Course: LIN 443/543 Semantics II
Term: Spring 2007
Instructor: Jürgen Bohnemeyer
Text: Cann 1993 plus additional readings

Overview: This course provides a first introduction to the linguistic study of sentence and utterance meaning. It is designed to be complementary to LIN438/538 *Semantics*, which focuses on lexical meaning. While there is arguably no clear "logical" order among the two courses, and you are in fact free to take them in any order you like, students commonly prefer to start with 438/538, perhaps among other things because it is the less technical of the two. Also, because compositional semantics presupposes a solid grounding in syntactic theory and analysis, 443/543 has more entry requirements than 438/538 (see below).

Requirements: Students must complete LIN415/515 Syntax I before taking LIN443/543.[1] LIN434/534 Syntax II is recommended as well, but not required.

Goals: At the center of LIN443/543 lies the predominant approach to compositional semantics (the study of sentence meaning) in contemporary linguistics and philosophy: *formal semantics*, developed by philosophers of language such as Max Cresswell, Donald Davidson, David Lewis, Richard Montague, and Robert Salnaker in the 1960s and 70s based on the groundwork laid by the logicians Gottlob Frege (1848-1925) and Alfred Tarski (1902-1983). Formal semantics seeks to capture the contribution that the constituents of a sentence make to its meaning in terms of *truth conditions*. Formal semantics is often equated with *truth-conditional*, *referential*, or *denotational* semantics,[2] as opposed to *representational*, *conceptual*, or *cognitive semantics*, which views meaning as a mapping between linguistic utterances and some internal cognitive representations they invoke.[3] We will discuss the philosophical controversy over the understanding of the notion of "truth conditions" and their role in semantics. Truth conditions are characterized in a formal metalanguage. The formal language most widely used in linguistics is (mostly, first-order) *predicate calculus*. But translations into a formal language do not explicate the meaning of English sentences any better than translations into, say, Mongolian, until the semantics of the formal language is defined. Formal semanticists describe meaning in terms of truth conditions; but the meaning of a sentence is

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[1] Technically, it's *LIN415/515 or by permission of the instructor*. However I won't give that permission unless you have taken 415/515 or an equivalent introduction to syntax.

[2] In his series of seminal papers, *English as a formal language* (1970), *Universal grammar* (1970, often cited as *UG*), and *The proper treatment of quantification in English* (1973, often cited as *PPQ*) Richard Montague (1930-1971) provided the first comprehensive, explicit, and detailed treatment of "fragments" of natural language in formal semantics. For this reason, formal semantics was often equated with *Montague Grammar* or *Montague Semantics* in the 1970s and 80s.

[3] None of these terms are synonymous, though. For instance, a compositional semantics arguably *can* be wholly or partially representational. We'll try to clarify the relations among these concepts in class.

independent of its actual *truth* (truth is dependent on meaning, not the other way around). Semanticists evaluate the truth conditions of a sentence, as captured in formulae of predicate calculus, not with respect to (cognitive representations of) the real world, but with respect to simple mathematical (algebraic) *models*.[4] For this reason, formal semantics is also known as *model-theoretic* semantics. Thus, in principle, the semantic analysis of a sentence involves two steps: a translation into predicate calculus and a model-theoretic interpretation and evaluation.

The first part of the course (which comprises two-thirds of it – the first nine weeks) is dedicated to the conceptual and technical/mathematical basics of formal semantics. Your goal for this phase will be to learn to translate sentences of simplified versions ("fragments") of English into predicate calculus, in such a manner as to reflect certain aspects of their syntactic structure, and to evaluate the resulting predicate-calculus formulae with respect to appropriate models to see whether they meet native speaker intuitions about the truth conditions of the utterances. Towards the end of this part, we move beyond the "manual" translation of individual syntactic constructions/configurations, in search of general – as opposed to construction-specific – rules and constraints of the syntax-semantics interface. This first part of the course should also be of interest to anybody thinking of specializing in syntax (regardless of theoretical persuasion), even if they do not otherwise care a great deal about semantics – think of it as the minimum amount of appreciation for compositional semantics you need to have in order to do syntax. Plus, we'll add lambda-calculus to our technical bag of tricks, which is a useful tool not just for formal/compositional semantics, but also for lexical semantics. It's a convenient way of defining predicates in terms of the relations among their arguments. (Think, for example, semantic roles.)

The final fragment we build in Part I of the course is designed to deal with some aspects of the problem that has attracted the most attention in compositional semantics: scope ambiguities in quantification. Part II and III of the course introduce applications to other domains: temporal, aspectual, and modal operators, number marking and the mass-count distinction, telicity, and discourse semantics. Linguists of virtually all stripes and specializations can benefit from (and may sooner or later require) a working understanding of these semantic domains. And this is the one required-for-all course that offers an introduction to them.

