Computational Semantics and Pragmatics

Autumn 2014



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Last lecture

Dynamic semantics for dialogue: Ginzburg's KoS

What we have seen up to now:

- Context is represented in terms of individual informations states: the dialogue gameboard (DGB) component represent 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).
- The contextual updates defined by these interaction patterns explain the resolution of NSUs like "yes" (amongst others).

Summary of 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.

Given 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.

Adding Grounding into the picture

Before A's dialogue move enters the common ground, it must be grounded by B. Grounding requires that B understands the move relative to her own purposes.

- How to construe the grounding criterion?
- What are the consequences of grounding failure?

According to Ginzburg, a dialogue theory should have the ability to characterize for any utterance type

- the update that emerges in the aftermath of successful mutual understanding (grounding), and
- the full range of possible CRs otherwise (grounding failure).

Adding Grounding into the picture

To account for the grounding process, a field Pending is added to the DGB – it represents information about utterances that are as yet ungrounded.

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

- Right after an utterance by A takes place, B's Pending gets updated with u, a representation of what B's has understood of A's utterance.
- If this is sufficient for current purposes, u is removed from Pending and added to the LatestMove.
- At this point the participants' DGBs should be aligned – sufficient grounding has taken place.

Successful grounding

An example of a simplified utterance representation for *'Is George here?'*

$$\begin{bmatrix} \text{phon} : \texttt{is george here} \\ \text{constits} = \left\{ u_1{=}\text{is},\ u_2{=}\text{george},\ u_3{=}\text{here},\ u_4{=}\text{is george here} \right\} : \text{set(sign)} \\ \text{contextual-parameters} : \begin{bmatrix} \text{spkr} : \text{Ind} \\ \text{addr} : \text{Ind} \\ \text{l} : \text{Location} \\ \text{t} : \text{Time} \\ \text{g} : \text{Ind} \\ \vdots \end{bmatrix} \\ \text{content} = \text{Ask(spkr,addr, } \textit{BeIn}\text{(g, l, t))} \end{bmatrix}$$

For grounding to succeed, the *contextual parameters* of an utterance must be instantiated in the current context.

Grounding failure and clarification

- In principle, any contextual parameter / constituent is clarifiable.
- If u is not grounded, different questions can be accommodated into QUD referring to some constituent u_i of u. For instance:
  - *What / Who do you mean by u_i?*
  - *What did you say in u_i?*
  - *What where you going to say after u_i?*
  - ...
- These questions do not need to be asked explicitly (can be *accommodated*): Given the need to ground, they simply become relevant issues once an utterance has been produced.
- Postulating that they enter QUD allows us to resolve the meaning of non-sentential CRs.

A: Is George here?

B: George? / Who? / Here? / Is?
B: Is George here?
B: Why?
B: Is ...?

Grounding failure and clarification

- *What / Who do you mean by u_i?*
- *What did you say in u_i?*
- *What where you going to say after u_i?*
- ...

A: Is George here?

B: George? / Who? / Here? / Is?
B: Is George here?
B: Why?
B: Is ...?

- The addressee of the CR will accommodate one of these questions in order to make sense of the CR.
- In KoS this is regulated by Clarification Context Update Rules.
- Knowledge of these rules is assumed to be part of our dialogue competency.

Other- and Self-repair

- Clarification questions and disfluencies have some parallelisms.
- According to conversation analysts, they are part of our repair system – to handle miscommunication or error in general.
- Some real examples of disfluencies with a made-up CR counterpart:

(1) A: Flights to Boston - I mean, to Denver.

(2) A: Have you seen Mark's erm earphones? Headphones.

(3) A: A vertical line to a- to a black disk.

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(1) *A: Flights to Boston.*
B: To Boston?
A: I mean, to Denver.

(2) *A: Have you seen Mark's erm earphones?*
B: Earphones?
A: Headphones.

(3) *A: A vertical line to a–*
B: To a. . . ?
A: to a black disk.

Disfluencies

- Speech disfluencies are a self-monitoring mechanism.
- They follow a fairly predictable pattern:

