

Simon Lab (USCOTS version) ANOVA-Factorial Designs

Background: Simon is an electronic game that was popular in the 1980s in which a person is expected to repeat a sequence of buttons provided by an electronic device. Each time you successfully repeat the given sequence of buttons, the sequence gets longer. The challenge is to remember as long a sequence as possible. The on-line game Simon Game at <http://www.cs.grinnell.edu/~lortonel/Glimmer/Simon/simon.cgi> provides the opportunity to design and conduct experiments that test which factors, such as sound, color, or speed, have the largest effect on memory.



You can go to the above site and leave all the variables blank when you are simply trying out the game. However, if you want to find your score in the database of results, a specific course ID and student ID will be needed.

Assignments: Each of the following can be done in groups of 2 or 3.

DAY 1: [20-60 minutes in class, 1-3 hours outside of class]

Paper Review: Read the paper by Surprenant, "Distinctiveness and serial position effects in tonal sequences", *Perception & Psychophysics*, Vol. 63, No. 4, pp. 737-745, 2001. Focus only on the first of the three experiments in the paper.

1. If there are any words or terminology that you do not understand, look them up and provide a short definition for each.
2. For the first experiment, identify or answer the following:
 - a) Objective of the experiment
 - b) Any relevant background (from journals that were referenced)
 - c) Response variable(s)
 - d) Factors and levels that were tested
 - e) Variables that were held constant during the experiment
 - f) Nuisance factors (i.e. factors that are not of interest, but may influence the results)
 - g) Were any interactions tested, and if so, what was observed?
 - h) What type of design was used in the experiment(s)?
 - i) How many trials were run for each experiment?
 - j) How could you modify this experiment if you were going to test the same hypotheses?

Be ready to submit your answers as well as discuss this material in class.

DAY 2: [20-60 minutes in class, 1-3 hours outside of class]

Play the Simon Game and develop a Factorial Design

Use the website <http://www.cs.grinnell.edu/~lortonel/Glimmer/Simon/simon.cgi> to develop your own experiment. Which factors do you believe will have the most significant results on memory? Submit your design at the beginning of class. Note that these games allow you to test three additional factors of your own choice. Be prepared to discuss how you addressed each of the following five points:

- 1) Clearly define a problem and state the objectives of your experiment.
- 2) Identify the response variable, factors, potential levels of each factor, and units.
- 3) Identify what other factors need to be controlled during the experiment
- 4) Choose an experimental design.
- 5) Explain how your experimental design builds upon previous research.

DAY 3: [20- 60 minutes in class, 0 outside of class] Discuss designs and decide on an experiment to be tested.

- 1) Prepare any questions you would like to ask cognitive psychologists or statisticians before you finalize your experimental design.
- 2) Write specific lab procedures that you will use while conducting the experiment. Determine who will collect the data at what time, how will you randomize the trials, how will the data be recorded, and exactly what will be measured
- 3) Ensure that your group has received appropriate Institutional Review Board approval.

1-2 WEEKS: [5-10 hours in lab or outside of class] Conduct the Experiment.

- 1) Meet with your professor to discuss your experimental design and analysis.
- 2) Collect data: In conducting the experiment, did you identify any other sources of variability that could be impacting the results? Submit lab procedures.
- 3) Write research paper (See “How to Write a Scientific Paper or Poster”)

[30 minutes in class] Bring 3 copies of your research paper to class. Submit one to the professor. The other 2 will be randomly assigned to other students in your class to review. Use the “How to Write a Scientific Paper or Poster” checklist to review each other's paper and provide comments.

FINAL REVISIONS, 1 WEEK OUTSIDE OF CLASS: [1-5 hours outside of class]

Make final revisions to your research paper. Submit:

- 1) First draft,
- 2) Other students' comments and checklists,
- 3) Data set with variable descriptions, and
- 4) Final paper.