Final scientific progress report for grant 190_18: Ganzfeld ESP research: Building on lessons learned

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Abstract:

Background

Meta-analyses of ganzfeld ESP research have found highest scoring with selected participants. However debate continues over how to interpret positive results. The present Confirmatory study follows up on this work to build on lessons learned and reduce debate.

Aims

1. to test the ESP hypothesis incorporating design features aimed to optimise psi-conduciveness *and* security. 2. to explore the previously-observed link between self-reported creativity and ganzfeld task performance using validated creativity measures.

Method

A ganzfeld precognition design was used to test 240 participants selected for creativity as well as practice of a mental discipline and/or prior psi experience and/or psi belief. Psi-conduciveness was further optimised by selecting experimenters. Optimal security measures included recording session data in triplicate to make any tampering detectable. The study design and analysis plan was pre-registered.

Results

72 hits were obtained out of 240 sessions, a 30% hit-rate, p=.043 (1-t), z=1.714. *Post hoc* investigations and as an independent software validation exercise found no subtle bias or software/RNG errors that might have inflated the hit-rate. No significant correlations were found between psi task performance and the creativity measures.

Conclusions

The study's Confirmatory hypothesis was significantly supported, indicating that participants could identify the randomly selected future target. The result encourages researchers that optimum security and psi-conduciveness can productively co-exist. Our study also pioneered the use of software validation methods in ganzfeld research and recommends this to other researchers.

INTRODUCTION

In the mid-1970s Adrian Parker and Charles Honorton introduced parapsychologists to a mild sensory isolation procedure known as the ganzfeld method, to test for hypothesised extrasensory perception (ESP) abilities. The method became popular and subsequently a number of meta-analytic reviews have evaluated the outcome of groups of ganzfeld studies, with most concluding that the overall study results support the ESP hypothesis (e.g., Bem & Honorton, 1994).

Internal patterns. Despite debate, there remain intriguing internal patterns within groups of studies. These patterns, notably correlations between participant types and session outcome, are not only less likely to be caused by questionable research practices, but may reveal something about mechanisms underlying ESP effects. The highest scoring in ganzfeld studies has occurred when participants have been selected for prior psi experience, psi belief, practice of a mental discipline (such as meditation) and creativity (Storm et al., 2010; Baptista et al., 2015; Storm & Tressoldi, 2020).

Building on lessons learned. Our previous (Watt et al., 2020) Exploratory ganzfeld precognition study implemented design features seeking to optimise psi-conduciveness as well as security. The study obtained significant support for the precognition hypothesis, and effectively acted as the foundation study for our application to Bial Foundation, to conduct a follow-up Confirmatory ganzfeld study. The following lessons were learned during the conduct of Watt et al., 2020. Given confidence intervals surrounding the obtained 36.7% hit-rate, a Confirmatory study should plan for the possibility of a lower hit-rate and should therefore have a larger number of trials to maximise statistical power. To try to further optimise psi-conduciveness, instead of participants being selected for at least one out of four possible inclusion criteria, participants would be selected for creativity plus at least one of the remaining three criteria. This is consistent with recommendations from a recent ganzfeld meta-analysis by Roe and colleagues (in press), and builds on previous observations that the strongest and most consistent effects in ganzfeld research have been with artistic participants (visual artists, musicians, actors, and writers) (Baptista et al., 2015; Dalton, 1997). The average hit rate for this group is 41% for seven studies by different experimenters. Another practical lesson we learned is that for a larger study, an extra experimenter would be needed. This person would act as overall coordinator and notify experimenters of which participants met the study inclusion criteria. To facilitate cross-checking of computer session records, and capture any unexpected deviations from procedure, a manual logbook would be introduced. To keep the PI (Watt) fresh, a larger study should be broken into Waves with rest periods between. The multiple-experimenter precognition design had worked smoothly, and the other psi-conducive and security design features of the Confirmatory study had been effective and remained unchanged.

Exploring creativity. Our new study introduces an exploratory process-oriented question, again to try to build on previous research observations. Previous ganzfeld studies have found positive results for creative participants but have often rather loosely defined creativity. We decided therefore to include validated measures of creative activities and achievements, and of creative ideation, to try to learn more about how domains of creativity, levels of achievement, and degree of creative ideation ability, might associate with performance on the ganzfeld ESP task. In this way, we hoped to explore and contribute to better understanding of the previously-observed relationship between creativity and positive performance on ganzfeld ESP tasks.

Following award of the grant from the Bial Foundation (number 190/18), and many delays (see Appendix 1), the planned study was pre-registered (Watt, 2023).

Hypotheses and planned analyses

H1: Confirmatory. Participants will correctly identify the randomly selected target clip at greater than chance expectation (tested using exact binomial probability, number of hits obtained out of 240 trials, where p.hit = .25).

For the following Exploratory hypotheses, Ganzfeld task performance will be indexed by the session Z-score (calculated from target and decoy ratings).

H2: Paranormal belief (measured by ASGS) will correlate positively with Ganzfeld task performance (one-tailed).

H3a and 3b: Creativity (measured by ICAA and RIBS) will correlate positively with Ganzfeld task performance (one-tailed).

METHOD

Experimenter characteristics

As with our previous study, experimenters were psychology students recruited to be knowledgeable about parapsychology and to have a positive attitude to the study hypothesis. After a description of the study design, prospective experimenters were asked:

> What is your *a priori* belief that the psi hypothesis in our study will be supported? Please respond with the following scale: (5 – strong belief; 4 – moderate belief; 3 – neutral; 2 – moderate non-belief; 1 – strong non-belief).

Wave 1 had 3 experimenters (mean belief rating 3.7);Wave 2 had 9 experimenters, (mean belief rating 3.9); Wave 3 had 3 experimenters, (mean belief rating 4.3).

Participant recruitment

Prospective participants were mainly recruited by experimenters via the KPU volunteer panel, social media, posters, and personal contacts. Those interested in participating completed the online PIQ and then the filter was applied to identify those who would be invited to participate in a ganzfeld session.

Participant selection criteria

Participants qualified for inclusion if they self-reported as creative (Q9: *Do you engage in any artistic/creative activities?* Yes/No and Q10: *How would you rate yourself for level of creative/artistic ability?)* AND reported practicing a mental discipline (such as meditation) weekly or more often; AND/OR reported prior psi experience (Q18: *Have you ever had an experience which you think may have* *involved psi?* Yes/No); AND/OR reported psi belief (Q19 *Is the existence of ESP...?* or Q26 *Is the existence of psychokinesis...?*).

Questionnaire materials

All questionnaire materials were presented using Qualtrics.

Participant Information Questionnaire (PIQ). The 30-item PIQ is an unvalidated form developed for research at the Koestler Parapsychology Unit. It includes demographic questions as well as questions regarding paranormal beliefs and experiences, practice of mental disciplines, and self-reported creativity. Appendix 2 contains the full PIQ.

Australian Sheep-Goat Scale (ASGS; Thalbourne, 1995). The 18-item ASGS is a validated measure containing items about putative psychic abilities and experiences. The participant indicates their attitude to each statement, responding either 0=false; 1=uncertain; 2=true. Therefore scores can range from 0 to a maximum of 36.

Inventory of Creative Activities and Achievements (ICAA; Diedrich et al., 2018). ICAA was chosen as a measure of creativity because it goes beyond the usual 'artistic' definition of creativity, thus allowing us to widen our understanding of possible relationships between participants' different domains of creative activities and achievements and ganzfeld task performance. This validated scale assesses both creative activities (CAct) and creative achievements (CAch) across eight domains: Literature, Music, Creative Cooking, Visual Arts, Arts & Crafts, Performing Arts, Sports, Science & Engineering. The CAct sub-scale assesses how frequently a certain activity has been performed in the last 10 years, using a 5-point Likert-type scale (0 = *never*; 1 = *1-2 times*; 2 = *3-5 times*; 3 = *6-10 times*; 4 = *more than 10 times*).

Runco Ideational Behavior Scale (RIBS; Runco et al., 2001). RIBS was chosen as a measure of creative ideation because it is an objectively scored and validated measure of creative ideation. RIBS assesses ideational behaviour using a 5-point Likert scale (1 = *never*, 5 = *very often*) to evaluate 23 items (e.g., *I have ideas about new inventions or about how to improve things; I am able to think about things intensely for many hours*.). A single RIBS score is computed by averaging across the 23 items (range = 1-5).

Ganzfeld laboratory location and layout

The ganzfeld laboratory used throughout this study was located in a basement room of a modern building. The room was split into two sections. In the reception section, there were three upholstered easy chairs around a low coffee table. Two large panels divided the reception part of the room from the ganzfeld area. The ganzfeld section contained a comfortable reclining chair for the participant, an adjacent small table with computer monitor, mouse, keyboard, and digital recorder, and an upright chair for the experimenter.. Pot plants, fabric wall-hangings, and local art prints were used to help give the space a relaxing and 'non-clinical' ambience.

Computer program. Apart from the digital audio recorder which was manually operated by the experimenter, the ganzfeld task was presented by a computer program that had been developed by a member of the PPLS technical support team. A password was needed to log in to the computer and initiate the ganzfeld program. Further details of the program are in Appendix 3.

Random Number Generator. The TrueRNG3 (USB hardware RNG produced by ubld.it) was used whenever a source of randomness was needed in this study (for target pool selection, order of presentation of target pool on screen for judging, and for target selection.) The RNG was periodically tested (as further described in Appendix 3).

