

Sample Assignment 2

Homework Assignment for Epistemology of Experimentation

With a partner *from a different field*, either:

- A) Design and run a pilot experiment on a problem *unfamiliar to you both*;
- B) Observe, in the role of ethnographers, scientists in a field *unfamiliar to you both*.

Write a short report (max. 700 words) about your findings and methodological observations. Due July 16th (email to Liz & Catherine, or bring to class).

A: Design and run a pilot experiment

Run an experiment. Report your methods, results, and reflections about what worked well, what challenges you faced, and what you would change if you were to run the experiment again. Attach any questionnaires or forms you used, diagrams of your apparatus, graphs of data, etc.

Experiment ideas (you're strongly encouraged to come up with your own):

- Can people see into the future? <http://dbem.ws/FeelingFuture.pdf>
- What is the relationship between life satisfaction and academic success?
- Does buttered toast always land butter side down?

Some questions to consider:

- What are appropriate control conditions for your experiment?
- How strong do your results need to be to show a real effect?
- Have you used appropriate blinding techniques to control for bias?
- Are your measurements valid indicators of what you're investigating? How can you determine their internal/external/construct validity?
- How can you rule out alternative hypotheses and check auxiliary assumptions?

B: Observe, in the role of ethnographers, scientists at work

Contact a scientist and ask to "shadow" them for a day. Observe their work in the lab/field, and their discussions in lab meetings. Report all of the activities you observe as objectively as you can. (Consult an ethnography text for ideas.) Discuss any features of their research practices that seem significant or tie into questions discussed in the course.

Some questions to consider:

- How far do practical constraints determine what kinds of experiments are done and how much data is collected?
- What is the social structure in the lab, and how does this affect the kinds of research done there? How does it affect the kind of theoretical and practical knowledge that members of the lab gain?
- How do they try to make their observations as objective as possible?
- Are questions about underdetermination addressed? How?
- What kind of measurements are taken, and how directly do they indicate the phenomenon being researched?
- Why are specific model organisms used?

Reflections on Sample Assignment 2

The learning objectives of the Homework Assignment were to apply concepts from the course to a real experimental context, and to gain understanding of what it is like to actually do science. Some students chose to shadow scientists for a day, while others chose to do a simple experiment. We had them work in pairs with a partner from a different field to encourage them to consider more than one perspective.

The assignment worked extremely well, and had both profound and occasionally hilarious results. Philosophy students who had never taken a science course visited optogenetics, and telecommunications labs, where they were blown away by the complexity of the reasoning involved in real-world experiments, and harassed the PIs with what must have seemed like strange questions about the underdetermination of their theories.

The most skeptical of the philosophy students reported in class that he was surprised to find that “it turns out the scientists know what they’re doing after all.” The reports noted that the labs had techniques in place for ensuring the objectivity of measurements, that the scientists were aware of issues of theory-ladenness, that they had reasoned justifications for their choice of model organisms, and worried about how practical decisions or random chance might affect the reliability of their results. In short, the concepts we’d discussed in class were seen in action, and made real.

In the simple experiments, pairs of philosophy majors and geneticists or MRI engineers dropped toast from their kitchen tables, and thought about the philosophical implications of their buttering techniques. One of the reports described how “at first glance we made jokes in regards to toast’s ontological value, until slowly more and more the jokes turned into conversation about legitimate challenges one might find in actually conducting this experiment.” The reports considered issues like construct validity, appropriate control conditions, auxiliary hypotheses, measurement problems, and the theory-ladenness of their observations. Some of the scientists came around to seeing that the topics discussed in class are more than just a lot of empty talk, and indeed are essential problems to consider when designing experiments.

In the end, the most skeptical of the science students conceded that philosophy could be useful in the interpretation of experimental results, although remained unconvinced about its usefulness in guiding methodology. Seeing that the students were even having these conversations was really gratifying. That several of them had their minds opened to new methods of investigation reminded me of why teaching is such an important profession.