

**HPS 1653 / PHIL 1610 – Philosophy of Science Recitation**  
**Fall Term 2005 (06/01)**

**Class:**

MW 10:00-10:50 –

**Recitation 1015:**

M 1:00 – 1:50 ()

**Recitation 1020:**

T 1:00 – 1:50 ()

**Recitation 1025:**

T 3:00 – 3:50 ()

**TA:** Benny Goldberg

**Office:** 901-H Cathedral of Learning

**E-mail:** [metabenny@yahoo.com](mailto:metabenny@yahoo.com) (*this is the best way to reach me*)

**Phone:** 412-241-6611

**Office Hours** (*also by appointment, just email me*):

W 12:00 – 1:00

H 3:30 – 4:30

**Attendance and Participation**

Attendance is required, though you get two “freebie” misses, no questions asked. Exceptions are made only for extreme circumstances (a death in the family, grave illness, etc). Participation is also required, since part of each class will involve discussions of the material. It is thus the responsibility of each student to come to class prepared and actively engage in discussion. Each of you will probably have picked up different points from the readings or have novel insights, so please share them!

A discussion is not a chat! It has a focus, a subject topic, a problem that it tries to answer. My role will be to encourage you in participating in the best way possible to the discussion. Since a discussion is about something, a fruitful discussion requires all of you to have done the reading and attended the lectures, so that everyone shares a common knowledge base. An opinion is not an argument; a good discussion is made up of theses, or opinions, which are supported by arguments. I will encourage you to explain the position you want to defend or to criticize. Because discussions articulate and discuss arguments, it will help you for the writing of your essays. Therefore, your participation in class will make the writing assignments easier.

Discussions, especially in a field such as philosophy, will raise a lot of very different opinions. My role will be to make sure that you respect each other regardless of the views that will be discussed or supported by any of you. I won't accept any insult or any dismissive comments. On the other hand, I welcome disagreements as long as you try to provide good reasons for your position. Thus, you will be an active and positive contributor to the discussion, and this is the kind of attitude I will value in the classroom.

## Requirements and Grading

*Essays (40%):* Two essays, each 4-5 pages typed (Times or Times New Roman, 12 pt font, double-spaced). Suggested topics will be posted on the website at least two weeks before each due date. Each essay will count for 20% of your final grade. I am willing and able to read over drafts of papers, and help with topics; set up an appointment or come to my office hours.

*Exams (50%):* Two exams, the second non-cumulative. Short answer/short essay/"gobbets" in format. Review sheets and sample exams will be posted on the website at least two weeks before each exam. Each exam will count for 25% of your final grade.

*Recitation Grade (10%):* Weekly written responses to the reading, at least 1 page typed but no more than 2 pages maximum (Times or Times New Roman, 12 pt font, double-spaced) to be submitted electronically as a Microsoft Word attachment and sent to Benny's email address ([metabenny@yahoo.com](mailto:metabenny@yahoo.com)) and **received by 10:00 p.m. the night before your recitation** (Sunday night for Rec. 1015, and Monday night for Recs. 1020 and 1025). You get one free skipped assignment, no questions asked.

These should be **responses** to the readings and **NOT summaries**. That is, they should respond to the reading with a question you had about it, a problem you see with the argument, a false or questionable assumption on the part of the author(s), an argument for or against some point in the article. They should **NOT** contain a restatement or summary of what the article was about. These are short assignments, so there is no need to go into great detail or feel that you have to respond to every part of the article; pick a small portion, perhaps just one argument or part of an argument, and respond to that. You can always send me an email and ask if you have a question about the appropriateness of some topic.

Below is a sample response paper to get you started (it's much too long for your responses), a response to Poincaré's *Science and Hypothesis*.

The main quote I will discuss is this:

"If geometry were an experimental science, it would not be an exact science. It would be subjected to continual revision. Nay, it would from that day forth be proved to be erroneous, for we know that no rigorously invariable solid exists. *The geometrical axioms are therefore neither synthetic a priori intuitions nor experimental facts.* They are conventions., Our choice among all possible conventions is *guided* by experimental facts; but it remains *free*, and is only limited by the necessity of avoiding every contradiction, and thus it is that postulates may remain rigorously true even when the experimental laws which have determined their adoption are only approximate. In other words, *the axioms of geometry...are only definitions in disguise...*One geometry cannot be more true than another; it can only be more convenient. Now, Euclidean geometry is, and will remain the most convenient..." (p.49-50).

## Commentary:

I'm not sure what it means to be accepted by convention. Does this mean a convention of certain qualified experts? It is interesting that, once there is complete freedom to choose a particular geometry (or construct a geometry) the law of non-contradiction forces the construction of that geometry to be a certain way in order to avoid contradiction. Can we term this freedom a gauge freedom? (A gauge freedom is when, in a formula of physics, one can change certain aspects of the math without changing the physical reality that the math represents.) I realize that geometry by convention is what Poincaré is talking about, but the analogy might be fruitful. It certainly seems similar: one chooses to represent the same geometry with a different mathematical formulation that allows one to do certain things more conveniently. We know that the geometries are the same, or at least that they are intertranslatable (or perhaps, intertransformable?) from Poincaré's comments above. Furthermore, the question of the *physical* significance of the geometry is up to experimental verification, and cannot be decided a priori on the basis of the mathematical formulation of the geometry alone. I'm not sure, however, if this is actually similar to gauge freedoms or if it is merely analogous. If it is similar, would it be the first instance of the idea of such a freedom? Additionally, one can also help make sense of gauge freedoms (but probably only in those situations where a gauge field is shown to have no physical significance) as conventions for the convenience of working physicists.

I'm not sure I agree with his analysis of the origins of space and of direction in space. While his ideas are certainly plausible, this topic is surely one which should be decided by empirical investigation and not through mere reflective analysis. Of course, the tools were not present to do this sort of analysis in Poincaré's time, but this does lessen the value of his analysis. Of course, his conclusion, that, "...representative space in its triple form—visual, tactile, and motor—differs essential from geometrical space," is, I think, completely correct (p.56). The evidence he provides to this effect, however, is where the problems lie. One would need data from cognitive psychology and psychophysics in order to really show his conclusion. Furthermore, I'm not sure I follow Poincaré's reasoning on the origins of geometry. His story is certainly believable, and likely even true—but I don't see how it has anything to do with geometry. Geometry, if I understand correctly, is an abstraction from both solid bodies on the one hand, and the two categories of movement and the corresponding idea/phenomena of displacements. I guess it's not clear to me how geometry is thus the laws of these displacements.

### **Academic Integrity**

You should be aware of the University of Pittsburgh policy on academic integrity (see <http://www.fcas.pitt.edu/academicintegrity.html>). Any form of cheating or plagiarism will be grounds for not accepting work and assigning a grade of zero on that assignment. If you have a question about whether something counts as plagiarism, please ask me.

### **Special Needs**

Please notify me in case of special needs. If necessary, you can contact Disability Resources and Services (see <http://www.drs.pitt.edu/tempconditions.html>).