Security measures for ganzfeld precognition task
While no study can be completely secure against fraud or error, this study took multiple precautions to attempt to minimize programmer, experimenter, and participant fraud and error. These include recording data in three locations to make it difficult to fraudulently manipulate or erroneously record session data without detection. Further details of security measures are reported in Appendix 3.

Ethics approval. Due to there being different experimenters at different stages of the study ethical approval was given several times by the University of Edinburgh School of Philosophy, Psychology and Language Sciences ethics committee. Wave 1 ethics approval number 33-2223/4; Wave 2 ethics approval numbers 295-2223/3 and 295-2223/4; Wave 3 ethics approval number 9-2324/3.

Overall study choreography. Wave 1 (N = 60 trials, sessions conducted January – March 2023); Wave 2 (N = 120 trials, sessions conducted June 2023 – March 2024); Wave 3 (N = 60 trials, sessions conducted November 2023 – January 2024). CW monitored overall study progress but did not observe any study data files, collate any descriptive data, or conduct any analyses until all 240 Formal trials were completed.

PROCEDURE

After initial greetings, experimenters explained the procedure, answered questions, and guided the participant through the belief and creativity questionnaires

Ganzfeld precognition task.

Preparation. The experimenter then led the participant through the ganzfeld precognition task. Participants were seated in a reclining chair, were encouraged to make themselves comfortable and were offered a blanket. The participant wore headphones and was able to adjust the volume to a sample of white noise, to a comfortable level. They also wore a red-tinted eye-mask, and the experimenter adjusted the position of a floor-standing lamp with a warm white light, so that it was at a comfortable brightness for the participant with eyes open. The experimenter sat near to the participant.

Relaxation and impression period. When the participant was ready to proceed with the task, the program played them a 9-minute relaxation exercise followed by a 25-minute period of white noise during which the experimenter took notes of the participant's mentation, which was also recorded on the digital recorder.

Judging. After reading on-screen instructions, the participant initiated the computer's random selection of the target pool and viewed the four possible clips in a randomly presented order. Participants then rated the four clips for degree of similarity to their mentation.

Session results/feedback. After the participant submitted their finalised ratings, the computer was prompted to randomly select the session target, and this was played to the participant as feedback.

Finally, there was a debrief chat and the participant was thanked. Sessions typically lasted between 90 minutes and 2 hrs.

RESULTS

Participant demographics
The main demographic characteristics of the study's participants are shown in Table 1 (Appendix 7). Perhaps unsurprisingly, the participant demographic was quite similar to that of the experimenters. Apart from Wave 1 of the study, which was able to draw more from the KPU volunteer panel, there was a fairly high proportion of student participants. Participants were also fairly young with mean age of 29 years (range 18 to 84 years).

Participant profiles on the study selection criteria and questionnaires
To be selected to take part in this study, participants had to self-report as creative, plus report prior psi experience, and/or psi belief, and/or practice of a mental discipline. Except for the three participants who had been belatedly found not to meet the study inclusion criteria, and the two whose PIQ responses were missing, all other participants met the compulsory self-reported creativity criterion and, as can be seen from Table 2 (Appendix 7), 75% of participants met an additional two or three of the study's inclusion criteria. Table 3 (Appendix 7) presents descriptive statistics for participants' scores on the paranormal belief and creativity measures.

Hypothesis tests

Ganzfeld precognition task performance
Hypothesis 1 was the study's only Confirmatory hypothesis. We predicted that participants would correctly identify the randomly selected target clip at greater than chance expectation (tested using exact binomial probability, number of hits obtained out of 240 trials, where p.hit = .25). Seventy-two hits were obtained out of 240 sessions, a 30% hit-rate. This hypothesis was significantly supported on the planned analysis: $p = .043$, 1-t, $z = 1.714$.

Paranormal belief, creativity, and ganzfeld precognition task performance
Exploratory Hypothesis 2 predicted that paranormal belief (measured by ASGS) would correlate positively with Ganzfeld task performance (one-tailed). Exploratory Hypotheses 3a and 3b predicted that Creativity (measured by ICAA and RIBS) would correlate positively with Ganzfeld task performance (one-tailed). The open-source JASP statistics software (https://jasp-stats.org) was used to correlate participants' paranormal belief and creativity questionnaire scores (see Table 3) against their ganzfeld task performance (as indexed by session Z-score). Correlations for these four analyses are near-zero, in fact slightly opposite to the predicted direction, and therefore no support was found for these hypotheses. The detailed results of these hypothesis tests are shown in Table 4 (Appendix 7).

Alternative interpretations

This study appears to have obtained support for the precognition hypothesis, which leads us to consider possible alternative explanations for the elevated hit-rate in this study.

Appendix 3 sets out the many security measures that sought to protect the integrity of the study's data. We will expand upon three leading alternative explanations for the elevated hit-rate: selective reporting; experimenter error/fraud; and subtle software bias.

1. Selective reporting. Researchers in psychology and parapsychology can sometimes be guilty of conducting many exploratory analyses and then selectively reporting those that 'worked' (e.g. Wagenmakers et al., 2012). Study registration is one way to minimise or at least make detectable such practices. Our study size and planned analyses were pre-registered (Watt, 2023), with the test of the precognition hypothesis registered as Confirmatory. The pre-registration document matches the analysis and sample size reported here, therefore confirms that we adhered to the planned analysis and number of trials. So the results are not affected by selective reporting.

2. Experimenter error or fraud. Though it is difficult to completely eliminate the possibility of experimenter fraud, the precognition design prevents leakage of information about the future target at the time that the participant submits their ratings. So the experimenter cannot deliberately or inadvertently 'guide' the participant to give a higher rating to the future target clip. Recording of session data in triplicate facilitates cross-checking to ensure data is consistent across the different recording locations and modalities, and helps to prevent or render detectable tampering with the locally recorded session results. During the session there were three data uploads to a remote University of Edinburgh server to which none of the experimenter team, including the PI, have access; this was later independently double-checked by the programmer, for consistency with local session records. Despite these precautions, and because the study used multiple student experimenters, is it possible that one or two 'rogue' experimenters fraudulently achieved very high hit-rates that inflated the overall study outcome? To explore this possibility, Table 5 (Appendix 7) gives the breakdown of psi task results for each experimenter, and shows that 10 out of the 15 experimenters obtained a hit-rate higher than 25%. So there is a generally positive trend throughout the three Waves of the study. The elevated hit-rate is not down to just one or two 'outlier' experimenters.

3. Subtle software bias.

3.1. Pre-tests. The computer program used in the present study was originally developed by a member of the IT support team at the University for our previous similar study (Watt et al., 2020). The programmer made a few minor edits for the new study, and before running any Formal sessions we (AP and CW) conducted a small number (N=24) of software validation sessions to check that the program was robust even if the mouse and keyboard behaviour did not follow the expected behaviour. We manually recorded key session information and checked that it was consistent with the session data recorded by the program (it was). These sessions obtained a 25% hit-rate, as expected by chance.

3.2. Post hoc bias tests. After the 240 Formal sessions had been completed and we became aware that the hit-rate significantly exceeded MCE, we investigated whether the number of hits might have become artefactually inflated. For instance a subtle software bias could coincide with a bias in the participants' preferences during the judging period. Before the participants started to rate the four possible target clips, the program played them each clip. This order of viewing of the four possible target clips should have been random, because the program sampled the RNG to determine the viewing order of the four possible clips. If the viewing order was non-random - let's say there was a slight tendency for the future target clip to be presented *first* - and the participants *also* tended to give a higher rating to the first-viewed clip, then these two factors combined might lead to artefactually higher ratings for future target clips. This possibility was investigated in two ways. First, for the study's 240 Formal trials, we counted the viewing position of the future target clip. (Bear in mind this analysis can only be done with the benefit of hindsight, because the target identity is randomly determined by the program at the very end of the session, after the participant has submitted their ratings.) The future target was selected by the program (by sampling the RNG) to be the First viewed clip 61 times, Second viewed clip 57 times, Third viewed clip 61 times, and Fourth viewed clip 61 times. This frequency distribution did not significantly deviate from chance (Chi^2 (3df) = 0.200, p(2-t) = 0.978. This analysis demonstrates that the target *was* being randomly allocated to the four different viewing positions, as we had intended. Next, we investigated whether participants had any tendency to give their highest rating to any particular viewing position. The First viewed clip was given the highest rating 65 times, the Second viewed clip received the highest rating 64 times, the Third viewed clip received the highest rating 59 times, and the Fourth viewed clip received the highest rating 52 times. So there appeared to be a slight tendency for participants to prefer clips that were presented earlier in the viewing sequence. However this tendency was not statistically significant (Chi^2 (3df) = 1.767, p(2-t) = 0.622). These post hoc analyses of the data from our 240 Formal trials do not support the idea that the number of hits in our study was inflated by a coincidence of participant bias with target viewing position bias.

3.3. Independent software validation exercise. Finally, in case there was a different subtle software error that might not be detectable in a small number of trials, we commissioned an independent University of Edinburgh researcher (PO) who specialised in software validation, to conduct a more extensive software validation exercise. We ran two versions of the study using a software validation script with 'fake' participants to enter pre-determined video clip ratings. The script also opened, closed and restarted the study, and was run over the period of 4 weeks without experimenters present. We ran 240 sessions of the original version of the study (average duration 58 minutes), and 5,549 sessions of a shortened version in which video and audio clips were all shortened to one second, but study software itself remained untouched (average duration 2 minutes). In both versions, the experiment software's performance was measured against the likelihood of random events, that the match between the video highest-rated by puppeteering script and the one randomly selected by experiment software occurs 25% of times.
This validation exercise revealed no bugs or discrepancies, confirming that the experiment software performed as expected under both human and script-controlled conditions. The script-based validation showed that the software's randomisation and selection processes operated correctly even without human observation, enhancing the credibility of our study's outcomes. This thorough validation process

reinforced our confidence in the software's reliability and the integrity of the collected data. See Appendix 4 for further details.

