

Type Theory with Records for Natural Language Semantics:

Lecture 1

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Outline

Interaction and Grammar

Communitarian Semantics bumps into Conversation

Basic information about the course

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Interaction and Grammar

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Interaction and Grammar

- ▶ Given the state of the art, a simple **actual** conversation such as (1), still constitutes a significant challenge to formal grammar of just about any theoretical flavour.

3 People trying to print a file (ca. 1990)

John: Okay which one do you think it is?

Try F1 F1 again and we'll get

Sarah: Shift and F1?

Sue: It's, no.

John: No, just F1 F1.

Sue: It isn't that.

John: F1.

Right, and that tells us

Sue: It's shift F7.

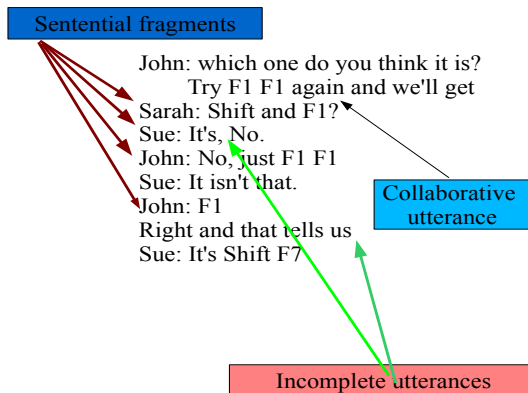
(from the British National Corpus)

3 People trying to print a file (ca. 1990)

- ▶ a rather humdrum conversation from the British National Corpus (BNC).

Fragments in conversation: frequency

- Distinguishing characteristic of spoken language—high frequency of *fragments*



Challenges to semantic/discourse theories

Self answering (cf. Speech act based analyses)

John: which one do you think it is?
Try F1 F1 again and we'll get

Partial comprehension

Sarah: Shift and F1?
Sue: It's, No.
John: No, just F1 F1
Sue: It isn't that.
John: F1
Right and that tells us
Sue: It's Shift F7

inconsistency/disagreement

multilogue

3 People trying to print a file

- ▶ We will revisit the example at the end of the course ...

Grammar and Spoken Interaction

- ▶ Accommodating the fact that spoken language involves interaction typically viewed as external to the grammar as such.
- ▶ to the extent we accept that indexicals such as 'I', 'You', 'Here', and 'Now' need to be accommodated by the grammar a similar claim can be made for the NSUs exemplified in (1):
- ▶ The meaning of words or constructions involves notions that irreducibly involve notions of interaction.

Grammar and Spoken Interaction: data from the BNC

- (1) a. Ann: Can you hear the birds singing? Listen. James: Er (pause) **yeah**. Ann: Can you hear? Bryony: I hear birds singing. Ann: You can hear the birds singing. **Yes**.
- b. Ann: Well put it on the draining board and I'll wash it and then put it back (pause) James: Right, I'll see ya tonight Ann: **Mhm, mhm** (pause) James: Tarrah Ann: mm, **bye** [conversation ends]
- c. Tim: Those pink things that af after we had our lunch. Dorothy: **Pink things?** Tim: Yeah. Er those things in that bottle. Dorothy: Oh I know what you mean. For your throat?
- d. Cherrilyn: Are you still (pause) erm (pause) going to Bristol (pause) on Monday? Fiona: Dunno. Cherrilyn: No? Fiona: I dunno. Doubt it, why? (= *Why do you ask if I'm going to Bristol?*)

Grammar and Spoken Interaction

- (2) a. A: Yes.; meaning of 'yes': p , where $p?$ is the current issue under discussion.
- b. A: Bye.; meaning of 'bye': A seeks to disengage from a conversation with B which has involved at least some discussion.
- c. A: *mmh.*; meaning of 'mmh': A acknowledges understanding of B's latest utterance.
- d. B: Did Jo leave? A: *Jo?*; intended content meaning of reprise fragment 'u?': A asks B what is the intended reference of B's (sub-utterance) u under condition of phonological segmental identity.
- e. B: Did Jo leave? A: *Why?*; meaning of metacommunicative 'Why?': A asks B of the cause of an utterance by B, an utterance the issue which it raises remains under discussion.

