Journal of Parapsychology

— Rhine Research Center —

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Keeping Up Is Hard to Do

Etzel Cardeña

In a past editorial (Cardeña, 2017) I made the case that those engaged in psi research, as in all other scientific endeavors, must have a good knowledge of their field's previous research and theoretical work. In this Editorial I turn to the present and future. It has become somewhat of an in-group meme that psi research has been at the forefront of methodological innovations. There is considerable truth to that statement. To give but a few examples (see also Cardeña, in press): a) in his encyclopedia entry on telepathy, James (1899) illustrated how aware were the foremost psychical researchers of his time of potential nonconscious artifacts in research, b) the French Nobel prizewinner Charles Richet was the probable originator of randomization in research design, in his experiments on psi (Hacking, 1988), c) Pratt and others collaborated with statisticians to put their endeavors on a secure footing and produced the first comprehensive meta-analysis (Pratt, Rhine, Smith, Stuart, & Greenwood, 1940; see also Gupta & Agrawal, 2012); d) the recent outcry in psychology and other disciplines about QRPs (questionable research practices), including selective reporting, had already been discussed decades ago in psi-related publication policies and data analyses (e.g., Johnson, 1976; Office of Technological Assessment, 1989, p. 337), and e) parapsychology as a field is much better at using "masking" procedures than mainstream psychology and other fields (Watt & Nagtegaal, 2004). And as a more modest contribution, I will draw attention to the recent requirements by the *Journal of Parapsychology* to require demographic and attitudinal information from researchers interacting with participants. Although we have had evidence in psychological research for decades that the researchers' gender, attitudes, and other characteristics can affect the performance of participants (e.g., Rosenthal & Rubin, 1978; Schlitz, Wiseman, Watt, & Radin, 2006; Silverman, 1974), I am not aware of any other scientific journal requiring this essential information.

Past achievements in science, however, do not suffice in an ever-moving landscape, with increasing number of practitioners, changing standards, and advances in statistical, reporting, and technological procedures. When looking at the best standards, however, some parapsychology work has lagged. To give an immediate example, this issue of the *Journal of Parapsychology* inaugurates the use of *digital object identifiers* (DOIs), a way to help cross-reference publications that has become standard in scientific journals (see Ryan, this issue) but has been missing in most parapsychology journals. As a recent editor, I have also received submissions that have used dated statistical procedures and/or shown little awareness of advances in related fields. That is not, of course, the case of some submissions (e.g., Irwin, Marks, & Geiser, this issue; Schofield, Baker, Staples, & Sheffiedl, this issue), but reminds me of one of the most serious problems in the field, namely its insularity from what occurs in other areas of science. The wonderful Bial Foundation biannual symposia (full disclosure, I am an unpaid scientific advisor of

its Board), which gather many of the foremost researchers in parapsychology and various other disciplines, help the former to become aware of advances in other areas, but the field needs much more than that. I urge individual researchers as well as organizations (e.g., the PA, the SSE, the SPR, as well as Bial) to come up with enticements for psi researchers and open scientists in other areas to collaborate. For example, a good percentage of Bial Foundation biannual grants could be reserved for projects that integrate psi and mainstream components. This will help not only to break down the field's insularity but also to keep psi researchers up to date in the advances of more mainstream areas. Another aspect that we need to embrace is the ongoing push for study registries and open data (see Ryan, this issue). As one of the contributions in this issue shows (Vernon, this issue), researchers should not be worried that pre-registering a study will somehow make significant results disappear. And registering data will facilitate enormously meta-analyses and, incidentally, force all researchers to keep good records of their data. This is increasingly becoming a requirement for mainstream publications.

One final thought about keeping up... Parapsychology urgently needs to entice promising and interested young researchers to use new techniques to probe into its fascinating set of problems. When I was a doctoral student I had the privilege of attending the FRNM's (now Rhine Research Center) Summer Institute, mostly designed for serious students, which exposed me to some of the best work and workers in the field, and which is partly responsible for my being the editor of this Journal. Those Summer Institutes are long gone, but I urge organizations and universities to develop professional-level intensive workshops or institutes, so that some of the incoming geneticists, neuroscientists, physicists, psychologists, and other scientists, will also get bitten by the psi bug early in their careers. These organizations could also help publicize and organize research internships in psi research labs. Bright graduate students in different fields energize the field and help keep it updated of the ongoing transformations in science (e.g., see the excellent meta-analytic chapter by two students out of three authors, Baptista, Derakhshani, & Tressoldi, 2015, in a book also co-edited by a then graduate student). Otherwise, parapsychologists may end up as the salmons that while self-congratulating themselves for their previous jumps fail to see and prevent the jaws of the expecting bear in the next one.

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A Test of Reward Contingent Precall[1]

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Abstract: Precall represents improved memory for material practiced after the recall test. Such behavior has been suggested to serve the needs/motives of the individual. However, attempts to examine this have met with limited success, possibly reflecting the value of the reward. The current pre-registered study took the original approach of identifying a motivating reward: a cash reward of £10. The main study then examined the effect of offering this reward contingent upon precall performance. I made two confirmatory predictions: first, that post recall practice would lead to greater precall. Second, that a contingent reward would elicit greater precall. A mixed design involved randomly allocating participants to either a reward/no-reward condition and presenting them with 20 arousing images, after which they were given a surprise recall task. Following this, a sub-set of the images was presented twice allowing participants to practice. Precall scores represented the number of correctly recalled images that were subsequently repeated, and baseline scores the number of correctly recalled images not repeated. Analyses showed precall scores were significantly higher than baseline; however the contingent reward had no effect. This may indicate a Type I error or an anomalous precognitive effect. Hence, some speculative ideas are proposed in an attempt to account for the pattern of data.

Keywords: precall, precognition, contingent reward, arousing images

Precall represents the supposed positive effect on memory recall that would occur for items that are practiced *after* the recall test. Though such an idea is both provocative and controversial (Cardeña, 2015), there is some evidence to support it. For instance, Bem (2011) showed (Experiment 8 and 9) that practice on a sub-set of items produced a positive effect on recall performance for those items in a *preceding* memory task. However, attempts by others to produce similar effects have met with no success (see e.g., Galak, LeBouf, Nelson, & Simmons, 2012; Ritchie, Wiseman, & French, 2012; Vernon, 2017).

Based on an early model put forward by Stanford (1974) it has been suggested that psi as a process may work at an unconscious level to serve the needs or motives of the individual in an adaptive manner. The model itself contains a number of propositions that include the notion of a psi mediated

adaptive response and the idea that such effects may emerge "without a conscious effort" (Stanford, 2015, p. 96), with research showing some support for these components (Bem, Tressoldi, Rabeyron, & Duggan, 2015; Radin & Pierce, 2015). However, here the focus is on what Stanford (2015) refers to as the incentive value of the reward as he has previously suggested that the strength of a psi based effect would be "directly and positively related to the importance" of any such motivational object or event (Stanford, 1974, p. 45). This led to the suggestion that providing a contingent reward, which could be seen as serving the needs and/or providing motivation to the individual in question, would enhance any psi-based effects (see Luke, Delanoy, & Sherwood, 2008). Indeed, early work suggested that the benefit of a positive experience could act as a reward, which in turn might help facilitate psi (Stanford et al., 1976). However, more recent work examining the impact of a contingent reward on precall type effects has been less successful (see Luke & Morin, 2014; Luke, Roe, & Davison, 2008; Luke & Zychowicz, 2014).

Nevertheless, the lack of a clear contingent reward effect may be because the type of reward offered did not sufficiently serve the needs and/or motives of the individual (Bierman & Van Ditzhuyzen, 2006). For instance, previous work has offered participants the opportunity to rate erotic images (Luke, Roe, et al., 2008) or rate the relative humor of cartoons (Luke & Zychowicz, 2014). The use of erotic images was suggested to appeal to the primal sex instinct and, though not made clear, it is possible that the use of humorous cartoons may positively influence the mood of the individual. However, it is not clear that such rewards really achieve their desired aims. For example, no assessment was made regarding participants' perceptions of such rewards. Second, given the wide availability of erotic images, humorous cartoons, and other stimuli on the internet, it is no longer the case that access to such images is either difficult and/or would represent something unusual and therefore it is not clear that rating such images or cartoons would accurately represent a meaningful reward. Thus, it is possible that providing a contingent reward may facilitate the expression of a psi-based response but the specific reward would need to be perceived as such. Hence, rather than assume that erotic images or viewing a humorous cartoon would represent an underlying need and/or motivational reward, a pre-study survey was conducted on-line to specifically ask participants what type of reward would motivate them.

The on-line study was set up and delivered using Qualtrics software and a standard keyboard for entering responses. It involved asking participants to imagine themselves having the opportunity to take part in a lab based psychology experiment that would take approximately 25mins and to rank the reward options available in terms of what would most (1) to least motivate them (9). The 9 options listed, which were randomly ordered with each presentation, were:

1. Course-based credits
2. The opportunity to view some erotic images
3. The opportunity to participate in another task
4. The opportunity to finish the experiment early and leave
5. A reward of £10
6. The knowledge that I've helped with a research project
7. The opportunity to view some humorous material
8. The opportunity to avoid seeing some negative images
9. A sweet reward such as chocolate or cake

A total of 29 participants took part in the on-line survey, 27 females and 2 males, with a mean age of 21 years (*SD* = 1.19). These participants were opportunity sampled from the same population as those taking part in the main study and were assured that all responses given in the on-line survey were confidential and anonymous. The results can be seen in Table 1.

Table 1
Percentage of People Choosing each of the Nine Options.

Choice	Credits	Erotic images	Another task	Leave early	£10	Helping out	Humor material	Avoid negative	Chocolate / cake
1st	27.59	0.00	0.00	0.00	58.62	10.34	0.00	0.00	3.45
2nd	44.83	0.00	3.45	0.00	27.59	3.45	0.00	0.00	20.69
3rd	20.69	0.00	3.45	6.90	3.45	37.93	3.45	0.00	24.14
4th	3.45	3.45	20.69	10.34	3.45	20.69	31.03	0.00	6.90
5th	0.00	0.00	31.03	3.45	3.45	17.24	34.48	3.45	6.90
6th	3.45	6.90	3.45	41.38	0.00	6.90	17.24	13.79	6.90
7th	0.00	6.90	27.59	20.69	3.45	0.00	6.90	20.69	13.79
8th	0.00	3.45	3.45	13.79	0.00	3.45	6.90	55.17	13.79
9th	0.00	79.31	6.90	3.45	0.00	0.00	0.00	6.90	3.45

Interestingly, and perhaps unsurprisingly, the most popular option was a £10 reward (chosen by 58.6%) followed by the chance to gain course credits (27.5%). Informatively the least popular option was the opportunity to view erotic images (79.3%), though this may have been influenced by the gender distribution of the sample, which, though biased in favor of females, is highly representative of a psychology undergraduate cohort. Given the findings from this survey it would seem likely that the offer of a £10 cash reward would be more of a motivator and serve the needs of the individual than the opportunity to view either erotic images or humorous material. Hence, the current study examined the effect of a contingent £10 cash reward on precall performance. The study examined two confirmatory hypotheses:

H_A1 = Post recall practice of images will lead to greater recall of those images compared to those not practiced.

H_A2 = A contingent reward of £10 will lead to greater levels of precall compared to no reward

Method

This study was pre-registered at the Koestler Parapsychology Unit (ref#1026: http://www.koestler-parapsychology.psy.ed.ac.uk/Documents/KPU_Registry_1026.pdf) and a copy of the raw data uploaded to the site.

Participants

An a-priori power analysis used a combined average effect size of *d* = 0.305 (from Bem, 2011, Experiments 8 and 9), an alpha criterion of 0.05 (two-tailed), coupled with a test having the statistical power of 0.8. Using the formula from Howell (2013), a test with the power of 0.8 and an alpha of 0.05

(two-tailed) translates into a δ score of 2.80, which leads to a projected N of $(2.80/0.305)^2$ or 9.18^2 equivalent to 84 participants. However, as there were 2 conditions (*Contingent reward* vs. *No reward*) and 4 sequences of image rotations (see Appendix A) to ensure an even distribution across these permutations, a sample of 88 participants would be required. Hence, once this target was reached the advertisement for the study was removed and only those that had signed up between the target N being reached and the removal of the advert took part. This meant that a total of 99 participants eventually completed the study, 84 (85%) female and 15 (15%) male, with an age range of 18 to 55 years (Mean = 20.1; SD = 7.1). All participants were opportunity sampled from the undergraduate psychology student population and all received course credit for participating in the study. Those randomly allocated to the reward condition were also offered an additional £10 cash reward contingent on their performance.

Researchers

Three researchers were involved in conducting the study: The primary investigator (PI: DJV), who conceived of and designed the study, and two research assistants (RA1: TD and RA2: LN), who helped with participant recruitment and data processing. Their ages were 53, 36, and 56 years (Mean age = 48.3; SD = 10.7) respectively. They identified themselves as operating and interacting with the participants in a friendly manner. In terms of a-priori belief that the psi hypothesis would be supported, all three identified their level of belief as moderate, or 4 on a 5 point scale running from: 1-strong non-belief, 2-moderate non-belief, 3-neutral, 4-moderate belief, 5-strong belief.

Materials

The experiment was conducted in a psychology lab using a Super RiteMaster computer tower installed with Windows 7 enterprise and an Intel® Core™2 Duo CPU processor with SuperLab 5.0 (Cedrus Corporation) presentation software. A diffuse star field image was used along with a 1-minute clip of new-age type music called Stargazing as a relaxation induction. The stimuli consisted of two main lists each containing 10 arousing images from the International Affective Picture Systems (IAPS) database (Lang, Bradley, & Cuthbert, 1997). One list contained positively arousing and the other negatively arousing images. Although the images were matched for mean arousal level (Positive: 6.53; Negative: 6.23; $t(18)$ = 1.51, p = 0.149), they differed significantly in terms of valence (Positive, 7.36; Negative, 2.32; $t(18)$ = 29.27, p = 0.001). The 2 main lists were further divided to produce 8 sub-lists each containing 10 images (5 positive and 5 negative) with each sub-list matched for mean valence and arousal levels. To record and assess participants' belief in the paranormal/ESP the revised paranormal belief scale (Tobacyk, 2004) was also administered.

Design

Participants were randomly allocated to one of two conditions in the study (*Contingent reward* vs. *No reward*). To reduce the opportunity of possible bias in allocating participants to a condition an experimental management system (Sona Systems see: https://canterburyccu.sona-systems.com/Default.aspx?ReturnUrl=%2f) was used so that participants signed themselves up for the study and picked a time slot that suited them. Hence, neither the Research Assistant (RA) nor the Primary Investigator (PI) were involved in enrolling participants. Furthermore, the PI also created a list of participants to ensure an even distribution across the two conditions (*Contingent reward* vs. *No reward*) and stimulus list rotations, with equal numbers of participants viewing each type of stimulus rotation (see Appendix A) from

1 to 99. The PI randomly allocated participants to this list in blocks of 16 using a random number generator (see, https://www.random.org/) to identify where in the block the first participant would be placed. For example, in the first block participant 1 was placed in position 13, which refers to the 3rd practice list in the no contingent reward condition (Study 4_Expt_P3). The second participant was then entered into position 14, which consisted of practice list 3 (P3) *with* a contingent reward (CR). This continued and when position 16 was filled the allocation rotated around to the first position until all positions in that block were filled. For example, if participant 4 was entered into position 16 participant 5 would be entered into position 1. For the second block of 16 the random number generator was again used to identify where in the block the first participant (in this instance participant 17) would be entered. This procedure continued until all participants had been allocated a condition. The RA then ran the participants in this sequence as they signed themselves up for the study.

Procedure

Consistent with previous work all participants were made aware that the experiment tested for ESP, although precisely how was not explained until they had completed the experiment. Each participant was tested individually in a quiet room. They began by reading through a general information sheet and completing a consent form. For those allocated to the contingent reward condition the instruction sheet had a £10 note clipped to it and informed them that if their ESP score was above chance they would immediately win the £10. No mention of the cash reward was made to those in the non-contingent condition. After having read the information sheet participants completed a paper version of the Revised Paranormal Belief Scale (Tobacyk, 2004). All participants then faced a computer screen with the instructions "When you are ready to begin press any key." Once they pressed a key on the keyboard they were told that they would be presented with an image of stars and hear some music and that the aim of this was to help them relax. Once again, they pressed a key to continue on to the image of a starfield along with the relaxing new-age type music, which played for 1 minute. At the end of this, another instruction screen appeared with the following message: "You will now be presented with a selection of both positive and negative images. Each image will remain on screen for 3.5 seconds. Please attend to the images." The instructions ended by stating that participants should press any key to begin. Once a key was pressed the computer presented all 20 arousing images in a random sequence. Each image was shown on screen for 3500ms along with its identifying label in font Ariel size 36pt.

Once all images had been shown a surprise recall instruction screen appeared saying "Your task now is to recall as many of the images you have just seen and write their names down on the sheet provided. You have 3 minutes to do this. You can write them in any order and spelling doesn't matter." Those allocated to the *Contingent reward* condition were also told that "If their ESP performance was above chance they would immediately win the £10 cash reward." Participants were then given 3 minutes to complete this section of the task. At the end of the 3 minutes the computer sounded a tone and instructed the participant to stop writing and hand their response sheet to the experimenter. During the experiment the experimenter calculated each participant's precall score as the number of images that would be repeated that were recalled compared to the number of images that were not repeated. For those in the *Contingent reward* condition if their recall of the repeated images was higher than those not repeated the participant would win the cash reward. If the precall score was either the same as or lower than the score for non-repeated images they would not win the reward. After handing the recall response sheet to the RA for cod-

ing, participants looked back at the computer screen for the next set of instructions telling them that they would now see a subset of images from the list just seen and that each image would remain on screen for 3.5 seconds and they should attend to the images. Participants simply pressed a key to move through this stage during which a practice list of 10 images (5 positive and 5 negative) was presented one at a time as before. After this participants were asked to recall the 10 images just seen by writing down their names on the sheet provided and handing it to the experimenter. They were given 2 minutes to do this and at the end of this time the computer sounded a prompt and instructed them to stop writing and hand their response sheet to the experimenter. The same 10 images were then shown again followed by another recall test. Once the post-recall practice phase has been completed all participants were asked to complete two 5-point Likert scale questions asking them how motivated they were to complete the task (1 = strongly motivated to 5 = strongly unmotivated) and how pleasant they found the task overall (1 =very pleasant to 5 = very unpleasant). Finally, participants were given a debrief information sheet explaining the aims of the study and providing contact details of the Principal Investigator (PI) should they wish to obtain more information. Those in the *Contingent reward* condition who won the reward received it immediately. Full University Faculty ethics approval was obtained for this study (Ref: 16/SAS/313C).

Analysis

Prior to analysis, the distribution of the data was examined using standard histograms overlapped with normal distribution curves and skewness and kurtosis values noted to ensure that any variability in the data was within tolerable limits (i.e., values <1). Potential differences in precall and baseline scores *within* and *between* participants were examined using repeated measures and independent measures *t* tests respectively. For the independent samples *t* tests, Levene's test for equality of variances was also used to ensure homogeneity of variance. These statistical tests employed a conservative 2-tailed approach to allow for the possibility that post-recall repetition of the images *could* impair recall performance (see Ritchie et al., 2012). The criterion for significance was $p < .05$ (two-tailed), and 95% confidence intervals and Cohen's effect sizes were also estimated.

Results

Ninety-nine participants were each exposed to 20 images, creating a total of 1980 trials. Of these, there were 162 (8%) trials that required additional consideration by two coders, masked to the aims of the study, due to spelling and/or grammar issues. The two coders who examined these items agreed 100% on the outcome of 161 (99%) of the responses. The 1 (1%) trial where no agreement was reached was excluded from the analysis. There were also 21 (1%) intrusions that did not refer to any of the images seen but were invariably semantically related (e.g., climber, death, snow) and these were also excluded from the analysis. Furthermore, repetitions were not counted as intrusions, just ignored, as the primary focus was whether the participant recalled the image and not necessarily the correct word.

Recall accuracy was coded as the number of images correctly recalled out of 20. The *Precall* score represents the number of correctly recalled images (from a total of 10) that were subsequently repeated and the *Baseline* score represent the number of correctly recalled images that were not repeated. The *Precall* and *Baseline* scores for the positive and negatively valenced images can be seen in Table 2.

Table 2
Precall and Baseline Scores for Positive, Negative, and for all Images Combined

	Positive		Negative		Total	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
Precall	2.35	1.19	3.42	1.06	5.77	1.74
Baseline	2.13	0.99	3.12	1.11	5.24	1.58

The first confirmatory hypothesis tested whether participants' *Precall* score would be greater than their *Baseline* score. A repeated measures *t* test comparing *Precall* to *Baseline* scores showed that the level of accuracy for the *Precall* condition was significantly higher than the *Baseline* condition (respective means: 5.77 vs. 5.24), $t(98) = 2.352$, $p = 0.021$, 95% CI (0.0836, 0.987), $d = 0.32$. The second confirmatory hypothesis tested whether participant's *Precall* score was greater in the *Contingent reward* condition than in the *No reward* condition. An independent samples *t*-test showed no difference in precall between the two conditions, (respective means: 5.68 vs. 5.87), $t(97) = 0.562$, $p = 0.575$, 95% CI (-0.499, 0.894), $d = 0.11$.

Exploratory analyses showed a nonsignificant correlation between *Precall* and *Baseline* scores, $r(99) = 0.075$, $p = 0.460$. Post-hoc comparisons (using a Bonferroni correction) were made between the positive and negative images in both the *Precall* and *Baseline* conditions. For the *Precall* condition, participants precalled more negative than positive images (respective means: 3.42 vs. 2.35), $t(98) = 7.304$, $p = 0.001$, 95% CI (0.779, 1.361), $d = 0.47$. The same pattern was evident in the *Baseline* condition with participants recalling more negative than positive images (respective means: 3.12 vs. 2.13), $t(98) = 6.947$, $p = 0.001$, 95% CI (0.707, 1.272), $d = 0.47$.

Comparisons of mean motivation levels (1 = strongly motivated to 5 = strongly unmotivated) and pleasantness ratings (1=very pleasant to 5 = very unpleasant) between the *Reward* and *No reward* conditions showed no significant differences (see Table 3, all *p*s >0.14).

Table 3
Reported Motivation and Pleasantness for Reward and No Reward

	Contingent Reward		No Reward	
	Mean	**SD**	**Mean**	**SD**
How motivated	1.62	0.87	1.87	0.85
How pleasant	2.58	1.41	2.87	1.25

Finally, examination of possible associations between *Precall* performance and participant belief in paranormal were conducted (see Table 4). These correlations showed a positive, though not consistent, relation between precall scores and psi, witchcraft, spiritualism and belief in extraordinary life forms, with a marginal correlation for psi. Interestingly, there was no relationship between precall scores and belief in precognition.

Table 4

Correlations for Total Precall Score and the Seven Sub-scales of the RPBS

	r	p
Traditional Religious Belief	.060	.55
Psi	.186	.06
Witchcraft	.214	.03*
Superstition	.056	.58
Spiritualism	.205	.04*
Extraordinary Life Form	.229	.02*
Precognition	.127	.21

* p< .05 (two-tailed)

Discussion

The data show a clear anomalous effect with participants recalling more of the images that *would be* repeated in the future. However, offering a contingent cash reward of £10 did not influence precall scores. There was no clear association between precall scores and baseline recall scores, although in both conditions participants recalled more negative than positive images. There was no difference in motivation level or pleasantness ratings between those offered and not offered a reward. Finally, there was some evidence of a positive relation between belief in the paranormal and precall performance.

That an anomalous precall effect was evident in the data could be interpreted simply as a Type I error. It is important to recognize that science does not deal in certainties but relies on statistics to make inferences about the state of the world. When doing this there are two possibilities: that there is in reality no effect in the population and the result is simply noise in the data, or a Type I error, or that there is in reality an effect in the population (Field, 2013). It is not possible to know with certainty which of these two options is true. Only with ongoing research and replicated and consistent effects over time and with multiple samples does the level of trust in such findings improve. Hence, the findings reported here should be viewed as providing one piece of the puzzle in helping to understand the possible nature of such anomalous effects.