DISCUSSION

The primary aim of this study was to build on lessons learned in previous ganzfeld ESP studies (e.g., Watt et al., 2020) and meta-analytic reviews (e.g., Baptista et al., 2015; Storm et al., 2010; and Roe et al., in press) and test the ESP hypothesis by optimising both psi-conducive and security design features. Our secondary (and Exploratory) aim was to apply validated measures of creativity, to try to improve understanding of how creative activities, creative achievements, and creative ideation might be associated with ganzfeld task performance.

Our initial Exploratory analyses that sought to correlate the creativity measures with ganzfeld task performance found no evidence of the predicted positive association. At first glance this appears to disconfirm the previous observations of a positive relationship between creativity and ganzfeld ESP scoring (e.g., Baptista et al., 2015). However it must be remembered that, although statistically significant, the hit-rate in our study is only 5% over the 25% expected by MCE. Therefore any correlational analysis is bound to be 'diluted' by the low 'signal to noise' ratio in our data. Also, our participants were selected *because* they self-reported as creative, and a comparison of our participants' scores on the creativity measures compared to the published norms for these measures reveals that our participants were indeed above-average in their creativity. This too would hamper a correlational analysis, which would have greater ability to detect any relationship if there was a range of creativity scores, rather than mostly relatively high scores. As a result, this aspect of our study perhaps works better as a way to 'profile' the characteristics of participants who self-report as creative and offer themselves to take part in parapsychology studies.

For our test of the precognition hypothesis, amongst the important psi-conducive features that we implemented were: participant selection criteria emphasising self-reported creativity as well as representation of one or more additional participant variables; avoiding experimenter fatigue by limiting number of sessions, therefore requiring multiple experimenters; and selecting experimenters to be knowledgeable about parapsychology and have a positive expectation towards the study outcome supporting the precognition hypothesis. Optimal security measures included: use of a precognition design; recording of data in triplicate; use of multiple experimenters; and pre-registering the precognition hypothesis as Confirmatory.

CONCLUSIONS AND RECOMMENDATIONS

Across 240 trials we obtained a 30% hit-rate, which significantly supported the prediction that participants would be able to identify the future randomly chosen target video clip. As Kennedy (2016) points out, software validation has tended to be neglected by parapsychologists as well as psychologists. In the final (unplanned) part of our project, to investigate whether a software error or bias could have produced the above-chance hit-rate in our study, we commissioned an independent software validation exercise to run 'puppeteered' sessions where no person was present in the ganzfeld lab. This exercise found no bugs or discrepancies and confirmed that our ganzfeld program software and RNG was behaving as it should. We hope that by reporting this exercise, we encourage other researchers to build software validation into their research plans. It would be preferable to conduct such extensive software validation *before* formal data collection begins, to avoid the risk of wasting resources lest an undetected software bias permeates an entire study.

Of course there may be some other as yet undiscovered artefact that affects our study outcome. However, to the best of our knowledge given the efforts described here, we believe that we have ruled out the most likely alternative explanations for the elevated hit-rate in our study. Our study therefore finds support for the precognition hypothesis. This finding adds to the database of mostly positive ganzfeld precognition studies, and lends encouragement to other researchers to test the ESP hypothesis with the more secure precognition design and 'optimum' design features that we implemented here.

Regarding the Exploratory investigations using validated creativity measures, we have noted that parapsychologists can be rather casual in their definition of 'creativity' when selecting participants for their studies. Our study helps to build an understanding of these volunteers' creativity using validated measures. We plan to further explore the different domains of creativity captured with the ICAA, because there is a tendency to equate 'creativity' with the arts. However creativity can emerge in other domains, such as in science and engineering, and design. It will be interesting to see how much these less stereotypical forms of creativity are represented in our sample, and we encourage parapsychologists to be more systematic in their effort to understand links between participant profiles and psi task peformance.

Caroline A. Watt

Professor Caroline Watt
30th June 2024

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Appendix 1: Changes from original project and table of expected and actual output

There were two main changes to the original project (1 and 2 below), and one more minor addition (3 below), all of which were approved in advance by the Bial Foundation's Administration Board. Section 4 below details 'extra' work that we did during the pandemic while the grant programme was paused, for which we did not seek permission. Finally, the Table shows the originally planned outputs for the grant and the outputs at the time of this Report.

1. Timeline. The original planned project start date was May 2019. This was delayed by three factors. First, Prof Watt requested an October 2019 start date, to coincide with the arrival of a new PhD student, Abby Pooley, who would be able to collaborate on some of the project work as part of her PhD. This would give good value for money for the Bial Foundation. Secondly, after completion of preparatory work including recruiting experimenters for the first study, due to the coronavirus pandemic the University stopped all face-to-face data collection from March 2020. While many researchers were able to pivot their research into online data collection, this was not practically feasible for our ganzfeld study. Finally, after nearly 2 years of restrictions on in-person testing, there was a further year's delay due to an after-effect of the pandemic: our original ganzfeld lab was closed (along with all other lab space in the architecturally historic psychology building) so that modern ventilation systems could be installed. We had to wait until November 2023 to be allocated new lab-space, in a different building. Finally, due to the change in start time of the periods of data collection, we did *not* change the total planned number of trials, but pre-registered them (Watt, 2023) as a single 240-trial study that would be conducted in three (not two) waves, with N=60, N=120, and N=60. This change of scheduling was approved by Bial Foundation.

2. Study design. To make up for lost time (as described in section 1) we requested a change of study design from telepathy (where there is a 'sender', a 'receiver' and two experimenters) to precognition (where only one participant and experimenter is needed). (Although page 9/22 of our grant application provided for the possibility of change from telepathy to precognition design, we requested formal approval for this change.) Both telepathy and precognition fall under the category of Extrasensory Perception, so our study would still test the ESP hypothesis. However generally precognition studies are quicker and less resource-intensive to conduct, as well as being less susceptible to error. We also made a more minor design change, to drop the planned time-estimation task (because the study by Watt et al., 2020 had used this task and found no interesting results with it). Instead, we introduced systematic measurement of participants' creativity, which previous ganzfeld studies *had* found was associated with positive ganzfeld performance. This helped our study to build on learnings from previous research. We adhered to the pre-registered analysis plan (Watt, 2023) to combine the data of the three waves to give maximum statistical power for a single Confirmatory analysis testing the precognition hypothesis. As well as there being no change to the total number of trials, there was no change to the original key design features intended to help the study be maximally psi-conducive according to previous research, with carefully selected participants doing just one trial each, and multiple experimenters to avoid burn-out.

3. Software validation exercise. After we found that we had obtained an above-chance hit-rate that appeared to support the precognition hypothesis, we commissioned an independent University of Edinburgh researcher who specialised in software validation, to conduct an extensive software validation exercise (see Appendix 4). This found no discrepancies and confirmed that the ganzfeld program software was operating as planned, thus supporting the integrity of our conclusions.

4. New meta-analysis. To make some progress while in-person testing was not possible, Abby Pooley conducted a meta-analysis of previously unstudied aspects of ganzfeld telepathy studies. We reported this work at two conferences, and it was subsequently published (Pooley et al., 2023). It will also form a chapter of Pooley's PhD thesis. We also organised an online conference panel to discuss how to progress ganzfeld ESP research (Watt et al., 2021).

Table highlighting the differences between expected and achieved output indicators

Expected and achieved output indicators (number of actions)

Output indicators	Expected (according to application)	Achieved
Advanced training: PhD theses	0	*3 chapters pending (see note 1)*
Advanced training: Master theses	0	0
Advanced training: Other	0	0
Organization of seminars and conferences	0	0
Book	0	0
Book chapter	0	0
Conference presentation	2	2
Conference paper	1	2
Journal article	2	1 *(plus 2 in preparation, see note 2)*
Other (specify)	0	1 (article in non-peer-reviewed Bulletin of the Parapsychological Association)

Notes:

1. PhD thesis chapters (pending). Parts of the research conducted in this program will help to form **three** chapters for Abby Pooley's PhD thesis. One chapter is based on the already-published paper from an early part of the project with Pooley as first author. Another chapter will conduct a linguistic analysis of mentation content and use SEM to investigate relationships between mentation content and other participant variables. Another chapter will expand on the theme of software validation, using our experience here as a case study. Pooley will give due credit to the Bial Foundation's support in her thesis acknowledgements and we would expect these chapters to lead to further journal publications co-authored with Prof Watt, in which the Bial Foundation's support will be credited. Please see note below for details of publications in preparation.

2. Journal articles in preparation.

We anticipate at least two further peer-reviewed journal articles will arise from this research programme.

6.1. A report of the results of the Confirmatory test of the precognition hypothesis in this study, emphasising optimum design features and including information about the software validation exercise.

6.2 A report considering the Exploratory process-oriented questions in this project, particularly focusing on the measures of creativity and how these correlate to psi task outcome and other participant characteristics. If space allows, this article may include investigation of linguistic characteristics of participants' mentations. If space does not allow, we will present the analysis of mentation contents in a third paper.