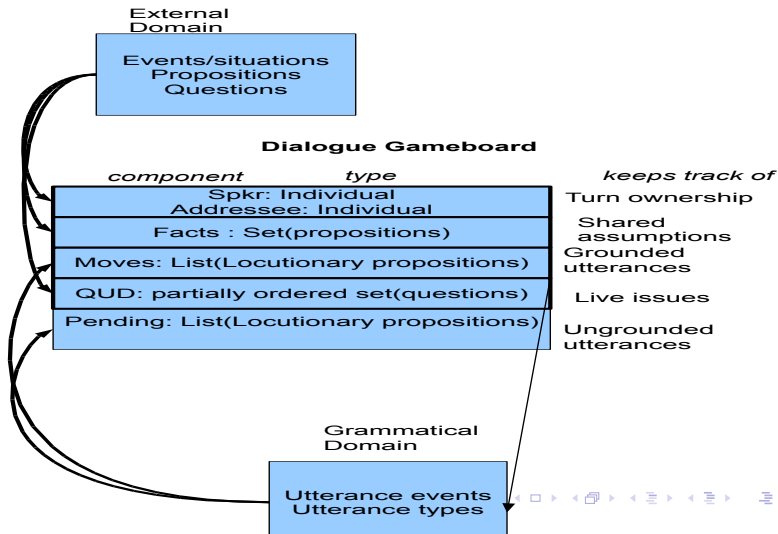
Linking up the external world, grammar, and interaction I

- ▶ Need formal theory that provides notions such as ‘current issue under discussion’, ‘disengagement from conversation’, ‘acknowledgement of understanding’, ‘ask intended reference of other’s utterance’, ...
- ▶ KoS (Ginzburg (1994); Larsson (2002); Ginzburg and Cooper (2004); Purver (2004); Fernández (2006); Ginzburg (2012)) links up: the external world, grammar, and interaction.
- ▶ Fundamental to KoS is the dynamic strategy to meaning, pioneered by Stalnaker, Lewis, Kamp, Heim, Barwise, Groenendijk and Stokhof et al—the meaning of a linguistic form is explicated in terms of the effect its use has on existing commonly shared contextual “resources”.

Linking up the external world, grammar, and interaction II

- ▶ This suggests thinking of context as structured by resources which conversational participants keep track of, as demonstrated by linguistic evidence.
- ▶ Working out what these resources are and how to model interaction in their terms will be a focus of lectures 3 and 4.

Linking up the external world, grammar, and interaction



Type Theory with Records (TTR)

- ▶ For this purpose we will use Type Theory with Records (TTR).
- ▶ TTR is a formalism that allows us to incorporate insights from Situation Semantics, Montague Semantics, Discourse Representation Theory, Head-driven Phrase Structure Grammar, and Semantic Frame Theory.
- ▶ We will show how it can be used to model semantic ontologies, interaction, and to write dialogically-oriented grammars.

Pay Off

- ▶ Conversation from micro (disfluencies) to macro (conversational genres, multilogue)
- ▶ Conversation: Opening, middle game, ending
- ▶ Empirical benchmarks for NSUs and metacommunication from corpus studies on the British National Corpus, child language data
- ▶ New perspective on traditional semantic concerns: **negation**, quantification, anaphora,
- ▶ **Detailed theory of relevance**, which allows us also to talk about Gricean *irrelevance*.

Course Plan

- ▶ **Lecture 1:** The interactive stance: basic desiderata for a semantic theory; A theory of events and situations.
- ▶ **Lecture 2:** Grammar in TTR: frames and lexical semantics; Incremental context and content; Tense and aspect.
- ▶ **Lecture 3:** A theory of abstract entities (propositions, questions, outcomes) and illocutionary interaction: analysis in terms of dialogue game boards; Negation.
- ▶ **Lecture 4:** Unifying metacommunicative and illocutionary interaction; Generalized quantifiers and copredication.
- ▶ **Lecture 5:** Non-sentential utterances; extensions: disfluencies, multilogue, conversational genres.