The anomalous precall effect is however consistent with the positive findings of others who have also reported anomalous precognitive effects (Bem, 2011; Maier et al., 2014; Subbotsky, 2013; Vernon, 2015). Such findings are suggestive that something out of the ordinary is going on and that it may be possible for a future event to influence a present event and/or behavior. Interestingly, the lack of any association between precall and baseline recall scores suggests that the two processes may be mediated by distinct underlying neural processes. However, it should be noted that this is a speculative possibility and in this instance is reliant on a null result and as such remains the domain of future research to explore. Furthermore, it is conceptually interesting to note that the current study elicited an effect using what Bem et al. (2015, p. 8) refer to as a *slow-thinking protocol*, which they suggest may produce a lower success rate than fast-thinking protocols. However, the success of the current paradigm may be due to the length of time given to initially recall the target material. Here, participants were only given

3 minutes to recall as many of the images as they could in any order. Although others have either failed to clearly specify an amount of time (e.g., Baruss & Rabier, 2014; Bem, 2011), or allowed participants up to 5 minutes (e.g., Ritchie et al., 2012; Subbotsky, 2013), allowing participants more time might increase the possibility of unhelpful conscious cognitive processes interfering and/or inhibiting psi based effects. Such an idea would fit with the findings from Bem et al. (2015) suggesting more robust precognitive effects may be elicited with what they consider to be fast-thinking protocols. However, this raises the point that the distinction between fast and slow is somewhat arbitrary and is confounded with implicit and explicit processes. As such, this may be something that future research could helpfully tease apart. Alternatively, it could be due to the fact that the current study used emotive images whereas much of the previous research that failed to elicit a clear effect is based on the recall of words (e.g., Baruss & Rabier, 2014; Ritchie et al., 2012; Subbotsky, 2013).

The fact that both precall and baseline scores were better for negative than positive images is consistent with both mainstream literature (e.g., Kensinger, 2007) and psi-based research (Lobach, 2009). A suggestion put forward to account for this pattern is that stimuli that elicit stronger feelings and/or reactions may be better suited to eliciting psi based behaviors (e.g., Radin, 2004). Hence, future research may find it more productive to include or rely on stimuli that produce strong physiological reactions.

Given the proposal by Palmer and Miller (2015) that the primary investigator is often a good predictor of the outcome of psi based research, it is worth reflecting for a moment on whether the attitudes of those conducting the research in this instance could be responsible for the outcome. Although all three of the researchers who took part in and conducted this study would classify their a-prior belief as moderate, it would be more accurate to refer to this as an open-minded expectation rather than a set level of belief per se. We remained open-minded to the possibility of psi-based behaviors, but were more inclined to follow the data than rely on rhetoric and argument. Given this, it is possible that the attitudes and/or beliefs of the researchers could have influenced the outcome, but only in the sense that all things are "possible." If the outcome of this study were in any meaningful way influenced by such processes then one would expect the outcome to more closely reflect the experimenters' expectations. In this instance, the contingent reward should have enhanced the precall effect, but this was not the case. Hence, although it is not possible to state with any degree of certainty that the attitudes and expectations of the researchers did not influence the outcome, given that the findings do not fully reflect their initial expectations such influences alone are unlikely to account for the pattern of the data.

The significant precall effect reported here also raises some further issues. First is the issue of whether the precall effect is reliant on feedback or not. Second, given that a reward did not influence precall performance it could be suggested that offering a reward does not help to elicit psi type behaviors. Finally, some consideration is given to how such an effect may be accounted for theoretically.

There is discussion in the general precognitive literature that feedback concerning the relevant target material may be important for precognition to occur (Marwaha & May, 2016). The idea here is that the precall effect could be based on the feedback provided post-testing rather than the future event itself. There is some support for the notion that providing feedback can help with precognitive performance (Honorton & Ferrari, 1989; Steinkamp, Milton, & Morris, 1998). However, in the current study no specific feedback regarding precall performance was given to the participants either during or after

the study. Although it was the case that those in the contingent reward condition would have received a reward following their performance, if it was above chance, they would not know to what extent this was reliant on recalling any of the specific target images. Hence, such feedback could at best be viewed as generic and given that the contingent reward did not influence performance this would seem to suggest that feedback, in this instance, is not essential for precall to occur. Such a finding, although useful in helping to delineate the potential processes underlying precall performance, is not unique as others have also found clear precall effects without including a feedback component (Bem, 2011).

In terms of contingent reward there are anecdotal reports of rewards leading to more robust psi effects (Franklin & Schooler, 2011; Targ, 2012), though others have maintained that a more intrinsic level of motivation is more effective (Haraldsson, 1970). Furthermore, the model put forward by Stanford (1974) has been taken to suggest that psi based behaviors would be directly influenced by the relative importance, or reward to the individual. However, in this instance offering a £10 cash reward had no effect. Such a pattern suggests a number of plausible possibilities. First, and most obvious, is the idea that offering a contingent based reward does not influence the strength of any psi-based effects. Such an idea would be consistent with the findings of others who have found that offering a reward has no impact on psi performance (Luke, Roe & Davison, 2008; Luke & Morin, 2014; Luke & Zychowicz, 2014). A second possibility is that offering a reward could in fact reduce the level of intrinsic motivation of the individual, which in turn may reduce and/or inhibit the emergence of any psi-type behaviors. Such an idea would be consistent with mainstream research showing that external rewards can indeed reduce intrinsic motivation (Deci, Koestner, & Ryan, 1999). However, if this were the case then one would expect to see reduced levels of motivation for those offered a reward compared to those not offered any reward. As can be seen from the data presented in Table 3 this is clearly not the case. However, it should be noted that participant motivation in this instance was only assessed using a single item question. Although participants completed this anonymously it is possible that they might have not fully understood the question and/or that the question did not provide a full and accurate measure of their motivation. So, the idea that the reward had no influence on motivation is speculative and needs to be interpreted with caution. This could be something that future research can address directly using a standardized motivation scale such as the Situational Motivation Scale (Guay, Vallerand, & Blanchard, 2000). A further plausible though speculative alternative is that the participants in the study may not have believed that the reward was real. This possibility came to light during the debriefing process when some participants spontaneously mentioned that they thought the reward was part of a deception. Familiarity with lab based research makes it all too easy to forget how those who are naïve or simply inexperienced may view such procedures and what they do or do not believe is the real focus of the study. Unfortunately, participants were not asked whether they thought the reward was real or not; it is possible that some might not have believed in the reward and hence it might not have motivated them. Such an idea highlights the necessity for a deliberate effort to be made as part of the debriefing procedure to invite such disclosures from participants regarding their concerns about the study including any suspicions. Effective use of the post-experimental interview represents a key opportunity to help improve future work (Aronson, Ellsworth, Carlsmith, & Gonzales, 1989).

Theoretically, from a physics perspective, as counterintuitive as it may seem, all fundamental questions in physics are time symmetric. That is, they admit and allow both time-forward and time-re-

verse formulations (Sheehan & Ibison, 2011). Hence, precognition is both allowed and possible. Intriguingly, Taylor (2014) has suggested that the notion of precall or precognition would be consistent with a block universe account, which suggests that information transfer may be influenced by the phase synchrony of the brain states at the two times. That is, a resonance may occur between the spatiotemporal neuronal network that encodes the original stimuli and the one that is used to recall it at a later date. The assumption is that this overlap, or match, in neural network patterns leads to a greater coherence, which in turn could produce a greater activation of the original network leading to a greater level of recall. The greater level of resonance between the neural network of the present and the future is proposed as the basis for improved recall in the here and now. In essence, the information is transferred from the future brain to the present brain of the same person. Such a proposal is necessarily speculative given our current understanding of such phenomena and the nature of time in general. It is interesting to note that recent research examining the neural connectivity of parent-child dyads has shown associations between the level of neural connectivity and complex emotions of both parent and child (Lee, Miernicki, & Telaer, 2017). Furthermore, although the proposal that neural phase synchrony over time may mediate precall effects is necessarily speculative it does at least offer a potential mechanism that can be tested.

Finally, that there was some evidence of a positive association between belief in ESP and precall performance is interesting but not new (Palmer, 1971). What was of interest here was that the pattern was not consistent across the various domains as measured by the RPBS (Tobacyk, 2004), and in particular that there was no association between belief in precognition and precall performance. This would suggest that, if belief is in any way driving the effect it is based more on an overall generic belief rather than a specific belief in a particular aspect of ESP.

In conclusion, this study shows evidence of an anomalous precall effect that may be either a Type I error or a "real" anomalous effect. If real, it does not seem to be reliant on feedback concerning target material and may be mediated by processes distinct from those supporting normal recall. That the offer of a contingent reward did not influence precall performance suggests that such rewards do not influence psi-based behaviors. However, before such a view is accepted it would need to be made clear during the experiment that the reward was real. Furthermore, the precall effect could be accounted for in terms of resonant neural synchrony occurring at the two time periods. Finally, the association between belief in ESP and precall performance suggests that generic belief in ESP events/behaviors may be sufficient.

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Appendix A

The 8 sub-lists (consisting of 4 practice lists and 4 no-practice baseline lists).

Practice 1	Valence	Arousal	No practice baseline	Valence	Arousal
War	2.62	6.21	Skydivers	7.57	7.27
Gun	2.17	6.9	Pilot	7.02	6.14
Grave	1.63	6.2	Gymnast	7.74	6.14
Suicide	2.19	6.24	RollerCoaster	7.2	6.68
Solider	2.81	6.04	Money	7.91	6.44
Astronaut	7.35	6.02	Toilet	2.26	5.28

	Valence	Arousal		Valence	Arousal
Hiker	7.03	6.55	Police	2.91	6.28
Skier	7.33	7.35	Ship	2.48	6.46
Sailing	7.73	6.65	Accident	2.06	6.2
HangGlider	6.71	6.09	Fire	2.04	6.52
Mean	4.76	6.43	**Mean**	4.92	6.34

Practice 2	Valence	Arousal	**No practice baseline**	Valence	Arousal
Skydivers	7.57	7.27	War	2.62	6.21
Pilot	7.02	6.14	Gun	2.17	6.9
Gymnast	7.74	6.14	Grave	1.63	6.2
RollerCoaster	7.2	6.68	Suicide	2.19	6.24
Money	7.91	6.44	Solider	2.81	6.04
Toilet	2.26	5.28	Astronaut	7.35	6.02
Police	2.91	6.28	Hiker	7.03	6.55
Ship	2.48	6.46	Skier	7.33	7.35
Accident	2.06	6.2	Sailing	7.73	6.65
Fire	2.04	6.52	HangGlider	6.71	6.09
Mean	4.92	6.34	**Mean**	4.76	6.43

Practice 3	Valence	Arousal	**No practice baseline**	Valence	Arousal
Sailing	7.73	6.65	Hiker	7.03	6.55
HangGlider	6.71	6.09	Skier	7.33	7.35
Skydivers	7.57	7.27	Astronaut	7.35	6.02
Pilot	7.02	6.14	RollerCoaster	7.2	6.68
Gymnast	7.74	6.14	Money	7.91	6.44
Suicide	2.19	6.24	Gun	2.17	6.9
Solider	2.81	6.04	Grave	1.63	6.2
Toilet	2.26	5.28	War	2.62	6.21
Police	2.91	6.28	Accident	2.06	6.2
Ship	2.48	6.46	Fire	2.04	6.52
Mean	4.94	6.26	**Mean**	4.73	6.51

Practice 4	Valence	Arousal	**No practice baseline**	Valence	Arousal
Astronaut	7.35	6.02	Pilot	7.02	6.14
Hiker	7.03	6.55	Gymnast	7.74	6.14
Skier	7.33	7.35	Sailing	7.73	6.65
RollerCoaster	7.2	6.68	HangGlider	6.71	6.09
Money	7.91	6.44	Skydivers	7.57	7.27
War	2.62	6.21	Suicide	2.19	6.24
Gun	2.17	6.9	Solider	2.81	6.04
Grave	1.63	6.2	Toilet	2.26	5.28
Accident	2.06	6.2	Police	2.91	6.28
Fire	2.04	6.52	Ship	2.48	6.46
Mean	4.73	6.51	**Mean**	4.94	6.26

Un Test de Pré-call avec une Récompense Contingente

Le pré-call représente une amélioration des souvenirs pour un matériel *après* un test de rappel. Il a été suggéré qu'un tel comportement servait les besoins / les motivations de l'individu. Toutefois, les tentatives pour l'examiner ont rencontré peu de succès, reflétant possiblement la valeur de la récompense. La présente étude pré-enregistrée a pris l'approche originale d'identifier une récompense motivante : un paiement cash de 10 £. L'étude principale a donc examiné l'effet induit par cette récompense contingente offerte après la performance de pré-call. Deux prédictions confirmatoires ont été faites : d'abord, que la pratique après le rappel allait mener à un meilleur pré-call ; ensuite, qu'une récompense contingente allait produire un meilleur pré-call. Un protocole avec des mesures répétées mettait les participants devant 20 images stimulantes présentées aléatoirement, après quoi ils recevaient, à leur surprise, une tâche de rappel. Après cela, un sous-ensemble des images était présenté deux fois, ce qui leur permettait de s'entraîner. Les scores de pré-call représentaient le nombre d'images correctement rappelées qui étaient subséquemment répétées et les scores de base le nombre d'images correctement rappelées qui n'étaient pas répétées. Les analyses ont montré que les scores de pré-call étaient significativement plus élevés que ceux de la ligne de base, toutefois la récompense contingente n'a eu aucun effet. Cela pourrait indiquer une erreur de Type I ou un effet précognitif anomal. Par conséquent, quelques idées spéculatives sont proposées dans une tentative pour rendre compte de la structure des données obtenues.

Ein Belohnungstest abhängig von der Voraussage

Voraussage (Precall) stellt eine verbesserte Gedächtnisleistung für Material dar, das nach dem Erinnerungstest geboten wird. Ein solches Verhalten wurde vorgeschlagen, um den Bedürfnissen/Motiven des Individuums gerecht zu werden. BisherigenVersuchen, dies zu überprüfen, war nur begrenzter Erfolg beschieden, möglicherweise abhängig vom Wert der Belohnung. Die vorliegende vorher registrierte Studie verfolgte den ursprünglichen Zugang zur Identifkation einer motivierenden Belohnung: einen Barbetrag von £10. Die Hauptstudie überprüfte dann, wie sich die Belohnung in Abhängigkeit von der Voraussageleistung auswirkte. Zwei überprüfbare Voraussagen wurden getroffen: erstens, dass die nachfolgende Erinnerungsübung zu vermehrtem Precall führt. Zweitens, dass eine kontingente Belohnung einen größeren Precall nach sich zieht. In einem Messwiederholungsdesign wurden Teilnehmern zufällig 20 stimulierende Bilder gezeigt, nach denen ihnen eine überraschende Erinnerungsaufgabe geboten wurde. Danach wurde ihnen zweimal eine Untergruppe von Bildern geboten, mit denen sie sich vertraut machen konnten. Den Precall-Treffern entsprach die Anzahl der korrekt erinnerten Bilder, die anschließend wiederholt wurde, und den Baseline-Treffern die Anzahl der korrekt erinnerten Bildern, die nicht wiederholt wurden. Die Analyse ergab, dass die Precall-Treffer signifikant über der Baseline lagen, die kontingente Belohnung jedoch keinen Effekt zeigte. Dies könnte auf einenFehler Erster Art hinweisen oder auf einen anomalen präkognitiven Effekt. Von daher werden einige spekulative Ideen vorgeschlagen beim Versuch, die Muster in den Daten zu erklären.

Una Prueba de Prerecuerdo con una Recompensa Contingente

El prerecuerdo representa una memoria mejorada para material practicado *después* de la prueba de recuerdo. Se ha sugerido que tal comportamiento se conforma a las necesidades/motivos del individuo. Sin embargo, los intentos de examinar esto han tenido un éxito limitado, posiblemente reflejando el valor de la recompensa. Este estudio pre-registrado tomó el enfoque original de identificar una recompensa motivadora: una recompensa en efectivo de £10. El estudio examinó el efecto de ofrecer esta recompensa contingente al rendimiento de prerecuerdo. Hice dos predicciones confirmatorias: primero, que la práctica posterior a la exposición a los estimulos llevaría a más prerecuerdo. Segundo, que una recompensa contingente aumentaría el prerecuerdo. Utilicé un diseño de medidas repetidas presentando a los participantes aleatoriamente 20 imágenes excitantes, tras lo cual se les asignó una tarea de recuerdo sorpresa. Después de esto, les presenté un subconjunto de las imágenes dos veces para que practicaran. Los puntajes de prerecuerdo representaron la cantidad de imágenes recordadas correctamente y repetidas posteriormente y la línea de base representó la cantidad de imágenes recuperadas correctamente pero no repetidas. El análisis mostró que los puntajes de prerecuerdo fueron significativamente más altos que el valor inicial, sin embargo la recompensa contingente no tuvo efecto. Esto puede indicar un error tipo 1 o un efecto precognitivo anómalo. Por lo tanto, propongo algunas ideas especulativas para explicar el patrón de datos.

Belief in the Paranormal: A State, or a Trait?[1]

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Abstract: Although belief in paranormal phenomena has long been studied as if it were a psychological trait, many commentators recently have preferred to define beliefs as a psychological state. Somewhat surprisingly, the psychometric decomposition of a belief into state and trait components has yet to be undertaken. To this end, we invited a sample of 584 American adults to complete a questionnaire measure of paranormal and traditional religious beliefs on four occasions at monthly intervals. An application of latent state-trait models to the data showed both paranormal belief and traditional religious belief to be predominantly trait-like constructs, with a small but significant state-like component. These findings may have specific implications for the assessment of paranormal beliefs, as well as general implications for a state theory of beliefs.

Keywords: state versus trait, belief in paranormal phenomena, latent state-trait models

In terms of both description and measurement the distinction between psychological states and psychological traits has made a substantial contribution to the study of individual differences in personality, ability, moods, and emotions (Chaplin, John, & Goldberg, 1988; Deary, 2009). Definitions of these two constructs are by no means standardized, but a generally agreed distinction is that states are relatively transient reactions to an internal or external situation or context, whereas traits are relatively stable attributes or dispositions to behave in certain characteristic ways (Hamaker, Nesselroade, & Molenaar, 2007).

A general objective of this project was to explore the status of *beliefs* in terms of states and traits. Although this approach has been applied to the cognate domain of attitudes (e.g., Kaczmarek, Bujacz, & Eid, 2015; Steyer & Schmitt, 1990), and at least one study reported the construction of purportedly state and trait measures of a specific set of beliefs (Radtke, Inauen, Rennie, Orbell, & Scholz, 2014), the potentially instructive psychometric decomposition of beliefs into state and trait components appears not to have been undertaken. We chose to focus our investigation on beliefs in paranormal phenomena as its context on the grounds that a distinction between state and trait models of such beliefs has recently been

suggested by Nees and Phillips (2014). Further, a resolution of this issue could well have implications for the future construction and administration of questionnaire measures of paranormal belief.

Beliefs as a State

There has been some philosophical speculation on the nature of the mental representation of beliefs (e.g., Clapin, 2002; Pitt, 2013), and even some doubts that such representation exists (Horgan, 1992), but as yet there is no broadly agreed position on these issues. Nonetheless, some psychologists (e.g., Connors & Halligan, 2015; Heiphetz, Spelke, Harris, & Banaji, 2013), philosophers (e.g., Jackson, 2007; Schwitzgebel, 2010), and other cognitive scientists (e.g., Ghrab, Saad, Kassel, & Gargouri, 2017; Reser, 2011) are converging on an operational definition of belief as *a state in which a person regards a given proposition as true*. At first glance this formulation of beliefs as a state may seem trite, but it does successfully function to accommodate the remarkably wide range of mental phenomena that various commentators have dubbed "beliefs" or "belief systems" (e.g., Boden, Berenbaum, & Gross, 2016; Quine & Ullian, 1970). In recent years the designation of belief as a state has shown a surge in popularity, although the fundamental elements of this notion can be traced at least as far back as William James (1889) who observed, "In the case of... belief, the object is not only apprehended by the mind, but is held to have reality. Belief is thus the mental state or function of cognising reality" (p. 321).

The foregoing definition may serve successfully to differentiate state models from trait models of belief but in itself it is insufficient as a general account of belief, if only for the reason that "the acceptance of a proposition as true" is not necessarily an all-or-nothing event. In other words, unless we adopt the conceptually unparsimonious position that there is to be one explanation for unreserved core beliefs and another for qualified or half-hearted beliefs, a "state" view of belief must also accommodate degrees of conviction or doubt. This primary property of beliefs is of pivotal importance to the psychometrics of belief for the following reason. A belief questionnaire typically lists individual instances of a belief or a belief system and respondents are asked to indicate in each case the level of their endorsement of the belief or the frequency with which the specified belief-related act (e.g., praying) is performed. Although the designers of such tests may well have had a trait model in mind (explicitly or implicitly) during the construction of the test it is possible also to interpret belief questionnaires from a state perspective. In this context such a questionnaire would be deemed to elicit a succession of transitory belief states, potentially one state for each test item. Given that the participant's task is to rate each successive state in real time for the degree of conviction with which it is accepted, what might be the interpretation of the aggregate questionnaire score under the state model? In this regard the state approach to belief would have to be slightly extended to encompass not only the acceptance of a given belief but also the relative intensity of acceptance. Under this extended state model an aggregate score on a belief questionnaire therefore may be construed as an indication of the intensity with which the relevant belief state was evoked on this occasion; that is, the aggregate score may be interpreted as an index of the overall disposition to that type of belief state at the time of assessment. The key issue in assessing the viability of the state model of beliefs, however, is whether the intensity of these questionnaire-elicited belief states varies from one occasion to another.

In the specific context of paranormal beliefs this approach has rarely been advocated. Nees and Phillips (2014) recently distinguished between state and trait accounts of paranormal belief, and they

urged researchers to give serious consideration to the view that paranormal belief may be evoked as a state, but as yet this suggestion appears to have had no discernible influence on the study of paranormal beliefs. Under a "state model" internal or external cues would serve to activate the mental representation of a paranormal belief as a psychological state. Note, however, that this activated state need not necessarily be conscious; thus, one day a person may exhibit uncharacteristically cautious behavior without consciously connecting this to the fact that the day is Friday the thirteenth (Näyhä, 2002).

Although the state model of paranormal belief has yet to be investigated directly, perhaps some earlier empirical findings could be interpreted to lend support to this approach. There are a few indications that a person's score on a paranormal belief questionnaire may not be as stable as has generally been assumed; rather, the score may depend in part on the circumstances in which the test is taken and on the participant's psychological state at that time. People made to feel helpless by being given an unsolvable problem (Dudley, 1999), or induced to experience negative affect (Dudley, 2000), or led to contemplate their own mortality (Jong, Halberstadt, & Bluemke, 2012), or otherwise placed under acute stress (Keinan, 2002) may then show elevated belief in the paranormal. More generally, people in a negative affect state at the time of testing may show stronger paranormal belief than the other participants (Beck & Miller, 2001). On the other hand, some people in an unconscientious mood may also tend to generate slightly higher belief scores (Irwin, 2003), as may participants in a "good mood" at the time of testing (e.g., King, Burton, Hicks, & Drigotas, 2007). In a group testing context, scores on a paranormal belief questionnaire may differ with the demand characteristics of the setting and, in particular, the perceived attitude of the test administrator (Layton & Turnbull, 1975; Wiseman & Schlitz, 1997). Again, based on responses to a setting with a haunted reputation Houran and Lange (1996) advocated a contextual account of the evocation of paranormal beliefs. These diverse observations are consistent with a view of paranormal belief as in part an adaptation to prevailing circumstances, a transitory state, or contextually invoked mental set that may fluctuate with the psychological setting. On the other hand, several studies (e.g., Hergovich, 2003; Roig, Bridges, Renner, & Jackson, 1998; Watt & Ramakers, 2003) deliberately manipulated the context of the test administration and found no consequent variation in paranormal belief scores. In short, there is scope for a study to assess in a more explicit fashion the viability of a state model of paranormal belief.

The endorsement of traditional religious tenets or *religiosity* is sometimes classified as a belief in the paranormal; certainly the two are correlated (for a review see Irwin, 2009) and, in many respects, cognate constructs (Irwin & Marks, 2013). In any event religiosity may be a useful yardstick by which to interpret the characteristics of paranormal belief, and both types of belief therefore were included in the study reported here. In relation to a state model of such beliefs there is ample empirical evidence that pre-existing religious beliefs may be accentuated by situational factors such as serious illness, bereavement, and other stressful life events (e.g., Hussain, Weisaeth, & Heir, 2011; Johnson et al., 2011), although the construction of these changes as *transient* states may sometimes be moot. Further, these data in themselves do not necessarily disqualify an account in terms of traits. Nevertheless a state model of the activation of traditional religious beliefs may well be as cogent as that for (other) paranormal beliefs, and these models therefore warrant conjoint empirical evaluation.