List of publications

Journal article

Pooley, A., Murray, A., & Watt, C. (2023). Understanding the factors at play in the sender-receiver dynamic during telepathy ganzfeld: A meta-analysis. *Journal of Anomalous Experience and Cognition,* 3(1), 42-47. https://doi.org/10.31156/jaex.23878

Abstracts (conference proceedings)

Pooley, A. (2021) Interim report of the sender-receiver relationship in the ganzfeld. *Proceedings of the 44th International Annual Conference of the Society for Psychical Research,* 6-7. (online meeting, url members only)

Watt, C., Pooley, A., Rabeyron, T., Batissou, A., & Roe, C. (2021). Panel: Progressing ganzfeld ESP research. *Proceedings of SSE-PA Connections 2021: A combined meeting of the Society for Scientific Exploration and the Parapsychological Association*. (online meeting, url members only)

Other (non-peer-reviewed publication)

Pooley, A. & Watt, C. (2023). Koestler Parapsychology Unit ganzfeld research lab. *Mindfield* (Bulletin of the Parapsychological Association) 15(2), 16-20. Special issue on Parapsychology Research Labs.

Appendix 2: Koestler Parapsychology Unit Participant Information Questionnaire (with additional highlights and notes to show criteria for inclusion/exclusion from study).

Participant Information Questionnaire - Koestler Parapsychology Unit

Dear Participant,
Thank you for expressing an interest in taking part in our research.
As a first step, we would like to gather some general information about you which will help us evaluate which of our ongoing or future research projects might be suitable for you as a participant.
All of the information you give us will be kept strictly confidential. No-one except our researchers will be able to find out what responses you have given to the questions unless we have asked for and received your written permission to release that information. No contact details that you provide will be shared with any third party.
Thank you for your help with our work!
(ethics approval number here)

1. Please provide your email address …………………………………………………………
2. Please select your sex
   - ☐ Male
   - ☐ Female
   - ☐ Non-binary / third gender
   - ☐ Prefer not to say
3. Current age (in the format XX, years) ……(exclude if under 18 years) ………
4. Please state your occupation ……………………………………………………………
5. Please state your **highest completed** educational/vocational qualification [less than high school; high school graduate (e.g., GCSE/Highers); College (e.g., Highers/Advance Higher/A-levels); Undergraduate degree (e.g., BSc, MA); Postgraduate degree (e.g., MSc, Postgraduate Diploma); Doctorate (Phd); Vocational qualification (e.g., BTEC, VTQ, T-level)]
6. Do you live within easy travelling distance of Edinburgh?
   (if no, go straight to end of PIQ, excluded)
   - ☐ No
   - ☐ Yes
7. Have you ever participated in any formal laboratory parapsychology studies?
   - ☐ No
   - ☐ Yes
8. If yes, please state the location, dates, and provide a brief description of the research:

   ………………………………………………………………………………….

The following two questions concern your artistic/creative activities and abilities. Creativity can be expressed in many different domains including: literature, music, arts-and-crafts, creative cooking, sports, visual arts (graphics, painting, sculpting, architecture), performing arts (theatre, dance, film), and science and engineering.

9. Do you engage in any artistic/creative activities?
   - ☐ Yes
   - ☐ No

10. How would you rate yourself for level of creative/artistic ability?

    (5-point scale, 1 = Low, 5 = High) …Include if rating 3, 4 or 5….
11. Have you ever practised any form of mental discipline/exercise/self-improvement program e.g. meditation, transcendental meditation, yoga, tai chi, aikido, psychotherapy, biofeedback, hypnosis, relaxation exercises?
    - ☐ Yes
    - ☐ No
12. If yes, please state which practice/discipline/exercise ………………………………………………………
13. If yes, how often do you practice? …Include if selecting Weekly or more…
    - ☐ Daily (5)
    - ☐ Several times a week (4)
    - ☐ Weekly (3)
    - ☐ Several times a month (2)
    - ☐ Monthly or less (1)

14. How often do you **lose awareness of your surroundings** when you are engaged in an activity?

    (5-point scale, 1 = Never, 5 = Always)
15. How often do you **lose all sense of time** when you are engaged in an activity?

    (5-point scale, 1 = Never, 5 = Always)
16. Occasionally, our research might require us to have some information about various medical conditions. Please tick to report your experience of the following conditions:

	Never	5 years or more	1-5 years ago	Currently
Epilepsy				
Headaches				
Heart trouble				
Mental Health Disorder				Exclude
Hearing loss				
Poor vision				
Colour-blindness				
High blood pressure				

SECTION 2

Please use the following definitions for answering the next 17 questions:

Psi: This is a 'blanket' term used to refer to all paranormal processes and causation and commonly divided into two categories:

1. Extrasensory Perception (ESP): Reception of information without the use of known senses or logical inference.

ESP is, for convenience, divided into three categories:

- *Telepathy: ESP of the thoughts, feelings or behaviour of another person or organism.*
- *Clairvoyance: ESP of distant physical events or concealed objects.*
- *Precognition: ESP of the future.*

2. Psychokinesis (PK): Mental influence on the physical world.

17. What best describes **your own** psi ability? (Please tick one box)

    (5-point scale, 1 = I have no psi ability, 5 = I have high psi ability)
18. Have you ever had an **experience** which you think may have involved psi?
    - ☐ Yes
    - ☐ No
19. Is the existence of ESP...? (Please tick one box)

    (5-point scale, 1 = Impossible, 5 = Certain) (Include if 3, 4 or 5)
20. Have you ever **had** an experience which is best explained by **telepathy**?
    - ☐ Constantly
    - ☐ Frequently
    - ☐ Occasionally
    - ☐ Rarely
    - ☐ Never
21. Have you ever **heard or read** of an experience which is best explained by **telepathy**?
    - ☐ Constantly
    - ☐ Frequently
    - ☐ Occasionally
    - ☐ Rarely
    - ☐ Never
22. Have you ever **had** an experience which is best explained by **clairvoyance**?
    - ☐ Constantly
    - ☐ Frequently
    - ☐ Occasionally
    - ☐ Rarely
    - ☐ Never
23. Have you ever **heard or read** of an experience which is best explained by **clairvoyance**?
    - ☐ Constantly
    - ☐ Frequently
    - ☐ Occasionally
    - ☐ Rarely
    - ☐ Never
24. Have you ever **had** an experience which is best explained by **precognition**?
    - ☐ Constantly
    - ☐ Frequently
    - ☐ Occasionally
    - ☐ Rarely
    - ☐ Never
25. Have you ever **heard or read** of an experience which is best explained by **precognition**?
    - ☐ Constantly
    - ☐ Frequently
    - ☐ Occasionally
    - ☐ Rarely
    - ☐ Never
26. Is the existence of psychokinesis…?

(5-point scale, 1 = Impossible, 5 = Certain) (Include if 3, 4 or 5)

27. Have you ever **had** an experience which is best explained by **psychokinesis**?
    - ☐ Constantly
    - ☐ Frequently
    - ☐ Occasionally
    - ☐ Rarely
    - ☐ Never
28. Have you ever **heard or read** of an experience which is best explained by **psychokinesis**?
    - ☐ Constantly
    - ☐ Frequently
    - ☐ Occasionally
    - ☐ Rarely
    - ☐ Never
29. Do you believe that you might be able to demonstrate any psi ability in a controlled laboratory experiment?
    (5-point scale, 1 = Not at all, 5 = Certain)
30. If you would like to describe any experiences you have had that possibly involved psi, please do so in the space provided: ………………………………………………………………………………………………………..

Notes on study inclusion criteria

Included if participant reports creativity PLUS ONE (or more) of the other criteria (practice of a mental discipline, prior psi experience, psi belief), defined below:
Creativity = Yes to Q9 + 3, 4 or 5 rating on Q10
1. Practice of a mental discipline = 3, 4 or 5 on Q13 (at least weekly practice)
2. Prior psi experience = Yes to Q18
3. Psi belief = 3, 4 or 5 rating to Q19 (ESP belief) OR 3, 4 or 5 rating to Q26 (PK belief)

Appendix 3: Measures to protect the security of the ganzfeld precognition task data

1. Restricted access to the ganzfeld lab. Access to the corridor in which the ganzfeld lab was located was controlled by electronic ID cards which needed to be pre-authorised for access. Entry to the ganzfeld room itself was controlled by a code entered on a keypad.

2. There were multiple experimenters (one per session, up to 20 trials per experimenter), thus the study's integrity was less vulnerable to a single 'rogue' or careless experimenter. Mentations were audio-recorded for later transcription and verifying that the recording matched the other records of session details.

3. Before Wave 1 Formal testing began, CW and AP conducted 24 Informal ganzfeld sessions in order to validate the ganzfeld software. We kept manual records of the session information in the study logbook (date & time, participant ID, experimenter ID, session type (Informal or Formal), target pool and order in which targets played, ratings given to targets, final designated target and session hit or miss outcome). We then checked that this matched the information recorded in the session data files; no discrepancies were found. 6 ‘hits’ were obtained during these sessions, consistent with the expected chance hit-rate of 25%. As planned, data from Informal sessions were not included in the analysis.

4. During the session, the computer data was automatically date and time-stamped and kept in duplicate, both locally on the lab PC, and uploaded to a remote University of Edinburgh server. The timestamp was added by the server and so could not be faked by the experimenter. The IP address of the incoming message was also recorded, so messages sent from anywhere other than the experiment PC would be detected. The experimenters and lead researcher did not have access to the remote server because only the programmer had the password to the server. The programmer was a member of the IT support staff for the School of Philosophy, Psychology and Language Sciences, and had no affiliation to the KPU or vested interest in a particular study outcome.