Outline

Interaction and Grammar

Communitarian Semantics bumps into Conversation

From Communitarian Semantics to the Interactive Stance

- ▶ Semantics as practised highly productively since Frege:
 - ▶ characterizing *successful communication*:
 - ▶ *the proposition expressed by a sentence in context*
 - ▶ *the referent of an NP*
 - ▶ *anaphoric/presuppositional potential*
 - ▶ abstracting away from individual differences, from the *communicative process*
- ▶ *Communitarian Semantics*

From Communitarian Semantics to the Interactive Stance

- ▶ A variety of data we will see today will lead us to propose an alternative, more general perspective to our semantic enterprise—the interactive stance.
- ▶ The interactive stance involves taking seriously the fact that communication involves multiple agents with distinct beliefs and desires and places importance on explicating the potential for misunderstanding, rejection, and correction, as well as success.

Communitarian Semantics: some assumptions

Meaning v. Content

- ▶ **Meaning v. Content** (Montague, Kaplan, Bar Hillel, Cresswell, Barwise and Perry):
 - ▶ *character/meaning*, associated with sentences or types of utterances,
 - ▶ *content/interpretation*, associated with sentences-in-context or utterances.

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- ▶ Alternative construal: a meaning—associated with an utterance type, where an utterance is a spatio-temporally located event involving the sequential enunciation of one or more words.

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- ▶ Alternative construal: a meaning—associated with an utterance type, where an utterance is a spatio-temporally located event involving the sequential enunciation of one or more words.
- ▶ This perspective proffered originally in Barwise and Perry (1983); Gawron and Peters (1990); Cooper and Poesio (1994); Poesio (1998)), but has generally aroused scant interest.

Meaning v. Content

- ▶ *The supra-contextual nature of Semantics*: Semantics associates meanings with expressions.
- ▶ This notion of a meaning as a contextual use rule can be formalized as a function from *contexts* to *contents*. (3) is a simple example of a meaning construed as a function:
 - (3) a. I hear you.
 - b. $f: c \mapsto \text{Hear}(s,a,t)$, where s is the speaker in c , a is the addressee and t overlaps with the time of c .

Equal Access to Context

- ▶ *Equal Access to Context*: As a conversation proceeds a shared context (the *common ground*) emerges: A has her turn, reaches a transition relevance point (TRP); Then either A proceeds or B takes over *from the common ground point at which A spoke..*
- ▶ (4) exemplifies why Equal Access seems a plausible assumption: A makes an initial utterance, a query, which either A or B can follow up on:
 - (4) a. A(1): Who should we invite to the conference?
 - b. A(2): Perhaps Noam, huh?
 - c. B(2): Perhaps Noam, huh?

Lewisian Regularities

- ▶ Simplifying somewhat, Lewis (1968) proposes that a regularity as described below is what underlies the communicative process involved in conveying 'literal import':
 - (5) Original Lewisian regularity: Whenever S is uttered, the utterer intends to communicate P and the hearer acquires the belief P .
- ▶ Now (5) won't work for sentences whose (literal) import varies with context, the lion's share of actually used sentences.
- ▶ So replace it with:
 - (6) Contextualized Lewisian regularity: Whenever A utters S with meaning μ in a context c , A communicates that P , where $P = \mu[f]$, f is the assignment c provides for μ , and B acquires the belief that P .