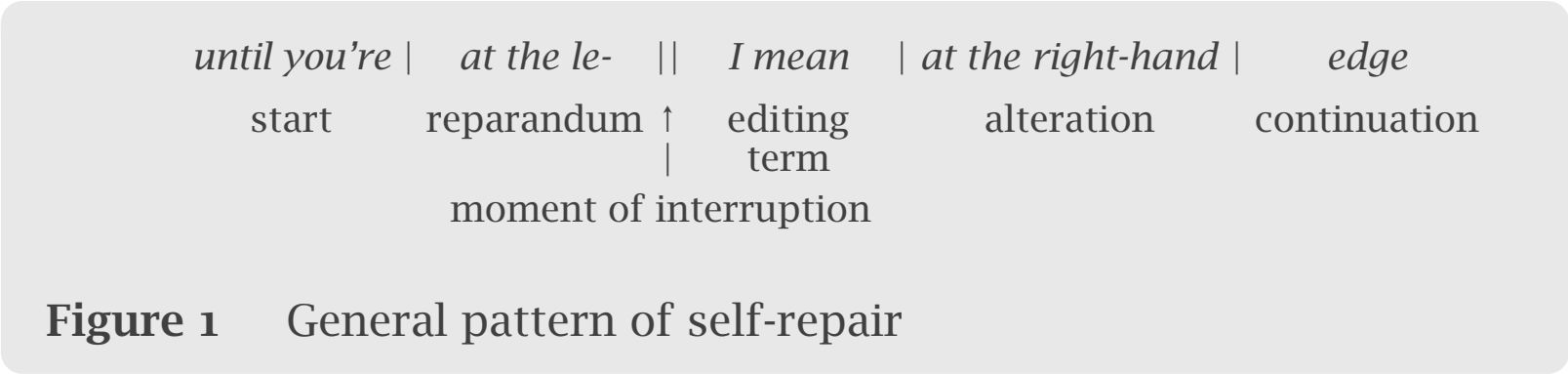


Figure 1 General pattern of self-repair

- Of these elements, all but the moment of interruption and the continuation are optional.

Willem Levelt (1989). *Speaking: From Intention to Articulation*, MIT Press.

Backward-looking vs. forward-looking disfluencies

We can distinguish between two types of disfluencies:

- BLDs: the moment of interruption is followed by an alteration that refers back to an already uttered reparandum.

> Why it is – why is it that nobody makes a decent toilet seat?
> Flights to Boston I mean to Denver.

- FLDs: the moment of interruption is followed by a completion of the utterance which is delayed by a filled pause (er / uh), a hesitation, or a repetition.

> And also the– the dog was old.
> Today was, uh, definitely a shorts day around here.

Disfluencies in KoS

- Disfluencies can be treated very similarly to CRs.
- As the utterance unfolds, there arise questions that can be pushed on to QUD:
  - utterance monitoring questions about what has happened so far (e.g., *what did the speaker mean with sub-utterance* u_1*?*)
  - utterance planning questions about what is still to come (e.g., *what word does the speaker mean to utter after sub-utterance* u_2*?*).

Jonathan Ginzburg, Raquel Fernández and David Schlangen (2014). Disfluencies as Intra-Utterance Dialogue Moves. *Semantics & Pragmatics*, 7(9):1-64.

Disfluencies in KoS

One modification to the DGB is needed: Pending needs to be updated incrementally to incorporate utterances that are in progress.

What triggers implicit QUDs related to self-repair?

- BLDs are possible at any point where there is "correctable material". i.e., when Pending is not empty.
- FLDs require an editing phrase (*'uh'* , *'thee'*), whose import is the existence of a soon-to-be-uttered word.
  - given a context where LatestMove is a FL editing phrase by A, the next speaker may address the issue of what A intended to say next.

Motivation for the account

Why treat disfluencies within a semantic / grammatical theory?

- Most psychological and computational approaches filter out disfluencies based on structural properties before any interpretation takes place.
- However, there is evidence that the disfluent material enters the common ground:

(1) [Peter was + well he was] fired. (from Heeman and Allen 1999)

⇝ *the pronoun 'he' refers to a referent introduced in the reparandum.*
⇝ *Andy was unsure about what he should say, after uttering 'was'.*
⇝ *Andy was unsure about how to describe what happened to Peter.*

(2) Take there . . . [in a reference identification task]

⇝ *the addressee infers the speaker is having difficulty with lexical retrieval and looks at objects that are more difficult to describe (Arnold et al. 2007).*

- The KoS account is compatible with this evidence.

End of our little excursion into the dynamic semantics of dialogue

Course Recap

Topics we have covered:

- Turn taking
- Dialogue acts
- Grounding
- Annotation and inter-annotator agreement
- Alignment
- Dynamic semantics for dialogue, including disfluencies.

Course Recap

Tasks you have done:

- Transcription of actual dialogue
- Annotation exercises with inter-annotator agreement calculation
- Homework exercise on dialogue act analysis
- Read and discussed several papers

Reminder of course evaluation:

- Coursework: 30%
  - some graded exercises
  - some non-graded exercises
    (failing to submit means loosing 0.5 on total coursework grade)
  - reading and discussion of relevant research papers
    (10% at my discretion)
- Final project (paper + presentation): 60% + 10%

Practicalities

- Recall the final paper needs to be done in Latex.
- Have a look at the grading criteria for papers and presentations.
- Presentations:
  - Up to 15 minutes + 5 minutes for questions.
  - Attending all presentations is mandatory.
  - Currently scheduled on Thursday 23, 9–13h.
  - We could instead do 11-13h + 14-15:30h ?
  - We could move them to Tuesday 21 to leave more time to work on the paper after feedback ?