Computational Pragmatics

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Today

- Brief introduction to a prominent dialogue semantics theory: Ginzburg's KoS.

- Further brainstorming about project ideas.

Interaction and Grammar

- It is uncontroversial that spoken dialogue is the primary form of language (also from the point of view of language acquisition).

- However, it is still controversial to assume that interaction is built into the grammar.

- The dominant paradigms in grammar and semantics have, on the whole, abstracted away from interaction, viewing it as somebody else's problem.

- Given the state of the art, typical conversations (fragmentary, with metacommunicative utterances, etc) still constitute a significant challenge to formal grammar of just about any theoretical flavour.

Ginzburg's KoS

Jonathan Ginzburg (2012) *The Interactive Stance: Meaning for Conversation* [KoS $\approx$ *conversation-oriented semantics*]

- A theory of meaning for spoken interaction that can, in particular, account for non-sentential utterances (NSUs), and characterise the potential for misunderstanding.
- We'll be able to see only a snapshot of the framework.

KoS is based on 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 commonly shared "contextual resources".
- this suggests thinking of context as structured by resources which conversational participants keep track of.

Ginzburg's KoS

- KoS provides a theory of context for conversation by means of which NSUs and metacommunication can be analysed formally.
- Main questions:
  - ▶ How is context structured?
  - ▶ How does context evolve?

- Other comprehensive accounts of a theory of context for dialogue include work in the PTT framework (e.g. Poesio & Traum 1997, 1998, Poesio & Rieser 2010) and work within Segmented Discourse Representation Theory (SDRT) (e.g. Asher & Lascarides 2003, 2008).

A Single Context?

Classic semantics operates under the assumption that perfect communication obtains — nothing goes wrong, interpretation leads to an identical update of the interlocutors' information states.

- D. Lewis (1968): Whenever S is uttered, the utterer intends to communicate p and the hearer acquires the belief p.

- *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.

It seems a plausible assumption: e.g., A can make an initial utterance, a query, which either A or B can follow up on:

> A(1): Who should we invite to the conference?
> A(2): Perhaps Noam, huh?
> B(2): Perhaps Noam, huh?

A Single Context?

However, these examples illustrate that the contextual possibilities for resolving the fragment 'Bo?' are distinct for speaker and addressee:

A: Who does Bo admire?
B: Bo?
– reading 1: Does Bo admire Bo?
– reading 2: Are you asking who BO (of all people) admires? / Who do you mean 'Bo'?

A: Who does Bo admire? Bo?
– reading 1: Does Bo admire Bo?
– reading 2: Did I say 'Bo'?

Turn Taking Puzzle (Ginzburg 1997): The resolution of the bare 'Why?' phrase changes according to who keeps or takes over the turn.

A: Which members of this audience own a parakeet?
A: Why? (= Why own a parakeet?)
B: Why? (= Why are you asking which members of this audience own a parakeet?)

Context in KoS

- In KoS, there is actually no single context.
- Instead of a single context, analysis is formulated at a level of information states, one per conversational participant.
- The total information state, with two components: one public (the dialogue gamebord) and one private.

$$\begin{bmatrix} \text{DGB} \\ \text{Private} \end{bmatrix}$$

- We will be concerned with the DGB: an agent's take of the common ground.

Context in KoS: the DGB

- The dialogue gameboard (DGB) represents information that arises from publicized interactions.

- DGB (initial definition):

$$\begin{bmatrix} \text{spkr: Ind} \\ \text{addr: Ind} \\ \text{Facts : Set(Prop)} \\ \text{Moves : list(IllocProp)} \\ \text{QUD : poset(Question)} \end{bmatrix}$$

- The speaker/addressee roles serve to keep track of turn ownership.

The Dialogue GameBoard

- **FACTS** represents the shared knowledge conversationalists utilise during a conversation (information that can be embedded under presuppositional operators).

  - initial common ground: *7th October, Amsterdam, cloudy,...*
  - facts about content <u>and form</u> of (parts of) the utterance

  > A: Did Mark send you a love letter?
  > B: No, though it's interesting that...
  > — you refer to Mark/my brother/our friend
  > — you bring up the sending of love letters
  > — ask about Mark's epistolary habits
  > — that the final two words you just uttered start with 'l'.

  - Not all these facts can be picked up in ellipsis / anaphora.

  > B: No, why? (= why are you asking whether Mark sent me a love letter; cannot mean: why do you refer to Mark/my brother/our friend, why do you bring up the sending of love letters etc)
  > B(3b): No. Don't you think that's a bit over inquisitive? ('that' = your asking me whether Mark sent me a love letter)

The Dialogue GameBoard

Does FACTS contain only semantic information?