Communitarian Semantics: some assumptions

- ▶ Montague: *I fail to see any great interest in syntax except as a preliminary to semantics.*
- ▶ Generally true of formal accounts of context change (e.g. those formulated in Discourse Representation Theory (Kamp and Reyle (1993), in Dynamic Predicate Logic and its relatives (e.g. Groenendijk and Stokhof (1991); Dekker (2004) and in Segmented Discourse Representation Theory (Asher and Lascarides (2003))))) , with the important exception of Poesio and Traum's PTT:
- ▶ Weak Montogovianism: only the *content* of utterances (*not* their syntactic or phonological properties) contributes information that persists in the context.

Motivation for the Interactive Stance

Terry: Yeah I but think he gave me all his drink.

Damion: **Who?**

Terry: **Sam.**

Damion: He gave it to you?

Terry: **No, no**, I was (laughing) drinking all his drinks.

Damion: **Which Sam?**

Terry: Sam, Sam, the one

Damion: The one

Terry: who was totally pissed.

Damion: **Oh Fleckerstein or the other one?**

Terry: No have you got, don't you know the other one?

Damion: No there's two we know.

Terry: **Yeah.**

Damion: **The one with Kevin**

Terry: The one with the longish

Damion: or the other one.

Terry: it's the other one.

Damion: **Oh right.** (BNC, KR2)

Communitarian Semantics: some problematic assumptions

- ▶ (*) despite being a perfectly normal and unremarkable conversation points to some very significant issues.
- ▶ Damion spends just about the entire conversation without a unique referent associated with 'he', and 'Sam'.
- ▶ Hard to square with the Contextualized Lewisian Regularity: where a function gets fed its value (a contextual tuple of some kind), yielding a content as value, or no value whatever if something goes wrong.

Communitarian Semantics: some problematic assumptions

- ▶ This technical quibble is a symptom of a far deeper malaise: with some notable exceptions to be discussed below, linguistic semantics still operates under the assumption that **perfect communication** obtains—nothing does go wrong and interpretation leads to an identical update on Damian's and Terry's information states.
- ▶ involves giving up on trying to make sense of conversations such as the above and most concretely the analysis of the meaning of NSUs there such as 'Who?', 'Which Sam', and 'Oh Fleckerstein or the other one?') that express metacommunicative queries.

Communitarian Semantics: some problematic assumptions

- ▶ The data in (7) and (8), involving the resolution of NSUs, are incompatible with (the above version of) Equal Access.
- ▶ (7) illustrates that the contextual possibilities for resolving the fragment 'Bo?' are distinct for the speaker and the addressee:

(7) a. A: Who does Bo admire? B: Bo?

Reading 1 (**short answer**): Does Bo admire Bo?

Reading 2 (**clausal confirmation**): Are you asking who BO (of all people) admires?;

Reading 2 (**intended content**): Who do you mean 'Bo'?

b. A: Who does Bo admire? Bo?

Reading 1 (**short answer**): Does Bo admire Bo?

Reading 2 (**self correction** Did I say 'Bo' ?)

Communitarian Semantics: some problematic assumptions

- Fragments of this kind, henceforth *reprise fragments* (RFs) are frequent: the **clausal confirmation**) and **intended content** readings constituting approximately 30% of all clarification requests in the British National Corpus.

Communitarian Semantics: some problematic assumptions

- ▶ (8) is an even more striking illustration of the phenomenon we have dubbed the Turn Taking Puzzle (TTP) (see Ginzburg (1997)): here the resolution accorded to the bare 'Why?' changes according to who keeps or takes over the turn.
- ▶ (8c) shows that these facts cannot be reduced to coherence or plausibility—the resolution unavailable to A in (8a) yields a coherent follow up to A's initial query if it is expressed by means of a non-elliptical form:

- (8) a. A: Which members of this audience own a parakeet?
Why? (= Why own a parakeet?)
- b. A: Which members of this audience own a parakeet?
B: Why? (= Why are you asking which members of this audience own a parakeet?)
- c. A: Which members of this audience own a parakeet?
Why am I asking this question?

