

Study Registration For the KPU Study Registry

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

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

The ACES Study (Anomalous Cognition with Electromagnetic Shielding)

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

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

The ACES study, Anomalous Cognition with Electromagnetic Shielding, is designed to assess the possible influence of environmental electromagnetic (EM) fields on psi performance. The experiment will use a within-subjects randomized control design to assess psi performance in four types of EM field exposure. The psi test is a card matching exercise in which two participants in separate rooms will be given a set of eight cards with photographs on them. The sending participant will arrange their images on a board and the receiving participant will attempt to duplicate that arrangement of images. The study's purpose is to identify a set of EM factors that might inhibit or enhance psi effect size and reliability for use by individuals and future scientific research into psi phenomena.

The ACES study will also explore possible correlations between psychological factors and psychic performance. Four self-report measures will be administered after screening for psi ability and prior to initiation of formal psi testing in the controlled electromagnetic conditions: 1. the Multidimensional Assessment of Interoceptive Awareness, 2. the Tellegen Absorption Scale, 3. the Revised Transliminality Scale, and 4. the Interpersonal Reactivity Index.

4. A statement or list of the specific hypothesis or hypotheses being tested, and whether each hypothesis is confirmatory or exploratory.

Pairs of participants will perform a series of psychic tests in which the receiving participant is exposed to four conditions: 1. Outside the Faraday tent, exposed to ambient EM fields (OT), and three randomly ordered conditions inside a Faraday tent that reduces exposure to ambient EM fields, 2. Tent grounded, external EM fields replicated inside the tent, effectively reversing the Faraday tent's EM field reduction and creating a blinded comparison condition (TR); 3. Tent grounded, no EM replication (TG); and 4. Tent ungrounded, no EM replication (TU). All the EM performance hypotheses are confirmatory.

EM performance hypotheses:

Primary hypothesis

1. There will be a statistically significant difference in psi performance among the four experimental conditions.

Secondary hypotheses

2. Psi performance in the OT condition will be higher than chance expectations.
3. Psi performance in the TR condition will equal performance in the OT condition.
4. Psi performance in the TG condition will be higher than in the TR condition.
5. Psi performance in the TU condition will be lower than in the TR condition.

Study participants will complete a series of four psychometric assessments prior to beginning the formal trials to determine whether correlations exist between these psychological traits and psi performance in the OT condition. All the personality correlation hypotheses are confirmatory.

Personality correlation hypotheses:

6. Scores on the Multidimensional Assessment of Interoceptive Awareness will positively correlate with psi performance.
7. Scores on the Tellegen Absorption Scale will positively correlate with psi performance.
8. Scores on the Revised Transliminality Scale will positively correlate with psi performance.
9. Scores on the IRI's Perspective Taking subscale will positively correlate with psi performance.

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

Potential participants took part in group screenings. These group screenings included semiformal testing of psi ability using the same psi test as will be used in the formal

experiments. The top performers in these group screenings will be invited to take part in the experiments until 50 people have been enrolled in the study.

Pairs of participants (see randomization in Section 9) will complete a run of four trials, one trial in each of the four conditions, then switch sender and receiver roles and complete another run of four trials. Each visit for testing with two participants will result in data on two runs.

Participants will be asked to complete three visits of two runs each. With 50 participants, this will yield an ideal dataset of 150 runs of four trials each. We expect participant attrition. Data from participants who do not complete the required three visits will not be included in the final dataset. Anyone who had partnered with a person who dropped out will be asked to perform an additional set of runs with a different, randomly selected partner from among those already-enrolled participants within their area to replace the data that was collected when they were paired with the person who dropped out. This will ensure the final dataset includes an equal number of runs from all participants.

The actual final dataset will include data from fewer than 150 runs due to attrition, but should still be more than the 100 runs needed according to the pre-study power analysis. We will report the number of participants who did not complete three runs, and compare their performance in the trials with the performance of those who did complete three runs to verify that bias did not occur from participants dropping out.

