
Syllabus

Lecture Sessions: Tuesday, Thursday 10 – 11:15
Room: Integrative Learning Center N458
Course Instructor: Seth Cable (scable@linguist.umass.edu)
Course Websites: Main Course Page: http://people.umass.edu/scable/LING797M-FA19
Moodle Page: https://moodle.umass.edu/course/view.php?id=58268
  • Moodle Guest Access: “SemanticAlgebras19”

1. General Overview

The primary goals of this course are two-fold. First, this course aims to elucidate the historical, intellectual, and technical/theoretical context of some of the most important foundational works in the discipline of formal natural language semantics. Secondly, the course aims to provide students with (some of) the background necessary to comprehend and critically evaluate papers written within the ‘Montague Grammar’ tradition, particularly the classic papers found in Montague (1974) and Partee (1976).
1.1 Motivation for the Course

As the field of formal semantics has grown over the past forty years, it has become more tightly integrated into the other sub-disciplines of linguistics – especially syntax. A consequence of this integration is that much semantic research nowadays assumes a GB-style syntactic architecture, where LF tree-structures are separately generated by the syntax and then ‘input’ to a recursively defined semantic interpretation operation. In addition, in much current work, the denotations output by the interpretation operation are characterized purely via representations in a logical metalanguage, one that is implicitly understood by readers.

Although there are many merits to these developments, a negative consequence is that one can be expert in reading and evaluating current semantic research, while nevertheless finding great difficulty in comprehending the earliest and most influential works of our discipline. In addition, although the original ‘Montague Grammar’ framework is no longer widely used, much current work is nevertheless still written in an explicitly ‘model theoretic’ style akin to those early works. Finally, the research done within frameworks that are ‘directly compositional’ is best understood and contextualized as a development of the key ideas of Montague (Jacobson 2014).

For these reasons, it is important for semantics students to have the ability to read and comprehend the classic papers of Montague (1974) and Partee (1976). It is also very important to be able to ‘translate’ proposals from one research tradition into another, to allow for effective comparison and evaluation of different analyses. One could, then, view the overarching primary goal of this course as the development of these skills, alongside a deeper understanding and appreciation of the seminal works of Montague.

2. Course Requirements

2.1 Problem Sets

Due to the technical nature of the course material, it is critical that students complete regular problem sets on the material. There will be approximately seven such assignments; each will be assigned on a Thursday and due the following Thursday. Students are permitted to collaborate on problem sets, as long as each student writes up their work individually.

2.2 Take-Home Final

There will be a cumulative final exam, which will be distributed on the last day of class, Tuesday December 10th. The completed final must be submitted to me by email by the end of the day on Thursday, December 19th.

3. Structure of the Course

3.1 Models: Logic and Semantics

A fundamental concept in the work of Montague (and many others) is that of ‘interpretation with respect to a model’. While this concept is emphasized in some semantics textbooks (Chierchia &
McConnell-Ginet 2000), it is not emphasized in all introductory semantics curricula (Heim & Kratzer 1998). In addition, in many semantics textbooks, the concept is introduced somewhat by fiat, without much motivating (or clarifying) context. For this reason, our course will begin by providing some historical and conceptual context for the tools of ‘model-theoretic semantics’.

In this first section, we begin by reviewing the syntax and proof system of two fundamentally important logical languages: Propositional Logic (PL) and First Order Logic (FOL). We will then see how several key questions about these systems motivate the development of a mathematically precise characterization of what it means to be an ‘interpretation’ of these languages. We will then see how so-called ‘models’ can play this rule for FOL. Finally, we will see how, once armed with the notion of a ‘model’, we can answer those fundamentally important questions about PL and FOL. This general plot structure is outlined below:

General Plot for This Unit:

- Propositional Logic (PL): Syntax and Natural Deduction System
- First Order (Predicate) Logic (FOL): Syntax and Natural Deduction System
- The Problem and Importance of Establishing ‘Soundness’ and ‘Completeness’
- Formal Semantics of PL: Valuations
  - Sketch of how to use valuations to prove soundness and completeness
- Formal Semantics of FOL: Models
  - Sketch of how to use models to prove soundness and completeness
- Some Other Neat Results of Model Theory
- A Model Theory for Natural Language? Benefits and Obstacles

Readings and Resources (Posted on Moodle)


3.2 Algebras and Semantics

Having seen the value and importance of models in the analysis of formalized languages, we will now begin to unpack Montague’s general program for applying these tools to the analysis of natural language. The central work laying out this program is Montague’s paper “Universal Grammar” (“UG”) The concepts and tools put forth in this paper are crucial for a proper understanding of the systems broadly referred to as ‘Montague Grammar’ (MG). In a sense, the system put forth in “UG” is what lies ‘under the hood’ of all subsequent papers in the MG tradition. For this reason, a large portion of the course will be devoted to an in-depth presentation of the UG system.
Of central importance to the system in “UG” is the notion of an (abstract) algebra. This is because the UG system – and thus Montague’s general program for natural language analysis – is based upon the following core insight: interpreting a language with respect to a model can itself be mathematically modeled as a kind of mapping between (so-called) ‘algebras’, namely a ‘homomorphism’. Consequently, we will begin this portion of the course with a basic introduction to the concepts of an ‘algebra’ and a ‘homomorphism’. We’ll then see right away that a ‘valuation’ of PL is essentially a homomorphism from a kind of ‘syntactic algebra’ (forming the sentences of PL) to a ‘semantic algebra’ (consisting of operations over truth-values). We’ll then further develop this notion of ‘interpretation as homomorphism’ so that it can apply to FOL (without quantification).

