

Computational Semantics and Pragmatics

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Outline

Last week of lectures. Topic: **dialogue modelling**

- Today
 - * basic units in dialogue
 - * speech act theory
 - * the joint action model of dialogue
 - * the interactive alignment model (time permitting)
- Tomorrow
 - * dialogue acts
 - * turn-taking
- Homework #3: Available this evening.

Dialogue Modelling

Research on dialogue deals with the study of language as it is used in conversation.

- **spontaneous and online**: disfluent, fragmentary, elliptical
 - * what is grammatical? what are the units of study?
 - * multi-modality
- **multi-agent phenomenon**: coordination
 - * content coordination
 - * coordination of the communicative process: turn-taking, feedback

A transcript fragment from the Switchboard corpus:

B.52 utt1: Yeah, /
B.52 utt2: [it's,+ it's] fun getting together with immediate family. /
B.52 utt3: A lot of my cousins are real close /
B.52 utt4: {C and} we always get together during holidays and
weddings and stuff like that, /
A.53 utt1: {F Uh, } those are the ones that are in Texas? /
B.54 utt1: # {F Uh, } no, # /
A.55 utt1: # {C Or } you # go to Indiana on that? /
B.56 utt1: the ones in Indiana, /
B.56 utt2: uh-huh. /
A.57 utt1: Uh-huh, /
A.57 utt2: where in Indiana? /
B.58 utt1: Lafayette. /
A.59 utt1: Lafayette, I don't know where, /
A.59 utt2: I used to live in Indianapolis. /
B.60 utt1: Yeah, /
B.60 utt2: it's a little north of Indianapolis, about an hour. /

Some Key Units of Analysis

- **Turns:** stretches of speech by one speaker bounded by that speaker's silence – that is, bounded either by a pause in the dialogue or by speech by someone else.
- **Utterances:** units of speech delimited by prosodic boundaries (such as boundary tones or pauses) that form *intentional units* – that is, that can be analysed as an action performed with the intention of achieving something.
- **Dialogue acts:** intuitively, conversations are made up of sequences of actions such as *questioning, acknowledging*, . . . a notion rooted in *speech act theory*.

Speech Act Theory

Initiated by Austin and developed by Searle in the 60s-70s within philosophy of language.

Speech act theory grows out of the following observations:

- Typically, the meaning of a sentence is taken to be its truth value.
- There are utterances for which it doesn't make sense to say whether they are true or false, e.g., (2)-(5):

- (1) The director bought a new car this year.
- (2) I apologize for being late.
- (3) I promise to come to your talk tomorrow afternoon.
- (4) Put the car in the garage, please.
- (5) Is she a vegetarian?

- These (and generally all) utterances serve to perform actions.
- This is an aspect of meaning that cannot be captured in terms of truth-conditional semantics.

Types of Acts

What are exactly the actions that are performed by utterances?
Austin identifies three types of acts that are performed simultaneously:

- **locutionary act**: basic act of speaking, of uttering a linguistic expression with a particular phonetics/phonology, morphology, syntax, and semantics.
- **illocutionary act**: the kind of action the speaker intends to accomplish, e.g. *blaming, asking, thanking, joking,...*
 - * these functions are commonly referred to as the illocutionary force of an utterance \rightsquigarrow its **speech act**.
- **perlocutionary act**: the act by which the locution and illocution of an utterance produce a certain effect on the addressee.

Relations between Acts

Locutionary vs. illocutionary acts:

- The same locutionary act can have different illocutionary forces in different contexts:

The gun is loaded \rightsquigarrow *threatening?* *warning?* *explaining?*

- Conversely, the same illocutionary act can be realised by different locutionary acts:

Three different ways of carrying out the speech act of requesting:

- (6) A day return ticket to Utrecht, please.
- (7) Can I have a day return ticket to Utrecht, please?
- (8) I'd like a day return ticket to Utrecht.

Illocutionary vs. Perlocutionary acts:

- Illocutionary acts are intended by the speaker and are under the speaker's full control.
- Perlocutionary acts are not always intended and are not under the speaker's control.

Types of Illocutionary Acts

Searle distinguished between five basic types of speech acts:

- **Representatives**: the speaker is committed to the truth of the expressed proposition (assert, inform)
- **Directives**: the speaker intends to elicit a particular action from the hearer (request, order, advice)
- **Commissives**: the speaker is committed to some future action (promise, oaths, vows)
- **Expressives**: the speaker expresses an attitude or emotion towards the proposition (congratulations, excuses, thanks)
- **Declarations**: the speaker changes the reality in accord with the proposition of the declaration (provided certain conventions hold), e.g. baptisms, pronouncing someone guilty.