Beliefs as a Trait

Another conceptual approach to the study of beliefs is to portray them as relatively stable facets of personality, that is, as traits. This view has a long history in psychology (e.g., see Jastrow, 1902; Williamson, 1915), and some detailed analyses of beliefs as a trait were undertaken in the first half of the twentieth century (e.g., Allport, 1937). Today, however, the construction of beliefs as a trait typically remains implicit or is simply declared with scant supportive argument (Saucier, 2008). Although the intensity of some beliefs certainly seems to be consistent across situations and contexts, there are instances in which the evidence of consistency is weak (Hamaker, Nesselroade, & Molenaar, 2007). The legitimacy of assuming beliefs to be trait-like therefore warrants explicit evaluation. The study of paranormal beliefs offers a convenient opportunity for this assessment.

Again, despite occasional references to paranormal beliefs as a personality trait (e.g., Delacroix & Guillard, 2012; Mohr, Koutrakis, & Kuhn, 2015), researchers' assumption that paranormal beliefs constitute a trait is largely implicit and unproven (Grimmer & White, 1990). Be this as it may, the substantial majority of the numerous correlative investigations of paranormal beliefs (for a review of this extensive literature see Irwin, 2009) have indexed the intensity of these beliefs by way of a single administration of a paranormal belief questionnaire, presumably on the assumption that the data generated from this test would be much the same as those solicited on virtually any other occasion. Admittedly, the high test-retest reliability of some of these questionnaires (Irwin & Marks, 2013) may be taken to support this assumption, but in the surveys from which these psychometric parameters were educed, perhaps the context in which the retest was administered was highly similar to the context of the original administration; if so, a routine test-retest design may not be sufficiently sensitive to the potential role of context. In any event the habitual practice of assessing paranormal beliefs by means of a single administration of a questionnaire suggests that the interpretation of these beliefs as a stable trait is very widespread and by default constitutes the conventional position.

A similar view of the domain of traditional religious beliefs also seems to be customary, although in this instance the trait hypothesis is often made explicit (e.g., Baumsteiger & Chenneville, 2015; Van Praag, 2013). Indeed, despite intergenerational differences and episodic fluctuations in religiosity this personality characteristic is remarkably stable over a person's lifespan (Hamberg, 1991) and thereby it may function largely as a trait. In summary, there is evidently a common assumption among researchers that both paranormal belief and religious belief constitute psychological traits.

The Present Study

The aim of our study therefore was to assess the domain of paranormal beliefs in terms of its psychometric status as a state or as a trait, using the cognate domain of traditional religious beliefs for comparison. Note that there was no necessary assumption here that paranormal beliefs cannot be both a state and a trait. Many psychological constructs initially identified as meeting the requirements for one of these categories have subsequently been shown to comprise components of both (Deinzer et al., 1995). Extraversion, for example, has long been recognized as a personality trait but has more recently been found to have a state component too (Fleeson, 2001; Schutte et al., 2003); and anxiety, originally

conceptualized as a state, was subsequently found to be more effectively represented by both state and trait components (Endler & Kocovski, 2001; Kendall et al., 1976).

The study was essentially exploratory, designed to investigate if scores on a standardized questionnaire measure of paranormal belief are best deemed to represent a psychological trait, or a psychological state, or indeed, a hybrid construct with components of both. A potential means of discriminating among these options is provided by a body of psychometric theory known as latent state-trait (LST) theory (e.g., Geiser et al., 2015; Steyer, Geiser, & Fiege, 2012). In an LST analysis a given psychological measure is administered to group of people on several occasions, then structural equation modelling is applied to the longitudinal data in order to distinguish between the portion of the variance that can be attributed to a stable disposition consistently evident over time (latent psychological traits) and the portion attributable to fluctuation across occasions (latent psychological states), plus a residual portion attributable to random measurement error.

Method

Design

The study was conducted as an online survey of a panel of participants assessed on four occasions with an interval of four weeks between each assessment; that is, the project had a four-wave longitudinal design. The methodology of the study was approved by the Human Research Ethics Committee of the first author's home university (*Approval No. HE15-018).*

Participants

A total of 611 residents of the USA were sourced from an online research panel provided by Qualtrics™ (Qualtrics, Provo, UT). Of these, 27 failed to respond correctly to a dummy question embedded in the survey to ensure respondents were paying attention to the questionnaire items. These cases were deleted leaving a total sample of 584 at Phase 1, reducing by attrition to 239 at Phase 4. Details of participant numbers, age and gender for each of the four phases of the study are shown in Table 1.

Table 1
Details of Participants for Each Phase of the Study

Phase			Age		
	N	% male	M	SD	Median
Phase 1	584	49.8	51.47	13.86	53
Phase 2	355	50.4	51.81	13.98	53
Phase 3	344	50.0	51.88	14.01	53
Phase 4	239	50.6	51.43	14.13	53

Materials and Procedure

Measures were amalgamated into four online surveys using Qualtrics™ software (Qualtrics, Provo, UT) and each released to participants at 4-weekly intervals. The names of the survey designers (HI and AM) and their affiliated university were stated in a plain-language information page, but beyond this the participants had no knowledge of the investigators' personal style or beliefs. For the record we should state these researchers' level of support for the psi hypothesis: for HI, grade 4 ("supportive"), and for AM, grade 3 ("neutral").

After reading a plain-language information page, potential participants implicitly signified their consent to participate by clicking the option to progress to the survey questionnaire. Qualtrics person-nel allocated an identity code number to each participant, thereby allowing the researchers to match data across phases without compromising the participants' anonymity.

For the first wave participants provided information on age and gender, and for all four waves they completed the *Survey of Scientifically Unaccepted Beliefs* (SSUB; Irwin & Marks, 2013), a 20-item scale with 15 items assessing paranormal or New Age Beliefs (NAB; e.g., "Fortune tellers can accurately sense the fu-ture using a crystal ball") and 5 items measuring basic Judeo-Christian religious beliefs or Traditional Reli-gious Beliefs (TRB; e.g., "There is a Hell, where unbelievers or sinners are punished"). Participants reported the extent to which they agreed or disagreed with these statements on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*). All items within the SSUB were randomized for each participant for each wave to reduce the possibility of carry-over effects. Both subscales have exhibited excellent internal consistency in pre-vious administrations as well as in all phases of the present study; for the latter Cronbach's alpha for New Age Beliefs ranged from .89 to .91 and for Traditional Religious Beliefs, .91 to .92.

For the present LST analyses, however, we assigned the items of each scale to two item parcels for each wave, respectively. This was done because LST analyses require at least two measurements per con-struct and time point to statistically identify trait, state residual, and measurement error components. Item parceling was based on an item-level principal component analysis with a single component for each scale. Items were assigned to parcels based on the size of their component loadings to create homogenous par-cels. Parcels were composed of identical items at each wave.[2] In our LST analyses, we specified a series of models to test whether NAB and TRB represented more trait-like or more state-like constructs. For each construct, we estimated three models and compared their fit to the data. In Model 1, we included only (parcel-specific) trait latent variables and measurement error variables, but no state residual latent vari-ables. Model 1 thus represented the assumption that each construct was purely trait-like. In Model 2 we included only state latent variables that were not allowed to correlate across time as well as measurement error variables. Model 2 thus represented the assumption that each construct was purely state-like. In Model 3, we included trait, state residual, and measurement error variables (full LST model). Model 3 thus represented the assumption that the NAB and TRB constructs may contain both state and trait compo-nents. Model 3 also allowed us to compute coefficients representing the proportion of trait, state residual, and error variance in each measure as well as underlying true score variables (as discussed below). Finally, we estimated combined multi-construct LST models with both NAB and TRB (Models 1C through 3C). The

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2 We also ran all model versions with three (as opposed to two) parcels. The analyses with three parcels yielded essentially the same results as the analyses with two. For simplicity, we only report the analyses based on two parcels.

combined models allowed us to look at relations between the trait and state residual components for both constructs in terms of latent correlations between trait and state residual factors across constructs.

The LST analyses were based on the so-called multitrait-multistate (MTMS) model of LST theory (Eid, 1996, see Figure 1) which allows taking potential indicator heterogeneity into account and which has been recommended for LST analyses based on theoretical reasoning and simulation work (Geiser & Lockhart, 2012). The MTMS model includes trait latent variables for each measure (parcel), common state residual (*SR*) latent variables for each time point, and measurement error variables for each variable. Figure 1 shows a path diagram of the combined multiconstruct MTMS model for the NAB and TRB parcels estimated in the present study.

Based on an MTMS model, coefficients can be calculated to reflect the proportion of variance explained by trait, state residual, and error variables. The consistency coefficient gives the proportion of observed (or true score) variance due to trait variance. The occasion-specificity coefficient gives the proportion of observed (or true score) variance due to state residual variance. The reliability coefficient gives the proportion of observed variance not due to measurement error. A detailed mathematical description of these coefficients can be found in Geiser and Lockhart (2012).

Model 1 estimated in the present study represented a version of the MTMS model in which the SR factors were omitted (trait only model). In Model 1, all intercepts and factor loadings were fixed to zero and one, respectively, and trait factor means were freely estimated. This specification reflects the assumption of perfect stability of true individual differences across time, thus representing a pure trait model. In Model 2, we omitted the trait factors and only included uncorrelated state factors. In Model 2, all state factor loadings were fixed to one and all intercepts were freely estimated to allow for potential mean changes across time. Latent state factor means were not estimated. Model 2 thus reflected the assumption of a pure state variability process with no trait stability. Model 3 included both trait and SR factors as shown in Figure 1. In Model 3, all intercepts and factor loadings were fixed to zero and one, respectively, and all trait factor means were freely estimated. This again reflected the assumption of a stable trait component, but now allowing for systematic state fluctuations at each time point as reflected in the SR factors.[3]

All models were analyzed with the software Mplus 8 (Muthén & Muthén, 1998-2015) using robust full information maximum likelihood information (R-FIML). R-FIML estimation allows taking all available data points into account to avoid bias and loss of statistical power due to missing data and provides robust fit statistics and parameter standard errors for nonnormal data.

Results

Table 2 contains descriptive statistics for all variables used in the LST models. Table 3 shows goodness of fit results for the different models. It can be seen that Model 1 (the trait-only model with no *SR* factors) did not show a good fit for either NAB or TRB according to the chi-square test of model fit, which was highly significant for this model for both constructs. Model 2 (the state-only model) showed

3 We also tested versions of Model 3 that allowed for autoregressive effects among *SR* latent variables (Eid, Holtmann, Santangelo, & Ebner-Priemer, 2017). Including autoregressive effects did not lead to a significant improvement in model fit for either construct and none of the autoregressive effects were statistically significant. We therefore report the analyses without autoregressive effects.

an even worse fit for both constructs. Model 3 (which included both trait and state residual components) fit the data very well for both constructs as indicated by non-significant chi-square values and descriptive model fit indices.

When both constructs were combined into multi-construct models (Models 1C through 3C) in Table 3, we obtained similar results. The trait-only (Model 1C) and state-only (Model 2C) models did not fit well. In contrast, the multiconstruct LST model with both trait and state components (Model 3C) fit the data very well. We therefore present detailed outcomes for Model 3C.

Table 4 contains the parameter estimates obtained for Model 3C. It can be seen that all trait factor variances and standardized trait factor loadings were large and highly significant, indicating a strong trait influence on both the NAB and TRB measures. In contrast, *SR* factor variances and standardized *SR* loadings were much smaller for both constructs and non-significant for TRB at Time 1 and Time 3, indicating a much weaker state influence on both constructs relative to the trait influence.

The NAB and TRB trait factors were moderately positively correlated across constructs (latent *r* between .17 and .23, *p*-values ≤ .001), indicating a rather weak relation between the trait components of NAB and TRB. Parcel-specific trait factors for the same trait were highly correlated (NAB: latent *r* = .94, TRB: latent *r* = .86), indicating a high degree of homogeneity of the item parcels within each construct. State residual factors at the same measurement occasion were not significantly correlated across constructs, except for Time 4 (latent *r* = .62, *p* = .001).

Figure 1. Path diagram of the multiconstruct LST model estimated for the NAB_{it} and TRB_{it} measures (*i* = indicator/parcel, *t* = time point). SR_{tc} = state residual factor (*c* = construct). All trait factors were allowed to correlate. State residual factors were uncorrelated, except for different constructs at the same time point. All factor loadings were fixed to 1. Trait, state residual, and measurement error variances were freely estimated.
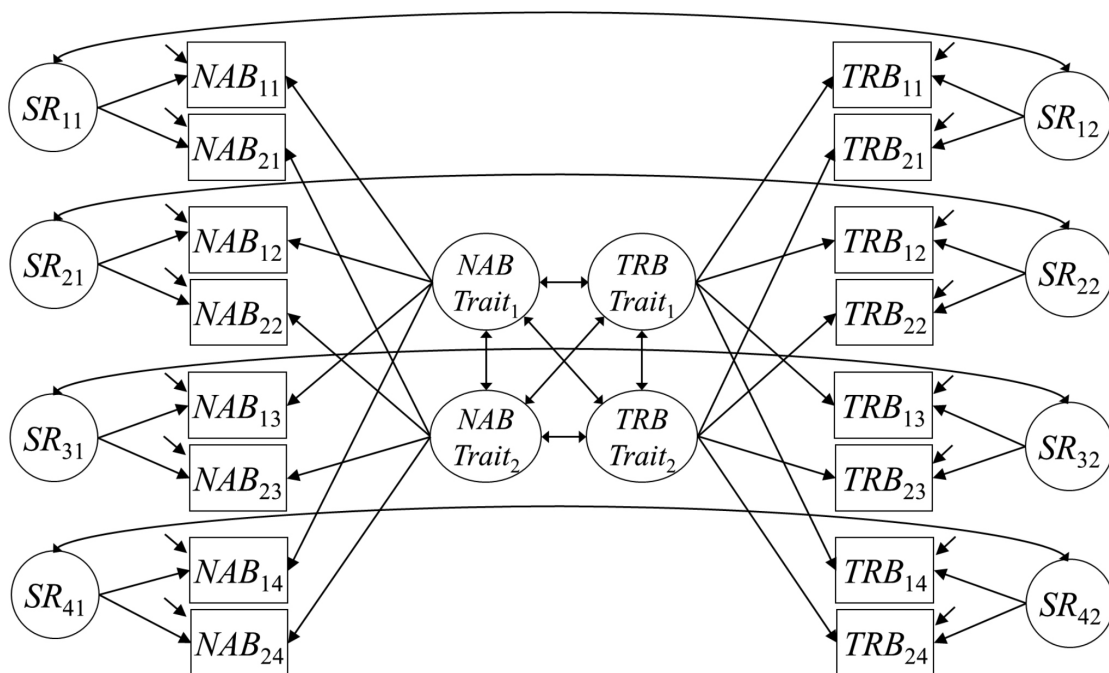
Table 2

Correlations, Means, and Standard Deviations for the NAB and TRB Item Parcels

	NAB_{11}	NAB_{21}	NAB_{12}	NAB_{22}	NAB_{13}	NAB_{23}	NAB_{14}	NAB_{24}	TRB_{11}	TRB_{21}	TRB_{12}	TRB_{22}	TRB_{13}	TRB_{23}	TRB_{14}	TRB_{24}
NAB_{21}	.84															
NAB_{12}	.78	.75														
NAB_{22}	.76	.83	.87													
NAB_{13}	.79	.76	.81	.78												
NAB_{23}	.76	.83	.78	.86	.85											
NAB_{14}	.82	.81	.84	.81	.86	.82										
NAB_{24}	.77	.84	.78	.84	.78	.87	.86									
TRB_{11}	.13	.17	.15	.15	.18	.16	.14	.10								
TRB_{21}	.19	.20	.24	.21	.24	.22	.19	.15	.78							
TRB_{12}	.12	.16	.17	.17	.20	.19	.15	.10	.90	.75						
TRB_{22}	.16	.17	.23	.17	.22	.19	.15	.12	.77	.84	.80					
TRB_{13}	.12	.17	.17	.19	.19	.19	.15	.13	.92	.77	.91	.75				
TRB_{23}	.15	.17	.22	.18	.21	.17	.16	.13	.75	.85	.73	.83	.77			
TRB_{14}	.14	.17	.18	.18	.21	.20	.19	.14	.93	.77	.89	.76	.92	.75		
TRB_{24}	.19	.19	.23	.18	.20	.21	.19	.17	.78	.87	.74	.83	.79	.88	.81	
M	2.57	2.46	2.50	2.38	2.50	2.39	2.53	2.38	3.58	3.80	3.60	3.78	3.57	3.73	3.60	3.75
SD	0.75	0.72	0.76	0.74	0.70	0.72	0.72	0.71	1.23	1.21	1.21	1.22	1.23	1.22	1.25	1.22

Note. NAB = New Age Beliefs. TRB = Traditional Religious Beliefs. The first index after the variable label indicates the parcel (indicator i); the second index indicates the time point t (e.g., NAB11 = NAB Parcel 1, Time 1).

Table 3

Goodness of Fit Measures for Different Models

Model	x^2	*df*	*p*	RMSEA	CFI	SRMR	BIC
	NAB						
Model 1	207.50	31	<.001	.10	0.92	.04	3,412
Model 2	952.66	24	<.001	.26	0.55	.60	4,887
Model 3	26.24	27	.51	.00	1.00	.04	3,200
	TRB						
Model 1	104.18	31	<.001	.06	0.96	.03	6,105
Model 2	1,000.45	24	<.001	.26	0.41	.61	8,484
Model 3	36.63	27	.10	.03	0.99	.03	6,042
	Combined						
Model 1C	385.67	122	<.001	.06	0.94	.03	,510
Model 2C	2593.99	108	<.001	.20	0.47	.47	13,342
Model 3C	117.38	110	.30	.01	1.00	.03	9,239

Note. RMSEA = root mean square error of approximation. CFI = comparative fit index. SRMR = standardized root mean square residual. BIC = Bayes information criterion. NAB = New Age Beliefs. TRB = Traditional Religious Beliefs. Model 1 = trait latent variables only. Model 2 = uncorrelated state latent variables only. Model 3 = latent state-trait (MTMS) model. Model 1C-3C = combined multi-construct versions of Models 1-3 with NAB and TRB in the same model.

Table 4

Parameter Estimates and Standard Errors for Model 4

Parameter	Estimate	SE	Standardized Estimate
		NAB	
Trait factor loadings			
NAB_{1t}	1.00 [a]	–	.88, .89, .91, .94 [b]
NAB_{2t}	1.00 [a]	–	.91, .91, .93, .93 [b]
SR factor loadings			
NAB_{11}	1.00 [a]	–	.31
NAB_{21}	1.00 [a]	–	.32
NAB_{12}	1.00 [a]	–	.32
NAB_{22}	1.00 [a]	–	.33
NAB_{13}	1.00 [a]	–	.24
NAB_{23}	1.00 [a]	–	.24
NAB_{14}	1.00 [a]	–	.21
NAB_{24}	1.00 [a]	–	.20
Factor means			
Trait 1 (NAB_{1t})	2.54	0.03	
Trait 2 (NAB_{2t})	2.42	0.03	
Factor variances			
Trait 1 (NAB_{1t})	0.44	0.03	1.00 [a]
Trait 2 (NAB_{2t})	0.44	0.02	1.00 [a]
SR Time 1	0.06	0.01	1.00 [a]
SR Time 2	0.06	0.01	1.00 [a]
SR Time 3	0.03	0.01	1.00 [a]
SR Time 4	0.02	0.01	1.00 [a]
Measurement error variances			
NAB_{11}	0.08	0.01	.14
NAB_{21}	0.03	0.01	.08
NAB_{12}	0.06	0.01	.11
NAB_{22}	0.03	0.01	.06
NAB_{13}	0.06	0.01	.11
NAB_{23}	0.04	0.01	.08
NAB_{14}	0.04	0.01	.08
NAB_{24}	0.05	0.01	.10
		TRB	
Trait factor loadings			
TRB_{1t}	1.00 [a]	–	.96, .94, .97, .96 [b]
TRB_{2t}	1.00 [a]	–	.93, .91, .92, .94 [b]
SR factor loadings			
TRB_{11}	1.00 [a]	–	.07 [c]
TRB_{21}	1.00 [a]	–	.07 [c]
TRB_{12}	1.00 [a]	–	.25
TRB_{22}	1.00 [a]	–	.26
TRB_{13}	1.00 [a]	–	.15
TRB_{23}	1.00 [a]	–	.15
TRB_{14}	1.00 [a]	–	.17

TRB$_{24}$	1.00 [a]	–	.18
Factor means			
Trait 1 (*TRB*$_{1t}$)	3.58	0.05	
Trait 2 (*TRB*$_{2t}$)	3.77	0.05	
Factor variances			
Trait 1 (*TRB*$_{1t}$)	1.40	0.07	1.00 [a]
Trait 2 (*TRB*$_{2t}$)	1.27	0.08	1.00 [a]
SR Time 1	0.01 [c]	0.02	1.00 [a]
SR Time 2	0.10	0.05	1.00 [a]
SR Time 3	0.03 [c]	0.02	1.00 [a]
SR Time 4	0.05	0.02	1.00 [a]
Measurement error variances			
TRB$_{11}$	0.11	0.02	0.08
TRB$_{21}$	0.29	0.03	0.14
TRB$_{12}$	0.07	0.02	0.05
TRB$_{22}$	0.18	0.03	0.11
TRB$_{13}$	0.07	0.02	0.04
TRB$_{23}$	0.18	0.03	0.13
TRB$_{14}$	0.09	0.03	0.06
TRB$_{24}$	0.13	0.03	0.09

Note. NAB = New Age Beliefs. TRB = Traditional Religious Beliefs. The first index after the variable label indicates the parcel (indicator i); the second index indicates the time point t (e.g., NAB11 = NAB Parcel 1, Time 1). SR = state residual factor. Standardized factor loadings can be interpreted as correlations between measured variables and latent factors. Standardized measurement error variances indicate 1 − Reliability. a parameter fixed a priori for model identification or theoretical reasons. b standardized trait factor loadings are reported in the order Time 1, Time 2, Time 3, Time 4. c estimates not significant at the .05 level. Dashes (−) indicate that a standard error was not computed due to a parameter being fixed rather than freely estimated. All intercepts were fixed to zero and are therefore not shown in the Table. Factor correlations are reported in the text.

Table 5

Consistency, Occasion-Specificity, and Reliability Coefficients Based on Model 4

Parcel	CO(parcel)	OS(parcel)	Reliability	CO(true scores)	OS(true scores)
NAB$_{11}$	.77	.10	.86	.89	.11
NAB$_{21}$	.82	.10	.92	.89	.11
NAB$_{12}$	.79	.10	.89	.89	.11
NAB$_{22}$	.84	.11	.94	.89	.11
NAB$_{13}$	.83	.06	.89	.94	.06
NAB$_{23}$	.86	.06	.92	.94	.06
NAB$_{14}$	.88	.04	.93	.95	.05
NAB$_{24}$	.86	.04	.90	.95	.05
TRB$_{11}$	.92	.00	.93	1.00	.00
TRB$_{21}$	.86	.00	.86	.99	.01
TRB$_{12}$	.89	.06	.95	.93	.07
TRB$_{22}$	.82	.07	.89	.93	.07
TRB$_{13}$	.93	.02	.96	.98	.02

*TRB*23	.85	.02	.87	.97	.03
*TRB*14	.91	.03	.94	.97	.03
*TRB*24	.88	.03	.91	.97	.03

Note. NAB = New Age Beliefs. TRB = Traditional Religious Beliefs. The first index after the variable label indicates the parcel (indicator i); the second index indicates the time point t (e.g., NAB11 = NAB Parcel 1, Time 1). CO = consistency (proportion of trait variance). OS = occasion-specificity (proportion of state residual variance). Rel = Reliability (proportion of measured variance that is not due to measurement error). CO(parcel) and OS(parcel) sum up to Rel for a given parcel within rounding error. CO(true scores) and OS(true scores) sum up to 1.0 for a given parcel.

Table 5 shows the consistency, occasion-specificity, and reliability coefficients calculated based on the variance components reported in Table 4. The large consistency and small occasion-specificity coefficients in Table 5 again show that both constructs were mostly trait-like with only small state residual influences. Between 77% and 93% of the measured variance (between 89% and 100% of the true score variance) reflected trait variance, whereas only between 0% and 11% of the (observed or true score) variance reflected state residual variance. Measurements of NAB reflected slightly more state residual variance than measures of TRB. Both constructs were measured with high precision, as indicated by the large reliability coefficients (model-based reliabilities between .86 and .96).