5. There were three data uploads. The first occurred at the start of the session (recording experimenter ID, participant ID and demographics, and whether the session was classified as formal or informal). The second occurred when the participant's target ratings had been completed and submitted, before the target identity was randomly selected. The third occurred after the target was selected and before the experimenter or participant had seen the target identity. All Informal and Formal sessions were logged.

6. To facilitate further cross-checking, experimenters kept a manual logbook. The logbook was glue bound at the spine and pages were hand-numbered in advance by CW, so a missing page could be detected. Details were recorded of every session that was conducted (both Informal and Formal), including date and time of session, participant ID, order of target presentation and target pool identity, submitted ratings, session result (target identity and whether session was a hit or miss), and whether anything unexpected happened during the session, such as the session being prematurely ended due to the participant feeling uncomfortable. This was later cross-

checked by the experimenters and also by CW, to ensure consistency with automated session records. No discrepancies were found.

7. To prevent the risk of leakage of target information before the target judging was completed, a precognition design was used. Therefore the judging was completed, recorded in duplicate, and uploaded before the computer randomly selected the target. The screens that divided off the ganzfeld section of the room from the reception section prevented a line of sight from the corridor outside the laboratory, through the glazed section of the lab door, to the computer monitor used during the session (this feature would be helpful for a study using a telepathy design but is less relevant for a precognition study.)

8. To prevent bias or patterning in the target selection, a commercially available RNG (TrueRNG3) was used to randomly select the target pool, the order of presentation of the target clips during judging, and the target. The study RNG was tested at the start of each wave of the study to make sure there was no bias in the relative frequency of target pool selection (1/50), of target clip selection (1, 2, 3, or 4), and of target selection (1/200). These tests found that the RNG was not deviating from chance expectation.

9. After conclusion of the data collection, the programmer independently verified the number of direct hits by checking the duplicate data held on the remote server, unaware of the number of hits the experimenters had recorded on the computer running the experiment. No discrepancies were found.

10. After study results were known, a further extensive software validation exercise was undertaken in an attempt to rule out the possibility of subtle bias in the software that might not have been detected in the initial validation sessions. Further information is reported in the Discussion section and Appendix 4.

Appendix 4: Independent software validation exercise

We confirmed the reliability of our study software using software validation. We puppeteered (remote controlled, using a python script) the computer on which the experiment was running, to run a large number of 'fake' participants. We then compared those 'fake' outcomes to chance, to reveal whether there were any biases inherent in the study software itself. The script used Python's pyautogui library (https://github.com/asweigart/pyautogui) to simulate participants' actions: control the mouse and keyboard, wait when appropriate. It also provided the study software with random guesses (using python's *random.shuffle()*), wherever the participant was expected to make decisions.

The script also opened, closed and restarted the study, and was run over the period of 4 weeks without experimenter's supervision.

The validation process aimed to validate if a) the experiment software's random selection mechanism (TrueRNG3) was functioning correctly i.e. picking all each of 4 options equally often (25% chance); b) that when video ratings were distributed at random, the frequency of matching the highest-rated video to the TrueRNG3 randomly selected one also aligned with expected probabilities (25% chance).

In the full length study, a match occurred 59 times out of 280 times the simulation was run (21.07%). In those simulations, each of 4 videos was 'picked as favourite' by the puppeteering software 73, 83, 56 and 68 times (26.07%, 29.64%, 20.00% and 24.29%), while being selected by research software 66, 77, 66 and 71 times (23.57%, 27.50%, 23.57%, 25.36%).

In the shortened version of the study, a match occurred 1364 times out of 5549 times the simulation was run (24.48%). In those simulations, each of 4 videos was 'picked as favourite' by the puppeteering software 1351, 1447, 1347 and 1404 times (24.35%, 26.08%, 24.27% and 25.30%), while being selected by research software 1399, 1394, 1385 and 1371
times (25.21%, 25.12%, 24.96% and 24.71%). Larger number of runs resulted in the random numbers being closer to the expected 1/4 chance (25%).

The validation revealed no bugs or discrepancies, confirming that the experiment software performed as expected under both human and script-controlled conditions. The script-based validation showed that the software's randomisation and selection processes operated correctly even without human observation, enhancing the credibility of our study's outcomes. This thorough validation process reinforced our confidence in the software's reliability and the integrity of the collected data. All scripts used to perform this software validation can be found on

All scripts used to run the software validation of this study can be found on https://github.com/codestorytelling/software-validation-precognition-24

Appendix 5: Output - Conference presentations and published Abstracts

PANEL: PROGRESSING GANZFELD ESP RESEARCH

Caroline Watt[1], Abby Pooley[1], Thomas Rabeyron[1],[2], Alexandre Batissou[2], & Chris Roe[3]

[1]Koestler Parapsychology Unit, University of Edinburgh
[2]Laboratoire InterPsy, University of Lorraine, France
[3]Centre for Psychology and Social Sciences, University of Northampton

Introduction: There have been numerous claims of replicable evidence of psi in the ganzfeld (e.g., Bem & Honorton, 1994; Storm, Tressoldi & Di Risio, 2010; Storm & Tressoldi, 2020). However, these claims have been challenged on the grounds of the possible presence of questionable research practices (Bierman, Spottiswoode & Bijl, 2016) and sub-par methodology (Wagenmakers, Wetzels, Borsboom, & van der Maas, 2011), an issue which also greatly affects the discipline of psychology. In recent years, some parapsychologists have turned from the ganzfeld towards laboratory methods involving unconscious measures of psi that are modelled on methods that are more familiar to researchers in mainstream psychology, such as Bem's 'feeling the future' studies (Bem, 2011).

However, other researchers (e.g., Watt et al., 2020; Roe et al., 2020) have argued that it is premature to move away from the use of a method that has such a long track record in parapsychology. Furthermore, meta-analyses have identified internal patterns (such as higher scoring with studies employing selected participants) that could be used by researchers when designing their studies, to help improve the likelihood of obtaining above-chance scoring (Cardeña, 2020; Storm, Tressoldi & Di Risio, 2010; Storm & Tressoldi, 2020). This would, in turn, facilitate more process-oriented research.

In this panel, researchers who have conducted ganzfeld studies will each give a presentation on their work to set the context for a discussion with each other and with the audience on how to progress ganzfeld ESP research.

Professor Caroline Watt (also moderator): Introduction, the value of ganzfeld ESP research.

Abby Pooley: Towards a 'golden standard' experiment for assessing claims of telepathy in the ganzfeld (data collection delayed due to covid): including statistical improvements and other evidence-based methodological recommendations, particularly concerning the sender-receiver relationship.

Professor Thomas Rabeyron and Alexandre Batissou: Innovation in the ganzfeld – introducing research currently underway using photic stimulation instead of homogenous red light.

Professor Chris Roe: A brief retrospective of ganzfeld ESP studies at University of Northampton, outline of plans for future ganzfeld research at Northampton (data collection delayed due to covid), and introducing latest work in collaboration with Glenn Hitchmann and Adam Rock on individual differences in ganzfeld studies that may have a bearing on the question of participant selection.

Acknowledgements: Caroline Watt and Abby Pooley are grateful to the Bial Foundation for their support with Grant No.190/18. Thomas Rabeyron and Alexandre Batissou are grateful to the Perrott-Warrick Fund for their support. Chris Roe is grateful to the Bial Foundation, Perrott-Warrick Fund, Society for Psychical Research Research Grants Committee and the Parapsychological Association Research Endowment (PARE) Fund, for their support.

Book of Abstracts (extract)
44th International Annual Conference of the Society for Psychical Research

On-Line via Zoom - 18th and 19th September 2021

Abstracts of Presented Papers

Interim Report of the Sender-Receiver Relationship in the GanzfeLd
Abby L. Pooley, KoestLer Parapsychology Unit, University of Edinburgh

There have been numerous claims of replicable evidence of psi in the ganzfeLd, especially with selected participants (Storm, TressoLdi & Di Risio, 2010; Storm & TressoLdi, 2020) and that [t] standard' protocols have the greatest impact on a ganzfeLd study (Storm, TressoLdi & Di Risio, 2010; Baptista, Derakhshani & TressoLdi, 2014). Selected participants are often identified as those who've had a previous psi experience, belief in psi/paranormal, artistic/creative, participated in psi research, and practice of a mental discipline (e.g. meditation, yoga; Baptista, Derakhshani & TressoLdi, 20141; Storm, TressoLdi & Di Risio, 2014). To assess which [t] standard' protocols may have the greatest impact on a telepathy ganzfeLd study, the author has analysed telepathy ganzfeLd studies from 1985 (post Joint Communiqué to the present day) to see which are the most useful to implement when performing a telepathy ganzfeLd. This date range was decided due to Honorton and Hyman's (1985) detailed List of recommendations for future ganzfeLd studies in the Joint Communiqué, which suggested studies before this were too Lax in their methodologies. However, the definition of what is a [t]standard ganzfeLd' procedure remains unclear and open to debate (Bem, Palmer & Broughton, 2001; Milton, 1999).