Felicity Conditions

Speech acts are characterised in terms of **felicity conditions** (rather than truth conditions): conditions under which utterances can be used to properly perform actions (specifications of appropriate use).

Searle identifies four types of felicity conditions (Speaker, Hearer):

<i>Conditions</i>	REQUESTING	PROMISING
propositional content	S intends future act A by H	S intends future act A by S
preparatory	a) S believes H can do A b) It isn't obvious that H would do A without being asked	a) S believes H wants S doing A b) It isn't obvious that S would do A in the normal course of events
sincerity	S wants H to do A	S intends to do A
essential	The utterance counts as an attempt to get H to do A	The utterance counts as an undertaking to do A

These conditions can be seen as dimensions on which a speech act can go wrong, but also as constitutive of particular speech acts.

Beyond Speech Acts

Speech act theory was developed by philosophers of language (Austin 1962, Searle 1975) \rightsquigarrow their methodology forgoes looking at actual dialogues.

Empirical traditions that have also shaped current dialogue research:

- Conversation Analysis (sociology): Sacks, Schegloff, Jefferson
- Joint Action models (cognitive psychology): Clark, Brennan, . . .

Speech act theory focusses on the intentions of the speaker. But a dialogue is not simply a sequence of actions each performed by individual speakers.

- Dialogue is a **joint action** that requires coordination amongst participants (like playing a duet, dancing a waltz)
 - * many actions in dialogue serve to manage the interaction itself
 - * they are overlooked by speech act theory
- There are **regular patterns** of actions that co-occur together

Adjacency Pairs

Certain patterns of dialogue acts are recurrent across conversations

question – answer
proposal – acceptance / rejection / counterproposal
greeting – greeting

Adjacency pairs (term from Conversation Analysis)

- pairs of dialogue act types uttered by different speakers that frequently co-occur in a particular order
- the key idea is not strict adjacency but *expectation*.
 - * given the first part of a pair, the second part is immediately relevant and expected
 - * any intervening material is perceived as an *insertion sequence* or a *sub-dialogue*

Waitress: What'll ya have girls?

Customer: What's the soup of the day?

Waitress: Clam chowder.

Customer: I'll have a bowl of clam chowder and a salad.

The Joint Action Model

Also called collaborative model or grounding model.

- Clark & Schaefer (1989) put forward a model of dialogue interaction that sees conversation as a **joint process**, requiring actions by speakers and addressees.
- Conversation is a continuous process of establishing common ground between speaker and addressee ⇒ **grounding**
- Speakers and addressees have **mutual responsibility** in managing the grounding process and making communication successful.

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

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

Levels of Communication

Ladder of actions at different levels of communication performed by speakers and addressee with each utterance (Clark / Allwood)

Level	Actions
1 contact:	A and B pay attention to each other
2 perception:	B perceives the signal produced by A
3 understanding:	B understands what A intends to convey
4 uptake:	B accepts / reacts to A's proposal

In contrast to Austin's distinction between locutionary, illocutionary, and perlocutionary acts, the emphasis here is in the joint character of the actions performed with/by utterances

⇒ effective utterances in dialogue are **joint actions**.

Grounding Criterion

Level	Actions
1 contact:	A and B pay attention to each other
2 perception:	B perceives the signal produced by A
3 understanding:	B understands what A intends to convey
4 uptake:	B accepts / reacts to A's proposal

Lack of understanding may occur at any level of action

- we may not realise we are being addressed
- we may not hear our interlocutor properly
- we may not know the meaning of a word the speaker uses
- we may fail to recognise the relevance of what is said

To achieve grounding, dialogue participants must understand each other at all levels of communication *up to the grounding criterion*:
⇒ the appropriate degree of understanding given the communicative situation at hand (sufficient for current purposes).

Grounding Criterion

Level	Actions
1 contact:	A and B pay attention to each other
2 perception:	B perceives the signal produced by A
3 understanding:	B understands what A intends to convey
4 uptake:	B accepts / reacts to A's proposal

According to Clark, the levels of action are connected by two principles:

- **Upward causality:** actions at lower levels (completed successfully up to the grounding criterion) allow actions at higher levels.
- **Downward evidence:** evidence that a level has been achieved can be taken as evidence that the grounding criterion has been reached at all lower levels.

A: How would you like to be contacted?

B: By email, please. At `john.smith@email.com`

A: OK. Thank you very much and have a good day

B: Goodbye.

Evidence of Understanding

How does it become established whether the grounding criterion has been reached?

- Addressees give constant feedback to the speaker regarding their level of understanding.
 - * **positive feedback**: implicit or explicit acknowledgements
 - * **negative feedback**: clarification requests
- Mechanisms to provide positive evidence of understanding:
 - * acknowledgement
 - * repetition
 - * demonstration (paraphrase, reformulation, completion)
 - * relevant next contribution
- This need for evidence of understanding structures the dialogue into **contributions**:
 - * each contribution to dialogue is made up of a **presentation** phase and an **acceptance** phase.