Discussion

The findings of this study provide little support for the construction of beliefs as a psychological state. Both paranormal beliefs (as indexed by items of the NAB scale) and traditional religious beliefs (as indexed by TRB items) had relatively small state residual variance. A definition of beliefs as a state in which a person regards a given proposition as true may be useful for representing the phenomenology of beliefs, but this definition evidently is inadequate as a viable perspective for the psychometrics of beliefs. The potential influence of state-related factors certainly is not to be dismissed out of hand. After all, as noted earlier in the paper, deliberate manipulation of the psychological context of assessment has been reported to affect performance on a paranormal belief questionnaire. Nevertheless, the demonstration of such effects does not in itself contradict our finding that state factors generally play only a minor role in the degree to which people present with paranormal or religious beliefs on a given occasion. A score on a belief questionnaire may depend in part on the circumstances in which the test is taken and on the participant's psychological state at that time, but in the normal course of events it seems these state effects are statistically significant but not substantial.

By contrast the study's findings show much stronger support for the notion that paranormal and religious beliefs function as psychological traits. The substantial portion of the variance in both NAB and TRB scores was shown to be attributable to the contribution of stable traits. This observation could be taken to condone the widespread practice of assessing paranormal beliefs through a single administration of an appropriate questionnaire. By implication, the finding also serves to give some degree of validation to the substantial body of empirical research that has followed this procedure. At the same time, the potential presence of minor state effects stands as a caution to researchers that there may be some "noise" in the data in addition to the usual random measurement error. The dominance of the trait contribution

certainly should not be taken as an excuse for neglecting the standardization of questionnaire administration. Note also that the construction of paranormal beliefs as largely trait-like does not assume that these beliefs must be continuously manifest. Rather, the intensity of people's paranormal beliefs would better be regarded as an enduring disposition to show a relatively regular or predictable response when prevailing circumstances warrant this behavior (Fridhandler, 1986). Further, perhaps the person need not necessarily be conscious of a given paranormal belief at the time it influences behavior (Näyhä, 2002).

Conclusions

The findings of this study are consistent with the construction of paranormal and religious beliefs as stable psychological traits, and they do not encourage the current preference for defining beliefs as a psychological state. Nonetheless a caveat should be entered here with regard to the generality of the study's findings. Beliefs are a remarkably heterogeneous category of human mentation, and it may well be the case that the observed pattern of trait and state characteristics of paranormal and religious beliefs does not apply to other types of belief. Paranormal and religious beliefs are known to rely substantially on social mediation, for example (Irwin, 2009; Markovsky & Thye, 2001). Other beliefs less susceptible to social influences may therefore show even greater trait saturation. Just as the findings might not generalize to other beliefs, the identified pattern of relations may be relatively specific to the questionnaire measure of paranormal and religious beliefs used here, or to the US cultural background of participants, or to the four-week interval between test administrations. Constructive replication of the study would be welcome, particularly in regard to the potential operation of moderating variables in this context. We hope that our innovative application of latent state-trait theory to the study of beliefs will inspire similar studies. In addition, we hope that the study's findings will be taken into account by researchers planning to construct or to administer a questionnaire measure of belief in paranormal phenomena.

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La Croyance au Paranormal: Un État, ou un Trait ?

Bien que la croyance aux phénomènes paranormaux est depuis longtemps étudiée en tant que trait psychologique, plusieurs commentateurs ont récemment préféré définir les croyances comme des états psychologiques. De façon surprenante, la décomposition psychométrique d'une croyance en composantes état et trait n'a pas encore été réalisée. A cette fin, un échantillon de 584 Américains adultes fut invité à remplir un questionnaire sur les croyances paranormales et religieuses à quatre occasions, selon des intervalles espacées d'un mois. Une application sur ces données des modèles latents en état et trait a montré que tant les croyances paranormales que les croyances religieuses traditionnelles tendent à être, de façon prédominante, des constructions de type trait, avec une petite mais significative composante de type état. Ces résultats pourraient avoir des implications spécifiques pour l'évaluation des croyances paranormales, ainsi que des implications générales pour une théorie des croyances comme états.

Der Glaube ans Paranormale: Ein Zustand oder eine Eigenschaft?

Obwohl der Glaube ans Paranormale seit langem unter der Annahme erforscht wurde, er stelle eine psychologische Eigenschaft dar, haben es viele Kommentatoren neuerdings vorgezogen, Glaubenseinstellungen als psychologischen Zustand zu definieren. Die psychometrische Zerlegung einer Glaubenseinstellung in ihre Zustands- und Eigenschaftskomponenten muss, was etwas überraschend ist, erst noch geschehen. Zu diesem Zweck wurde eine Stichprobe von 584 erwachsenen Amerikanern gebeten, im monatlichen Abstand bei vier Gelegenheiten einen Fragebogen zur Erfassung paranormaler und traditioneller religiöser Glaubenseinstellungen auszufüllen. Die Anwendung latenter Zustands-Eigenschafts-Modelle auf die Ergebnisse ergab sowohl beim paranormalen Glauben wie auch beim traditionellen religiösen Glauben bevorzugt eigenschaftsähnliche Konstrukte mit einer geringen, aber signifikanten zustandsähnlichen Komponente. Diese Ergebnisse könnten spezifische Implikationen für die Einschätzung paranormaler Einstellungen wie auch allgemeine Implikationen für eine Zustandstheorie von Glaubenseinstellungen haben.

La Creencia en lo Paranormal: Un Estado, o un Rasgo?

Aunque la creencia en los fenómenos paranormales se ha estudiado durante mucho tiempo como si se tratara de un rasgo psicológico, recientemente muchos comentaristas han preferido definir a las creencias como un estado psicológico. De manera algo sorprendente, la descomposición psicométrica de una creencia en componentes de estado y rasgo aún no se ha llevado a cabo. Por ello, invitamos a una muestra de 584 adultos estadounidenses a completar un cuestionario de creencias religiosas paranormales y tradicionales en cuatro ocasiones a intervalos mensuales. Modelos de rasgos de estado latentes de los datos mostró que tanto la creencia paranormal como la creencia religiosa tradicional eran predominantemente constructos de tipo rasgo, con un componente pequeño pero significativo de estado. Estos hallazgos pueden tener implicaciones específicas para la evaluación de las creencias paranormales, así como implicaciones generales para una teoría de estado de las creencias.

Creation and Validation of the
Belief in the Supernatural Scale[1]

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Abstract: This study aimed to create and validate a new scale, the "Belief in the Supernatural Scale." Study one used an Exploratory Factor Analysis (EFA) to reduce an initial item pool of 71 items to 44 and to identify a factor structure with 382 participants. A five factor structure was proposed: "mental and psychic phenomena," "religious belief," "psychokinesis," "supernatural entities," and "common paranormal perceptions." We then analyzed the proposed scale in study two using a Confirmatory Factor Analysis (CFA) with 318 new participants. The new scale provides a wide range of items and indicates that while religious and paranormal beliefs show a clear division, spiritual belief is spread among those factors, indicating that spirituality might be the concept that links religiosity and paranormality. The Belief in the Supernatural Scale (BitSS) provides a valuable tool that can be used alone, or alongside previous measures, for research into supernatural belief.

Keywords: supernatural belief, religious belief, paranormal belief, spiritual belief, scale development

This study presents the development and validation of a scale to measure supernatural belief. This scale acknowledges the nuanced nature of religious and paranormal beliefs and enables researchers to measure them together, or separately, with equal degrees of clarity. The measurement of these concepts has been problematic with the primary measure in the field, the Revised Paranormal Belief Scale (rPBS) (Tobacyk & Milford, 1983), containing a "traditional religious belief" subscale. The incorporation of this subscale indicates that religious belief is regarded by researchers as being an aspect of paranormal belief. In reality, the relation between religious and paranormal belief is unclear and has provided mixed results at best (Aarnio & Lindeman, 2007). Moreover, "supernatural belief" has been used to refer to either "paranormal" (Randall & Desrosiers, 1980) or "religious" (Jong, Halberstadt, & Bluemke, 2012) concepts; such arbitrary use depends on what the researcher is investigating. In contrast, Metaphysical Chauvinism (Beck & Miller, 2001) suggests that people can believe in different "supernatural" concepts and that there should be a separation of religious and paranormal beliefs. This theory posits that peo-

ple can believe in one phenomenon while not believing in another, when both are arguably similar in nature. For example, one person might believe in ghosts and not believe in angels, which illustrates that people can believe exclusively in either a religious or a paranormal phenomenon. This indicates that a scale is needed to measure the overarching concept of supernatural beliefs, incorporating both religious and paranormal beliefs while maintaining the distinctions between them.

A new scale should consider these definitions while acknowledging the overlaps between them. For example, the term "supernatural" has been debated (Lindeman & Svedholm, 2012), with one definition being anything that is beyond nature (Sagan, 1995). Similar debates abound when defining paranormal phenomena, which have been defined as violating the "basic limiting principles" of science (Broad, 1949 p. 291), and religiosity, defined as something that relates to an ultimate truth and higher power (Koenig, 2012). The spiritual has been particularly difficult to define but is often characterized as being something more personal than the religious (Zinnbauer et al., 1997). According to the theory of Metaphysical Chauvinism, it is important that any new scale take into account how individuals can group or cluster together in terms of their beliefs. Several studies have been carried out to group people into different types of believers, with four groups often emerging (Aarnio & Lindeman, 2007; Irwin, 1997; Rice, 2003; Schofield, Baker, Staples, & Sheffield, 2016). Schofield et al. (2016) named these groups "believers," "paranormal believers," "sceptics," and "religious believers." This grouping clearly indicates that some people only hold religious beliefs and others only paranormal beliefs. Research that has looked at the relations between the beliefs, rather than how individuals group together regarding their beliefs, has provided mixed results, with some studies finding that paranormal and religious beliefs are similar (Goode, 2000; Haraldsson & Houtkooper, 1996; Orenstein, 2002) and others finding differences (MacDonald, 2000; Rice, 2003). This ambiguity may indicate an issue with the measurement of these concepts and the complex interplay between paranormal and religious beliefs.

Scales that measure "religiosity" number in the hundreds (Hill & Hood Jr., 1999). Unlike paranormal scales that are typically phenomenological in focus, religiosity scale dimensions look at constructs such as belief, behavior, and experience. Religiosity scale dimensions are mainly based on those posited by Allport and Ross (1967): "intrinsic," a more personal idea of what a person believes, and "extrinsic," what a person does for their religion (e.g., do they go to church?). A further dimension was added about how a person might question their beliefs, referred to as "quest" (Batson & Schoenrade, 1991). Variations on these three dimensions have been used but are often criticized for being too arbitrary (Gorsuch, 1984). For example, Saroglou (2011) proposed four distinct and connected dimensions of religion: "believing," "bonding," "behavior," and "belonging." These map onto the psychological processes "cognitive," "emotional," "moral," and "social." Saroglou called this the big four religious dimensions model, illustrating the subjective nature of dimension naming. One of the major issues with religiosity scales is the overlap between religiosity and spirituality. Many scales measure spirituality (Kapuscinski & Masters, 2010) and the term itself is used in an arbitrary fashion depending on the researcher (Kim, Martin, & Nolty, 2015). Items on the scales may refer to religious concepts (e.g., God), but the measure may be labeled as examining "religious" or "spiritual" belief. Although the link between spirituality and religiosity has been acknowledged (Hill & Pargament, 2008) and might seem obvious, the complexity of their relation needs further investigation.

However, as highlighted in the rPBS, the links between religious, spiritual, and paranormal belief

need to be considered. Scales that measure paranormal constructs are less plentiful than those about religiosity, with one of the main differences being the factors. Although religiosity scales measure factors such as intrinsic and extrinsic, the factors on paranormal scales tend to look at different types of phenomena such as superstition (Nixon, 1925) and Extra Sensory Perception (ESP) (Thalbourne & Delin, 1993; Thalbourne & Haraldsson, 1980). Moreover, the scales differ with regard to looking at belief (Jones, Russell, & Nickel, 1977; Tobacyk & Milford, 1983; Tobacyk, 2004) or experience (Irwin, Schofield, & Baker, 2014; Kumar, Pekala, & Gallagher, 1994). The most commonly used scale in this area is the Paranormal Belief Scale (Tobacyk & Milford, 1983), and the later revised Paranormal Belief Scale (Tobacyk, 2004).

The rPBS is the mainstay of the paranormal researcher but it has been critiqued for its number of factors. The authors posit seven factors (Tobacyk & Milford, 1983; Tobacyk, 2004), while other researchers have identified five (Lawrence, 1995; Lawrence & Cicco, 1997; Lawrence, Roe, & Kani, 1997) or two (Lange, Irwin, & Houran, 2000; Irwin & Marks, 2013). Items included in the scale have also been criticized; for example, the item "witches do exist" might not indicate a belief in witchcraft, merely the acknowledgment that there are people who call themselves witches (Irwin, 2009). These problems, coupled with the lack of a concrete definition of paranormal belief, substantially weaken the scale's validity (Lawrence, 1995), with confusion surrounding what is being measured and how dimensions are classified. Furthermore, the inclusion of traditional religious belief as a subscale means that the rPBS does not provide an accurate score of global paranormal belief; high scores on the measure do not differentiate between high religious or high paranormal believers and Metaphysical Chauvinism proposes that individuals can hold these as contrasting beliefs (Aarnio & Lindeman, 2007; Rice, 2003; Schofield et al., 2016), although it has been argued that the rPBS should not be used as a unitary measure but that the sub-scales should be examined separately (Lawrence, 1995). Therefore, a new scale is required with an adequate number of valid items that can be used both uni- and multi-dimensionally in a way consistent with theory and empirical research, and which can measure "supernatural belief" in a way that encompasses the above concepts of paranormal, religious, and spiritual beliefs.

Study 1 – Item Generation and Exploratory Factor Analysis

This study aimed to create a new scale that incorporates religious, spiritual, and paranormal beliefs under the umbrella term of supernatural belief. The new scale is informed by theory and previous empirical research while being mindful of the issues regarding the previous scales. An item pool was created by taking items from previous scales of religious, spiritual, and paranormal beliefs. The pool was then reduced and the factors were assessed to evaluate the relation between religious, spiritual, and paranormal belief within the larger context of supernatural belief.

Method

Participants

Sample sizes for Exploratory Factor Analysis vary but Worthington and Whittaker (2006) suggest at least 300 participants. Therefore, the sample size used in this study (n = 382) was deemed to be

adequate for the 71 items in the proposed scale. The participants were recruited from the University of Derby, including on-campus and online students, by the first author, who gave general details about the study. Also, using opportunity sampling, recruitment was carried out via social media (Twitter and Facebook). The British Psychological Society was also contacted for recruitment. The participants' ages ranged from 18 to 79 years-of-age (M = 34.85, SD = 12.81). The gender of the participants was: male = 104 (27%), female = 276 (72%), and two (.5%) preferred not to say. Of the participants, 287 (75%) were higher education students, eight (2%) attended college or other post-secondary education, 211 (55%) were enrolled in undergraduate degrees, and 68 (18%) in postgraduate study. Of those that were not currently students, the level of education attainment was: seven (2%) a primary or secondary education; 16 (4%) college or other post-secondary education; 32 (8%) undergraduate degrees; and 40 (10%) post-graduate study. The University of Derby students were offered academic credit as an incentive for taking part in the study.   A total of 450 participants started to fill out the survey with 382 completing all the questions, a completion rate of 85%.

Materials

Item Pool Generation for the Belief in the Supernatural Scale

There were three stages in the process of selecting items for the item pool: stage one was the initial search for scales to draw items from; stage two was an evaluation of the scales from the initial search; stage three was the evaluation and possible modification of the items taken from the scales.

Stage One – The Search for Scales

The scales used needed to be associated with belief. However, if the items could be modified to fit that category or another term had been used interchangeably with belief (faith, for example), then inclusion in the final list of scales was deemed acceptable. Further criteria at the initial stage were that the scales needed to have cross-cultural and face validity. The initial search was conducted using Hill and Hood Jr.'s (1999) book that contains over 100 measures of religiosity for religious and spiritual belief scales. For paranormal belief scales, Irwin's (2009) book was consulted as 14 scales are featured in the appendix. The religious, spiritual, and paranormal scales were checked and chosen based on the above criteria. The scales measured different variants of religious, spiritual, and paranormal belief, or all of those concepts (for example in the case of the rPBS, Tobacyk, 2004) but they are split this way for ease of searching. Using the books as initial sources also helped establish key search terms. The terms "religious belief scale," "spiritual belief scale," and "paranormal belief scale" were initially used. The following search engines were used: Elsevier Science Direct, Psychinfo, and Google Scholar. Although several scales were identified from these searches, it became clear that this method of searching was unwieldy and would not provide a comprehensive list of scales. Within Psycinfo it is possible to generate a list of the scales used by studies identified after a particular search. We established that using the search term "beliefs" rather than "belief" generated a more comprehensive list of studies. Using this method it was possible to see the most commonly used scales in studies that looked at the religious, spiritual, and paranormal. The scales found by this method were integrated with the previous lists, duplicates were noted and removed. The advantage of this method was that it allowed the scales to be rated on their popularity.

Stage Two – Reducing the Scales

Once a full list of scales was established, the next stage involved assessing them individually. Although stage one did involve a certain amount of assessment, stage two involved looking more in depth at the items within the scale and what the scales had been used for previously. The scales needed to measure belief, have cross- cultural validity, and be available. Also, it is worth noting that some of the scales had been developed as clinical tools (particularly some of the spiritual belief scales) and were therefore inappropriate. Despite this, some of the scales had elements of one or more of the previous exclusion criteria but either some of the items could be used or some of the items could be used with modifications. The studies were checked to see if further scales could be identified. This left 49 scales. Stage three involved evaluating these scales and selecting items from them.

Stage Three – Reducing the Items

The initial pools of items were taken from the scales selected in stage two. The pool of items numbered 639 initially. The first pass looked at duplicates, and a second examination checked face validity. The next step examined cross-cultural validity. Finally, the items were examined to see if people who were non-believers could answer them. If the items could be altered to address any of the above issues this was done. This process resulted in a final item pool of 204. This pool was then sent to three expert reviewers leaving 71 items. A seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) including a midpoint of 4 (uncertain) was selected, paralleling the rPBS.

Procedure

Participants were provided a link to the study via email if they were recruited face to face, or the link was included in Twitter and Facebook along with brief details of the study. The 71 items in the survey were hosted online on Qualtrics. On the survey's landing page, the participants were briefed and asked questions regarding consent and a series of demographic questions. The final page of the survey debriefed the participant. Ethical approval for this study was received from the University's Psychology Research Ethics Committee.

Analysis

An Exploratory Factor Analysis was run on the 71 items generated to evaluate item redundancy and initial factor groupings. Analyses are two-tailed unless mentioned otherwise.

Results

Data Normality

There was adequate sampling adequacy for the analysis and the correlations in the matrix were significantly different form zero and therefore factorable. The Maximum Likelihood technique was selected, and an oblique rotation method (Direct Oblimin) selected. It revealed an eight factor solution

based on the criterion of Eigenvalues > 1 and a three factor solution based on a scree plot. Before further interpretation was attempted, some items were removed.

Item Reduction

Cronbach's alpha showed very good internal consistency, α = .98. The communalities on three items were low with an *r* < .4, which indicated that they should be considered for removal (Velicer & Fava, 1998). One item was below .2 (*r* = .164), "The existence of an afterlife can never be scientifically demonstrated, for it is impossible to..." and it did not load onto any of the eight factors so it was deleted. The initial correlation matrix was examined for multi-collinearity and correlations greater than .8 were marked. Twenty-nine items met that criteria and were examined to establish which could be deleted based on repetition (Rockwell, 1975). For example, the items "The soul continues to exist though the body may die" and "Everyone has an immortal soul" had a correlation of .816; the former item was deleted due to the latter being a better measurement of the concept. In total 20 items were deleted.

Main Analysis

The Factor Analysis was re-run on the remaining 51 items. Again, the sampling adequacy was good and the correlations in the matrix were significantly different form zero and therefore factorable. We chose a Factor Analysis using the Maximum Likelihood technique with Direct Oblimin oblique rotation method. Cronbach's alpha showed very good internal consistency, α = .97, with no items requiring further scrutiny; communalities were all > .2. However, the pattern matrix after rotation suggested that further items should be removed. Six items had loadings of <.4 and were removed, for example "I believe that mind can control matter" had a loading of .36. The item "I think about how my life is part of a larger spiritual force" cross-loaded onto factors one and two and was also deleted. This led to seven further items being deleted.

The final Factor Analysis was run again on 44 items, the sampling adequacy was good and the correlations in the matrix were significantly different form zero and therefore factorable. Again, Factor Analysis using the Maximum Likelihood technique with Direct Oblimin oblique rotation method was chosen. Cronbach's alpha showed good internal consistency (α = .97) with no items requiring further scrutiny and communalities were all > .2. The "Everyone has an immortal soul" item loading dropped to .39 and we retained it because it was just below the .4 threshold and has strong theoretical importance.

Kaiser's criterion for Eigenvalues presented a five-factor solution, while the scree plot (see figure 1) suggested a three-factor solution. Three, four, and five factor solutions were run but items mostly loaded onto the first two factors indicating that the models were under factored. Based on the Eigenvalues and previous research, for example, the rPBS is suggested to have as many as seven factors, the five-factor solution was favored and forced. See Table 1 for the factor loading after rotation. The five factors are interpreted as follows: factor one – "mental and psychic phenomena (MPP)"; factor two – "religious belief (RB)"; factor three – "psychokinesis (PK)"; factor four – "supernatural entities (SE)"; and factor five – "common paranormal perceptions (CPP)."
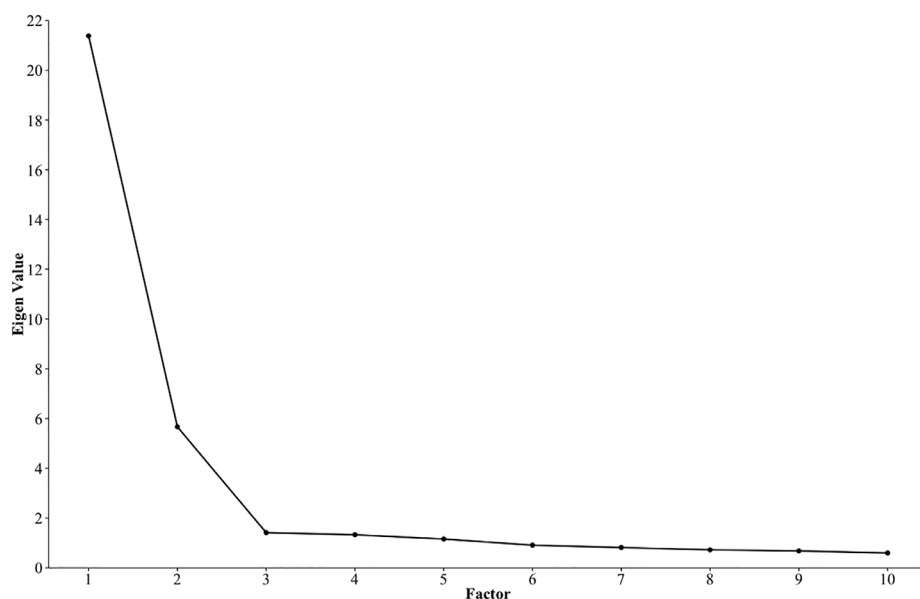
Figure 1. Scree Plot Showing Eigenvalues and Factor Numbers.

Following item reduction and exploratory factor analysis on the initial 71 items, a 44 item five-factor solution was selected. Factor one was named "Mental and Psychic Phenomena" (MPP), due to items related to such constructs as ESP or mental telepathy, although other phenomena were present in this group, such as auras and reincarnation. Factor two was labeled "Religious Belief" (RB) with the items focusing mainly on religious belief and different aspects of God. The third factor was named "Psychokinesis" (PK), with items related to concepts such as levitation or the movement of objects using the mind. The fourth factor was named "Supernatural Entities" (SE), with items relating to beings such as demons, angels, or a supreme being. The fifth factor was named "Common Paranormal Perceptions" (CPP), with items related to haunting or poltergeists, for example. Study two was then conducted to confirm the proposed structure, and examine test-retest reliability and validity.

