférieurs à ce qu'on pouvait attendre du hasard, bien que de manière non-significative. Toutefois, en accord avec les prédictions basées sur le modèle du PMIR, les participants placés dans la condition non-intentionnelle ont obtenu des scores supérieurs au hasard et également supérieurs à ceux placés dans la condition intentionnelle, quoique ces différences n'étaient pas significatives. Les mesures de la croyance au psi, de l'ouverture à l'expérience et de la créativité émotionnelle ne montrèrent pas de corrélations avec les scores psi. Les résultats sont discutés à la lumière des précédentes études et des suggestions sont faites pour de futures recherches.

German

EIN VERGLEICH DER ERGEBNISSE VON NICHTABSICHTLICHEN MIT ABSICHTLICHEN PRÄKOGNITIONS-AUFGABEN

ZUSAMMENFASSUNG: Stanfords Modell der psi-vermittelten instrumentellen Reaktion (PVIR) nimmt an, dass Psi eine evolutionäre adaptive Funktion darstellt, die im Dienste des Organismus arbeitet, aber nahezu völlig unbewusst abläuft. Luke und Mitarbeiter haben eine Anzahl erfolgreicher Experimente durchgeführt, die das PVIR-Modell mit einer automatisierten nichtabsichtlichen Präkognitionsaufgabe untersucht haben, wobei deren experimentelles Ergebnis Aufgaben bedingte, deren Angenehmheitsgrad in Abhängigkeit vom jeweils erzielten Psi-Treffererfolg variierte. Da bisher mit diesem Paradigma nur nichtabsichtliche Aufgaben getestet wurden, vergleicht die vorliegende Studie die Bedingungen nichtabsichtlicher mit absichtlichen Psi-Testaufgaben, um die Annahme des PVIR-Modells zu überprüfen, dass Psi unbewusst sei. Eine Stichprobe von 40 Psychologiestudenten absolvierte 10 Einzeldurchgänge der automatisierten Präkognitionsaufgabe, wobei, einem Design für unabhängige Gruppen folgend, 20 Teilnehmer zufällig der nichtabsichtlichen und 20 Teilnehmer der absichtlichen Bedingung zugeordnet wurden. Im Unterschied zu früheren Ergebnissen blieb das gesamte Psi-Testergebnis unter der mittleren Zufallserwartung (MZE), allerdings nicht signifikant. In Übereinstimmung mit den Vorhersagen des PVIR-Modells erzielten Teilnehmer in der nichtabsichtlichen Testbedingung überzufällige Treffer und schnitten besser ab verglichen mit den Teilnehmern in der absichtlichen Bedingung, allerdings sind die Unterschiede nicht signifikant. Es zeigte sich, dass Fragebogenwerte in Bezug auf Glauben an Psi, Offenheit für Erfahrung und emotionale Kreativität nicht mit Psi-Treffern korrelierten. Die Ergebnisse werden im Lichte früherer Studien diskutiert zusammen mit Vorschlägen für zukünftige Forschungen.