33 65.67 67.64 P: so (if y + if you) imagine the bottom right
34 67.64 68.79 P: you just got two spaces
35 68.82 69.06 E: | yah
36 68.85 71.32 P: (which . + which) is . sort of . horizontally
37 71.36 71.60 E: | mhm
38 72.06 75.81 P: uhm . you want . . the bottom bit of the l to go to the bottom
39 75.97 76.34 E: | okay
40 77.27 78.86 P: and what you want is (your + the) long ! end
41 78.87 79.21 E: | mhm
42 79.71 80.78 P: to be along the right
43 81.56 82.80 E: | to . be along the right
44 82.80 85.11 E: | okay so it's a reflection of an ordinary english L ?
45 85.26 85.64 P: yes
46 85.70 86.09 E: | okay

Feedback

Feedback mechanisms can be classified according to the level of communication at which the evidence of understanding is given.

A: I know a great tapas restaurant in Goldoni street.

B: Pardon? / A great what? / Goldoni street? / Should I consider this an invitation?

However, there is not a one-to-one correspondence between the form of feedback utterances and their function.

yeah ~> level 1 / 2 / 3 / 4 ?

Goldoni street? ~> level 2 / 3 / 4 ?

Note also that one single utterance can give positive and negative feedback simultaneously:

B: A tapas restaurant where?

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.*

Least Collaborative Effort

Which feedback mechanism is appropriate in a given situation depends on several factors

- the degree of uncertainty regarding a possible misunderstanding
- the desire to be brief and efficient
- ...

Clark's **principle of least collaborative effort**: dialogue participants will try to invest the minimum amount of effort that allows them to reach the grounding criterion.

Here effort is *collaborative* (cf. Gricean quantity maxims)

Grounding and Metacommunication

- The primary function of feedback acts is to manage the grounding process
- They are *meta-communicative*: while other types of acts deal with the topic of the conversation, the subject matter of feedback utterances are the basic acts of communication.

	Layer 1: basic communicative acts	Layer 2: meta-communicative acts
B:	There is not one ticket left in the entire planet! So annoying!	
C:		Where for?
B:		Crowded House.
B:	My brother is going and he doesn't even like them.	
A:	Why doesn't he sell you his ticket?	<i>implicit positive evidence</i>
B:	Cos he's going with his work. And Sharon.	<i>implicit positive evidence</i>
A:		Oh, his girlfriend?
B:		Yes.
B:	They are gonna come and see me next week.	

Interim Summary

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.

Interactive Alignment Model

The collaborative model assumes that dialogue partners take into account their common ground and thus model each other to some extent.

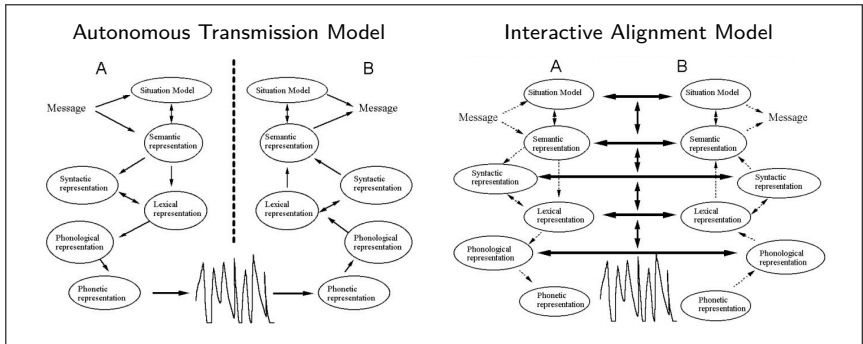
Pickering & Garrod (2004) have argued that there are powerful automatic mechanisms that lead dialogue participants to converge.

- **Priming**: unconscious effect whereby exposure to a stimulus or “prime” increases the likelihood of producing behaviour that is identical or related to the prime.
- Priming is related to memory: the likelihood of producing forms that have been primed by a previous stimulus decreases as the distance from the prime increases.
- Priming across interlocutors supports direct alignment and leads to successful communication.

Interactive Alignment Model

- Successful dialogue leads to aligned representations at every level
- Alignment at one level enhances alignment at other levels
 - * e.g., syntactic alignment is enhanced by lexical / semantic overlap:

nun **giving** a book to a clown (V NP PP rather than “nun giving a clown a book”) → “sailor **showing** a hat to a girl”; more priming with “sailor **giving** a hat to the girl”
 the **sheep** that’s red (Relative Clause rather than “the red sheep”) → “the **book** that’s red”; more priming with “the **goat** that’s red”



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