Table 1
Factor Loadings after Direct Oblimin Oblique Rotation

			Factor		
	MPP	RB	PK	SE	CPP
I believe that it is possible to send a mental message to another person, or in some way influence them at a distance, by means other than the normal channels of communication.	.79				
There is a great deal we have yet to understand about the mind, so it is likely that many phenomena (such as Extra Sensory Perception (ESP) will one day be proven to exist.	.72				
There is such a thing as telepathy (communication directly from mind to mind).	.72				
I am convinced that thought transference actually does work.	.70				
Extra Sensory Perception (ESP) is an unusual gift that many persons have and should not be confused with the elaborate trick of entertainers.	.67				
Every person has an aura (a mysterious energy field, usually invisible, surrounding the body).	.65				

Item	1	2	3	4	5
There is both a spiritual as well as a natural side to reality.	.58				
I believe that a person's deeds are stored in his or her "karma."	.56				
There are some objects or places that have a special spiritual meaning, for instance being surrounded by a certain type of energy.	.52				
Some people have an unexplained ability to predict the future.	.52				
Reincarnation does occur.	.49				
I believe psychic phenomena are real and should be studied scientifically.	.48				
Some people have a mysterious ability to accurately predict such things as natural disasters, election results, political assassinations etc.	.45				
During altered states, such as sleep or trances, the spirit can leave the body.	.43				
There is a spiritual realm besides the physical one.	.43				
Everyone has an immortal soul.	.39				
Religion gives meaning to my life.		.96			
My religious belief is an important part of who I am as a person.		.83			
Religious belief is better than logic for solving life's important problems.		.81			
In my life, I experience the presence of the divine.		.78			
I believe in God.		.66			
My spiritual belief affects absolutely every aspect of my life.		.63			
God has given humanity a complete, unfailing guide to happiness and salvation, which must be totally followed.		.58			
There are individuals who are messengers of God.		.57			
God has given some people the power to heal the sick.		.54			
Every human being is a member of the cosmos and God is the cosmic mind.		.51			
Some individuals are able to levitate (lift) objects through mental forces.			-.88		
There is such a thing as levitation (raising the body through mental power).			-.71		
Psychokinesis, the movement of objects through psychic powers, does exist.			-.70		
Some men and women can find missing persons by swinging a pendulum over a map.			-.45		
There exist evil, personal spiritual beings, whom we might call demons.				-.68	
There is a devil.				-.64	
Black magic really exists.				-.49	
There exist good personal spiritual beings, whom we might call angels.				-.49	
I firmly believe that ghosts or spirits do exist.				-.46	
I believe that there is a divine plan and purpose for every living being and thing.				-.45	
A Supreme Being exists.				-.45	
In spite of what many people think, card reading, for example tarot cards, can tell a lot about a person and their future.					-.64
Some psychics can accurately predict the future.					-.57

Astrology is a way to accurately predict the future.	-.56
Some buildings are haunted.	-.51
There are such things as poltergeists (spirits which signal their presence by moving objects or making noises).	-.46
As a general rule, a fortune teller's predictions which come true are the result of coincidence.	.45
It is often possible to make valid personality judgements about people by knowing their astrological sign.	-.40

Study 2 – Confirmatory Factor Analysis and Construct Validity

The aim of study two was to conduct a Confirmatory Factor Analysis on the BitSS developed in study one using a fresh sample of participants. The test-retest reliability of this scale was assessed by doing a three-month follow-up study of participants. Also, comparisons were made for convergent validity to the three scales used by Schofield et al. (2016): the rPBS, the rRLI, and the ISS. A cluster analysis was conducted on the new scale to see if similar groups of believers could support Metaphysical Chauvinism (Beck & Miller, 2001).

Methods

Participants

Participants (*N* = 318) were recruited from the University of Derby (both on campus and online) and social media (Facebook and Twitter) using an opportunity sampling method by the first author, who gave general details surrounding the study. The age range was from 18 to 72 (*M* = 31.19, *SD* = 15.17). The gender of the participants was: 75 (24%) males, 241 (76%) females, and two (1%) preferred not to say; 255 (80%) identified as students, of which 219 (69%) were undergraduates, 34 (11%) were postgraduates, and two (1%) were in college or post-secondary school education. The initial sample was 422 people but only 318 (81%) answered all the items.

Materials

Belief in the Supernatural Scale

The Belief in the Supernatural Scale (BitSS) was developed in study one (see appendix). The item response format is a seven point Likert scale from 1 (strongly disagree) to 7 (strongly agree), so the possible scores range from 44 to 308. Item 39 is reverse scored. Three scales were used to test the validity of the new scale and were selected due to their use by Schofield et al. (2016).

Revised Religious Life Inventory

The Revised Religious Life Inventory (rRLI) (Hills, Francis, & Robbins, 2005) has 24 items and three subscales. The subscales measure: Intrinsic religious belief (nine items), extrinsic religious belief (seven items), and quest (eight items). The item response format is a seven point Likert scale; the range of

scores is from 24 to 168. Items include: "As I grow and change, I expect my religion also to grow and change" and "If not prevented by unavoidable circumstances, I attend church."

Intrinsic Spirituality Scale

The Intrinsic Spirituality Scale (ISS) (Hodge, 2003) has six items and no subscales; the item response format uses an 11-point scale, tailored to the item. Items two, four, and six are reversed. Items include: "In terms of the questions I have about life, my spirituality answers," item response format range: "no questions" to "all questions" and "When I am faced with an important decision, my spirituality"; item response format range: "plays absolutely no role" to "is always the overriding consideration."

Revised Paranormal Belief Scale

The Revised Paranormal Belief Scale (rPBS) (Tobacyk, 2004) is a 26-item scale with seven subscales: precognition, spiritualism, witchcraft, psi, traditional religious belief (4 items each), superstition, and extraordinary life forms (3 items each). The item response format is a seven point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Items include: "Black cats can bring bad luck" and "Some people have an unexplained ability to predict the future." Subscale scores were averaged. Cronbach's *α* Coefficients were >.92 for the main scales and >.77 for the seven subscales.

Procedure

After participants had been recruited, they were emailed details of the study and a link to the online survey that was hosted at www.qualtrics.com, or the link and details were provided on the social media post. The four questionnaires (BitSS, ISS, RRLI, and rPBS) were presented in a different order for each participant for counterbalancing. The final page of the survey was brief explaining the study and restating the right to withdraw. Participants were asked if they wanted to participate in a three-month follow up study. Those that agreed were sent a re-test after three months.

Analysis

A Confirmatory Factor Analysis was performed on the data from the BitSS Scale. Further tests of validity were carried out using correlations and one cluster analysis and reliability was tested using a test re-test Pearson correlation.

Results

Confirmatory Factor Analysis

A Confirmatory Factor Analysis was conducted on the proposed "Belief in the Supernatural" scale. The data was normal and factorable. The sample size was greater than 200 and therefore deemed more than adequate (Worthington & Whittaker, 2006). We chose the Maximum Likelihood method as the estimator and the first variable in each subscale was set as 1 for data scaling purposes. There were no negative error variances and none of the Squared Multiple Correlations (SMCS) ex-

ceeded 1. Factor loadings were examined and deemed as being adequate, the lowest value being item 39 (r^2 = .271).

Table 2
Fit Indices for the BitSS Scale.

Factors	X^2	Df	p	RMSEA	SRMR	CFI	TLI	NFI
Five	3359.03	892	<.001	0.09 90 % (0.A090-0.097)	0.08	0.83	0.82	0.78
One	5665.09	902	<.001	0.13	0.12	0.66	0.65	0.62
Cut off Values (Hu & Bentler, 1999)	N/A	N/A	>.05	≤ 0.06	≤0.08	≥0.95	≥0.95	≥0.95

X^2-Chi Square, Df –Degrees of Freedom, RMSEA - Root Mean Square Error of Approximation, SRMR - Standardized Root Mean Square Residual, CFI - Confirmatory Fit Index, TLI - Tucker-Lewis Index, and NFI - Normed Fit Index.

A number of measures of fit were examined (see table 2) taken from various fit indices including: Overall (Chi-square), absolute (SRMR, RMSEA), and incremental fit (NFI, CFI, TLI). All of the indices were beyond the recommended thresholds. Kline (2011) states that these thresholds are "marginal" and the value of the X^2 indices is suspect (Gerbing & Anderson, 1985), so the indices indicate the possibility of the data not fitting the model perfectly. Localized areas of strain were examined to evaluate if any items were weak. Standardized residuals were examined to further identify localized areas of strain. The correlations of the standardized residuals were investigated for values > .2 (Kline, 2011) and 18 did. Thirteen items correlated with one other item (13, 19, 26, 6, 9, 35, 16, 3, 7, 20, 29, 34, 41), three correlated with two items (36, 1, 2), one correlated with three items (43) and one correlated with seven others (31). An examination of the z correlation table showed that these values were significant; the typical cut off value for this is > 1.96 for significance of .05 or >2.58 for a significance of .01 (Harlow, 2014). The correlations between the scales demonstrate excellent convergent validity, see Table 3.

Table 3
Correlations Between Scales

	BSI	IS	RRL
Intrinsic Spirituality	0.67*		
Revised Religious Life	0.56*	0.66*	
Revised Paranomal Belief	0.91*	0.52*	0.40*

Note. BSI = Belief in the Supernatural; IS = Intrinsic Spirituality; RRL = Revised Religious Life. * *p< .01*
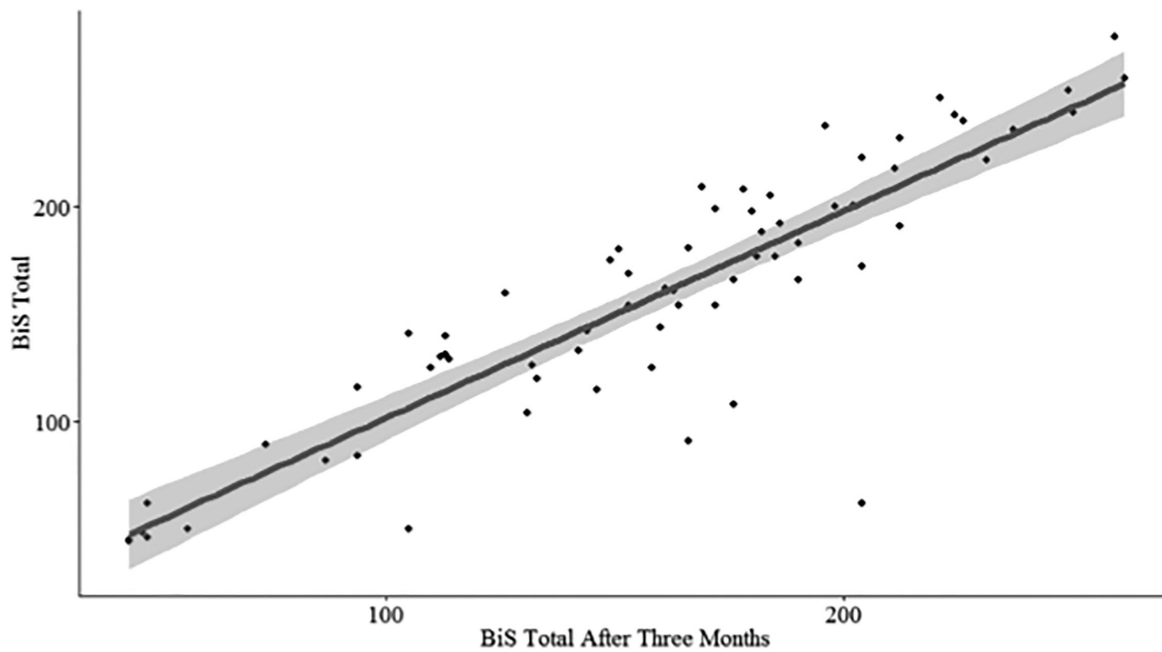
Figure 2. BitSS Totals at the Study Date and Three Months After.

Cluster Analysis

A Hierarchical Cluster Analysis was performed on the five subscales of the BitSS; descriptive statistics are displayed in Table 4. Z-scores were used to normalize the data of the three scales. To optimize minimum variances between the clusters, Ward's method was selected (Ward, 1963).

Table 4
Mean (and Standard Deviation) Z-scores for the Four Clusters

	Mean (SD) Z-scores				ANOVA	
	Cluster 1 (*n*=61, 19.18%)	Cluster 2 (*n* =127, 39.94%)	Cluster 3 (*n* =105, 33.02%)	Cluster 4 (*n* =25, 7.86%)	f (3,314)	*p*
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)		
Mental and Psychic Phenomena	.24 (.37)	.88 (.49)	-1.16 (.53)	-.17 (.53)	343.65	<.001
Religious Belief	-.43 (.51)	.64 (.87)	-.85 (.28)	1.42 (.58)	155.52	<.001
Psychokinesis	-.17 (.54)	.99 (.70)	-.94 (.19)	-.66 (.41)	277.47	<.001
Supernatural Entities	-.15 (.54)	.85 (.61)	-1.08 (.40)	.60 (.72)	248.93	<.001
Common Paranormal Perceptions	.18 (.50)	.90 (.63)	-1.02 (.42)	-.75 (.47)	269.17	<.001

The scree plot (Figure 3) indicates at least three clusters, but for comparative purposes a four-cluster solution was used. Levene's Test was significant (<.05) for all five subscales, violating the assumption of equality; Box's Test was also significant, but the probability values were accepted again due to the large

sample size (Tabachnick, Fidell, & Osterlind, 2007). The four Cluster solution was internally validated using a one-way MANOVA (IV_1 = 4 × clusters; $DV_{1(MPP)}$, $DV_{2(RB)}$, $DV_{3(PK)}$, $DV_{4(SE)}$ and $DV_{5(CPP)}$). This showed a significant difference between the scales and that the model accounted for an average of 70% of the variance ($F_{(15)}$ = 90.23, $p < .001$, Wilks $\Lambda = 0.07$). A one-way ANOVA and *post hoc* Tukey HSD examined the squared Euclidian differences between each cluster with regard to the subscales of the BitSS. (see table 5). The majority was significant, apart from: PK difference between cluster 3 and 4 (=.08) and the CPP differences between clusters 3 and 4 (=.11). For a graph of the *z*-scores of the scale within the clusters see Figure 4.

In summary, a CFA was used to further test the five-factor model of supernatural belief proposed by the EFA in study one. The fit indices showed that the data were not a perfect match to the model. Model re-specification was examined and the changes produced small differences in the fit indices and further changes to the model were therefore rejected. The model also correlated with three other measures of spirituality, religiosity, and paranormal belief. The BitSS scale had a strong correlation with the scale measuring paranormal belief, and moderate ones with the other two scales. The "Religious Belief" subscale of the rPBS had a strong correlation with the religiosity scale; the remaining subscales on the BitSS had a strong correlation with the paranormal belief measure totals and respective subscales. The spirituality scale showed a moderate correlation with all subscales apart from "Psychokinesis" and "Common Paranormal Perceptions." The cluster analyses showed that the classification into "believers," "paranormal believers," "sceptics," and "religious believers" groups posited by Schofield et al. (2016) was supported and this supported the five factor model of the BitSS scale. Finally, the BitSS scale showed good test-retest reliability at a three-month follow-up.
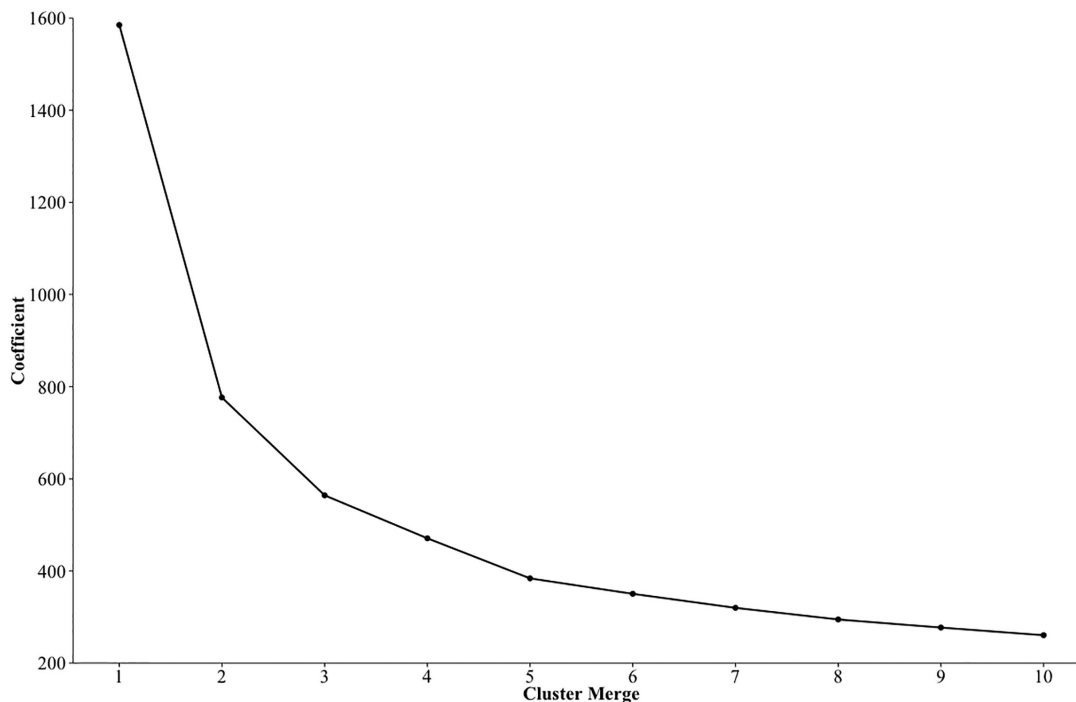
Figure 3. The Last 10 Merged Squared Agglomeration Distances and the Cluster Merges of the Five Subscales of the BitSS.
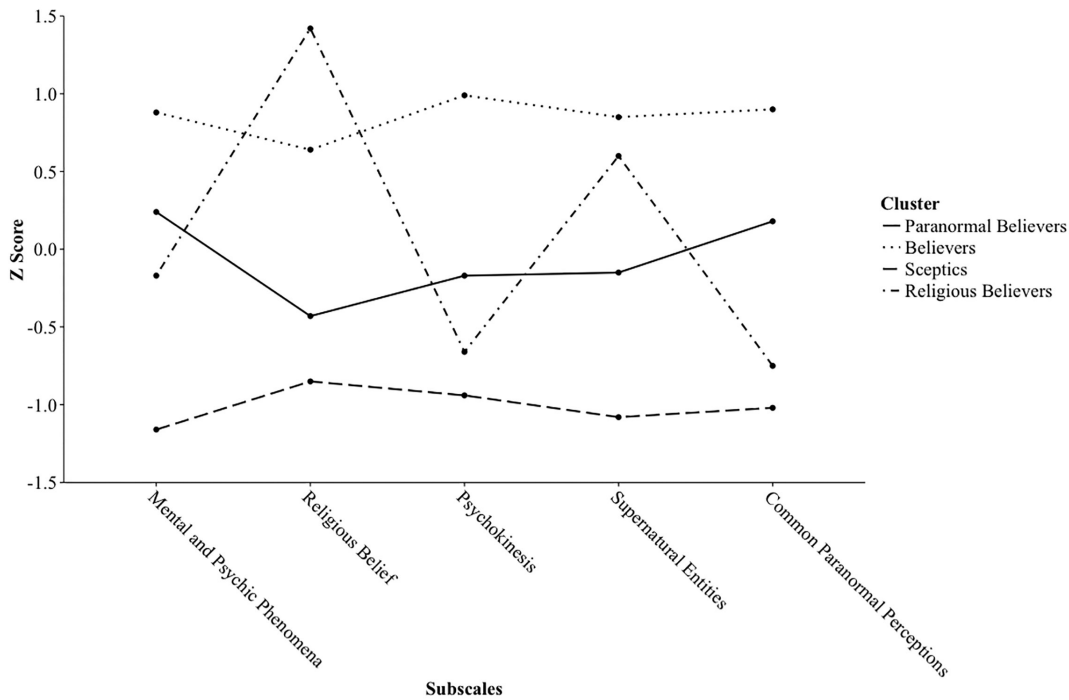
Figure 4. Mean Z-Scores for the Subscales of the BitSS and their Respective Cluster Membership.

Discussion and Conclusions

Study one created an initial item pool and reduced it to a 44-item scale and proposed a five-factor solution using EFA. The factors were: "Mental and Psychic Phenomena," "Religious Belief," "Psychokinesis," "Supernatural Entities," and "Common Paranormal Perceptions." Study two tested the factors proposed in study one using CFA and found that although the model was not a perfect fit to the data it was adequate, and showed excellent convergent validity and test-retest reliability.

The BitSS scale demonstrated good convergent validity, it correlated strongly with the rPBS, and moderately with the rRLI and the ISS. The "Religious Belief" subscale correlated strongly with the rRLI; the remaining subscales on the BitSS correlated strongly with the paranormal belief measure. The ISS showed a moderate correlation for all subscales apart from "Psychokinesis" and "Common Paranormal Perceptions." The BitSS scale showed good test-retest reliability at a three-month follow up showing a strong correlation. In addition, a cluster analysis on the BitSS showed that the groups posited by Schofield et al. (2016) and others (Aarnio & Lindeman, 2007; Irwin, 1997; Rice, 2003) were supported, and this in turn supported the five-factor model of the BitSS scale.

The scale and its five factors are comparable to previous measures, with a five-factor solution also being posited by some researchers for the rPBS (Lawrence, 1995; Lawrence & Cicco, 1997; Lawrence, Roe, & Kani, 1997). However, it differs from previous scales in a number of ways. First, the BitSS "Mental and Psychic Phenomena" factor has a larger number of items than the rPBS and of a broader scope; interestingly, the items primarily overlap with the rPBS "spiritualism" subscale (e.g., mental mediumship). This BitSS factor also appears more in line with the "New Age" subscale of Lange et al.'s (2000) purification of the rPBS and Irwin and Marks's (2013) Survey of Scientifically Unaccepted Beliefs. However, the BitSS offers more than two subscales and subsequently a clearer interpretation of paranormal belief than the one provided by the "New Age" factor in the aforementioned scales. In addition, this factor contains items pertaining to precognition similar to Tobacyk's (2004, 1988) "Precognition" subscale of the rPBS. The BitSS "Religious Belief" factor comprises mostly items that refer to religion, God, or the divine. This accords with the "Traditional Religious Belief" subscale of the rPBS, but is a more robust measure of religious belief than the rPBS's factor because it contains more items. In addition, at least three of its items could be argued as being more spiritual in nature (for example, "my spiritual belief affects absolutely every aspect of my life," "every human being is a member of the cosmos and God is the cosmic mind"), reflecting the difficulty in distinguishing spiritual beliefs from religious and paranormal ones. The BitSS "Psychokinesis" factor has items that are clearly linked to psychokinesis and is similar to the "psi" subscale of the rPBS (Tobacyk, 2004) and to items of the ASGS (Thalbourne, 1995), such as "I believe I am psychic." The BitSS "Supernatural Entities" factor items relate to both religious and paranormal constructs mainly concerned with separate sentient beings (angels). This is in line with the Supernatural Belief Scale (Jong, Bluemke, & Halberstadt, 2013), which has items such as: "There exist good personal spiritual beings, whom we might call angels." The BitSS "Common Paranormal Perceptions" factor items encompass precognition and haunting and the haunting element is similar to Otis and Alcock's (1982) Extraordinary Beliefs Inventory.

The EFA and CFA analyses of the BitSS also indicate that the underlying link between religious and paranormal belief is spiritual belief, making it difficult to distinguish it as a separate belief system. For example, the "Mental and Psychic Phenomena," "Religious Belief," and "Supernatural Entities" factors all included items related to spirituality. The majority of the items related to spirituality were found in the "Mental and Psychic Phenomena" factor, making it the most spiritual of the factors. The "Supernatural Entities" factor has two items that refer to spiritual beings, relating to angels and demons, potentially covering both religious (the reference to angels) and paranormal/religious (the reference to demons) concepts. Therefore, religiosity and paranormality are separate rather than overlapping concepts, but both concern the spiritual concepts that underlie them. This offers considerable support for defining religious and paranormal belief separately, while highlighting the difficulties in defining spirituality without reference to either the religious or the paranormal.

One potential criticism of the new scale could be that measuring supernatural belief is too broad. The attempt to measure the three concepts of religious, spiritual, and paranormal belief could be the reason for the overlap seen between the resulting five factors, and the lack of a subscale that measures spirituality alone is a potential problem. However, arguably the overlap of spirituality with other concepts might make the measurement of spirituality as a discrete concept an impossible task. Also, the sample is WEIRD (Western, Educated, Industrialized, Rich, and Democratic) (Henrich, Heine, & Noren-

zayan, 2010) so the cross-cultural validity of some of the items has not been established. Finally, it remains to be seen if the scale can measure belief in unbelievers adequately. Although the CFA showed that the data did not fit the model perfectly, there are reasons for this. Chi-square is affected by sample size (Brown, 2015); the sample in this study being greater than 200 is arguably large and perhaps inflated this measure of model fit. Model complexity also plays a role: the 44-item, five factor model tested is highly complex and so it is less likely that some of the fit indices will fall within the accepted boundaries (Hu & Bentler, 1999). Moreover, the fit indices are often described as thresholds, but according to Hu and Bentler (1999) they should be used as "rules of thumb" rather than "cut offs" and so the values should be accepted when they are close to fit. The sample size, model complexity, and the assertion that the indices are just rules of thumb suggest that although the model is not a perfect fit, it is acceptable. More importantly the findings are in line with previous theory (Beck & Miller, 2001) and research (Schofield et al., 2016). The scale also shows good validity, correlating strongly with the rPBS, and moderately with the rRLI. Moreover, compared to the three other scales used in the cluster analysis, the BitSS subscales provide a good amount of detail about their respective factor contents and are clearly supported by previous research and theory. Rather than using a number of separate scales to build a picture of how people believe using Cluster Analysis, the BitSS and its subscales offer a clear picture of the beliefs that make up the four clusters.