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

Data collection has not begun as of the time of submission to the registry.

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

7. Specification of all analysis decisions that could affect the confirmatory results, including: the specific statistical test for each confirmatory hypothesis, whether the test is one-sided or two-sided, the criterion for acceptable evidence, any transformations or adjustments to the data, any criteria for excluding or deleting data, and any corrections for multiple analyses. Checklists and examples for registering classical analyses, permutation and bootstrap analyses, Bayesian analyses, and classification analyses are provided in the [statistics registration document](#). (This information can be included in section 4 above for simple experiments.)

Raw data provided to the statistician for analysis will be coded to maintain blindness as to participants and trial conditions. The dependent variable for EM performance hypotheses is the number of cards placed in matching positions (hits) on the sender's and receiver's boards in each trial. The unit of analysis will be the number of hits recorded in the individual trials. With 50 participants doing 3 runs each as receivers, we will have 150 data points for each of the four conditions. The actual final data sets will contain fewer data points due to removing data collected from participants who drop out. The distributions will be highly skewed, requiring the use of non-parametric tests. Statistical significance will be set at the $p = .05$ level.

We will test the primary hypothesis, Hypothesis 1, with a Kruskal-Wallis test (non-parametric F test) to determine whether there is an overall difference between the four experimental conditions. If the Kruskal-Wallis test shows statistical significance, then we will run the following tests for Hypotheses 2 through 5.

We will test Hypothesis 2 using the Wilcoxon-Mann-Whitney test (non-parametric t -test, one-tailed). Hypothesis 3 requires a test of approximate equivalence, and thus a two-tailed test. For this, we will create two Skellam distributions by subtracting the number of hits expected by chance from the number of hits observed in the TR condition and again by subtracting the number of hits expected by chance from the number of hits observed in the OT condition. We will test the resulting distributions using a Student t -test, two-tailed.

If the test of Hypothesis 3 shows approximate equivalence, then we will test Hypotheses 4 and 5 using the Wilcoxon-Mann-Whitney test, one-tailed. If the test of Hypothesis 3 does not show approximate equivalence, then we will replace TR with OT in Hypotheses 4 and 5, still using the one-tailed Wilcoxon-Mann-Whitney. We will use a Bonferroni correction to significance levels for Hypotheses 2 through 5.

It is possible that psi performance in some or all of the four experimental conditions may be higher than chance expectations while simultaneously not differing significantly from each other. Because of this possibility, if the Kruskal-Wallis test for Hypothesis 1 does not show statistical significance at the $p = .05$ level, providing evidence against our primary hypothesis, then we will do an exploratory analysis comparing each of the four experimental conditions against chance expectations with the Wilcoxon-Mann-Whitney t -tests, one-tailed. In these exploratory tests, results with a p -value $\leq .05$ and $> .01$ will be considered "weakly suggestive of psi" and results with a p -value $\leq .01$ will be considered "strongly suggestive of psi."

The study will test the relationship between individual participant scores on the four personality scales and the mean of the each participants' three psi performance measurements in the OT condition (Hypotheses 6 through 9) by using Spearman's rank-order correlations, one-tailed, with a Bonferroni correction for multiple comparisons.

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

The power analyses for this study were done using G*Power, version 3.1.9.2. Dr. Charles Tart's 1988 experiment, which this study seeks to replicate and expand upon, reported a mean of 1.22 hits per 10-card trial in the shielded and grounded condition. Each 10-card trial was expected to produce one hit by chance using standard probabilities. With a Poisson distribution of $P = .1$, the observed hit rate yields a Cohen's d effect size of 0.22 against the null. If this effect size is repeated in the ACES study, it would require 130 trials in the TG condition to produce statistically significant results ($\alpha = .05$, one tailed) with a power of .8 ($1 - \beta$ of .2). The hit rate observed in the small pilot study comparing target images was 1.46 for a 10-card set of IAPS images, yielding an effect size of $d = 0.46$ against the null. With the same power assumptions, this effect size would require only 31 trials in the TS condition to attain statistical significance with the previously stated confidence levels. The ACES study will seek to include data from at least 100 runs, with each run comprised of four trials, one trial in each of the four conditions.

