

Mechanisms of Meaning

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MoM Recap

Recall that the aim of the course is to look into aspects of meaning beyond compositional semantics at the sentence level.

In particular aspects of meaning related to the two end-points of the interpretation ladder:

- *lexical semantics*
- compositional semantics
- discourse structure
- *dialogue*

We'll spend the remaining sessions discussing issues related to dialogue interaction.

Plan for Today

- Collaborative model: grounding
- Interactive Alignment model

Language in Interaction

- Traditionally, (computational) linguistics has focused on analysing isolated sentences or written text.
- Dialogue or conversation is the most basic setting for *language use*.
- Dialogue is a form of *interaction* and brings in extra challenges.
- Crucially, it involves *multiple participants*, which requires *coordination*.
 - * *content* coordination: utterances in a dialogue are connected to form a coherent discourse; speakers need to avoid misunderstanding.
 - * *interaction* coordination: turn-taking (who speaks when) and integration of language with other modalities (gestures, gaze, ...)

Models of language use: product vs. process

- Classic pragmatic models of speech acts (Austin 1962, Searle 1975) emphasise the idea that language is a form of *action*.
- However:
 - * the characterisation of speech acts focuses on the speaker
 - * and abstract away from actual conversational contexts
 - * speech acts are a *product* of the speaker.
- Dialogue models (Clark & Schaefer 1989, Allwood 1995) emphasise the idea that language is a form of *interaction*.
 - * focus on communication (Latin *communicare* - 'to share')
 - * conversation is a continuous *process* of establishing common ground (Stalnaker 1978) between speaker and addressee.

The Collaborative Model

- Clark & Schaefer (1989) put forward a model of dialogue interaction that sees conversation as a *joint process*, requiring actions by speakers and addressees.
- Their model is based on the notion of *contribution*: each contribution to dialogue is made up of a *presentation* phase and an *acceptance* phase.
- This collaborative scheme of joint contributions allows participants to coordinate their interaction and make sure they understand each other.
- *Grounding* is the process by which participants reach mutual understanding of what is said and add it to the common ground.
- *Grounding Criterion*: The speaker and addressee mutually believe that the addressee has understood what the speaker meant to a criterion sufficient for the current purposes.

Clark & Schaefer (1989) Contributing to discourse. *Cognitive Science*, 13:259–294.

Clark (1996) *Using Language*. Cambridge University Press.

Grounding & Feedback

How is grounding achieved?

- *Principle of closure*: Participants need to give explicit *feedback*, signalling understanding or else requesting repair.
- Evidence of understanding can take different forms at the acceptance phase:
 - * Continued attention
 - * Relevant next contribution (adjacency pairs)
 - * Acknowledgement (nod, continuer, assessment)
 - * Demonstration (paraphrasing, reformulating or completing)
 - * Display (verbatim repetition)

Grounding & Feedback

A: ... I need to travel in May.

B: And, what day **in May** did you want to travel?

A: **OK** uh I need to be there from the 12th to the 15th.

B: And you're flying from what city?

A: I want to fly from Pittsburgh

B: **Mm hmm**

A: to Seattle.

B: **OK.**

A: Most machines don't record that slow. So I'd wanna, when I make a tape

B: **be able tuh speed it up.**

A: **Yeah.**

From the British National Corpus (KP5):

A: Did you get your tickets for Crowded House?

B: No!

There is not one ticket left in the entire planet!

So annoying!

C: Where for?

B: Crowded House.

My brother is going and he doesn't even like them.

A: Why doesn't he sell you his ticket?

B: Cos he's going with his work.

And Sharon.

A: Oh, his girlfriend?

B: Yes.

They are gonna come and see me next week.

A: Not Sharon from Essex?

B: No, she's Sharon from <laughing> Australia.

A: Oh, alright then.

B: That's the only reason I forgive him.

<laughing> Cos she's not born in this country!

Burnard (2000) *Reference Guide for the British National Corpus (World Edition)*, Oxford Univ. Computing Services.

Levels of Understanding

Levels of understanding proposed by Allwood (1995) and Clark (1996):

1. *attention*
2. *perception*
3. *meaning understanding*
4. *intention understanding*

According to Clark, these levels are related by the following principles:

- *Upward causality*: actions at lower levels allow actions at higher levels.
- *Upward completion*: actions are completed going up the ladder of levels.
- *Downward evidence*: evidence that a level has been achieved is also evidence of understanding at all lower levels.

Allwood (1995) An Activity-based Approach to Pragmatics. *Gothenburg Papers in Theoretical Linguistics*, 76.