The new scale successfully captures the nature of supernatural belief and, being based on previous scales that have measured religiosity, spirituality, and paranormality, provides a wide range of items that assess these three concepts. The clear delineation of religious and paranormal belief emerging from these factor analyses supports the Metaphysical Chauvinism theory (Beck & Miller, 2001) and concurs with previous research that distinguishes religious and paranormal believers (Schofield, Baker, Staples, & Sheffield., 2016). This further strengthens the proposition that religious belief should not be defined as a paranormal belief. Also, the rPBS does not refer to either ghosts or poltergeists specifically, despite this being a staple of paranormal/supernatural belief, which makes the new subscale more comprehensive. The five factors of the new scale encompass the aspects of the supernatural well and are easy to interpret. The new scale provides insight into how the three concepts of religious, spiritual, and paranormal belief might fit together. Although religious and paranormal beliefs show a clear divide, spiritual belief is spread among the factors. The notion that spirituality is the underlying concept of religious and paranormal beliefs could be tested in future studies. The BitSS has more items covering fewer factors than the rPBS and has a clearer factor structure. The BitSS provides a new measure of supernatural belief to assess the personality and cognitive correlates of these types of belief.

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Appendix

Belief in the Supernatural Scale

Instructions

Each statement on this survey is something you may or may not agree with. Please respond to the statements as honestly as you can. For example, if you strongly agree with the statement please check that box. Please remember, your answer should reflect your own belief. You can choose from the following responses: Strongly Disagree; Moderately Disagree; Slightly Disagree; Uncertain; Slightly Agree; Moderately Agree; Strongly Agree.

1 My spiritual belief affects absolutely every aspect of my life.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

2 I firmly believe that ghosts or spirits do exist.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

3 Black magic really exists.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

4 Some people have an unexplained ability to predict the future.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

5 God has given humanity a complete, unfailing guide to happiness and salvation, which must be totally followed.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

6 There are individuals who are messengers of God.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

7 A Supreme Being exists.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

8 I believe that it is possible to send a mental message to another person, or in some way influence them at a distance, by means other than the normal channels of communication.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

9 Every human being is a member of the cosmos and God is the cosmic mind.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

10 I am convinced that thought transference actually does work.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

11 There is such a thing as levitation (raising the body through mental power).

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

12 Every person has an aura (a mysterious energy field, usually invisible, surrounding the body).

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

13 There is both a spiritual as well as a natural side to reality.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

14 There exist evil, personal spiritual beings, whom we might call demons.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

15 Some people have a mysterious ability to accurately predict such things as natural disasters, election results, political assassinations etc.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

16 Some men and women can find missing persons by swinging a pendulum over a map.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

17 Extra Sensory Perception (ESP) is an unusual gift that many persons have and should not be confused with the elaborate trick of entertainers.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

18 During altered states, such as sleep or trances, the spirit can leave the body.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

19 Reincarnation does occur.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

20 It is often possible to make valid personality judgments about people by knowing their astrological sign.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

21 I believe that there is a divine plan and purpose for every living being and thing.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

22 There is a great deal we have yet to understand about the mind, so it is likely that many phenomena (such as Extra Sensory Perception (ESP) will one day be proven to exist.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

23 There is such a thing as telepathy (communication directly from mind to mind).

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

24 Psychokinesis, the movement of objects through psychic powers, does exist.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

25 In spite of what many people think, card reading, for example tarot cards, can tell a lot about a person and their future.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

26 I believe that a person's deeds are stored in his or her "karma".

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

27 Religion gives meaning to my life.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

28 Some psychics can accurately predict the future.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

29 Some buildings are haunted.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

30 I believe psychic phenomena are real and should be studied scientifically.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

31 Everyone has an immortal soul.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

32 My religious belief is an important part of who I am as a person.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

33 Religious belief is better than logic for solving life's important problems.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

34 Astrology is a way to accurately predict the future.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

35 I believe in God.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

36 There is a spiritual realm besides the physical one.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

37 There are some objects or places that have a special spiritual meaning, for instance being surrounded by a certain type of energy.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

38 There is a devil.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

39 As a general rule, a fortune teller's predictions which come true are the result of coincidence.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

40 There exist good personal spiritual beings, whom we might call angels.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

41 There are such things as poltergeists (spirits which signal their presence by moving objects or making noises).

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

42 Some individuals are able to levitate (lift) objects through mental forces.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

43 In my life, I experience the presence of the divine.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

44 God has given some people the power to heal the sick.

Strongly Disagree □   Moderately Disagree □   Slightly Disagree □   Uncertain □   Slightly Agree □   Moderately Agree □   Strongly Agree □

Scoring

Item 39 is reverse-scored.

Subscales:

Mental and Psychic Phenomena: q4, q8, q10, q12, q13, q15, q17, q18, q19, q22, q23, q26, q30, q31, q36, q37.

Religious Belief: q1, q5, q6, q9, q27, q32, q33, q35, q43, q44.

Psychokinesis: q11, q16, q24, q42.

Supernatural Entities: q2, q3, q7, q14, q21, q38, q40.

Common Paranormal Perceptions: q20, q25, q28, q29, q34, q39, q41.

Subscale scores should be averaged.

La Création et la Validation de l'Echelle de Croyance au Supernaturel (Belief in the Supernatural Scale)

Cette étude avait pour but de créer et valider une nouvelle échelle, l'Echelle de Croyance au Supernaturel. La première étude a utilisé une analyse exploratoire de facteurs (EFA) pour réduire un ensemble initial de 71 items à 44 items, et pour identifier une structure factorielle, sur 382 participants. Une structure en cinq facteurs a été proposée : "phénomènes mentaux et psychiques", "croyances reli-gieuses", "psychocinèse", "entités supernaturelles", et "perceptions paranormales communes". L'échelle proposée fut alors analysée dans une deuxième étude utilisant une analyse confirmatoire de facteur (CFA) avec 318 nouveaux participants. La nouvelle échelle a fourni un large nombre d'items et indique

que, bien qu'il y ait une séparation claire entre croyances religieuses et paranormales, les croyances spirituelles sont distribuées sur les facteurs, indiquant que la spiritualité pourrait être le concept qui vient lier la religiosité et le paranormal. L'Echelle de croyance au supernaturel fournit un outil utile qui peut être employé seul ou en association avec d'autres mesures dans les recherches sur la croyance supernaturelle.

Die Entwicklung und die Validierung der Skala des Glaubens an das Übernatürliche (Belief in the Supernatural Scale)

Diese Studie wurde in Absicht unternommen, eine neue Skala zur Erfassung des „Glaubens an das Übernatürliche" zu entwickeln und zu validieren. In Studie eins wurde eine Exploratorische Faktorenanalyse (EFA) verwendet, um einen anfangs 71 Items umfassenden Pool auf 44 zu reduzieren und eine Faktorenstruktur mit 382 Teilnehmern zu gewinnen. Es ergab sich eine Fünf-Faktoren-Struktur , die sich aus „mentalen und psychischen Phänomenen", „religiösem Glauben", „Psychokinese", „übernatürlichen Wesenheiten" und „allgemeinen paranormalen Wahrnehmungen" zusammensetzte. Die vorgeschlagene Skala wurde in Studie zwei mittels einer „Konfirmatorischen Faktorenanalyse" (KFA) mit 318 neuen Teilnehmern analysiert. Die neue Skala ergab ein breites Spektrum von Items und weist darauf hin, dass – obwohl sich religiöse und paranormale Einstellungen klar voneinander unterscheiden --, spiritueller Glaube sich unter diesen Faktoren verteilt und darauf hinweist, dass Spiritualität das Konzept sein könnte, das Religiosität und Paranormalität miteinander verknüpft. Die Skala „Glaube an das Übernatürliche" (Belief in the Supernatural Scale, BitSS) stellt ein wertvolles Instrument dar, das entweder allein oder zusammen mit früheren Fragebögen zur Untersuchung des Glaubens an Übernatürliches verwendet werden kann.

Creación y Validación de la Escala sobre Creencias Sobrenaturales (Belief in the Supernatural Scale)

Este estudio tuvo como objetivo crear y validar una nueva escala, la "Belief in the Supernatural Scale" (BitSS). El estudio uno, con 328 participantes, usó un análisis factorial exploratorio (EFA) para reducir un grupo inicial de 71 a 44 reactivos e identificar una estructura factorial. Se propuso una estructura de cinco factores: "fenómenos mentales y psíquicos," "creencias religiosas," "psicokinesis," "entidades sobrenaturales," y "percepciones paranormales comunes". Analizamos la escala propuesta en el estudio dos utilizando un Análisis Factorial Confirmatorio (CFA) con 318 participantes nuevos. La nueva escala proporciona una amplia gama de reactivos y muestra que, si bien las creencias religiosas y paranormales muestran una división clara, la creencia espiritual se extiende entre esos factores, lo que indica que la espiritualidad podría ser el concepto que vincula la religiosidad y la paranormalidad. La BitSS proporciona una herramienta valiosa que puede usarse sola o junto con medidas previas para investigar creencias sobrenaturales.

Open Data in Parapsychology: Introducing *Psi Open Data*[1]

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Abstract: Open data in science brings important benefits, most notably the potential to accelerate scientific discovery, and the ability for the community to verify research findings. In addition to exploring these benefits, this paper considers concerns that some researchers may have about the approach. Publishing strategies, copyright and database right considerations, confidentiality, preparation of data for publication, and the citation of datasets are also discussed, as is the importance of journal policy. The second section of the paper presents Psi Open Data (https://open-data.spr.ac.uk), an open repository for parapsychology and psychical research data recently launched by the Society for Psychical Research. The repository is constructed using DKAN, an open source open data platform with a full suite of cataloging, publishing, and visualization features. It allows administrator users to upload research datasets, and any visitor to search for and download datasets. Various aspects of the repository are described: data structures, metadata, data classification, preview, and download facilities. Researchers are encouraged to support the repository by contributing datasets from both current and previous work.

Keywords: open data, psi, parapsychology

Driven by the explosion in use of the internet and world wide web, the open access movement has been gaining momentum since the early 1990s. Initially focusing on removing access restrictions to articles in scholarly journals, the concept of openness has broadened to encompass data and code. Several organizations have set out statements in support of openness in science:

- In 2003 the *Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities* was drafted at a congress organized by the Max Planck Society and the European Cultural Heritage Online (ECHO) project, encouraging open access to original scientific research results, raw data and metadata, source materials, digital representations of pictorial and graphical materials, and scholarly multimedia material (Max-Planck-Gesellschaft, 2003).

- In 2007 the Organisation for Economic Co-operation and Development (OECD) set out their *Principles and Guidelines for Access to Research Data from Public Funding,* seeking to promote a culture of openness and sharing of research data among public research communities (OECD, 2007).

- In 2008 the *Principles for Open Science* were drafted by Science Commons, promoting open access to literature, research tools, and data produced by publicly funded research (Science Commons, 2008).

- In 2010 the Panton Principles for Open Data in Science were publshed, stating that "science is based on building on, reusing and openly criticising the published body of scientific knowledge" and that "for science to effectively function, and for society to reap the full benefits from scientific endeavours, it is crucial that science data be made open." The principles guided that data related to published science should be explicitly placed in the public domain (Murray-Rust, Neylon, Pollock, & Wilbanks, 2010).

- In the UK, Research Councils UK's *Policy on Open Access* states that the UK Government is committed to ensuring that published publicly-funded research findings should be freely accessible (Research Councils UK, 2013).

The scope of the present paper is restricted to a discussion of open *research data*, which the OECD defines as "factual records (numerical scores, textual records, images and sounds) used as primary sources for scientific research, and that are commonly accepted in the scientific community as necessary to validate research findings." (OECD, 2007) The paper discusses the benefits of open data in science and examines objections that researchers might raise. Copyright and confidentially are discussed, as are best practices for transforming and formatting data. The second section presents *Psi Open Data*, an open repository for parapsychological and psychical research data recently launched by the Society for Psychical Research (SPR).

Open Data in Science

Benefits

Murray-Rust (2008) describes three examples that illustrate the principle that openly sharing data accelerates scientific progress: Mendeleev's construction of the Periodic Table using published data about properties (melting points, colors, densities, etc.) of chemical elements; the accidental discovery of pulsars; and a more recent example where Pang, Yau, and Chou (1995) used ancient Chinese eclipse records to calculate the variation of the Earth's rotation during the postglacial rebound and deduce a value for the lower mantle viscosity of the Earth. Parapsychology has its own examples: Spottiswoode's (1997) fascinating discovery of an unusual pattern when experiment results were plotted by Local Sidereal Time, and Palmer's (1997) discovery, in a re-analysis of the PRL ganzfeld database, that the relationship between ESP scores extraversion was attributable entirely to females. Open data can accelerate the rate of discovery in the following ways:

- Enabling researchers to explore questions not envisioned by the original investigators, and to address old questions in new ways, through re-use of data.

- Enabling meta-analyses, and the creation of new datasets by combining multiple data sources.

- Making possible the testing of alternative hypotheses, and the use of different methods of analysis; sharing of data encourages diversity of analysis and opinion.

Another key benefit of open data is *transparency*. Open data allows the community to identify errors in the research record through the reproduction of research findings, thereby preventing wasteful allocation of resources exploring research avenues founded upon erroneous conclusions. My personal experience with data from colleagues has been that errors sometimes do occur, and these can be identified and corrected by independent review. Jim Kennedy (personal communication, Winter, 2017) further notes that:

> Open data is a visible sign that researchers have confidence in their data and analyses, and that the data and analyses have likely had scrutiny by others. More generally, it is clear that open data is becoming a methodological standard for good research. Studies that are supported by open data will have much greater credibility with future readers than studies that maintain past, less transparent methodological practices. These are major benefits that should motivate researchers to make the effort to share their data.

Open data brings other benefits. Depositing data in a repository with institutional support protects against loss, and the knowledge that research data will be made public will encourage researchers to undertake good practices such as preparing a data dictionary and tracking file versions. Open data also provides accessible datasets for training students on data analysis.

Concerns

Researchers may argue that open data is unnecessary, as the current practice whereby researchers share their data with colleagues upon request is sufficient. The experience of Wicherts, Borsboom, Kats, and Molenaar (2006) suggests otherwise. They contacted 149 author teams requesting data for articles that had recently appeared in American Psychological Association journals. Even after repeated requests over a six-month period, they succeeded in acquiring data in fewer than one-third of cases. The situation with older datasets is likely to be worse still. Researchers will often struggle to locate old datasets, or they may be poorly documented, or in a format that can no longer be read.

A researcher may object to others producing analyses based on their data; they may have expended considerable time and effort setting up and running original experiments, and it may be galling to see others receive credit for quick, and possibly poor, pieces of work using their data. A response to this objection could be that the researcher should consider a different perspective, and be pleased that their data is being reused, and generating more value to science. Additionally, if the data is released under a license that requires attribution, and the original dataset is cited, the researcher will receive credit for that citation.

There may be concerns about the potential for inappropriate *post hoc* "data fishing." Once a dataset is open, other researchers are free to analyze it in any way they choose, and they may indeed perform multiple exploratory analyses. Clearly, there is value in exploratory analyses, but in a world with

open data, it is important that researchers appreciate the difference between pre-planned and exploratory analyses, and communicate this distinction to outside observers. It is also worth pointing out that studies utilizing open data can be preregistered. Perhaps the issue is not whether datasets are open, or not open, but how analyses are planned and reported.

Researchers may be concerned that data may be misinterpreted or misapplied. For example, unqualified individuals may apply inappropriate transformations or statistical treatments to data, and may have insufficient appreciation of the context in which the data were collected. Worse still, opponents of parapsychology (extreme skeptics) may *deliberately* use data in inappropriate ways to attack the original experiment, requiring researchers to divert time to defend their work. Perhaps it would be better to restrict access to qualified, trustworthy researchers? These are valid concerns, but restricting access would be problematic. Who would decide who is qualified, and trustworthy? The standard practice that has emerged within science is that open data is exactly that: open to everybody. Considering the crucially important advantages of open data, it is suggested here that open data practices should be fundamental, and other practices should be reviewed as necessary to reflect this position. Should researchers conduct their research in private, or should the community embrace openness and transparency, and accept the challenges that this brings?

Journal Policy

Increasingly scientific journals require the publication of supporting data. For example, this is now the case for *Science, Nature,* and *PLOS ONE*. The obvious corollary of data publication is that the data should also be made available to pre-publication reviewers. The *Instructions for Authors* for the *Journal of Parapsychology* strongly recommends data publication, but this is not mandatory. From the perspective of ensuring that research results can be verified by the community, optionality may be problematic, as authors who choose not to publish their data are likely to be those who know they have rushed the preparation of their manuscript, or are not confident in their statistical approach. One could question whether articles without accompanying data, which cannot be verified, have any place in an academic journal.

A middle ground may be for journals to award badges to incentivize authors to make data open, and to signify to readers that this has been done. For example, since 2014, *Psychological Science* awards an Open Data badge if authors provide the location of data in an open-access repository, and sufficient information for an independent researcher to reproduce the reported results. Studying the effect of this policy, Kidwell et al. (2016) report that before the introduction of badges, fewer than 3% of articles reported open data. By the first half of 2015, this had risen to 39%. This may be a good compromise for journals that want to encourage good methodology but are not ready to mandate requirements for publication. It also reinforces the trend for open data becoming standard practice. There are, of course, circumstances in which it is not possible or advisable to share data. For example, where this could violate participant's confidentiality, or where the data cannot be properly understood out of context (as may often be the case with qualitative studies).

Publishing Strategies

Researchers sometimes publish data on their own webpage, but an institutionally supported repository is recommended so that good practices such as cataloguing and regular backups are ad-

dressed, and the longevity of the data storage is assured. Data can be deposited with a general purpose data sharing service, such as the Dryad Digital Repository (http://datadryad.org/), the Open Science Framework (https://osf.io/), or figshare (https://figshare.com), or in a university-related archive, but a domain-specific repository has the advantage of being more visible to the specific research community, and thus will be more likely to be used, both for depositing and accessing data; this is the approach taken with *Psi Open Data*. A further advantage of a domain-specific repository is that it is generally much easier for a researcher to find the data they need. For example, *Psi Open Data* has a tagging and taxonomy system specifically designed for parapsychology and psychical research. It should be noted that, by virtue of the fact that the data are open, a dataset could appear in more than one repository.

Copyright and Database Right Considerations

Copyright is an intellectual property applicable to certain forms of creative work. Facts themselves (i.e., data) cannot be copyrighted, however copyright can protect the intellectual creativity of a database creator in the selection and arrangement of data in a database. The mere gathering of information (for example simply arranging a list of items in alphabetical order) is insufficient for the resultant database to acquire copyright (Pinsent Masons, 2008; U.S. Copyright Office, 1997). It seems that copyright is unlikely to pertain to the type of research databases under consideration here, although the position is not clear-cut. The duration of copyright, if it does apply, varies by jurisdiction, but is typically the life of the creator plus 50 or 70 years.

Database right ("Sui generis database right," 2017) is a property right similar to copyright, but applying to databases. In the EU and UK, database right lasts for 15 years from the creation of the database (in the UK, if the database is made available to the public within this period, then the 15-year protection period starts anew). Any substantial change to the database causes the 15-year period to recommence. As with copyright, if an employee constructs the database, the database right is owned by the employer. Database right does not currently apply in the USA.

In order to remove any doubt regarding the copyright and database right status of an open dataset, it is strongly recommended that an open data license is applied. Open Data Commons (https://opendatacommons.org/) provide three suitable options:

- The *Public Domain Dedication and License* is the most open; essentially all rights to the database are waived.

- The *Open Data Commons Attribution License* is similar, but requires anyone who makes public use of the data, or shares or adapts the data to attribute the original source.

- The *Open Database License* also requires attribution, but adds an additional condition that works produced from the database must also be open.

An open data license cannot be reversed, once the data is in the public domain it cannot be "unshared".

Confidentiality

Care must be taken to ensure that published data files do not contain personal data, for instance data about participants. Any database that contains data about living individuals who can be identified by the data or the data plus other information that users are likely to come into possession of will fall within the scope of data protection legislation.

Preparation of Data for Publication

It is considered best practice by some such as "The Leek group" (n.d.), to archive raw data that has not undergone any cleaning or transformation, to protect against the introduction of errors in cleaning and transformation processes. A cleaned dataset should also be archived, accompanied by a script, or exact instructions, for the transformation of the raw dataset to the cleaned version. A data dictionary or code book (an explanation of the meaning and format of each field) should also be included, as well as a description of the research that created the data, ideally in the form of a reference to an article in a peer-reviewed journal. With regard to the cleaned version, the file formats currently recommended by the UK data archive are set out in Table 1 (Van den Eynden, Corti, Woollard, Bishop & Horton, 2011).

Citation

The Task Group on Data Citation Standards and Practices (2013) studied the evolution of data citation practices and identified the following ten principles for data citation, which they offer as a guide to implementers:

1. *Status of Data:* Data citations should be accorded the same importance in the scholarly record as the citation of other objects.
2. *Attribution:* Citations should facilitate giving scholarly credit and legal attribution to all parties responsible for those data.
3. *Persistence:* Citations should be as durable as the cited objects.
4. *Access:* Citations should facilitate access both to the data themselves and to such associated metadata and documentation as are necessary for both humans and machines to make informed use of the referenced data.
5. *Discovery:* Citations should support the discovery of data and their documentation.
6. *Provenance:* Citations should facilitate the establishment of provenance of data.
7. *Granularity:* Citations should support the finest-grained description necessary to identify the data.
8. *Verifiability:* Citations should contain information sufficient to identify the data unambiguously.
9. *Metadata Standards:* Citations should employ widely accepted metadata standards.
10. *Flexibility:* Citation methods should be sufficiently flexible to accommodate the variant practices among communities but should not differ so much that they compromise interoperability of data across communities.

They observed that there are several types of persistent identifiers, but that the scheme that is gaining the most traction is the Digital Object Identifier (DOI), which was approved as an ISO standard in 2010. Ball and Duke (2015) provide further guidance about citing datasets.

Table 1
File Formats Recommended by the UK Data Archive

Type of Data	Recommended File Formats for Sharing, Re-use and Preservation
Quantitative tabular data with extensive metadata A dataset with variable labels, code labels, and defined missing values, in addition to the matrix of data	SPSS portable format (.por) Delimited text and command ('setup') file (SPSS, Stata, SAS, etc.) containing metadata information Some structured text or mark-up file containing metadata information, e.g. DDI XML file
Quantitative tabular data with minimal metadata A matrix of data with or without column headings or variable names, but no other metadata or labelling	Comma-separated values (CSV) file (.csv) Tab-delimited file (.tab) Including delimited text of given character set with SQL data definition statements where appropriate
Geospatial data Vector and raster data	ESRI Shapefile (essential: .shp, .shx, .dbf; optional: .prj, .sbx, .sbn) Geo-referenced TIFF (.tif, .tfw) CAD data (.dwg) Tabular GIS attribute data
Qualitative data Textual	Extensible Mark-up Language (XML) text according to an appropriate Document Type Definition (DTD) or schema (.xml) Rich Text Format (.rtf) Plain text data, ASCII (.txt)
Digital image data	TIFF version 6 uncompressed (.tif)
Digital audio data	Free Lossless Audio Codec (FLAC) (.flac)
Digital video data	MPEG-4 (.mp4) Motion JPEG 2000 (.jp2)
Documentation	Rich Text Format (.rtf) PDF/A or PDF (.pdf) OpenDocument Text (.odt)

Introducing *Psi Open Data*

Psi Open Data (https://open-data.spr.ac.uk) is a domain-specific open repository for data in the fields of parapsychology and psychical research. The repository was created and is operated by the SPR project, funded by a legacy from Nigel Buckmaster. Psi Open Data is constructed using DKAN, an open source open data platform with a full suite of cataloging, publishing and visualization features. DKAN allows administrator users to upload research datasets, and any visitor to search for and download research datasets.