General Plot for This Unit:

- Introduction to Algebras and Morphisms.
- PL as an Algebra, Valuations as Morphisms
- Algebraic Syntax/semantics of FOL (without quantification)

Readings and Resources (Posted on Moodle)


3.3 Translation and ‘Indirect’ Interpretation

Another crucial component of the “UG” system is Montague’s formal theory of (syntactic) translation from one language to another. Under this theory, translation can – under certain, very special conditions – be mathematically modeled as a homomorphism between the ‘syntactic algebras’ of two languages. We’ll see that this ‘homomorphic’ conception of translation has a very crucial consequence: if a language L can be (homomorphically) translated into another language L’, which has a defined (model-theoretic) semantics, then you’ve also thereby provided L with a defined (model-theoretic) semantics. We will discuss the central importance of this consequence for the general program of formal semantics.

General Plot for This Unit:

- Montague’s Theory of Translation and ‘Indirect’ Interpretation
- Indirect Interpretation of English (without quantification)
- Algebraic Syntax and Semantics of FOL (with quantification)
- Indirect Interpretation of Quantification in English
Readings and Resources (Posted on Moodle)


3.4 From “UG” to “PTQ”

Once we’ve reached this point, we’ll actually have developed a rather significant, purely ‘extensional’ fragment of English in Montague’s “UG” framework. However, many of the key empirical results of Montague’s work stem from his analyses of intensional contexts and constructions. Unfortunately, though, it is rather difficult, complex, and awkward to present those intensional analyses within the algebraic formalisms of “UG”. Partly for this reason, Montague’s most widely read work – “The Proper Treatment of Quantification in Ordinary English” (“PTQ”) – is couched within a relatively simplified, non-algebraic presentation of his overall theory. As Montague himself is careful to note in “PTQ”, the formal/technical changes found there are merely intended to aid the exposition of the overall theory. There remains ‘underneath the hood’ of the “PTQ” system the full complex algebraic treatment found in “UG”.

We will therefore begin this unit by ‘converting’ the “UG”-based algebraic (extensional) semantics that we’ve developed so far into a non-algebraic format akin to that found in PTQ. Once we’ve seen how, in principle, the architecture of the PTQ-system relates to that of the UG-system, we will build up some of the most important portions of the PTQ system. This will, of course, include an introduction to the syntax and semantics of Montague’s own specially designed intensional logical language. With all the pieces in place, we will review some of the key analytic results that generated such excitement over PTQ and the broader MG framework.

General Plot for This Unit:

- Converting our “UG” extensional semantics into a “PTQ” format
- Key portions of the English syntactic fragment in PTQ
- Montague’s Intensional Logic (IL): Syntax and Semantics
- Key portions of Montague’s translation system from English to IL
- Some important results and analyses of the PTQ system

Readings and Resources (Posted on Moodle)


3.5 Some Additional Important Early Works in Semantics

At this point, we will have seen in some depth how the system of “PTQ” is structured and how that system relates to the algebraic framework developed in “UG”. Consequently, we’ll have enough under our belts to properly understand and appreciate some of the later works by other researchers that directly build upon those two highly seminal papers of Montague’s.

In this final section of the class, we will explore in depth one of two of these important early works. Which works we read will be determined by the students, but the options include any of those listed below.

Potential Readings (Posted on Moodle)


Partee, Barbara and Mats Rooth. 1983. “Generalized Conjunction and Type Ambiguity.” In Baeuerle, Rainer, Christoph Schwarze, and Arnim von Stechow (eds), Meaning, Use and Interpretation of Language. Berlin: De Gruyter.


General Piece of Advice: MEET WITH ME!

At any point in the semester, please meet with me regarding any issues at all, particularly if you are having any kind of difficulties with the course. I am also very happy to discuss anything at all, especially any interesting puzzles you happen to note along the way.

4. Various Dates of Interest and Importance

- Monday 9/16: Last day to drop class without any record
- Tuesday 10/15: NO CLASS (Monday schedule)
- Tuesday 10/22: NO CLASS (Travelling)
- Tuesday 10/29: Last day to drop with a W (Undergrad) or DR (CPE and Graduate)
- Tuesday 11/26 NO CLASS (Thanksgiving Break)
- Thursday 11/28 NO CLASS (Thanksgiving Break)
- Tuesday 12/10 Last lecture; Take-Home Final Exam Distributed
- Thursday 12/19 Final Exam Due
- Thursday 1/2 Final Grades Submitted