

QRMS Project 4

“Due” Thursday, April 10, 2008

Accepted for Full Credit through Thursday, April 17, 2008

In this project, you will look at how to conduct a study in parapsychological research (i.e., into whether you or your classmates have psychic “psi” powers). Since the focus is on the process rather than the results (as well as other reasons), it is imperative that you be scrupulously honest in presenting your results and don’t attempt to sway them based on your preconceptions of the subject. If you have an objection to doing this for any reason, please feel free to ask me about an alternative topic. For this project, complete the studies indicated below and then answer the questions which follow in a well-organized typed essay. Unlike our previous projects, I suggest you format your paper as a series of numbered mini-essays corresponding to the questions. You may work alone or with one partner. (Some steps below need a partner, so finding a partner is recommended; however, you can use a friend outside of the class or myself during my office hours for this purpose if you wish to work alone.) Groups should submit only one paper, with the names of both group members. (And please don’t consult with outside sources, internet sites, etc., on this project. You shouldn’t need to.)

Part I: The Study

Summarize your overall data from each of the following in an appendix to your essay. Please resist the urge to just make this data up: actually doing this is a large part of the point, it won’t take you too long, and your data won’t do “what it’s supposed to” statistically speaking unless you really follow these closely. For each of the following, the basic protocol is to attempt to “guess” the suit (clubs, diamond, hearts, or spades) of a card without seeing its face. Keep track of the number of correct “guesses” out of 52 possible for each run. If you wish, you may also keep track of other interesting data such as streaks, correct color, etc. (but you don’t need to do any of this). Talk to me if obtaining a deck of cards for this purpose is a difficulty for you. I suggest reviewing Units 5A and 6D before beginning. Since you don’t know how to calculate this, you may use without justification the facts that you need to get **19 of 52** correct to have results significant at the 0.05 level and **22 of 52** correct to have results significant at the 0.01 level. If you decide to track other results as well, feel free to ask me about determining statistical significance for them.

For each of the following, run through a deck one time and record the number of correct “guesses.” Since replication of results is important, repeat each **four times** (so you have a separate count for each run through the deck). (Or, if you’re working with a partner, do two each.) Please do these in the order listed, and complete one before even reading what the next is, as we’re going to be changing the procedure a bit each time and reading ahead might influence your results. If the instructions for any step aren’t clear, ask me and I’ll clarify.

- (1) Do this experiment the first way that comes to mind. Don’t think about the best way; just the most obvious. Be sure to remember what you do, as you’ll have to write up a description of it in a later step. Try not to “cheat.”
- (2) If you’re like most people, you probably did the above by guessing what suit the card would have and then immediately turning it over to see if you were correct. (If not, do that until instructed not to.) However, this can be a source of bias, as a person keeping track of how many of each suit have come up can use this information to have a better idea of which suit is coming next. (This is similar to “counting cards,” except that that involves the number instead of the suit.) Try to keep track of this and see if you can do better than you did before using this knowledge.
- (3) If you’re like most people, you probably did the above without shuffling the deck between replications. (If you were, don’t do that any more until instructed to.) However, this can be a source of bias, as a person with a good memory can just learn the suit order. Try to do this (and combine with the above suit counting if you can) to see if you can do better than you did before using this knowledge.

- (4) One way to overcome the above problems is to not run straight through the deck. Instead, pick a card at random from the deck 52 times and “guess” what it is, replacing it in the deck afterward. This will (theoretically) stop the above sort of frequency analysis and memorization, but you’re still free to cheat if you can think of a way.
- (5) Another way to overcome the above problems is to prevent the subject being tested from knowing how they’re doing until the end. For this, have your partner (I’ll do it in office hours if you can’t find someone) hold the cards, showing you their backs one by one (or any other method you prefer) and keep track of whether your answers were correct or not *without telling you how you’re doing until the end of each run*. (And shuffle between runs.) If you find a way to cheat (reflection off of glasses or body language may work well), go ahead; your partner should, of course, be trying to prevent you from doing this.
- (6) Look over your results from the previous trials and try to think of the different ways that the results could be biased, either intentionally or unintentionally. Devise a method of performing this test that would prevent the subject from influencing the results through any of these means and run the experiment using this protocol. Be sure to remember what you do, as you’ll have to write up a description of it in a later step.

Part II: The Questions

This is the written portion of the project. Answer each of the following, preferably with a numbered mini-essay for each. Each is worth 12 points, for a total of 60 points overall. Don’t forget to include your data from Part I as an appendix.

- (1) Describe your methodologies from the first and last step. What changed between them? Which of the above steps are particularly good or particularly bad ways of running this study?
- (2) How do the steps for conducting a statistical study and other statistical techniques we’ve discussed (blinding, etc.) apply to your final methodology? Is there evidence that these techniques were necessary for you to get unbiased results?
- (3) In the above, you tried six different methodologies four times each for a total of 24 runs. By definition, statistical significance at the 0.05 level occurs by chance one time in 20. What is the probability that a person will have significant results at least once in the above? How many people in our class (of 35) would you expect to have had at least one statistically significant result? What about the same questions for at least one result statistically significant at the 0.01 level? What about the same questions for at least *two* results statistically significant at the 0.05 level? (For the “at least once” questions, see Unit 7B. For the “at least twice” question, there isn’t a formula in your book, so try to figure out a way of doing it by modifying your method for the “at least once” case.)
- (4) Considering the above, what should we think if someone gets results significant at the 0.05 or 0.01 levels (possibly multiple times) under your final methodology? What standard of evidence should we require to confirm that someone actually is exhibiting psi abilities?
- (5) Are these sort of statistical techniques a good way of testing for psychic ability?
If so: Why? How can we be sure that the subject isn’t cheating (perhaps unintentionally)?
If not: Why not? Is there a better way?
(If you’re having trouble answering this last question, you might take a look at Dr. Susan Blackmore’s “The Elusive Open Mind: Ten Years of Negative Research in Parapsychology” reprinted at <http://www.susanblackmore.co.uk/si87.html> (about 9 pages), as it offers a rather in depth look at this issue. Of course, you needn’t agree with her, or read this at all if you don’t want to.)

Have fun with this. Mathematics is supposed to be fun.