Data Structures

In DKAN data are arranged in *catalogs*. In Psi Open Data all datasets will be reside in a single catalog. A catalog contains a collection of *datasets*, which are related collections of data, for example, all of the data files pertaining to a particular series of experiments. A dataset has metadata, which provide information about the dataset, for example, identification of the creators of the dataset. A dataset contains one or more *resources*, which are the individual data files, links to data files, or documents.

Each dataset belongs to a *group* (called a *publisher* in Psi Open Data), that is an organization or individual who contributes data to the repository. DKAN administrators can be assigned to a group, which confers access to add data within that group. This would allow universities and other research groups to upload their own datasets, although initially all datasets will be uploaded by the SPR data librarian.

Metadata

Each dataset is accompanied by the following metadata:

- Title

- Description

- Author (the creators of the dataset)

- Publisher (the contributing organization)

- Modified date

- Release date

- Unique Identifier

- Geographical coverage

- Temporal coverage

- License details

- Contact name (optional)

- Contact email (optional)

The APA citation for each dataset is also provided, enabling users to cite the datasets in academic publications. At the present time this is URL based, rather than using the DOI scheme, due to the costs of implementing the latter.

Data Classification and Search Facility

To assist users in finding the data they need, each dataset is assigned to a *topic*. The classification

system used, set out in Table 2, is an extension of the system employed in the SPR Abstracts Catalogue, which classifies the complete publishing history of the SPR. The extension was developed by a working group of SPR council members led by David Rousseau; it is an extension in that some categories are divided one more level down. As a further aid to locating datasets, each dataset can be assigned one or more *tags*. The range of tags applied will evolve as datasets are added. A search facility enables users to enter search terms, which are compared against the metadata values of each dataset. The search can be refined by selecting tags, topics and publishers. The description and metadata of each dataset are also indexed by Google, thus the datasets are discoverable via Google searches.

Preview and Download

In addition to allowing any data file to be downloaded, DKAN allows site visitors to preview tabular data. Data can be displayed as spreadsheet-style rows and columns, or in a bar, point or line graph. Data that contain either coordinates or GeoJSON can also be displayed in map view. DKAN also includes a number of APIs to allow direct communication with external applications. These features, however, are not currently enabled, as it is not expected that users will require access to data in this way.

Submitting Data to the Repository

Researchers who support the aims of the initiative are encouraged to contribute datasets. The best time to prepare data for publication is throughout the process of creating it, and while preparing the associated research report for publication, *not* at some later time when a request for the data is received. The effort to prepare data for open data practices is relatively small if the data are collected and managed with data sharing in mind. As well as datasets from current projects, old datasets are valuable and researchers are also encouraged to submit these. Datasets placed in the repository will continue to benefit generations of researchers long into the future.

Researchers wishing to submit a dataset to the repository should send a message to the data librarian via the Contact page within Psi Open Data. The librarian will contact the researcher requesting completion of a data submission form, which comprises sections for the contributor to select an open data license, attest that their dataset does not contain identifiable personal information, and specify values for the metadata fields. Researchers will be encouraged to provide the raw dataset (i.e., the dataset that was used when preparing their paper). A cleaned dataset may also be provided, ideally accompanied by a script or precise instructions describing the transformation from the raw data. Ideally all data fields will be described in a data dictionary, however comprehensive documentation is not mandatory, as it is recognized that in some cases, for example with old datasets, this may not be possible. It is possible to add a dataset to the repository but defer publication. In this case the unpublished content is saved, but is not visible on the website. This option may be suitable if the authors would like to embargo their data until publication of the corresponding article. Psi Open Data does not have the facility to allow restricted access to datasets, for example, to peer reviewers in advance of a paper's publication. Researchers are also encouraged to support the initiative by downloading and analyzing datasets.

Table 2
Topic Classification in Psi Open Data

Anomalous Abilities and Experiences of the Living
Spontaneous Phenomena
Subjective personal phenomena
Objective personal phenomena
Anomalous encounters and events
Anomalous group behaviour
Anomalous animal behavior
Volitional Psi
Anomalous influence
Anomalous knowledge
Experimental Psi
Anomalous influence
Anomalous knowledge
Anomalous Capacities and Altered States of Consciousness
Anomalous mental abilities
Anomalous functional abilities
Altered states of consciousness
Anomalous forms of being
Evidence Suggestive of Survival of Bodily Death
Mental Mediumship and Cross Correspondences
Physical Mediumship
Spontaneous Apparitions and NDEs
Hauntings and Poltergeists
Reincarnation

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Open data en Parapsychologie: Pour Introduire *Psi Open Data*

L'*open data* en science fournit des bénéfices importants, en particulier le potentiel d'accélérer les découvertes scientifiques, et la capacité pour la communauté de vérifier les résultats de recherche. En plus de ces bénéfices, cet article prend en considération les inquiétudes que certains chercheurs pourraient avoir par rapport à cette approche. Des considérations sur les stratégies de publication, de copyright et de base de données, sur la confidentialité, la préparation des données pour la publication, et la citation des bases de données sont également discutées, de même que l'importance de la politique des revues. La seconde section de l'article présente le *Psi Open Data* (https://open-data.spr.ac.uk), un référentiel ouvert pour les données de la parapsychologie et de la recherche psychique lancé par la Société de recherche psychique. Ce référentiel est construit en utilisant DKAN, une plateforme d'open data qui est open source, avec un ensemble complet de fonctions de cataloguage, publication et visualisation. Il permet aux administrateurs de télécharger des bases de données de recherche, et aux visiteurs de parcourir et télécharger ces bases de données. Différents aspects de ce référentiel sont décrits : les structures des données, les méta-données, la classification des données, la prévision et les possibilités de téléchargement. Les chercheurs sont encouragés à soutenir ce référentiel en contribuant aux bases de données avec des travaux actuels ou antérieurs.

Open Data in der Parapsychologie: Vorstellung von *Psi Open Data*

Open Data in der Wissenschaft bieten wichtige Vorteile, am auffälligsten das Potential, wissenschaftliche Entdeckungen zu beschleunigen, und die Fähigkeit der Community, Forschungsergebnisse zu verifizieren. Zusätzlich zur Erläuterung dieser Vorteile behandelt dieser Beitrag die Vorbehalte, die einige Forscher in Bezug auf diesen Zugang haben könnten. Diskutiert werden auch Publikationsstrategien, Fragen von Copyright und Rechte an Datenbanken, Vertraulichkeit, Aufbereitung von Daten für die Veröffentlichung und das Zitieren von Datensätzen wie auch die Bedeutung für die Publikationspolitik von Zeitschriften. Im zweiten Teil des Beitrages werden die *Psi Open Data* (https://open-data. spr.ac.uk) vorgestellt, ein offenes Repositorium für Parapsychologie und Psychische Forschung, das kürzlich von der Society for Psychical Research ins Leben gerufen wurde. Das Repositorium verwendet DKAN, eine quelloffene Datenplattform mit einer vollen Abfolge an Funktionen zur Katalogisierung, Veröffentlichung und Visualisierung. Es gestattet Admininstratoren, Forschungsdatensätze hochzuladen, und jedem Besucher, Datensätze zu durchsuchen und herunterzuladen. Verschiedene Aspekte des Repositoriums werden beschrieben: Datenstrukturen, Metadaten, Datenklassifikation, Vorausschau und Möglichkeiten zum Download. Forscher werden aufgefordert, das Repositorium zu unterstützen und Datensätze laufender und früherer Forschungsarbeiten zur Verfügung zu stellen.

Acceso Abierto a Datos: Presentando *Psi Open Data*

El acceso abierto a datos en la ciencia conlleva importantes beneficios, sobre todo el potencial para acelerar el descubrimiento científico y dar a la comunidad la capacidad de verificar los resultados de la investigación. Además de explorar estos beneficios, este trabajo considera las preocupaciones que algunos investigadores pueden tener sobre este enfoque. También se discuten las estrategias de publicación, las consideraciones de derecho de autor y de base de datos, la confidencialidad, la preparación de datos para su publicación, y la cita de conjuntos de datos, así como la importancia de las pràcticas de la revista. La segunda sección del documento presenta Psi Open Data (https://open-data.spr.ac.uk), un repositorio abierto de datos de parapsicología e investigación psíquica recientemente lanzado por la Society for Psychical Research. El repositorio se construye utilizando DKAN, una plataforma de datos abiertos de código abierto con un conjunto completo de funciones de catalogación, publicación, y visualización. Permite a los usuarios administradores cargar conjuntos de datos de investigación, y cualquier visitante puede buscar y descargar conjuntos de datos. Se describen diversos aspectos del repositorio: estructuras de datos, metadatos, clasificación de datos, vista previa, e instalaciones de descarga. Se alienta a los investigadores a respaldar el repositorio contribuyendo conjuntos de datos de trabajos actuales y previos.

Book Reviews

VARIETIES OF ANOMALOUS EXPERIENCE: EXAMINING THE SCIENTIFIC EVIDENCE (2nd ed.), edited by Etzel Cardeña, Steven Jay Lynn, and Stanley Krippner. Washington, DC: American Psychological Association, 2015. Pp. xi + 452 (hardcover). ISBN: 978-1-4338-1529-4

When the first edition of this book was published in 2000 by such an inherently risk-averse organization as the American Psychological Association, it was generally regarded as an indicator that research into anomalous experiences had matured sufficiently to warrant serious mainstream attention. The appearance of this updated second edition would seem to confirm that impression. It also affords an opportunity to see how things might have advanced in the intervening 14 years. Both editions have the same overarching structure, being divided into two parts: Part 1 is concerned with Conceptual and Methodological Considerations to set the context (and provide the justification) for the reviews of particular phenomena that follow in Part 2, Anomalous Experiences (generally abbreviated to AEs). The particular chapters have been rearranged a little, with a separate introduction chapter now forming the first part of Part 1 and chapters on methodology and the relationship of AEs to pathology being reversed, producing a more coherent exposition. The majority of the book forms Part 2 and is broken into 11 chapters covering a wide range of phenomena. The titles and authors will be familiar to those who have the first edition, though changes include the replacement of an OBE chapter with one on Anomalous Self and Identity Experiences that includes both OBEs and mediumistic experiences. An important change is the addition of a final chapter that offers an integrative survey of the presented material. This is valuable given the wide range of materials and contributors.

The introduction, by editors Etzel Cardeña, Steven Jay Lynn, and Stanley Krippner, contrasts the thrall in which the general public is held when it comes to AEs, as reflected especially in a popular culture imbued with accounts of such experiences, with the almost complete lack of interest among academics. It is clear that this book is intended to be part of the effort to address this odd imbalance. The editors define the term *anomalous* and implicitly defend its adoption here. The label is, of course, contentious, given that its meanings include "deviant," "aberrant," and "freakish," and can imply something that is trivial or marginal. Instead here there is an emphasis on anomalous meaning "irregular" in the sense of being different from common experience, and in the sense of being "inconsistent with prevailing theory or accepted facts" (p. 4) in a manner that is potentially insightful. They court the neutral academic by asserting that psychology is sufficiently established epistemologically to be able to confront such phenomena as a means of testing or extending accepted knowledge rather than hastily brushing such anomalies under the carpet.

Part 1's emphasis is on establishing the strengths and weaknesses of the methods used to study inner experience, given that "reports of AEs are often accompanied by little or no corroborating physiological data or physical evidence" (p. 11) and there is a clear intention to develop "a sophisticated neurophenomenological account of AEs" (p. 11). I can see how this would be useful in the courtship of the psychological academic mainstream, though it does pander somewhat to the fad for treating neuroscientific accounts as more fundamental than, say, social psychological or transpersonal ones, which seems epistemologically dubious.

A reassuringly modest section in the introduction on Why AEs Matter sets the agenda for the book in emphasizing that, while relatively uncommon or infrequent, AEs form part of the rich tapestry of healthy human experience such that greater knowledge of them can only enhance our understanding of the human condition, helping people recognize the potential positive impacts of such experiences and ameliorating potential negative impacts (for example by misclassifying them as pathological). The notion that such experiences may truly challenge our understanding of the nature of reality and the capacities of humans to interact with that reality is included here, but it is clear that the book does not depend on this more challenging aspect.

In chapter 2 Etzel Cardeña and Ronald Pekala persuasively argue that the shift away from introspective methods had more to do with socio-political forces than with problems inherent to the method itself. That is not to say that introspection is unproblematic; rather, issues around forgetting, confabulation, drifting of attention, failures of reality monitoring, ineffability of experiences, social desirability and censorship, are considered along with interventions that may lessen their effects. However, they do claim that people are much better at describing the contents of their experience than identifying the causes of those experiences, and in any case many of the criticisms of observations of internal events could apply equally to observations of external events (p. 24). Of course, introspection may be the only means we have of accessing certain phenomena (behavioral or physiological analogues can be useful but also require multiple layers of interpretation that are fraught with difficulty).

Chapter 3, by John G. Kerns, Nicole Karcher, Chitra Raghavan, and Howard Berenbaum, focuses on psychopathology, which they define in terms of underlying dysfunctional psychological processes that cause subjective distress and functional impairment, such as the inability to work or maintain personal relationships. They also introduce the term *peculiarity*, understood as "the extent to which the experience deviates from the ordinary or common" (p 60). This sounds awfully similar to the working definition of '"anomalous"', and while the authors argue that peculiar is a broader term than anomalous — akin to the relationship between, say, extraversion and partying, the former being a latent variable that can be expressed in a variety of ways — the case is made very briefly and is not persuasive. It would have been useful to give more detail of expressions of peculiarity that would not qualify as anomalous. Peculiar events are distinguished from the simply rare or unusual in that the former's "genesis or nature is difficult to explain" (p. 60), but this also raises problems since for many lay persons there are readily available explanations for their experiences in terms of ESP, survival of bodily death, etc.

They go on to explore the ways in which AEs might be associated with pathology but with the caveat that "on the whole, there is scant support for the hypothesis that various AEs are associated with psychopathology" (pp. 62-3). The chapter usefully reminds us of how cultural expectations determine

what experiences will be regarded as deviant and can affect the degree to which they will be seen as distressing. Indeed, the reactions of others to accounts of AEs can significantly add to the difficulty that the experient has in coming to terms with the experience (Roxburgh & Roe, 2014). The other determining factor is volition, with experiences that occur unbidden and whose progression seems to be outside the experient's control being characteristic of pathology proneness. It is noted that some correlates of certain pathologies, such as openness to experience, absorption, and dissociation, are also associated with AEs, but there is a danger here of the logical fallacy of affirming the consequent (e.g., if this person's experience is a product of pathology they will show elevated levels of absorption; this person shows elevated levels of absorption; therefore, this person's experience is a product of pathology). The lie to this is easily demonstrated; people with paranoid delusions may report that government agencies are watching them and recording their movements, but this doesn't mean that all people who believe this are paranoid — I was a postgraduate at Edinburgh during the Gulf War when an Iraqi friend of mine confided that he was a person of interest to the UK's military intelligence security service and his movements were restricted, which didn't strike me as paranoid at all.

For Part 2, the editors helpfully requested that contributors structure their coverage of specialist topics so as to include an evaluation of empirical work, to note implications for clinicians who might encounter persons reporting such experiences, and relevant neuro-scientific work that might speak to mechanisms or substrates. This gives the volume a real sense of cohesion that is difficult to achieve across such a disparate range of contributors and topics. The topics covered have been selected on the basis that there is a substantial body of research, the experiences are generally considered (by the experient) to be of more than transient curiosity, and they are not considered primarily as a product of dysfunction.

First up is synesthesia, which Lawrence E. Marks defines as "the anomalous arousal of sensations or perceptions in a secondary sense modality, in addition to sensations or perceptions in the primary sense modality normally associated with the stimulus" (p. 80), such as visual sensations that are characteristically associated with the presentation of particular sounds or words (though later the definition is expanded to include conceptual and affective dimensions). In a familiar tale, Marks describes how skeptics have been unwilling to take subjective accounts of synesthesia at face value, though promisingly that is changing with the identification of distinctive patterns of brain activity that are associated with self-reports. Work to identify a common structure or process has produced interesting findings that suggest high levels of heterogeneity, which Marks evocatively describes as a "teeming multiplicity" (p. 97).

In a chapter on hallucinations, Richard P. Bentall describes a shift in clinical research away from categorical diagnoses such as schizophrenia toward a dimensional approach that locates severe mental illness as an extreme point along a continuum that includes normal functioning. This has focused attention on specific psychological phenomena such as hallucinations as objects of study in themselves, with surprising results. For example, while about 0.5% of the population might at some point meet the diagnostic criteria for schizophrenia, the prevalence of hallucinations is estimated to be in the range of 10-15%, suggesting that hallucinations are not *ipso facto* indicative of mental disorder. This otherwise excellent overview that focuses mainly on auditory hallucinations does not mention mediumistic experiences, which have been subject to a great deal of psychiatric study recently (Beischel & Zingrone, 2015) and show similar patterns in terms of how the experient can become distressed initially by the

voices they hear but can learn to accommodate them. It is clear that an explanation in terms of source monitoring seems most promising.

Stephen LaBerge next gives a review of lucid dreaming, the awareness during dreaming that we are actually dreaming, combining the psychological qualities of waking life (ability to reason and re-member aspects of waking life) with those of dream life (creating a vivid and realistic immersive world). LaBerge rightly states that "lucid dreaming is accepted today as a normal, if rare, phenomenon of REM sleep" (p 151), so that it is not clear how the experience qualifies as anomalous in the sense adopted by the book editors. Etzel Cardeña and Carlos Alvarado's chapter on anomalous self and identity expe-riences replaces a chapter in the previous edition that focused only on out-of-body experiences. The new chapter includes OBEs as part of a potpourri that covers a broad collection of experiences in which one's sense of self differs from the usual experience of being encapsulated in a physical body of fixed extension. I found this rather unsatisfactory, as the phenomenologies are so different that any attempt to emphasize points of similarity seems to be at the expense of neglecting the more substantial ways in which the experiences differ. In particular, research on mediumship, including neuroscientific studies, seems sufficiently well developed (Bastos et al., 2015) to warrant a chapter of its own.

Stuart Appelle, Steven J. Lynn, Leonard Newman, and Anne Malaktaris review research on alien abduction experiences (AAEs), with an emphasis on paralysis and OBE elements. Despite such AAEs having quite gruesome features, experients report that if they had a choice they would still have pre-ferred to have the AAE, which Appelle et al. interpret as "many abductees came to reinterpret these details in a way that made them feel that their lives had more meaning and purpose and that they were part of something larger than themselves" (p. 217). They conclude that "many, if not most, AAEs are associated with sleep paralysis, cultural scripts, and the possible shaping influences of suggestive proce-dures and hypnotizability" (p. 233).

Caroline Watt and Ian Tierney next discuss psi related experiences (PREs) and organize their chap-ter around three theories proposed to account for them, "First, the experient may misattribute a normal experience to a paranormal cause. Second, a *small but arguably sound body of knowledge* implies that some of these experiences reflect the operation of actual psi processes. Third, research has established that a significant proportion of distressed experients require clinical support and guidance, either be-cause they have turned away from treatment for a diagnosed condition in favor of a parapsychological interpretation of their experiences" (p. 242, emphasis added). This is a surprising emphasis on pathol-ogy given the general orientation of the book, which demonstrates that few AEs are persuasively asso-ciated with mental health issues. There also seems to be an odd implication that relatively little pub-lished research supports the psi process theory compared with the other explanations — my subjective impression is that the parapsychology database is at least two orders of magnitude larger than that for either of the other specialist topics.

The misattribution theory relies particularly on the claim that those who report PREs also tend to see connections between disparate things — a phenomenon known clinically as apophenia — so that their psi attributions reflect an overreaction to chance coincidences. But apophenia is rather an odd dimensional variable, and doesn't necessarily dichotomize into correct judgments that no meaningful

connection exists versus false positive responses to randomness. For example, Watt and Tierney refer to a study by Gianotti et al. (2001) in which those reporting PREs were more likely than a comparison group to report meaningful connections between unrelated words, but some of the word pairs presumed by the authors to be unrelated seem to me to have plausible connections (e.g., for shelf/marriage, in the UK an unmarried person can be described colloquially as "on the shelf," for horn/air many sports fans will be familiar with air horns) so that it is far from clear that identifying links represents an aberration. Indeed, Luke (2012) has speculated that some people may be oblivious to actual connections or patterns and overattribute to coincidence, which he terms randomania. This deserves serious consideration.

The psi theory is covered much more briefly (2 pages in comparison to over 4 for misattribution) and focuses on problems of repeatability and methodological issues, so that much space is devoted to controversies that seem likely to apply equally to the other theories, at the expense of coverage of actual findings. Ironically, lack of informed and balanced information about the ontology and consequences of PREs seems to be the primary factor in their being interpreted as distressing.

Stanley Krippner and Jeanne Achterberg present a number of documented cases of anomalous healing, noting that the people to whom they occur may typically see nothing puzzling or anomalous in their recovery. Observed effects are linked to variables associated with placebo effects, which seems a sensible mechanism to focus on if only to determine the limits of explanations in terms of it. Parapsychological models are also considered, though I expected this treatment to draw more heavily on DMILS work than it does.

Antonia Mills and Jim Tucker review evidence concerning past life experiences (PLEs). Conventional explanations are considered, including that past lives are inaccurate confabulations created via suggestion, and that they may be the products of cryptomnesia, consisting of perhaps detailed information that the claimant has been exposed to (for example in a historical novel) but has completely forgotten having been exposed to it. These explanations have always struck me as mutually contradictory in supposing either that memories are encoded in detail and are potentially retrievable intact or are impoverished in ways that rely on active reconstruction when recalled. Explaining cases in terms of one or other of these models depending on the circumstances rather seems like eating one's cake and having it. Some impressive cases are presented, though care needs to be taken to avoid double accounting, whereby features that are used to identify a potential previous life also form part of the test of goodness of fit: if we use information from the claimant that mentions he was a baker from Barnsley named Ben and among the very many deceased persons we search through we find one who has these attributes, then we clearly cannot after the fact claim these as remarkable correspondences between the past life memories and the deceased person's circumstances.

In the next chapter Bruce Greyson gives a summary of the typical elements reported in a near-death experience (NDE) and presents the attempts to organize these meaningfully, but has to conclude that "none of them have been tested to date in terms of their clinical usefulness or validity in predicting aftereffects" (p. 337). Undoubtedly these aftereffects can be profound given the tendency for NDErs to interpret their experience literally. He notes that NDEs have some similarities to several psychopathological conditions, drawing attention to links with dissociation, absorption, and fantasy proneness.

Psychoneurological explanations are plausible, but artificially induced NDE features often share only a superficial similarity with reported NDEs, and veridical features such as accurate nonlocal perceptions are very difficult to account for.

David Wulff completes the collection of AEs with a chapter on mystical experiences (MEs), tracing the historical roots of the term and culminating in a description of an ME as one that "diverges in fundamental ways from ordinary conscious awareness and leaves the strong impression of having encountered a reality radically different from the sensory-based world of everyday experience" (p. 370). Surveys indicate that MEs are surprisingly common, though this likely includes a high number of false positives. The tendency to have an ME is predicted by the same constellation of variables mentioned in other chapters, though set and setting also have an important role.

The final chapter, written by the editors, delivers the take-home message that the AEs surveyed in this volume are not, in and of themselves, indicators of pathology. They refer to Moreira-Almeida and Cardeña's (2011) criteria for distinguishing the nonpathological from the pathological, including the absence of psychological suffering, absence or comorbidities, and compatibility with their spiritual tradition, but recognize the clear need to help those who find AEs discomfiting or distressing. Importantly they offer a testable model that identifies factors that contribute to the tendency to have a negative experience. At the same time they are unsurprised by the failure of research on AEs to find consistent relationships with individual differences variables, given that the measures and research designs lack the subtlety to capture the complexities of the interrelations.

In summary, *Varieties of Anomalous Experience* offers a comprehensive and scholarly treatment by internationally renowned experts of a wide range of potentially related experiences. As a plea for mainstream psychology and neuroscience to accommodate AEs, this updated and authoritative book is about the strongest case that could be made.

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REINCARNATION IN AMERICA: AN ESOTERIC HISTORY, by Lee Irwin. Lanham, MD: Lexington Books, 2017. Pp. xxvi + 446. $130.00 (hardcover). ISBN 978-1-4985-407-7.