- Confirmation readings require partial syntactic parallelism:

  A: I phoned him. B: him? / #he?
  A: Did he phone you? B: he? / #him?

- Information pertaining to syntactic and phonological aspects of an utterance becomes presupposed after the utterance has been grounded at some level (not merely the utterance's content).

- We need fine-grained representations that allow for this (phon/syn information may fade away faster than semantics).

- This point has also been argued for extensively by Massimo Poesio, see e.g. Poesio & Traum, 1997; Poesio & Rieser, 2010.

The Dialogue GameBoard

- MOVES keeps track of the dialogue acts made.

- It is useful to single out the Latest-Move, a distinguished fact that characterises the most recent move made.

- The main motivation for this is to segregate from the entire repository of presuppositions information on the basis of which coherent reactions could be computed.

The Dialogue GameBoard

- QUD: (mnemonic for Questions Under Discussion): questions that constitute a "live issue". That is, questions that have been *introduced for discussion* at a given point in the conversation and not yet been resolved or abandoned.

- Being maximal in QUD (MAX-QUD) corresponds to being the current 'discourse topic' and is a key component in the theory.

- QUD and MAX-QUD are key elements of KoS.

Basics of Interaction

- Dialogue analyst's task: describe conventionally acceptable patterns of interaction (*protocols*), in terms of sequences of information states.

- Conversation as collection of coupled information states: each agent analysed in terms of her own dialogue gameboard and an unpublicized component.

- The basic units of change are mappings between DGBs that specify how one DGB configuration can be modified into another – conversational rule.

- The types specifying the mapping's domain and range are the preconditions and the effects of the rule.

$$\mathrm{DGB}_n \mapsto \mathrm{DGB}_{n+1} \qquad \begin{bmatrix} \mathrm{pre} & : \mathrm{DGB}_n \\ \mathrm{effects} & : \mathrm{DGB}_{n+1} \end{bmatrix}$$

Conversational Rules for simple assertion / querying

Ask QUD–incrementation:

$$
\begin{bmatrix}
\text{pre} & : & \begin{bmatrix} \text{q : Question} \\ \text{LatestMove} = \text{Ask(spkr,addr,q):IllocProp} \end{bmatrix} \\
\text{effects} & : & \begin{bmatrix} \text{qud} = \langle \text{q,pre.qud} \rangle \text{: poset(Question)} \end{bmatrix}
\end{bmatrix}
$$

Assert QUD–incrementation:

$$
\begin{bmatrix}
\text{pre} & : & \begin{bmatrix} \text{p : Prop} \\ \text{LatestMove} = \text{Assert(spkr,addr,p):IllocProp} \end{bmatrix} \\
\text{effects} & : & \begin{bmatrix} \text{qud} = \langle \text{p?,pre.qud} \rangle \text{: poset(Question)} \end{bmatrix}
\end{bmatrix}
$$

[NB: several aspects of this notations have not been explained; take it intuitively.]

Basic interaction protocols

- Asserting p or asking $p?$ update the DGB by adding $p?$ to QUD
  - $p?$ becomes QUD maximal.
- At this point, participants can contribute an utterance that is related to MAX-QUD.
- If MAX-QUD gets resolved, the relevant information enters FACTS, and MAX-QUD (and any other question in QUD that is resolved by the new information in FACTS) is removed from QUD.

Resolution of NSUs

- One of the major claims advanced in KoS is that QUD is a resource on the basis of which resolution of the various distinct classes of non-sentential utterances (NSUs) can be achieved.

- The resolution of 'yes' constitutes a simple example of this:

  ▸ we can formulate the meaning of "yes" as *the proposition p such as p? is MAX-QUD* (there is no need for "yes" to be adjacent to the utterance it is reacting to).

A: Did Billie show up at all?	A: Who's a good candidate?
B: Billie?	B: Peter.
A: Billie Whitechapel.	A: No. Paul is.
B: Yes.	B: OK.

Summing Up (after very basic intro)

- Given the primacy of spoken dialogue, semantics and grammar should be concerned with interaction.

- KoS is a theory of dialogue semantics that explains key features of dialogue: NSUs, but also metacommunication and grounding (we didn't see this).

- Context is represented in terms of individual informations states: the DGB component represents the take of each interlocutor on the common ground.

- Utterances change the context: they update the current configuration of the DGB.

- We can capture basic interaction patterns by defining *protocols* or *conversational rules* – mappings between DGBs (preconditions and effects).

- KoS has been used to underpin the development of dialogue system, e.g., GODIS (Larsson 2002).