Grounding & Metacommunication

- Grounding can fail at any of these levels.
- Clarification Requests can signal problems at any of these levels:

- (1) A: <cough>
B: **Pardon?** \rightsquigarrow *were you talking to me?*
- (2) A: I got tickets for the opera.
B: **Where for?** \rightsquigarrow *where did you say you got tickets for?*
- (3) A: He's going with Sharon.
B: **His girlfriend?** \rightsquigarrow *by Sharon, do you mean his girlfriend?*
- (4) A: How old are you?
B: **Why?** \rightsquigarrow *why are you asking this now?*

- Grounding takes place at a *meta-level*:

<u>communicative acts</u>	<u>meta-communicative acts</u>
B: I ordered some paint from you...	A: Yuh.
B: And I wanted to order...	
A: He's going with Sharon.	B: Oh, his girlfriend?
A: They are gonna come next week.	A: Yes.

Referential Communication

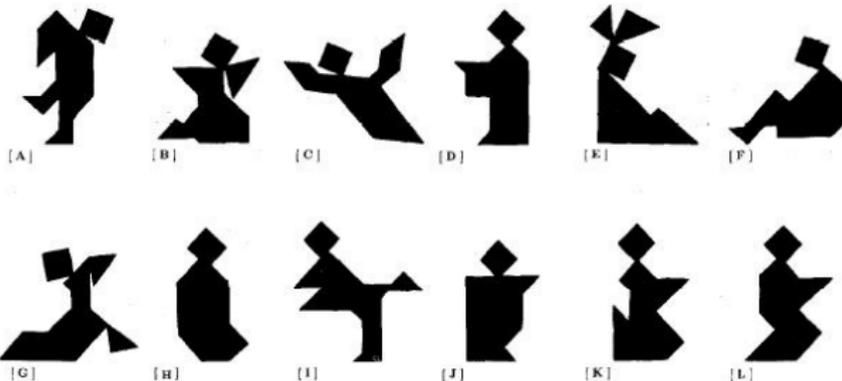
The collaborative model has taken referential communication as a case study: how do participants refer to objects in dialogue? Are the Gricean Maxims a good model of the referring process in conversation?

- Maxim of Quality: be truthful
 - * Do not say what you believe to be false.
 - * Do not say that for which you lack adequate evidence.
- Maxim of Quantity:
 - * Make your contribution as informative as is required
 - * Do not make your contribution more informative than is required.
- Maxim of Relevance: be relevant
- Maxim of Manner: be perspicuous.
 - * Avoid obscurity of expression / Avoid ambiguity.
 - * Be brief / Be orderly.

The collaborative model emphasises the *collaborative aspect of referring*: reference does not emerge from solitary choices of the speaker, but from an interactive process by speaker and addressee.

Referring as a Collaborative Process

- Like all other communicative acts in conversation, referring expressions need to be grounded to be effective.
- REs are not only a product of the speaker: speaker and addressee accept *mutual responsibility* for each RE.
- This model of the referring process was investigated by Clark & Wilkes-Gibbs (1986) in their “*Tangram experiments*”, where a *director* and a *matcher* refer to tangram figures over several trials.



Clark & Wilkes-Gibbs (1986) Referring as a collaborative process. *Cognition*, 22:1-39.

Referring as a Collaborative Process

In line with the contribution model: A presents a referring expression and B evaluates it. If the verdict is not positive, A or B must refashion that presentation. The refashioned expression is then evaluated, and so on.

Basic exchange:

- (1) A: Number 4's *the guy leaning against the tree*.
B: Okay.

Refashionings:

- (2) A: OK, the next one is the rabbit.
B: Uh—
A: That's asleep, you know, it looks like it's got ears and a head pointing down?
B: Okay.
- (3) A: Um, the third one is the guy reading with, holding his book to the left.
B: Okay, kind of standing up?
A: Yeah.
B: Okay.

Basic exchanges occur seldom on early trials (6%) but often on later trials (84%). Refashionings decline in later trials once a RE has been mutually established.

⇒ Referring is a joint process!

The Dynamics of Referring Expressions

Ways of referring are not static but evolve during dialogue:

- expressions are modified according to interlocutors' feedback,
- they become shorter as grounding is more firmly established.

Utterances by one director referring to the same figure on trials 1 to 6:

1. All right, the next one looks like a person who's ice skating, except they're sticking two arms out in front.
2. Um, the next one's the person ice skating that has two arms?
3. The fourth one is the person ice skating, with two arms.
4. The next one's the ice skater.
5. The fourth one's the ice skater.
6. The ice skater.

Experiments by Krauss & Weinheimer (1966) showed that this happens when talking to responsive partners, but not to a tape recorder.

Krauss & Weinheimer (1996) Concurrent feedback, confirmation, and the encoding of referents in verbal communication, *Journal of Personality and Social Psychology*, 4:343–346.

Minimizing Collaborative Effort

- To account for the features of the collaborative process, Clark & Wilkes-Gibbs propose the *Principle of Least Collaborative Effort*

“Our proposal is that speakers and addressees try to minimize collaborative effort, the work both speakers and addressees do from the initiation of the reference process to its completion”

- There is a trade-off in effort between initiating an expression and refashioning it: the more effort the speakers put in the initial expression, the less refashioning it is likely to need.
- Initial expressions are not always optimal due to time pressure, complexity, ignorance, ...
- Speakers deal with these constraints minimizing collaborative effort with repairs, instalments, and trial and error.
- Addressees minimize collaborative effort by indicating quickly and informatively what is needed for mutual acceptance.