Lee Irwin is Professor of Religious Studies at the College of Charleston in South Carolina. He counts among his interests Native American spirituality, Western esotericism, Eastern religions, transpersonal theory, and parapsychological research. He has authored or edited numerous articles and books on these topics. In the work under review, he tackles beliefs in and about reincarnation in America (i. e., the United States). He notes that there are three major avenues of influence on American ideas about reincarnation—those stemming from Amerindian cultures, those imported in religious and occult traditions, and those derived from "direct participatory knowledge [i.e., past-life memory] taken as evidential basis for such belief" (p. xv). He states that his project is "an attempt to understand more fully the American context for reincarnation as a viable postmortem theory for many people." It is not "an attempt to argue for any absolute conviction but rather to explore the value that such a theory has for others in the American context" (p. xvi). Nevertheless, in his concluding chapters he addresses the question of how reincarnation might operate, a subject to which I will return.

Reincarnation in America consists of an Introduction and twenty chapters organized into three parts. The six chapters of Part I, Pre-American Theories of Reincarnation, deal with Amerindian, Greek, Roman, Neoplatonic, Medieval Christian, Kabbalistic, and Christian esoteric ideas about rebirth. Irwin justifies this wide-ranging survey as a necessary background for understanding the reincarnation theories that were brought to America from the 16th century onwards. Oddly, he does not similarly contextualize the Native American traditions he considers. Amerindian reincarnation beliefs do not stand alone in the world but are related to an animistic system of global currency, as Sir Edward Burnett Tylor recognized as early as the 1870s (Tylor, 1877, vol. 2, pp. 2-5). Equally oddly, Irwin attributes Amerindian reincarnation beliefs to observations of "the cyclical nature of the seasons and the regenerative power of nature" (p. xvi), rather than to past-life memory and other signs, despite the evidence for the latter provided in Mills and Slobodin's (1994) *Amerindian Rebirth,* which he cites later on.

Part II, American Reincarnation, treats reincarnation beliefs in the earlier (pre-contemporary) American scene. Chapters are devoted to American Transcendentalism; African traditions and the Afro-Caribbean synthesis; Spiritualism, Theosophy, and occult systems such as Freemasonry and Rosicrucianism; Buddhism and other Asian religious influences; and, once again, Christian esoteric theories. These chapters are powerful testimony to the pervasiveness and diversity of reincarnation beliefs in America, from the colonial period onward. Ironically, as Irwin points out, native beliefs were absent from this American mixing bowl. Immigrants brought their traditions with them and were oblivious to similar ideas found among the indigenous peoples in the land they occupied.

Part III is entitled Post-American Reincarnation. Irwin explains that the concept of "post-American" reincarnation "points toward both the international global context of postmortem rebirth theories that are irreducible to any form of strict nationalism and the overall impact of science as another form of

transnational language and conception" (p. 291). During this period, the contemporary period, "global media" and "constant information exchange," as well as case studies conducted in the field and narratives from age regressions under hypnosis, inform American thinking about reincarnation. In addition to spontaneous case studies and regression narratives, the seven chapters address the pronouncements of channelers on reincarnation, the contribution of out-of-body and near-death experiences to the evidence for postmortem survival, and the implications of certain versions of quantum physics theory for the mind/body problem.

This third section of the book is less successful than the earlier sections. The material treated here is more extensive and complex than that dealt with before, and there are significant omissions and distortions of emphasis. In discussing Ian Stevenson's reincarnation theory (pp. 320-324), Irwin overlooks his concept of the psychophore, a sort of subtle or astral body he believed responsible for transferring memory and physical form one life to another (Stevenson, 1997, vol. 2, pp. 2083-2092; Stevenson, 2001, pp. 234, 251). The notion that the psychophore acts as a "template" for the new physical body obliged Stevenson to begin reincarnation with conception. He was uncertain what to do with cases whose intermissions were under nine months in length and was inclined to consider them possession rather than reincarnation. Irwin cites Jim B. Tucker's (2005) book, *Life Before Life,* but is apparently unaware of Tucker's (2013) *Return to Life,* which includes several American spontaneous cases of past-life memory and develops a novel theory of reincarnation as tantamount to the continuation of a dream. Irwin gives extended attention to regressions under hypnosis, which he treats as on equal evidentiary standing with spontaneous memories, but fails to appreciate the full impact of regressions on American popular (New Age) ideas about reincarnation. He singles out the speculations of Amit Goswami (pp. 381-384) and Eric Weiss (pp. 384-387) for special attention, but neither has had as much influence as regression therapists Michael Newton and Brian Weiss on popular thinking.

In his last two chapters, Irwin explores, tentatively, how the reincarnation process might work. He does so by bringing together the various "theories" of reincarnation represented in America and looking for common denominators in them, as if there is truth to be found in their intersection. Spontaneous case investigations are granted no special privilege. Irwin offers no justification for this procedure, attempts no review of the findings from research with spontaneous cases, and has no discussion of the ways in which these findings differ from common religious and New Age assumptions about reincarnation. This produces, among other things, an unquestioning acceptance of traditional ideas of karma, for which Stevenson found little support in his spontaneous cases research (Stevenson, 2001, pp. 251-153).

Reincarnation in America is at its best as an inventory of writings about reincarnation in the New World. Irwin demonstrates unequivocally that reincarnation ideas have never been absent from the American scene, although they have had no place in mainstream religious teachings. No one previously has brought this material together on anything like this scale and those with questions about reincarnation in American esoteric thought finally have somewhere to go for answers. Unfortunately, Irwin's achievement is badly undercut by referencing practices that provide uneven aid to the scholar who wishes to follow up and learn more. The basic referencing method is a Chicago social science format that places full references in chapter endnotes, with successive references to the same work given in short form, so that the reader has to hunt back through the notes (sometimes into earlier chapters) to locate a desired reference. A Bibliography at the end of the book repeats many citations, but far from all. Some

references are given in short form only, without complete information in either the chapter endnotes or the Bibliography, rendering them opaque to the reader unfamiliar with them. There is an editorial sloppiness here that one would not expect from Rowman & Littlefield, especially in a book that carries a $130 pricetag.

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SURVIVING DEATH: A JOURNALIST INVESTIGATES EVIDENCE FOR AN AFTERLIFE, by Leslie Kean. New York: Crown Archetype, 2017. Pp. viii + 408. $27.00 (hardcover).   ISBN 978-0-553-41961-0

Whether, and if so in what form, humans (and other sentient beings, see James, 1897/1956) may survive death would be at the top of the questions that many people would like parapsychology to answer. Even during more religious times, Mozart's desperate reminder to God about the promise to have everlasting life in his *Requiem* expressed what so many people have craved to know. How could it be otherwise? We are the existential center of our experiential universe (although some take this experience more literally than others) and it may seem incredible to us, despite evidence to the contrary, that the world will go on its merry way without our existence. And what a solace it would be to know that our dear departed in some or other way have not disappeared forever.

With the waning of religion in the West, science became the purveyor of answers, although it has recently steered away from any issue with even a whiff of the metaphysical, despite continued reports of unusual experiences, from children suddenly recollecting a previous life to individuals claiming to communicate with the deceased and, every so often, coming up with specific information that they should not be privy to. A main motivation for the foundation of the Society for Psychical Research (SPR) in 1882 was to investigate such events, without a preconception as to their nature, and through the tools of the scientific method. As any reader of the classical papers of SPR members on mediumship knows, some of these researchers were extremely thorough, intelligent, and often initially agnostic about claims of "paranormal" phenomena until the data persuaded them to change their minds (e.g., Sidgwick, 1915). They were also cognizant that the issue could not be easily resolved, if at all, because even the data from the best mediums left open other interpretations than contact with the deceased, such as outstanding psi abilities by the medium who might obtain that information without the mediation of a deceased person (i. e., the living agent "super-psi" hypothesis).

In our times, journalist Leslie Kean has written/compiled a volume presenting various strands of relevant evidence on the question of possible survival. Her book is quite comprehensive and covers research on "cases of the reincarnation type or CORT"; near-death experiences, in particular the aspects relevant to possible survival such as veridical perceptions while having an out-of-body experience and unusual end-of-life phenomena; mental mediumship providing suggestive evidence of survival; apparitions and hauntings; and physical mediumship as it may pertain to potential survival. She does not cover "electronic voice phenomena," but this is probably the weakest source of evidence for survival (cf. Leary & Butler, 2015).

Surviving Death, winner of a 2017 Parapsychological Association Book Award, has two features that I greatly appreciate, and one that I do not. Let me start with the former two. Kean values the knowledge that expert sources can bring to a book purporting to provide a "state-of-the-art" view

of the subject. She commissioned synthetic chapters from some of the foremost experts in the study of survival, including Jim Tucker on investigating children with past-life memories, Pim van Lommel on near-death-experiences (NDE), Peter Fenwick on end-of-life experiences, Julie Beischel on mental mediumship, Alan Gauld on trance mediumship and drop-in communicators (not a new chapter but an excerpt of his magisterial book on mediumship and survival (Gauld, 1982); Lloyd Auerbach on apparitions and hauntings, and Erlendur Haraldsson on mediumship evidence of survival. In addition she consulted with other experts with somewhat divergent opinions, including Stephen Braude and Michael Sudduth. For any newcomer to the vast and complex serious literature on possible survival, having one volume with all of these experts summarizing their work is well worth the admission fee, but the reader should discern between publications in peer-reviewed reputable journals, and those that have not been subjected to such process (e.g., pp. 186-187 on mediums' EEG).

The second feature I liked, and a treat for those of us who are familiar with the literature, are previously unpublished transcripts and first-person accounts of people directly involved with these phenomena. They include chapters by Cyndi Hammons, the mother of an American child who had a "resolved" (i. e., identified) reincarnation case; and by Kimberly Clark Sharpe, the nurse of the famous case in which a patient saw a very specific shoe outside of the hospital ledge of a hospital while having an experience of being outside of her body and which she should not have been able to see through ordinary means. There are also extensive quotations of Pamela Reynolds, perhaps the most famous NDE case in the literature, who provided specific descriptions of what happened during her surgery involving hypothermic cardiac arrest with consequent ceasing of brain activity, as well as the comments by her attending neurosurgeon, Robert Spetzler. He stated in an interview that "Her EEG was completely flat... I believe that Pam recalled things that were remarkably accurate. I do not understand from a physiological perspective how that could possibly have happened! (p. 108). Second-hand reports of these cases do not do justice to the level of specificity found in them, which argues against superficial debunking explanations. There are also first-person accounts by Kean of mediumship readings she got, and her reasoning as to why she found them very impressive and evidential. And just before the conclusion of the book there is a chapter by physical medium Stewart Alexander describing the development of his purported abilities. Kean also adds links or references to accessible youtube and other materials that explore further various areas, and maintains a webpage with supplemental and updated articles and recordings (http://www.survivingdeathkean.com/).

The various areas of research covered in the book have a cumulative effect, and provide enough basis for a reasonable person to argue that his/her belief does have empirical backing, or for an earnest skeptic to look at the primary evidence closely. Kean does not go into depth on how these various suggestive supports for survival could be integrated, but that task is elusive even for those who have devoted a big chunk of their life to the task, which explains my lack of patience with not only those who refuse to look at the evidence for possible survival, but also those who state that they know how it all fits together and produce rather trite answers that cannot even remotely explain the various contradictions in the data (e.g., some of the great mediums with very precise information that apparently only a deceased could know simultaneously exhibiting ignorance of some basic facts of the ostensibly communicating deceased personality). I did not expect that Kean would provide a synthesis (i. e., "a coherent set of concepts and principles which cover satisfactorily all the regions of fact," Broad, 1953, p. 8) of the

evidence for and against survival. But the one thing she could -and should- have done better is to be more critical of some of her sources and self-critical of her own assumptions.

In many ways *Surviving Death* provides more comprehensive and primary-sourced information than the typical non-specialist book on survival, but my one big objection also carries weight. I was initially impressed that in the first section, on CORT, she mentioned that the fact that the researcher who presented some photos for identification by a boy claiming a previous life knew the correct one was problematic as he might have conveyed some information even if unconsciously or unwillingly (p. 63; and of course "masking" in parapsychology research is a standard requirement, see Palmer, 2015). But later on, she does not exhibit the same prudence. For instance, when commenting on one of her own mediumship readings, which she found very convincing, she states that "the correct information *far* outweighed the inaccurate" (p. 160), but took no precautions to safeguard against her potential bias to emphasize confirming information. Or she overstates the case as when a medium tells that beside the grave of someone dead lies an "Albert… Albertone… or Alberone." Beside that grave a private Albone was buried, close to the names mentioned, but Keane changes it to a perfect hit by writing that "Buried there was Private G. W. Albone, just as Sandy has said." Or she fails to challenge a physical medium's (Stewart Alexander) rationale not to allow a filming of one of his séances with a low red light because such exposure would bring a destructive "turmoil," yet he was willing to write a book about his mediumship and wrote a chapter for this book, which describes what ostensibly happens in his séances.

Kean also makes the naive assumption that the controls for physical mediums she came up would preclude the possibility of fraud, but an expert with the motivation to deceive her would very likely come up with tricks that an intelligent person would not even think about. Case in point, Kean reports positively on her séances with Kai Mügge (or Muegge), communicating about them as late as January 2016 with Stephen Braude, yet that same year a damning and credible report about Mügge probably being fraudulent about at least some aspects of his séances came out (Nahm, 2016). As I write this re- view (February 9, 2018), Kean had not brought this issue in her webpage. *Surviving Death* will give the interested reader a plethora of information on most relevant areas of survival research, but it is a pity that by failing to be more circumspect and critical in some sections Kean actually weakens her argument for those who approach this literature without any dogmatic preconceptions.

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ΑΓΓΕΛΟΣ ΤΑΝΑΓΡΑΣ: ΤΟ ΧΑΜΕΝΟ ΗΜΕΡΟΛΟΓΙΟ. Η *Ζωή και το Έργο του Πατέρα της Ελληνικής Παραψυχολογίας μέσα από τα χειρόγραφα του* [ANGELOS TANAGRAS: THE LOST DIARY. THE LIFE AND WORKS OF THE "FATHER" OF GREEK PARAPSYCHOLOGY BASED ON HIS HANDWRITTEN DOCUMENTS]. Research and comments by Nikolaos Koumartzis. In Greek (with endorsements and introduction in English). Athens, Greece: Daidaleos, 2017. Pp. 650. ISBN 978-618-5298-02-9

This 650-page volume is a major publication - not only for Greek readers, but for all those interested in the history of parapsychology. Nikolaos Koumartzis draws on the memoirs of Angelos Tanagras, safely preserved by the Parapsychology Foundation for decades, and over 200 photographs collected from different sources, to bring back to life the works and times of the person who was indisputably the father of Greek parapsychology.

I admit that, despite my Greek origins, I did not know much about Tanagras myself, at least not until I met Nikolaos. I should have. He was the founder of the Greek Society for Psychical Research (GSPR), author of the theory of psychoboly (the forerunner of psychokinesis), a tireless psychical investigator, and a figure of international renown at his time, having initiated some of the earliest long-distance telepathy experiments (between Athens, New York, Paris, Vienna, and other European capitals). I also discovered that he was a person of great culture and influence, one of the most celebrated authors of his time, an Admiral in the Greek Navy, and friend to many members of Greek royalty and to the most important scientists of his era.

The book is divided into three sections. In the first one (pp. 77-319), Tanagras describes his works before discovering his passion for psychical research. Thanks to his literary talent, he masterfully highlights great moments of his era, which is in itself interesting to the great majority of interested Greek people (and, to some extent, to the rest of us). For example, in stark contrast to what today's tourists experience visiting the capital of Greece, Tanagras meticulously describes "old Athens," a city with a population of just 350,000 and hundreds of beautiful small villas and palaces. Similarly, he presents the burning of Smyrna (today's Izmir) in 1922 at the end of the Greco-Turkish War (p. 295), and the unknown and shocking details behind the death of Alexander, King of Greece, which impacted international affairs between the two World Wars.

The second section (pp. 321-573) is dedicated to Tanagras's work in our field: the founding of the Greek SPR (p. 343); the publication of *Psychical Research,* the society's monthly journal (p.359); and the 3rd, 4th and 5th international conventions of psychical research (pp. 435, 447, and 465 respectively). Among many others items, he discusses his study of the Anastenarides, the Greek firewalkers (p. 480), his theory of psychoboly (p. 502), and the possibility of developing latent psychical abilities (p. 557). Also of great interest is his defense of the idea that psychical research can be considered to be the "Religion of Science" (p. 562). The last section (pp. 575-579) serves as the epilogue to Tanagras's memoirs, with his observations and conclusions about his life work and research.

Angelos Tanagras: The Lost Diary is a premium publication, both in terms of design and paper-print quality. This makes sense because Nikolaos Koumartzis, besides being the Parapsychological Association's Art Director, also runs his own publishing house in Greece. The book is endorsed by several past presidents of the PA as well as mainstream Greek scientists, including the President of the Hellenic Physicists Society.

Nikolaos Koumartzis describes how this 7-year long project was completed and how he and his research team managed to transcribe 600 pages of Tanagras's quite difficult handwriting, using modern techniques (p. 34). The editor drew upon a wide variety of sources (e.g., 17 years' worth of issues of the Greek SPR journal, the Tanagras-Warcollier letters at the Institut Métapsychique archives), to thoroughly comment the original text (almost 1,000 footnotes) and help readers situate the social and political context of Tanagras's era, as well as that of parapsychology and related mainstream fields. For example in the introduction (p. 61) Koumartzis presents a little-known conflict in the field, in which Tanagras accused J. B. Rhine of presenting his own PK research as original without crediting Tanagras's earlier work.

This book fills a gap in terms of scholarly works concerning parapsychology in Greece. The flipside of such a thoroughly investigated volume is that its length might be discouraging for a general public. The editor may wish to consider a smaller, more accessible version of *The Lost Diary,* to increase the general public's exposure to Tanagras and his work as a psychical researcher.

Finally, a rather nice touch: the book came out just in time for the 60th Annual Convention of the Parapsychological Association in Athens in July, 2017. The last international meeting in Athens, the 4th Conference of Psychical Research in Greece, took place in 1930, 87 years earlier. Its organizer was Angelos Tanagras, of course; and this year's PA convention was organized by his memoirs' editor, Nikolaos Koumartzis.

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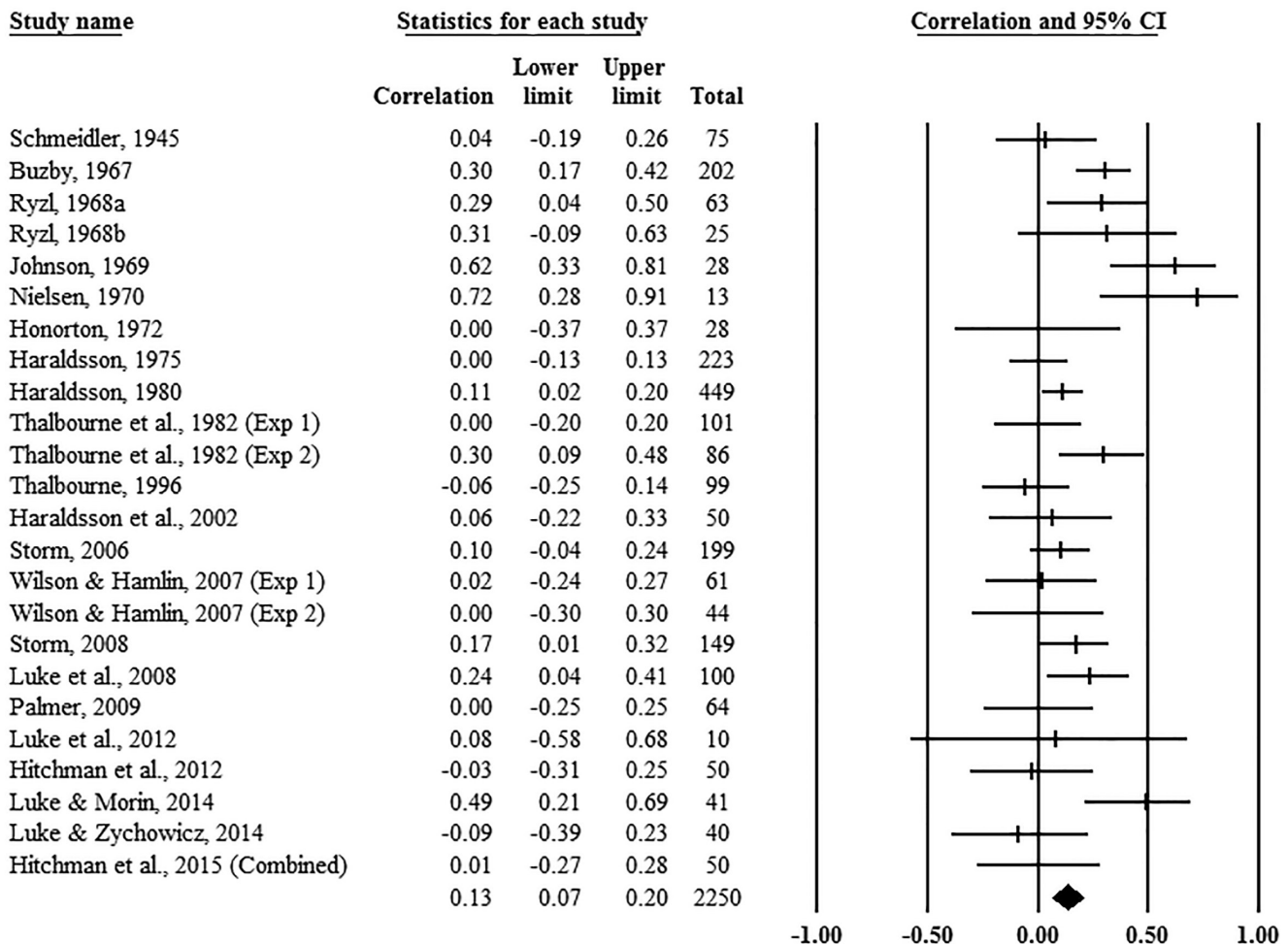51 rue de l'Aqueduc
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Correspondence

To the editor,

I am writing to make a correction to Zdrenka & Wilson's (2017) publication "Individual Difference Correlates of Psi Performance in Forced-Choice Precognition Experiments: A Meta-Analysis (1945-2016)," which appeared in the spring 2017 issue of the JP.

On page 14, regarding the Belief in Psi meta-analysis, Storm's (2008) effect size was incorrectly reported as -.17 when it should have been .17. Consequently—and with the addition of 2 more papers not previously included (Luke, Zychowicz, Richterova, Tjurina, & Polonnikova, 2012; Luke & Zychowicz, 2014), the meta-regression looking at year of publication as a moderator is no longer significant (QR = 2.11, p = .15). The updated mean weighted effect size r of the Belief in Psi meta-analysis is .13 (p < .001), with a 95% confidence interval between .07 and .20 (see diagram below). We offer our thanks to Lance Storm for pointing out the error to us.

Study name	Statistics for each study				Correlation and 95% CI
	Correlation	Lower limit	Upper limit	Total	
Schmeidler, 1945	0.04	-0.19	0.26	75	
Buzby, 1967	0.30	0.17	0.42	202	
Ryzl, 1968a	0.29	0.04	0.50	63	
Ryzl, 1968b	0.31	-0.09	0.63	25	
Johnson, 1969	0.62	0.33	0.81	28	
Nielsen, 1970	0.72	0.28	0.91	13	
Honorton, 1972	0.00	-0.37	0.37	28	
Haraldsson, 1975	0.00	-0.13	0.13	223	
Haraldsson, 1980	0.11	0.02	0.20	449	
Thalbourne et al., 1982 (Exp 1)	0.00	-0.20	0.20	101	
Thalbourne et al., 1982 (Exp 2)	0.30	0.09	0.48	86	
Thalbourne, 1996	-0.06	-0.25	0.14	99	
Haraldsson et al., 2002	0.06	-0.22	0.33	50	
Storm, 2006	0.10	-0.04	0.24	199	
Wilson & Hamlin, 2007 (Exp 1)	0.02	-0.24	0.27	61	
Wilson & Hamlin, 2007 (Exp 2)	0.00	-0.30	0.30	44	
Storm, 2008	0.17	0.01	0.32	149	
Luke et al., 2008	0.24	0.04	0.41	100	
Palmer, 2009	0.00	-0.25	0.25	64	
Luke et al., 2012	0.08	-0.58	0.68	10	
Hitchman et al., 2012	-0.03	-0.31	0.25	50	
Luke & Morin, 2014	0.49	0.21	0.69	41	
Luke & Zychowicz, 2014	-0.09	-0.39	0.23	40	
Hitchman et al., 2015 (Combined)	0.01	-0.27	0.28	50	
	0.13	0.07	0.20	2250	

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