

Paper Topics  
Philosophy of Logic

IMPORTANT: You may write your paper on any “philosophy of logic” topic. What follows are just some suggestions of things that I think are interesting and that we covered in class.

1. How many things are there?

We started class by asking this simple question, and it quickly seemed that maybe the answer was not so simple. One view we considered was that there are only particles, and not larger things made up of them. This is a view called “mereological nihilism,” and it is defended particularly clearly by Ted Sider in this paper: <http://tedsider.org/papers/nihilism.pdf>

The other relevant views are that all larger things made up of particles exist (the unrestricted composition principle) or a middle ground where only certain composite entities exist (restricted composition). I think that if you are interested in these issues, you should start with the Ted Sider paper I linked to. On p. 8 he lists several objections to nihilism: I think objections 1, 2, 5, and 7 could be fruitfully written about. Sections 3-5 cover objections 1 and 2; Section 7 covers Cartesian reasons to believe in the self (objection 5); and Section 11 covers nihilism vs. physics (objection 7).

You don’t need to read the whole paper, but maybe the first few sections and then the section(s) on the issue that most interests you. Then you might ask me (or use Sider’s references!) to find other papers on that topic. Here I’m thinking you would defend a claim like “Since I know I exist, and I’m not a particle, nihilism is false” or “Nihilism, although it conflicts with common sense, is the best way to understand how many things there are because...”

2. Is set theory logic?

Here, I’m thinking about the principle, “if there are some things, then there is another thing, the collection of those things.” Some, like Frege, have thought this is a logical truth. Some have thought that the best way to formalize this principle is with the naïve comprehension schema, which says, “for any definable condition C, there’s a set of all and only the objects x that have C.” In standard set theory, the naïve comprehension schema leads to a contradiction, and thus is presumably not a logical truth.

There are several views you could have about these matters. You might think that the original principle is not a principle of logic. Or you might think that it is a principle of logic, but that you can accept it while rejecting naïve comprehension. Or you might think that naïve comprehension is a principle of logic, and that any good set theory has to be a set theory wherein naïve comprehension is true (and such set theories exist). Or you might think that restricted comprehension is the correct logical principle.

3. Is structuralism true and to what domains does it extend, if so?

In Benacerraf's article, "What Numbers Could Not Be," he argues for a view called mathematical structuralism: the idea that numbers are not objects, but instead structures or roles. Any progression with the same structure as the numbers (0, 1, 2...) can play the role of the numbers. The elements of the progression are not important, the structure is.

Presumably Benacerraf would say the same thing about the integers, the real numbers, and the imaginary numbers. But mathematics deals with more than just numbers. For instance, consider integer arithmetic modulo 2 (the arithmetic of 0 and 1). It has the same structure ("Boolean lattice") as propositional logic (the logic of false and true). Are true and false just structural roles? Or consider set theory. Benacerraf seems to assume that sets, if they exist, are objects and not structures. Is there a reason to think this?

#### 4. Is logic empirical?

In class, we considered the idea that geometry is empirical and that in fact, Euclidean geometry (which Kant thought was logically necessary) is in fact false. Then we considered Hilary Putnam's view that logic is similarly empirical and his further view that classical logic is in fact false. If you want to write on this topic, you should read Putnam's "The Logic of Quantum Mechanics" (also published under the title "Is Logic Empirical?"—same article), which I've made available on the course website under the heading, "Which Logic is Right?"

A good paper would explain Putnam's view, and then take a stance. There's lots of things you could believe: No, logic is not empirical, and there are ways of understanding the physics that doesn't require nonclassical logic (this is perhaps the most common view). Or you might think that Putnam is right, or maybe that he's only partly right: that some logical truths could never be false, regardless of what the physics was like, but that other ones are empirical. Here there's a real question as to which ones are non-empirical, and why?

#### 5. Do Goedel's results show that the human mind cannot be a machine?

We covered this controversy a little bit in class. A great overview article can be found here: <http://www.iep.utm.edu/lp-argue/> This article covers two forms of the argument, one from Lucas and one from Penrose.

To write a paper on this topic does not require familiarity with Goedel's proof, but does require that you know clearly what he proved. For this I recommend section 1.1 of the SEP article: <http://plato.stanford.edu/entries/goedel-incompleteness/> (also see 6.3 and 6.4).

A good paper would take a stance on the question. It would focus on one argument that has been advanced to show that the human mind cannot be a machine based on Goedel's proof. You would consider the best objections to the stance you take on that argument, and explain why they are not compelling. Feel free to ask me for more reading on the topic (though the encyclopedia articles are very informative).

#### 6. Which theory of truth is correct?

7. What should we say about the semantic paradoxes?