

Seminar for Fall 2022: Logic and Natural Language

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Crosslisted in Philosophy (16:730:513) and Cognitive Science (16:185:602, section 02)

Wednesdays 9-12, Rutgers Philosophy Department (106 Somerset, 5th floor), Seminar Room

14 sessions: Sept 7 – Dec 14 (but no meeting on Nov. 23rd, which is a Friday at Rutgers)

There will be a Canvas site for the readings, most of which are indicated on the next page.

If you plan to attend but not register, please let me know by email, so have your address.

Course requirements, to be discussed at the first session:

—a short assignment at the end of Part One

—outline (1-2 pages) for a final project, to be discussed with me in an individual meeting

—initial draft (about 5 pages) of expository material for the final project

—the final project

—for Rutgers grad students in philosophy, the project can be +RP or –RP (RP = ResearchPaper).

Rough Plan: about 1/3 of the sessions on each of three parts, as outlined below, with extra emphasis on the bits in bold. But the group will determine how long we spend on Part One; so Part Three will get the time that is left for it. In some weeks, the seminar may start at 9:30, preceded by a “tutorial” session; and there may be optional extra sessions for Honors students.

1. Frege on Logic and the Foundations of Arithmetic

- a. Why is this thought to be important, at least for philosophers in the “analytic” tradition?
- b. Frege’s rejection of Aristotelian/medieval/Kantian conceptions of logic and logical form
- c. Frege’s conception of **propositions** (potential premises/conclusions, Gedanken, Thoughts)
- d. **his conception of analysis and his proposed analyses of axioms for arithmetic**
- e. Frege’s **deeply relational** conception of logic, quantification, and logical form
- f. questions about how ordinary sentences (e.g., of English) are related to propositions

2. Psychology, Quantification, and Quantificational Determiners

- a. the “standard semantics textbook” account of what words like ‘every’ and ‘most’ mean
- b. an associated neo-Fregean conception of sentences like ‘every dog chased most of the cats’
- c. brief tour of some “Number Sense” literature from psychology
- d. **some experiments about how words like ‘every’, ‘each’, and ‘most’ are understood**
- e. an associated **unrelational/neo-medieval** conception of quantification and logical form
- f. questions about how ordinary sentences (e.g., of English) are related to propositions

3. Steps Towards an Empirically Motivated Conception of “Natural Logic as Psychology”

- a. reminder of the (pre-Fregean) classical conceptions of logic and logical form
- b. brief tour of a few places where these conceptions were not entirely abandoned
- c. zoom in on some work by Larry Moss & Thomas Icard, and their **intriguing results about**
- d. **a spare Language of Thought that I posited in *Conjoining Meanings***
- e. suggest that this “**slightly-more-than-Aristotelian**” mental language—which doesn’t even allow for propositional negation or any nonatomic relational concepts—might suffice for understanding (even quantificational) human linguistic expressions
- f. Kant’s Revenge: where does **knowledge of *the rest of* logic and arithmetic** come from?

The material for Part One will be Frege's *Foundations of Arithmetic*, excerpts from his *Basic Laws of Arithmetic*, and his 1892 article "Function and Concept;" Ed Zalta's *Stanford Encyclopedia of Philosophy* entry on [Frege's Theorem](#); a chapter of Jeff Horty's book *Frege on Definitions*, and John MacFarlane's paper "Frege, Kant, and the Logic in Logicism". I'll get all this up on the Canvas site before the term begins. But for anyone who wants to get a head start, feel free to get going on the *Foundations of Arithmetic*, which is widely available. I won't be going through it page by page in the seminar. Instead, I'll highlighting the bits I think are most important—at least for purposes of the seminar—and relying mainly on Zalta's *SEP* essay (along with notes/slides of my own) to work through the central result that Frege proved concerning the relation of logic to arithmetic. For purposes of this seminar, Frege's successes will be more important than his famous inconsistency and failure to reduce arithmetic to logic; though we'll also talk some about the famous inconsistency and failure.

If you want a sense of the issues that will come up, apart from discussion of how arithmetic is related to logic, see this *SEP* essay (by me) on [Logical Form](#). If you want a sense of the studies that I have in mind under (2d), go [here](#). I hope to have some new data to report on by that point in the fall term; and so I'm still thinking about which papers I'll want to focus on. But the list will include the following, all of which can be found [here](#): The Meaning of *Most*; Interface Transparency and the Psychosemantics of *most*; The Mental Representation of Universal Quantifiers; and Linguistic Meanings as Cognitive Instructions. The last of these is the shortest, probably the most accessible, and probably the easiest entry point if you want some sense of the *kind* of thing we'll be reading in Part Two. I'm hoping that Tyler Knowlton, the lead author on the recent papers, will be able to join us at least once (live) in October.

For an initial sense of what I have in mind under (3b-3d), see [this nice overview](#) by Johan van Benthem, and then maybe Larry Moss' short paper "Natural Logic and Semantics." All of this will be available via the Canvas site. Likewise for the (pretty technical) Moss & Icard paper about the system in *Conjoining Meanings*; but we won't be working through the detailed proofs in their paper. By November, there will be a more accessible and historical paper to share; and my hope is that Icard will join us as a Zoom-guest for a session near the end of the semester. But depending on how things go, Part Three may end up being abbreviated and focused entirely on the issues that van Benthem discusses. (Luckily, Icard is also an expert on that stuff.)

As you might expect from the highlighted bits in the outline, part of the goal is to compare and contrast (at least) two different notions of analysis. Sometimes, proposed analyses—of words, concepts, sentences, or propositions—are offered as *normative proposals* that are connected to logic in Frege's very unpsychologistic sense, with no suggestion of "revealing" the pre-theoretic thoughts/concepts that ordinary humans have and express with ordinary sentences/words. Other times, proposed analyses are offered as *empirical hypotheses* about ordinary human cognition, drawing on various branches of cognitive science. Sometimes, it's not entirely clear if proposed analyses are offered as descriptions of ideal thinkers, or idealized descriptions of actual thinkers.

I will not be assuming that these are entirely distinct enterprises, or that there are no other notions of analysis worth thinking about. On the contrary, these will be topics of discussion and possible paper topics. But my hope is that some of the broader questions can be clarified by focusing on some specific case studies where our ignorance, regarding relevant norms and facts, has abated a little. Thinking about logic and its relation to arithmetic, while also thinking about natural human linguistic and cognitive capacities, can interesting for many reasons.