

# 17-396/17-696/17-960: Language Design and Prototyping, Spring 2020

## Assignment 7: Human Subjects Study Design

Assigned: Friday, February 21st  
Draft Due: Tuesday, February 25th, 3pm (beginning of class)  
Due: Thursday, February 27th, 11:59pm

### Policy

This assignment may be done alone or in pairs. Team members should state that they are collaborating and turn in the same document. People working in pairs should design two tasks for their research question (instead of one). Alternatively, pairs can design one task each for two separate research questions.

### Logistics

All clarifications (if any) to this assignment will be posted on the class discussion board on Piazza. Any revisions will be uploaded to the “assignments” page on the class web page.

### Learning Objectives of This Assignment

In this assignment, you will apply what you have learned about human subjects studies of programming language semantics to design a study to answer a research question about your programming language design.

### Part I: Rough Draft before class on Tuesday, February 25

#### Question 1, Research Questions, (15 points).

Describe several (at least 3) usability-related research questions you’d like to answer about your language. We recommend a formative question—something that helps you develop your language design or find flaws with it, rather than a summative question—something that evaluates whether a concrete part of your design is good or not. The reason is that doing a good job with a summative question in the scope possible in this class is very hard, and in any case it probably requires doing formative studies first anyway (if you find you really like this and want to do more, perhaps including a summative study, talk with the instructor about continuing on as a research project after the class is done). We recommend a question like one of the following:

- What is a natural syntax for expressing <some idea from my language>?
- What are barriers to users understanding my language syntax, and how can I reduce those barriers?
- What are barriers to users using my language syntax, and how can I reduce those barriers?

NOTE: substitute “my language syntax” etc. with some particular construct (or small set of constructs) from your language.

For each question, describe your motivation and explain how your question pertains to each of the categories in the definition of usability: “The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.” Specifically:

1. Who are the users?
2. What goal do the users have?
3. What is the main goal of the language construct you are evaluating? Is it intended to reduce bugs, make it easier to write code, read code, debug code, etc.?
4. In what context will your users be doing their work?

**Question 2**, Research Method, (5 points).

Pick one of the research questions above (students working in pairs should choose two, or do more in-depth work on one below). Select a research method discussed in class that’s appropriate to answering your question (naming which method you will use is sufficient).

**Question 3**, Study Population, (5 points).

Define your study population (i.e. who you will do the study with). If it is significantly different from your user population as defined in Question 1 (‘who are the users?’), explain why you think it is still a reasonable population to study.

**Question 4**, Task Definitions, (20 points). Define one or more short tasks for subjects to do, which will allow you to gather interesting observations relevant to your question. Groups working in pairs must write at least 2 tasks (which might be for different research questions), and more if they are very short. Produce task instructions in the form of a written document, web page, or any other form you feel is most appropriate.

**Question 5**, Training Materials, (10 points). Determine what training you will need to give to subjects in order for them to do your tasks (the answer may be “no training at all” but think about it). If training is required, write a short document that provides that training. Is it important that subjects be well trained, e.g. understand something subtle or be able to consistently do something? If so, include one or more practice tasks as part of your training.

If you need training, produce training instructions and training task descriptions in the form of a written document, web page, or any other form you feel is most appropriate.

**Important.** Make sure one of your training/task combinations can be done in about 10 minutes. It’s OK to find a subset of the training and task you really want to do to enable this, if need be.

**Question 6**, Data Gathering Plan, (10 points). Describe how your subjects will work on the task (on a worksheet? in a text editor on your computer?) and describe what data you will gather data on your subjects. Refer to one or more of the data gathering methods discussed in class.

## Part I Hand-In Instructions

You do **not** need to turn in anything for Part I. You do, however, need to be ready to pilot your task in class on Tuesday.

**Please bring necessary materials for your study to class on Tuesday, February 25th.** This might include printouts of a training document, training worksheet (if applicable), task description document, and task worksheet or your laptop (if the subject will work in an editor).

## Part II: In Class on Tuesday, February 25

**Question 7, In-Class Pilot, (10 points).** You will do a pilot of your 10-minute training and task combination with another student in class. The goal is to give you experience actually running a study and provide you with coarse feedback on the study design. We'll discuss each others' experiences towards the end of class.

If you are out of town or have a conflict with class on Tuesday, please let the instructor know to make alternative arrangements.

## Part III: Finish by 11:59pm on Thursday, February 27

**Question 8, Reflection, (10 points).**

Describe what you learned from piloting your task, about your language and/or about the study design. While it's nice if you learned about both, it's entirely possible that issues with the task design prevented you from learning much about your language. This is OK—that's why we pilot studies.

**Question 9, Revisions, (10 points).**

Revise all materials, as needed based on your experience in the pilot. Write down a brief summary of your changes. It is not necessary to include complete before/after copies of your materials, but you may do so if it's helpful in explaining what you changed.

## Part III Hand-In Instructions

Turn in a PDF with answers to all questions on Canvas. Include all study materials in your submission, either appended to the PDF or in a zip file that also includes the PDF with answers to the questions.