Translations from natural languages into a formal metalanguage inevitably involve a great deal of idealization and abstraction. For example, nobody has so far been able to construct a metalanguage that can encode the bulk the meanings

[4] The goal of compositional semantics is to capture how the meaning of complex expressions depends on the interpretations of their parts. It was Frege's insight that "dependence" in this sense can be described in terms of algebraic *functions*. Thus, if the interpretation of the component expressions is characterized in terms of constants and variables, the meaning of the complex expression emerges as a mathematical function of these constants and variables. It is then up to model theory to construct a model of values that "interpret" the constants and variables and test whether the resulting interpretation of the complex expression – the function – depends on the interpretation of the component expressions in a way that matches native speakers' linguistic intuitions about the truth conditions of the expression. Model theory, a branch of mathematics, was founded by Tarski.

expressed in lexical items. This is acceptable for us in this course, since we're primarily focusing on compositional/syntactic/sentence meaning anyway. But an equally powerful idealization of formal semantics as introduced in the first Part of this course is the restriction of compositional semantics to isolated sentences. One goal of Part III is to alleviate this shortcoming, by putting in place additional tools (and some revisions) that in combination with (classical = "static") formal semantics allow us to analyze the meanings of actual real-life utterances, rather than abstract sentences. At the same time, Part III offers an introduction to two major branches of linguistic pragmatics (the study of language use, when linguists or philosophers, as opposed to anthropologists or psychologists, are doing the "studying") – Austinian pragmatics (after J. L. Austin (1911–1960)), or the study of *speech acts*, and Gricean pragmatics (after H. P. Grice (1913-1988)), or the study of *implicatures*. Speech acts – utterances viewed as goal-directed actions – are a good starting point for correcting the shortcomings of the reduction of meaning to truth conditions. Implicatures are inferences that allow hearers to make plausible assumptions about the speaker's communicative intention, given what (s)he truth-conditionally says in a given context. Austin and Grice share the vision of truth-conditional meaning as merely a pale shadow of, and in some sense a vehicle for, utterance meaning. Pragmatics has important applications in most other fields of the study of language – especially in descriptive linguistics, language processing and language acquisition research, computational linguistics, and applied linguistics.

Another fundamental aspect of utterance meaning – apart from the speaker's communicative intentions – is context-dependence. The interpretation of all natural-language utterances – there really appears to be no exception! – is heavily dependent on both the linguistic and the extra-linguistic context. Since the late 1970s, formal semanticists have been working on modified versions of the classical "Montague Semantics" capable of dealing with meaning in context. These approaches are often grouped together as "dynamic" frameworks, since they consider the semantic contribution of a sentence to an utterance dependent on the context in which the sentence occurs. We discuss in particular the most widely used among these frameworks – *Discourse Representation Theory* (DRT). DRT ascribes truth conditions, not to isolated sentences, but to mental representations that are the product of the processing of stretches of discourse and that are updated with every new clause or sentence parsed. DRT has important applications in the treatment of discourse anaphora, tense and aspect, and information perspective, some of which we will consider.

Meetings: Tu/Th 12:30-13:50 in 250 Park
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Course work:

- Day-to-day reading assignments are listed in the syllabus below.

You will N-O-T be able to follow the course and complete the homework assignments and exams if you skip the readings! *This has nothing to do with how smart you are. The brightest student in the course will flunk the homework assignments and exams without doing the preparatory readings.* This is simply a consequence of the technical nature of the material.

- Four homework assignments. Homeworks must be completed within a week. Students in 443 have a lower grade scale (i.e., require fewer points for the same grade) compared to grad students. You get one chance (a replacement, handed out at the end of the course) to make up for a missed or flunked assignment. After that, every additional missed or flunked homework counts as flunked.
- Midterm exam. Obligatory for everyone. Problems will be similar to problems in the first two homework assignments or problems discussed in class. Again, undergraduate students will require fewer points per grade.
- Final exam. Obligatory for everybody except for those who can replace it with a term paper (see below). Problems will be similar to problems in the homework assignments and the midterm exam. Again, grading will be adjusted to undergraduate vs. graduate level.
- Term paper. Graduate students, and exceptionally, with permission of the instructor, students in 443 as well, have the opportunity to submit a short term paper (5-10 pages) instead of or in addition to the final exam. The paper must present an original semantic or pragmatic analysis formulated within the theoretical frameworks introduced in the course.
- In-class participation. I grade participation as follows: Regular active participation – A; regular attendance and occasional active participation – B; regular attendance, no active participation – C; irregular attendance, no active participation: D; poor attendance, no active participation: F.
- Exercises. At the end of each lecture I will assign a few exercises which we will discuss at the beginning of the following meeting. I will not collect or grade these; you complete them for the sole benefit of your own training. However, presenting the solution to an exercise in class is one excellent way of boosting your participation grade.

