Independent Project: Developing an idea

Each student will have the opportunity to devise, design, conduct and analyze an experiment on a topic of their choice. A full write-up of the project is to be handed in at the end of the semester (see the syllabus for the deadline). It is now time to start thinking seriously about what you intend to do. As an initial step, the pre-proposal provides an opportunity for you to present an idea to your instructor. You can also meet with your instructor before or after the pre-proposal is due. Your instructor is there to help you—so let them help you!

What is an idea?

An idea could be in the form of a question about a psychological phenomenon. It should be specific enough that it would be possible to devise an experiment to study it. (So “what is the meaning of life?” would not be a good idea.) But initially you do not need to be concerned with precisely how you would devise an experiment to study it. That can come later. For now it would be good to simply identify an issue that you think you would like to investigate.

What domains of psychological inquiry are acceptable?

Your independent project can address an issue in any area of cognitive psychology, broadly defined. This includes questions about memory, reasoning, decision-making, perception, word recognition, speech perception and production, movement production and control, and many other areas. If you are uncertain about whether a topic will be acceptable—just ask your instructor.

What are the constraints on the project?

The project must be based on a true experiment. A true experiment is one in which the experimenter (you) manipulates some aspect of the setting or of the stimuli presented to the participant. Thus, a correlational study, while it can be very informative, is not a true experiment. Similarly, although much can be learned through the use of surveys, they also are not real experiments. Finally, subject variables such as gender, religion, height, etc. cannot be manipulated by the experimenter (at least not easily!), so your project cannot be based exclusively on differences in subject variables. (It is okay, however, to analyze your data by taking subject factors into account, but there must be some other experimenter-manipulated variable also.)

How can I get an idea?

If you look through Psychology textbooks from courses you have taken you may be reminded of some topic that was of interest to you. You could then look up the topic on line in PsycInfo. Another source of ideas would be recent issues of psychology journals in areas of interest to you. Some journals that have manageable papers are Psychonomic Bulletin & Review, Attention, Perception & Psychophysics, and Memory & Cognition. It is essential that your project be closely related to an experiment reported in a recent journal article. Closely linking your research question to an existing result can greatly ease the challenge of writing the introduction section of your paper. Many successful projects involve experiments that are very similar to ones in a published article, but with some interesting change designed to address a question about the earlier result. For example, in a study of memory a paper might report an experiment that reveals some general memory principle—but of course only a limited type of stimulus material is typically used. So you might wonder whether the findings would generalize to other types of memory materials. Thus, a good way to get an idea would be to identify an article on a topic of
interest to you, read the article, and think critically about potential limitations in the way the experiment was done. Can you devise an alternate way to look at the issue that should result in the same “answer” if the initial paper was correct, but that would result in a different answer if the initial experiment was somehow limited to only the specific situation and stimuli studied? If so that would be a good idea for a project! Alternatively, can you think of a better (perhaps more internally valid or more ecologically valid) way to conduct essentially the same experiment but which might produce a different pattern of results? That also could be a good basis for a project.

**Resources**

Your instructor and teaching assistant will try to help you determine how to turn your idea into a manageable experiment. You can use the lab room, the computers and the software that we have been using in class. In class you will learn how to use the program PsychoPy to create an experiment. PsychoPy is freely available and you can install and use that on your own computer. Many experiments can be conducted without any specialized equipment or computers too!

You and your instructor will determine the number of participants that should be studied. This will depend somewhat on details of the design of your experiment. Your instructor wants to ensure that you will collect enough data to obtain an answer to your research question. (If you only studied one subject it is unlikely that you would be able to reach any definitive conclusions!) Usually between 10 and 15 participants is an adequate number. Time will be available during lab sections near the end of the semester for you to collect data using your classmates as participants.
Independent Project Discussion 1: General plans

This meeting allows you to provide a general sense of your plans for your independent project. Please address the following points:

1. What is the “research question” that your experiment is designed to answer. Often there is both a broad, more general question (for example: “Does a person’s physical capabilities affect distance perception?”) and a narrower more specific question (for example: “If a person’s legs are tied together will that make the distance to the door seem greater?”) Describe both types of questions.