Conceptual Pacts

- Brennan & Clark: when speakers and addressees ground a reference, they are creating a **conceptual pact**, a temporary agreement about a conceptualisation for a particular entity

A: A docksider.

B: A what?

A: Um.

B: Is that a kind of dog?

A: No, it's a kind of um leather shoe, kinda pennyloafer.

B: Okay, okay, got it.

⇒ Thereafter “the pennyloafer”



Brennan & Clark (1996) Conceptual Pacts and Lexical Choice, *Journal of Experimental Psychology*, 22(6):1482–1493.

Conceptual Pacts

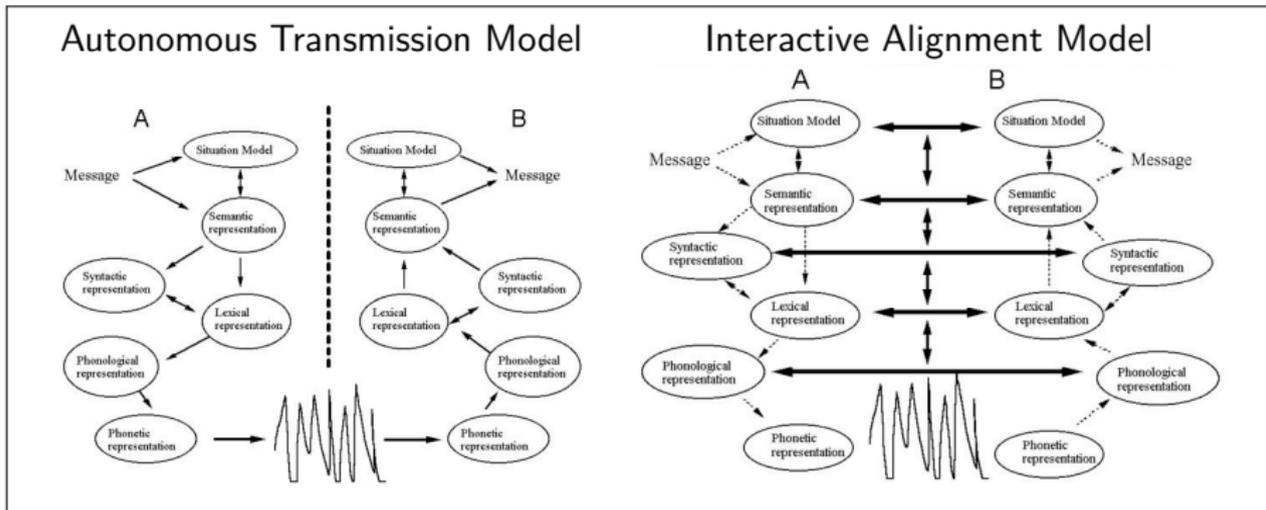
- The '*conceptual pacts*' model emphasises the *anaphoric aspects* ('*historic*') of the collaborative referring process
 - * **Recency**: dialogue participants tend to retain the most recent successful reference to an object.
 - * **Frequency of use**: more frequently used conceptualisations are more durable in memory; the more often an expression is used, the more firmly established it becomes.
 - * **Partner specificity**: when speakers create conceptual pacts (temporary agreements about a conceptualisation) with particular addressees.
- But recall that there are several forces at play: successive references tend to evolve and become more efficient

The curved round fish with the green stripe down its back
The curved round fish with the green stripe
The curved round fish.

Interactive Alignment Model

Pickering & Garrod (2004) present a *mechanistic* model of dialogue:

- interlocutors align their mental models via priming at many levels of linguistic representation avoiding resource-intensive inferences that require “other-modelling”.



Pickering & Garrod (2004) Towards a mechanistic psychology of dialogue, *Behavioral and Brain Sciences*, 27.

Interactive Alignment Model

- Successful dialogue leads to aligned representations at every level
- Priming across interlocutors supports direct alignment
- Percolations between levels: alignment at one level enhances alignment at other levels
 - * phonological/articulatory alignment: repeated references in the map task are phonologically reduced (also by interlocutor)
 - * syntactic alignment is enhanced by lexical and semantic overlap:

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nun giving a book to a clown  
→ sailor giving a hat to the girl (sailor showing a hat to a girl)  
  
the sheep that's read  
→ the goat that's red (the book that's red)
```

- Automaticity is achieved by *dialogue routines* (\approx conceptual pacts)

Next Week

- Dialogue and language acquisition.
- Presentation by Irma Cornelisse:
 - * E. Clark (2007) Young children's uptake of new words in conversation, *Language in Society*, 36:157-182.