Assessment:

- Homework assignments: 40% (10% per assignment)
- Midterm exam: 20%
- Final exam or term paper: 30%
- Participation: 10%

Syllabus

Part I	**The basic machinery of formal semantics**		
week	day	topics	reading[5]
1: Intro	1	The domain of semantic theory and the place of compositional/sentence meaning within it	ch.1.1
	2[6]	Formal semantics vs. other approaches to linguistic meaning; meaning and truth conditions	ch.1.2-1.4
2: Preds & args	1	The first fragment: rule-by-rule translation from English into a version of predicate calculus without quantifiers	ch.2.1
	2	A semantics for the first fragment, so far: set theory and beginnings of model theory	ch.2.2
3: Connectives	1	An extension/application of the first fragment: translating from English into propositional calculus (negation and coordination)	ch.3.1-3.3
	2	Semantics for the extension/application: model theory for propositional calculus	ch.3.4
First homework assignment out 02/01; due 02/08			
4: Type theory	1	The second fragment: from rule-by-rule translation to type-driven interpretation	ch.4.1-4.3
	2	Semantics for the second fragment: model theory for the "typed" predicate calculus (still w/o quantifiers); adverbs	ch.4.4-4.5
5: Lambda calculus I	1	A powerful extension of the second fragment: the lambda operator (poor man's version, binding variables in propositional functions only); special guest: the passive	ch.5.1-5.2.1
	2	Semantics for the extension: model theory for the lambda calculus (poor man's version)	ch.5.2.2-5.2.3
6: Lambda	1	The lambda calculus, deluxe edition (generalized for arbitrary types)	ch.5.3

[5] Unless otherwise stated, reading assignments refer to our text book, Cann 1993, *Formal semantics*. Additional readings are marked with ^ if downloadable from the library's online course reserve page for this course and with * if downloadable from the UBLearns/Blackboard system.

[6] I will be away attending a conference. Jean-Pierre Koenig has kindly agreed to teach this lecture.

	2	Retooling the syntax-semantics interface w/ lambdas: coordination revisited	ch.5.4
Second homework assignment out 02/22; due 03/01			
7: Quantification I	1	Predicate calculus: now with quantifiers	ch.6.1-6.2
	2	Translating English into typed predicate calculus with quantifiers	ch.6.3-6.4
8: Quantifi cati	1	**********!!!Mid-term exam!!!**********	
	2	Type raising (to deal with quantification outside the subject position) and scope ambiguities	ch.6.5
**********03/12 – 03/17 Spring break**********			
10: The syntax-semantics	1	Generalized quantifiers	ch.6.6
	2	Approaches to the syntax-semantics interface	^Heim & Kratzer 1998: ch.3; *Koenig in press
Third homework assignment out 03/22; due 03/29			

Part II		**The basic machinery applied and exploded: possible worlds, events, paths, and parts**	
week	day	topics	reading
11: Possible worlds &	1	Intensionality; modality as quantification over possible worlds	ch.9
	2	Word meaning, lexical decomposition, and event semantics	^Chierchia & McConnell-Ginet 2000: 431-482
12: The algebra of parts	1	Lattice theory and mereology: object parts, plurals, the mass-count distinction, measure phrases, and paths	^Krifka 1998: 197-205
	2	State change, mereology, and telicity	^Krifka 1998: 205-232

Part III	**Getting real**		
week	day	topics	reading
13-14/1: Utterance meaning	1	Non-truth-conditional meaning I: speech acts – utterances as goal-directed actions	^Levinson 1983: ch.5
	2	Non-truth-conditional meaning II: implicatures – defeasible inferences about communicative intentions	^Levinson 2000: ch.1
		Fourth homework assignment out 04/12; due 04/19	
	1	Non-truth-conditional meaning III: presuppositions – context as common ground	*Chierchia & McConnell-Ginet 2000: 349-389
14/2-15: Dynamic semantics	1	The case for dynamic semantics: "discourse anaphora" and "donkey anaphora" (cooking up trouble with the quantificational account of indefinite NPs)	^de Swart 1998: ch.6.1-6.2
	2	Dynamic semantics: truth conditions beyond the sentence level – an overview	^de Swart 1998: ch.6.3-6.4
	1	Tense and aspect in Discourse Representation Theory	^Kamp & Rohrer 1983
		**********!!!Final exam!!!********** **Place, date (during exam week!), and time t.b.a.**	

References

Cann, Ronnie. 1993. *Formal semantics: An introduction*. Cambridge: Cambridge University Press.

Chierchia, Gennaro & Sally McConnell-Ginet. ²2000. *Meaning and grammar: An introduction to semantics*. Second edition. Cambridge, MA: MIT Press.

de Swart, Henriëtte. 1998. *Introduction to natural language semantics*. Stanford, CA: CSLI.

Heim, Irene & Angelika Kratzer. 1998. *Semantics in Generative Grammar*. Malden, MA: Blackwell.

Kamp, Hans & Christian Rohrer. 1983. Tense in Texts. In Rainer Bäuerle, Christoph Schwartze & Arnim von Stechow (eds.), *Meaning, use, and interpretation of language*. Berlin: de Gruyter. 250-269.

Koenig, Jean-Pierre. In press. ??

Krifka, Manfred. 1998. The origins of telicity. In Susan Rothstein (ed.), *Events and grammar*. Dordrecht: Kluwer. 197-235.

Levinson, Stephen C. 1983. *Pragmatics*. Cambridge: Cambridge University Press.

---- 2000. *Presumptive meanings: The theory of generalized conversational implicatures*. Cambridge, MA: MIT Press.