2. Why is it important to obtain an answer to your question? For example, perhaps the answer will help advance our understanding of an important mental process or behavior.

3. How, in broad terms, will your experiment address the specific question? (Please describe the general methods that you might use in your experiment. There is no need to describe detailed methodological information although you may do so if you have thought about it.)

4. Identify alternative possible outcomes for your experiment, and the different answers that they would provide to your research question.

5. Although this will not necessarily be needed for our discussion, it will be important for you to identify one or more published journal article(s) that serves as a key part of the background and motivation for your proposed investigation. This will allow you to write a sensible introduction to your paper!
This worksheet is designed to help you identify the important dimensions about which decisions must be made when designing an experiment for your independent project. You might find this useful when planning the details of your independent project. You should make decisions about all seven items before you begin data collection.

1. **Research question.** What is the question that the experiment is designed to answer?

2. **General methodological approach.** What type of task and stimuli will you use to attempt to answer the research question? What sort of apparatus or equipment will be needed?

3. **Independent variable.** What are the factors to be varied and the levels of each?

4. **Dependent variable.** What is to be measured and how will you measure it?

5. **Design.** Each factor to be varied must be varied either between subjects or within subjects. Which different conditions will be grouped together? How many different conditions will a single subject be exposed to? How many trials will be needed? Will the trials be grouped into separate blocks? How will the order of conditions be determined? How many subjects are needed?

6. **Data analysis.** What statistical tests would be most appropriate (parametric?, non-parametric?). Which factor levels will be important to compare in the analysis? How will an individual subject's data be "reduced" before the group analysis is conducted?

7. **Interpretation.** What possible patterns of results could occur? How will these patterns help answer the research question? Are there likely alternative, non-interesting explanations for any of the potential outcomes? (If so, is it possible to redesign the experiment to eliminate these?)
Independent project:  
Approval to use human participants

Before you can begin to collect data for your independent project, the project must be reviewed in order to determine if the welfare of your participants is being protected. This requirement is designed to protect the subjects by ensuring that your treatment of them will be fair, and follows ethical standards. This is a requirement that all researchers at all institutions must meet. For purposes of your class project, your instructor will make the decisions about your treatment of human participants.

Please use the form in the following link to request approval:

http://abrams.wustl.edu/301/humanstudieswebform.htm
Independent project:
Class presentation and final paper

Presentation

Each student will make a brief presentation on one of the last days of class (check the schedule elsewhere) in which they present a summary of the introduction and method sections of their final paper. Your presentation should be approximately 7 minutes in duration. In it you should describe the motivation for your experiment--material that would be in the introduction to your paper: What question are you seeking to answer? You should also describe key aspects of the method. At the end of your presentation, the audience should know what you plan to do in your experiment and why you are doing it.

If you also have some preliminary (or complete) results, feel free to describe those. Descriptive statistics will be sufficient if you have not yet computed inferential statistics.

Some advice about the presentation of the presentations:

• Use high contrast (the slides will be much harder to see when projected than when on a computer screen)
• Use minimal text. The audience should not have to read--they can listen to you.
• Use color and graphics thoughtfully
• Avoid fancy templates and backgrounds
• Show a demonstration to simulate the events on a trial
• Don’t face the screen, face the audience
• Explain the implications of your experiment/question for real-world issues
• Humor, comics sometimes help
• Excessive humor doesn’t help
• Use laser pointer minimally (if at all), or thoughtfully (and hold it in one spot so people can find it)
• Don’t expect projected colors to exactly match those on the computer
• Show hypothetical anticipated results, possibly using figures.

Paper

The paper should be a complete report of your independent project including title page, abstract, reference list, and the other parts that are typically in scientific papers! Use the formatting guidelines that we have been using during the semester. Unless instructed otherwise, the paper is to be submitted electronically, as a Microsoft Word document. Because the deadline is so late in the semester, it is possible that late papers will not be graded in time for grades to be reported this semester. Also, there is a penalty for late papers (see the details on the syllabus).