Protocols assessed by the author included if a) participants saw the sender's room before the session, b) the sender could hear the receiver, c) the sender heard the receiver during the judging period, d) sender explicitly told to be silent, and e) the experimenter assisted in the judging with the receiver. These factors were analysed to help with planning protocols for future ganzfeLd telepathy studies, as there is Little systematic information currently available about their impact. Telepathy studies post- Joint Communiqué, which used selected participants, followed [t]standard' protocols (e.g. used visual stimuli, had the participants judge, participants contributed to one session) were rated by the author (1 = factor present, O = not present).
The analysis, rationale, process and study selection procedure will be detailed, along with the reporting of findings and assessment of the result implications. Finally, a critique of previous Literature defining the [e] standard' ganzfeLd protocol will feature in the presentation.

Acknowledgements: This work was supported by the Bial Foundation (Grant number PT/FB/BL-2018-190).

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Milton, J. (1999). Should GanzfeLd Research Continue to Be Crucial in The Search for A Replicable Psi Effect? Part l. Discussion Paper and Introduction to An Electronic-Mail Discussion. Journal of Parapsychology, 63(4), 309-333.
Storm, L., TressoLdi, P. E., & Di Risio, L. (2010). Meta-analysis of free-response studies, 1992-2008:
Assessing the noise reduction model in parapsychology. Psychological Bulletin, /36(4), 471-485.
Storm, L., & TressoLdi, P. (2020, May 22). Meta-Analysis of Free-Response Studies 2009-2018: Assessing the Noise-Reduction Model Ten Years On. PsyAr

Appendix 6: Other output - invited paper for special issue of PA Bulletin (*Mindfield* - not peer-reviewed)

Koestler Parapsychology Unit ganzfeld research labs

Abby Pooley and Caroline Watt[1]

Many different parapsychological studies have been conducted at the University of Edinburgh, including tests of macro-PK claimants, PK-RNG, DMILS, and ESP. In this article we will focus on the facilities used for ganzfeld ESP studies as these represent the longest ‘thread’ of parapsychological research at Edinburgh. The first ganzfeld ESP studies at the University of Edinburgh – amongst the first in the whole of parapsychology - were conducted in the mid-1970s by PhD student Adrian Parker under the supervision of Dr John Beloff. These were followed in the mid-1980s by studies conducted by Deborah Delanoy and Julie Milton, also PhD students supervised by Beloff. Professor Robert (Bob) Morris arrived in Edinburgh late 1985 as the first Koestler Professor, and CW joined him and the Koestler Parapsychology Unit (KPU) mid-1986.

Evolving KPU ganzfeld facilities. 1985-2004. When Morris arrived, the ganzfeld lab was basically a reclining chair in a cupboard set off from a larger room that contained office space. However, the university allocated space for the new Koestler Professor to establish research facilities. Supported by some funds from other benefactors, and guided by experienced ganzfeld researcher Charles (Chuck) Honorton, Morris went on to develop a suite of flexible experimental rooms. The rooms included a comfortably decorated reception room for pre- and post-session chat, a sound-attenuated and EMF-shielded room for the ganzfeld participant, a separate experimenter room, and several metres along the corridor a sender room that had a sensor on the door that would alert the experimenter if the door was opened. The experimenter could communicate with the receiver using a microphone, and the sender could hear the receiver’s mentation through a one-way audio link. These facilities were used for several years to conduct ganzfeld studies, often for final year undergraduate dissertations under Morris's supervision (Watt, 2006). After Bob sadly died in 2004, the KPU was restructured and, to make a long story short, some of the KPU lab-space was allocated to other researchers.

2005-2019. For several years, CW conducted studies that mostly did not require specialised laboratory facilities. However, after becoming the second Koestler Professor, CW decided to re-start ganzfeld research at Edinburgh. She organised facilities to conduct a ganzfeld precognition study (so no sender room was needed). These facilities consisted of a comfortably furnished reception/greeting room located in the basement of the psychology department (where most of the psychology lab spaces are based), and a metal portacabin (hence a Faraday cage) located in a garden area to the rear of the building, in which the ganzfeld participant and experimenter would be based during the session. Care was taken to ensure that both rooms were softly lit and had a comfortable ambience including art prints and wall hangings. CW’s first study was conducted with three student experimenters – one of whom was AP - and had several features intended to be psi-conducive. The results supported the precognition hypothesis (Watt et al., 2020). Subsequently, due to a planned university building project, the garden portacabins were removed and once again the KPU had no specialist ganzfeld lab, though the reception room was unaffected. Watt was then awarded

[1] Caroline Watt is grateful to the Bial Foundation for supporting her ganzfeld ESP research with grant number 190/18

funding from the Bial Foundation (BF) for a follow-up confirmatory ganzfeld ESP study, and a new ganzfeld lab was needed!

2020-2024. While CW liaised with psychology department facilities managers to identify suitable facilities, the pandemic occurred which prevented any face-to-face testing for about 18 months. Furthermore, as psychology staff returned to on-campus activities, ventilation systems in the basement research labs were judged to be inadequate. ALL the basement lab space was closed for renovation (at the time of writing this work is nearly completed). To cut *another* long story short, finally, in November 2022, KPU was allocated a basement room in another building, and in March 2023 we completed 'wave 1' of our BF ganzfeld precognition study. The images below show the research lab space that has been configured for the first wave of the study, and soon to be used for the second wave this summer.

Figure 1 The hallway outside the lab room. The study room (1) is one room in the basement lab space, used by other social researchers at the university.

Figure 2 View of the lab room, from the door when entering the room. (1) The casual seated area where the participants sit and chat with the experimenter, sign the consent form, and go over any questions. Participants can have a snack and water, if they wish. (2) Behind the moveable partitions is the formal testing area.

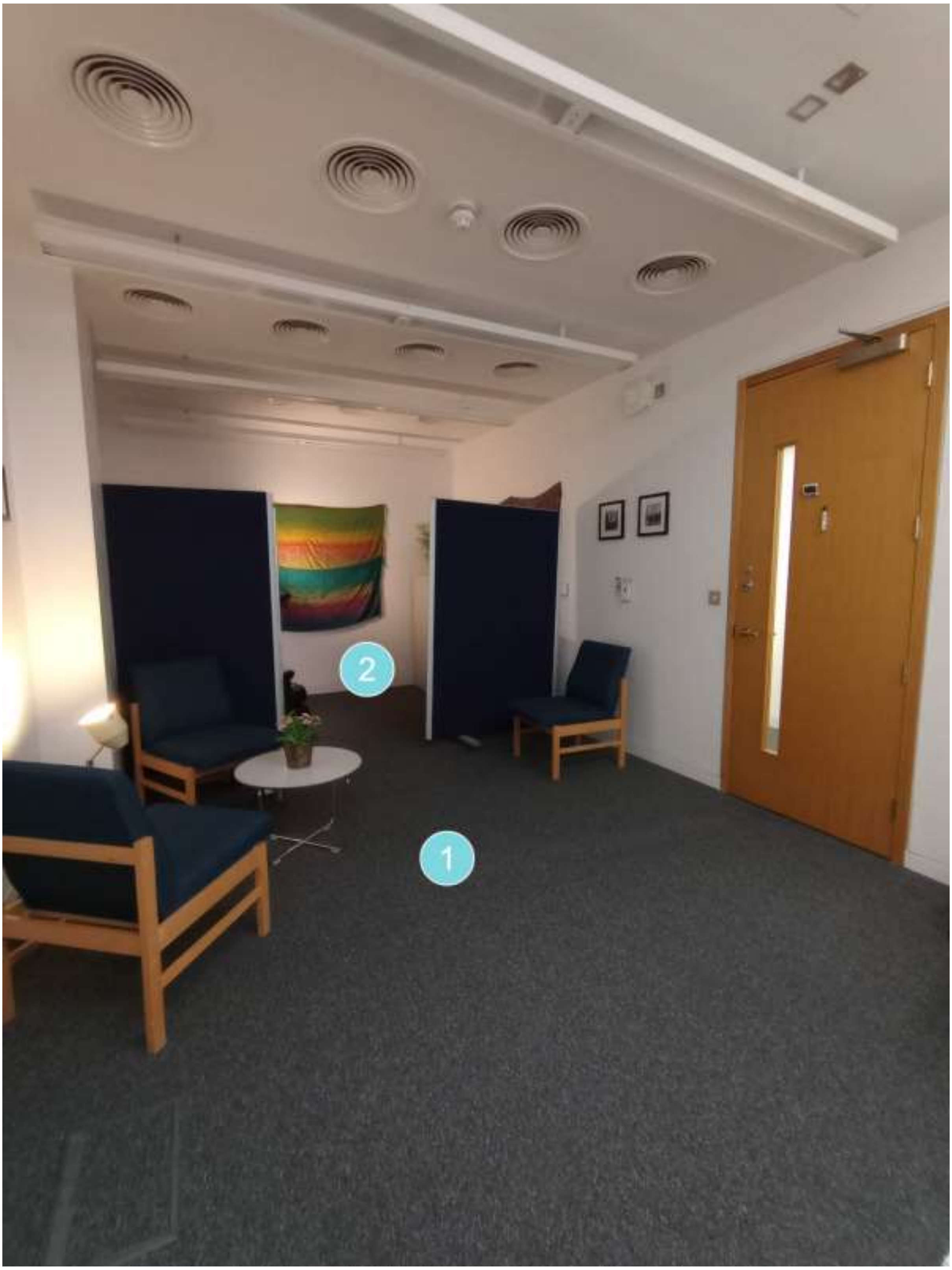

Figure 3 Alternative view showing the entrance door (only door to the lab space, off the main hallway in Figure 1). (1) The informal seating area. (2) Designates the formal testing space, behind the moveable partitions.