9. The methods for randomization in the experiment.

Card randomization

A research assistant will hand shuffle the sending participant's cards several times before each trial and place them in the resulting order onto the sender's board.

Participant pairing randomization

Study participants come from a wide geographical area around the San Francisco Bay. To reduce the effort required for them to participate, we will use four different testing locations. Participants will be sorted into groups according to which testing site is most convenient for them. Within the groups, participants will be pair-matched with partners for each testing visit using true randomization of their study ID numbers on the website www.random.org.

Condition randomization

Each sender/receiver dyad will perform a series of four trials, one outside the Faraday tent at the start of the session and three inside the Faraday tent, one in each condition. The tent will connect on the outside with a relay-equipped ground cable running to earth and a relay-equipped antenna cable to carry environmental EM fields to the interior. Both relay switches will be controlled by a computer program, which triggers the switches to create the several trial conditions. The program will select the inside-the-tent condition order using block randomization to ensure equal distribution of the six possible

three-condition orders. The orders will be true random sets obtained from www.random.org.

10. A detailed description of the experimental procedure.

Participants will be asked to complete the four personality assessments through secure, online administration prior to beginning the formal EM trials. The test of psychic performance will use a card matching exercise in which the sending and receiving participants are given a matched set of 8 cards and the receiver attempts to match the sender's arrangement of those cards. These cards contain 8 unique photographic images selected from the International Affective Picture System (IAPS) collection commonly used in psychological experiments.

For the formal trials, two research assistants (RAs) will coordinate in setting up the rooms, conducting the trials, collecting the data, and breaking down the equipment afterwards. After the RAs set up and test the Faraday tent and other equipment, they will activate the computerized automated procedure for selecting the order of trial conditions. Each of the two RAs will observe and coordinate activities working exclusively with either the sender or receiver. The participant acting as a sender will be in a separate room from the participant acting as a receiver, to isolate them from each other spatially and sensorially.

The sender/receiver dyad will do a run of four trials. The first trial will be with the receiver outside the Faraday tent. The receiver will then move inside the tent and sit quietly for 5 minutes while acclimating to the internal tent environment. The participant dyad will then do three more trials inside the Faraday tent, one in each of the three conditions. A computer will select the inside-the-tent condition order using block randomization to ensure equal distribution of the six possible orders.

In each trial, sender's RA will shuffle and arrange the cards on the sender's board and signal their readiness to the receiver's RA through text message. The receiving participant will be asked to arrange the cards on their board to match the card arrangement on the sender's board. When satisfied with their arrangement, they will tell the RA, who will text the sender's RA that the trial is completed. The trials will last until the receiver completes their arrangement or up to 7 minutes, whichever comes first. Participants will then record their card arrangements on a record sheet. The RAs will verify the accuracy of the record sheets and photograph the answer sheets and boards for later verification by a second RA. This process is repeated each time a participant team completes a trial until all four trials have been completed.

Each four-trial run will last approximately 30 minutes. When a run is completed, the participants will switch rooms and roles and complete a second four-trial run. Each

formal testing visit will last approximately 90 minutes from beginning to end, with one to four sessions scheduled for each day of testing.

Blinding

Neither the participants nor the researchers will see both boards or answer sheets of the sender/receiver pairs. The RAs will be instructed to not compare notes about the card positions they observe and participants will be asked to not discuss their memory of card positions after the runs. Data entry procedures. Data analysis will use a scoring algorithm to determine the number of hits in each trial. Trial, condition, and participant data will be coded to maintain statistician blindness.