Communitarian Semantics: some problematic assumptions

- ▶ The Turn Taking Puzzle vitiates Equal Access, since it demonstrates in a rather direct way that, at least some of the time, the contextual options available to one participant are distinct from those available to the other(s) participant(s).
- ▶ At the same time, the TTP is not an argument for solipsism, for instance of a type advocated in Relevance Theory (Sperber and Wilson (1986)), the only influential approach which explicitly avoids assuming Equal Access.
- ▶ The TTP reflects an asymmetry of production, not understanding: it seems clear that both participants would understand the potential contributions of the other.

Utterances v. Sentences-in-context

- ▶ The data in (9) illustrates that if A makes the utterance in (9(1)) a variety of facts about the utterance (in bold face in (2b-e)) potentially enter into the common ground.
- ▶ (9) exemplifies two classes of facts about the utterance that become presupposable, facts about the content of sub-utterances (9(2b-d)) and also facts that concern solely the phonology and word order of the utterance.

(9) A(1): Did Mark send you a love letter?

B(2b): No, though it's interesting **that you refer to Mark/my brother/our friend**

B(2d): No, though it's interesting **that you ask about Mark's epistolary habits**

B(2e): No, though it's interesting **that the final two words you just uttered start with 'I'**

Weak Montogovianism

- ▶ We have already seen some data that goes against Weak Montogovianism: the presuppositions about phonology and word order that emerge in the aftermath of an utterance.
- ▶ An additional set of phenomena are phonological and syntactic parallelism phenomena in CRs and NSUs.
- ▶ Clausal Confirmation readings require partial syntactic parallelism: an XP used to clarify an antecedent sub-utterance u_1 must match u_1 categorially:

- (10) a. A: I phoned him. B: him? / #he?
 b. A: Did he phone you? B: he? / #him?
 c. A: Did he adore the book. B: adore? / #adored?
 d. A: Were you cycling yesterday? B:
 Cycling?/biking?/#biked?

Weak Montagovianism

- ▶ The repetition reading of a RF involve (segmental) phonological identity with their source follows from their very nature ('Did you say ...'). And this requirement also applies to intended content RFs:

(11) (i) A: Did Bo leave? B: Max? (cannot mean: intended content reading: **Who are you referring to?** or **Who do you mean?**)
- ▶ The persistence of non-semantic information in context is very much an empirical question, but discarding Weak Montagovianism seems a necessary first step in accounting for a growing body of work in psycholinguistics that demonstrates the existence of non-semantically-based priming (see e.g. Branigan *et al.* (2000); Garrod and Pickering (2004)).

Integrating Semantics and MetaCommunication

- ▶ **Meaning, Content and CRification potential:** knowledge of meaning includes knowledge of CRification possibilities. In other words, an important benchmark for any semantic theory of dialogue is to accommodate as coherent and characterize the range of clarificatory potential of utterances by an interlocutor.
- ▶ **Semantic non-determinism:** the contexts available to the conversationalists in the aftermath of an utterance are NOT identical, as illustrated by various turn taking puzzles. This entails a cognitive architecture in which there is no single common ground, but distinct yet coupled Dialogue GameBoards, one per conversationalist.

Integrating Semantics and MetaCommunication

- ▶ **Fine-grained utterance representation:** information pertaining to syntactic and phonological aspects of an utterance not merely the utterance's illocutionary *content*—on whatever theoretical explication of this concept—becomes presupposed following a grounded utterance; This point has also been argued for extensively by Massimo Poesio, see e.g. Poesio and Traum (1997); Poesio and Rieser (2010).
- ▶ Also needed for an account of quotation (Ginzburg and Cooper (2012))..
- ▶ This requires a means of keeping track of the sign information associated with an utterance in context after its successful processing. In turn, this necessitates a grammatical ontology that furnishes all this information in parallel—a *sign-based grammar* of some kind

From Truth Conditions to Interaction Conditions

- ▶ The (or um a) basic requirement on semantic theory:
The ability to characterize for any utterance type the update that emerges in the aftermath of successful grounding and the full range of possible Clarification Requests otherwise.

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