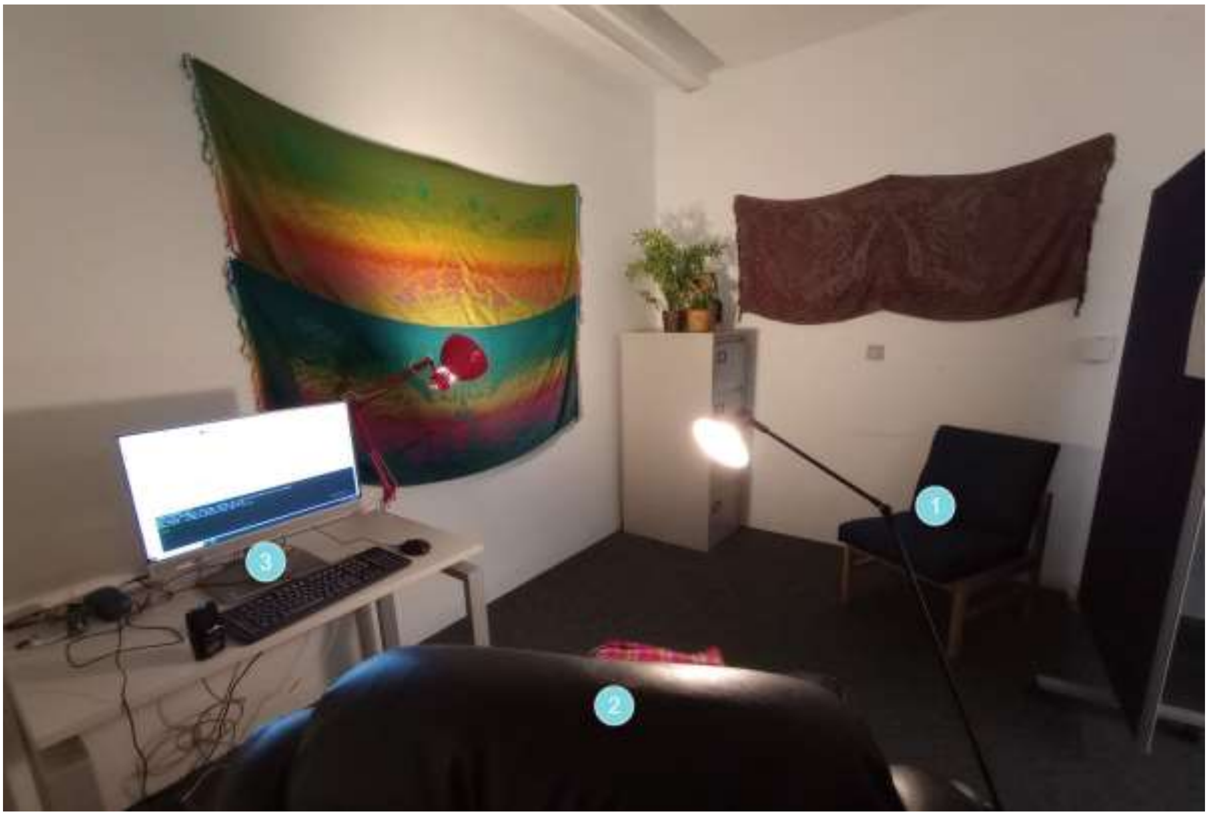

Figure 4 The formal experimental area, behind the moveable partitions. (1) The seat where the experimenter is during the ganzfeld session. The experimenter is present throughout the whole study, taking mentation notes and guiding the participant, if required. (2) The comfortable, recliner chair the participant sits in for the formal part of the study. Note the anglepoise lamp shining on the chair (adjusted for participant comfort). There is also a blanket for the participant, if they wish. (3) The experimental computer, which has the semi-automatic precognition software. The participant has control of the mouse and keyboard once the software starts. There is also the audio recorder on the table, next to the computer.

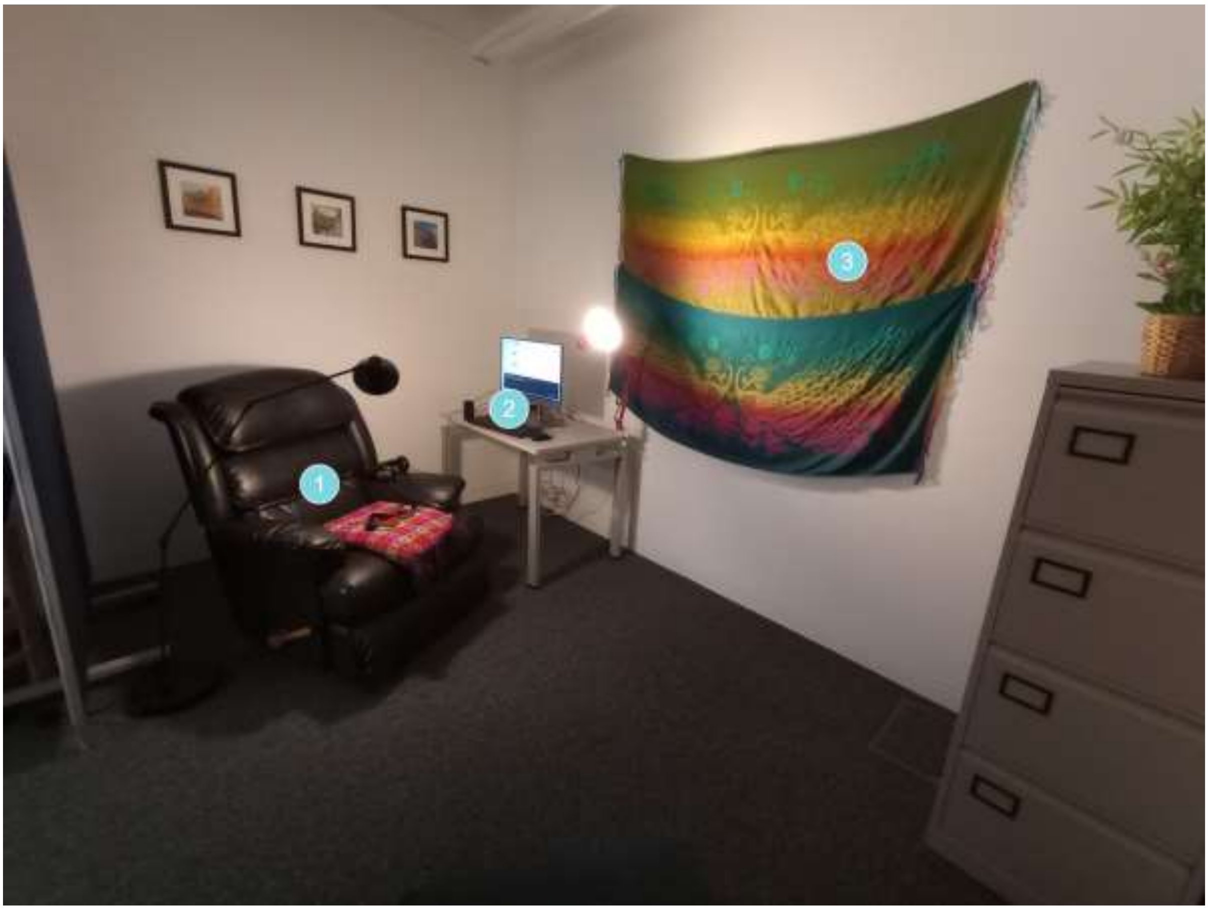

Figure 5 View from the experimenter's chair. (1) The chair where the participant sits for the formal part of the study. (2) The computer, which has the experiment software. (3) Note the décor of the room, with soft furnishing, soft lighting, wall art and fake plants to create a more comfortable environment.

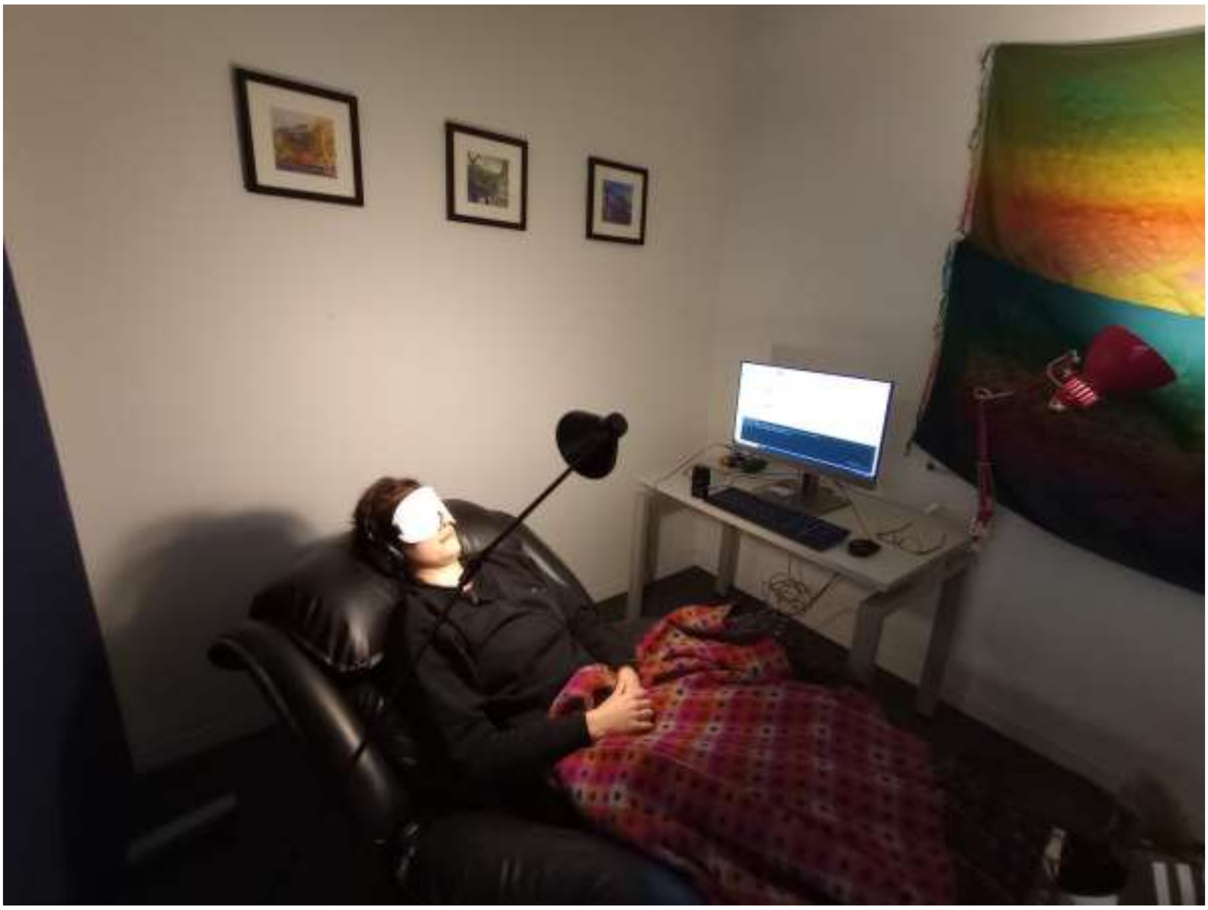

Figure 6 Demonstration of the ganzfeld in progress (note the participant wears a translucent mask tinted red on the inside, which gives a uniform red visual field and is more comfortable and practical than the traditional halved ping-pong balls. The anglepoise lamp bulb is therefore a warm white rather than a red bulb.)

Thoughts and experiences:

Caroline: Over the decades, our story shows that changing circumstances, both local and global, have led to different ganzfeld lab configurations and locations. But we have strived to maintain a warm and comfortable ambience for participants and experimenters. Of course, the physical set-up is only half the story, and in our recent ganzfeld precognition studies we have taken pains to select not only participants but also experimenters who are interested in parapsychology and neutral or positive towards the experimental hypothesis being supported. We also try to configure key moments in the experiment (such as the moment when the computer is prompted to select the precognitive target) so that the participant feels actively engaged with the session, unlike many psychology experiments where it rather seems that the participant is passively being experimented upon, and to build rapport between experimenter and participant – as Abby explains in more detail below.

Abby: I regard myself as open to psi, not a strong disbeliever nor true believer and like to think I am guided by the data. At first, I was interested in parapsychology because of its 'otherness' but soon learned how beneficial parapsychology is for wider psychology via its more rigorous methodological and statistical practices. During my undergraduate study (and subsequent doctoral research) parapsychological research at first felt like its own isolated bubble but bringing people into the lab, hearing their experiences and beliefs highlighted to me that parapsychological research is warranted and the topics of ESP, alleged paranormal experiences etc. are an integral part of the human experience.

As an experimenter the social ambience and atmosphere was strongly encouraged during my undergraduate project, unlike a standard student psychology project, which can often feel rushed and unsociable. Meeting with the participant, walk to the study space and sit-down chat prior to the formal part of the study was a core part of the study. Participants often relish the opportunity to talk to someone about their paranormal beliefs, experiences and thoughts and giving them the time to talk was not only beneficial for them but also helped build a connection with the experimenter. Although ganzfeld sessions can be long (1.5-2 hours for my undergraduate project) it allows the participant to fully understand the project, what is expected of them and engage with the task. The semi-automated ganzfeld software also allows the participant to feel in control of the session, for example they can progress to the next part at their own pace, watch the video clips to rate as many times as they like, talk to the experimenter as much as they want, review their mentation notes etc. (with the experimenter being unbiased!). Most participants felt relaxed and enjoyed the ganzfeld experience. Likewise, for myself as an experimenter, I could talk with participants about their experiences, hear their stories and support them in the study. This is something that is rare in experimental psychology studies, this social and human connection when most studies (especially undergraduate projects) focus on amassing as many responses as possible via questionnaires.

REFERENCES

Watt, C. (2006). Research assistants or budding scientists? A review of 96 undergraduate student projects at the Koestler Parapsychology Unit. *Journal of Parapsychology,* **70**, 335-355.

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Appendix 7: Tables of results

	Sex	**Mean age (range)**	**N students**
Wave 1 N=60	42F (70%) 16M (26.7%) 2 Other	34 yrs (20 - 73)	30 (50%)
Wave 2 N=120	93F (77.5%) 24M (20%) 1 Other (2 missing)	29 yrs (18 – 84)	78 (65%)
Wave 3 N=60	48F (80%) 10M (16.7%) 1 Other 1 Prefer not to say	23 yrs (18 – 42)	48 (80%)
Combined	**183F (76.3%) 50M (20.8%) 4 Other 1 Prefer not to say**	**29 yrs (18 – 84)**	**156 (65%)**

Table 1. Participant demographics

	Missing PIQ	**Did not meet criteria***	**+1**	**+2**	**+3**
Wave 1 N=60	0	0	N=13, 21.7%	N=19 31.7%	N=28 46.7%
Wave 2 N=120	N=2	N=3	N=27 22.5%	N=46 38.3%	N=42 35%
Wave 3 N=60	0	0	N=18 30%	N=30 50%	N=12 20%
COMBINED	**N=2 0.8%**	**N=3 1.25%**	**N=58 24.2%**	**N=95 39.6%**	**N=82 34.2%**

Table 2. Participants' profiles on the PIQ study inclusion criteria (creativity plus practice of a mental discipline or prior psi experience or psi belief).

Wave 1		**ASGS**	**C_Act_General**	**C_Ach_General**	**RIBS**
N=60	**Mean**	20.20	10.70	76.20	3.79
	Median	21.00	10.17	66.00	3.80
	SD	7.67	4.17	46.14	0.58
	Min	3.00	2.50	8.00	2.43
	Max	36.00	22.33	193.00	4.83

Wave 2					
N=178	**Mean**	17.52	10.61	90.42	3.58
	Median	19.00	10.17	84.00	3.63
	SD	8.43	4.79	51.44	0.61
	Min	0.00	1.50	4.00	1.78
	Max	36.00	22.17	270.00	4.78
Wave 3					
N=60	**Mean**	19.22	11.02	78.05	3.54
	Median	18.50	10.75	65.50	3.55
	SD	7.15	5.13	52.75	0.63
	Min	4.00	2.33	5.00	2.13
	Max	34.00	26.17	215.00	4.78
Combined					
N=238	**Mean**	**18.62**	**10.73**	**83.71**	**3.63**
	Median	**19.00**	**10.33**	**73.50**	**3.70**
	SD	**7.99**	**4.71**	**50.73**	**0.61**
	Min	**0.00**	**1.50**	**4.00**	**1.78**
	Max	**36.00**	**26.17**	**270.00**	**4.83**

Table 3. Descriptive statistics for the paranormal belief and creativity measures: Australian Sheep-Goat Scale (ASGS); Inventory of Creative Activities and Achievements General Creative Activity score (C_Act) and General Creative Achievement score (C-Ach); Runco Ideational Behavior Scale (RIBS).

Results

Correlation

Spearman's Correlations

Variable		ASGS	C_Act_General	C_Ach_General	RIBS	Session Z-score
1. ASGS	n	—				
	Spearman's rho	—				
	p-value	—				
2. C_Act_General	n	238	—			
	Spearman's rho	0.253 ***	—			
	p-value	< .001	—			
3. C_Ach_General	n	238	238	—		
	Spearman's rho	0.174 **	0.647 ***	—		
	p-value	0.007	< .001	—		
4. RIBS	n	238	238	238	—	
	Spearman's rho	0.287 ***	0.436 ***	0.333 ***	—	
	p-value	< .001	< .001	< .001	—	

Spearman's Correlations

Variable		ASGS	C_Act_General	C_Ach_General	RIBS	Session Z-score
5. Session Z-score	n	238	238	238	238	—
	Spearman's rho	-0.032	-0.041	-0.029	-0.048	—
	p-value	0.619	0.526	0.652	0.460	—

* p < .05, ** p < .01, *** p < .001[1]

Table 4. Results of Exploratory analyses correlating Session Z-score with Australian Sheep-Goat Scale (ASGS), Inventory of Creative Activities and Achievements sub-scales General Creative Activity (C_Act) and General Creative Achievement (C-Ach), and Runco Ideational Behavior Scale (RIBS).

[1] **Note**: All p-values in the matrix are two-tailed because the matrix includes unplanned inter-correlations between the questionnaire measures. However the pre-registered Exploratory analysis plan predicted directional (positive) correlations that would be one-tailed.

	Experimenter ID	**N Trials**	**N Hits**	**Hit-rate &**
Wave 1	100	20	5	25
	200	20	6	30
	300	20	5	25
Wave 2	400	20	6	30
	500	12	4	33
	600	20	6	30
	700	20	7	35
	800	20	8	40
	1000	15	4	27
	2000	9	3	33
	6000	1	0	0
	7000	3	1	33
Wave 3	3000	20	4	20
	4000	20	8	40
	5000	20	5	25

Table 5. Breakdown of ganzfeld psi task sessions and results, by experimenter