

Computational Pragmatics

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Recap from last lecture

Join Action model of dialogue by Herb Clark and colleagues.

Grounding: the process of coordinating mutual understanding and accumulating common ground.

- **Levels of communication**: ladder of joint actions (contact, perception, understanding, uptake).
- **Grounding criterion**: there must be mutual understanding at all levels up to a context-dependent grounding criterion
- **Feedback**: participants must give evidence of grounding (or lack thereof)
- **Downward evidence**: positive feedback at a level n is taken as evidence of grounding at all levels $< n$.

Gricean Pragmatics

We have contrasted the joint action / collaborative model to traditional speech act theory. The model is also influenced, and contrasts with, another strand of traditional pragmatics:

Paul H. Grice (1975) *Logic and Conversation*, in *Syntax and Semantics*, Vol. 3. New York: Academic Press

Grice's starting point: We very often mean more than what we literally say:

A: Are you going to Paul's party?
B: I have to work.
~> *I am not going.*

- B *implies* that she's not going to the party *without saying it*.
- This enrichment of the literal meaning is not a logical implication or entailment of B's utterance – it depends on features of the **conversational** context → **conversational implicature**
- Grice proposes that conversational implicatures can be systematically accounted for by a set of general rationality principles for the efficient and effective use of language in conversation.

The CP and the Maxims

The Cooperative Principle: Make your contribution such as it is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged.

- **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 (for the current purposes of the exchange).
 - ▶ Do not make your contribution more informative than is required.
- **Maxim of Relation:** be relevant
- **Maxim of Manner:** be perspicuous.
 - ▶ Avoid obscurity of expression / Avoid ambiguity.
 - ▶ Be brief / Be orderly.

Grice's point is not that we adhere to these maxims on a superficial level, rather that we interpret utterances assuming that the principles are being followed at some deeper level, often contrary to appearances.

Types of Implicature

- The speaker is directly observing the maxims:

Both Kyle and Ellen need \$10 for their movie tickets.

Kyle to Ellen: "I have \$9"

Implicature: *Kyle does not have \$10.*

- The speaker violates a maxim that clashes with another one:

A: In which city does Kim live?

B: She lives somewhere in Spain.

Implicature: *B does not know which city Kim lives in.*

- The speaker is openly flouting a maxim to exploit it:

A newspaper review of a newly opened play: "Soap opera star Rose Singer produced a series of sounds corresponding closely to the score of an aria from Rigoletto."

Implicature: *the reviewer believes that Rachel Singer's performance was not good.*

Reference letter for a PhD position: "His hand writing is lovely"

Implicature: *the referee believes the applicant does not have better qualities*

Beyond Grice

The Gricean maxims are formulated as exhortations to the speaker
– *be efficient!*

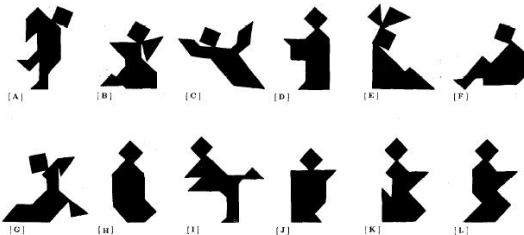
The collaborative model of Clark & colleagues elaborates on this idea by emphasising that conversation is a **joint collaborative process**.

To investigate these issues empirically, **referring tasks** have been used as a case study (e.g., matching task, map task).

Matching Referring Tasks

The classic “*Tangram experiments*” by Clark & Wilkes-Gibbs:

- **matching referring task**: an instruction giver (director) and an instruction follower (matcher)
- the task is to get the matcher identify the tangram figures
- the task is repeated (in different orders) over several trials



This facilitates investigation of the referring process as participants accumulate **common ground** and precedents for referring expressions.

Referring as a Collaborative Process

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.

Minimizing Collaborative Effort

- Clark & Wilkes-Gibbs' **Principle of Least Collaborative Effort**
"Our proposal is that speakers and addressees try to minimize collaborative effort, i.e. 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.

Establishing Conceptual Pacts

When speakers and addressees arrive at a successful expression (*ground* a reference), they create 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 leather shoe, kinda pennyloafer.

B: Okay, okay, got it.

⇒ Thereafter “the pennyloafer”



Conceptual pacts

- overwrite quantity maxims: they will continue to call it ‘*the pennyloafer*’ even when it does not need to be distinguished from other shoes
- are *partner-specific*: they will do so only when interacting with the dialogue partner with whom the expression had been grounded.

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

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 (1966) Concurrent feedback, confirmation, and the encoding of referents in verbal communication, *Journal of Personality and Social Psychology*, 4:343–346.

Referring in Interactive Settings (summary)

- speakers don't get only one chance to produce a description – they can reformulate
- they receive online feedback from their addressees
- addressees themselves contribute to the referring process
- referring expressions do not emerge from solitary choices of the speaker (cf. Gricean maxims), but from an interactive process by speaker and addressee.
- speakers and addressees can agree on a description for a referent during the referring process – what works for a dyad may not work for another one

⇒ Referring is a **joint process** where speakers and addressees try to **minimize collaborative effort**.

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

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

Constraints on Grounding

Principle of least collaborative effort: try to ground with as little combined effort as needed. \rightsquigarrow *what takes effort changes with the communication medium.*

Eight constraints that a medium may impose on communication:

1. **Copresence:** A and B share the same physical environment.
2. **Visibility:** A and B are visible to each other.
3. **Audibility:** A and B communicate by speaking.
4. **Cotemporality:** B receives at roughly the same time as A produces.
5. **Simultaneity:** A and B can send and receive at once and simultaneously.
6. **Sequentiality:** A's and B's turns cannot get out of sequence.
7. **Reviewability:** B can review A's messages.
8. **Revisability:** A can revise messages for B.

Clark, H. H., & Brennan, S. E. (1991). Grounding in communication. In L. B. Resnick, J. Levine, & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 127–149). Washington, DC: APA.

Constraints on Grounding

Table 1

SEVEN MEDIA AND THEIR ASSOCIATED CONSTRAINTS

Medium	Constraints
Face-to-face	Copresence, visibility, audibility, cotemporality, simultaneity, sequentiality
Telephone	Audibility, cotemporality, simultaneity, sequentiality
Video teleconference	Visibility, audibility, cotemporality, simultaneity, sequentiality
Terminal teleconference	Cotemporality, sequentiality, reviewability
Answering machines	Audibility, reviewability
Electronic mail	Reviewability, revisability
Letters	Reviewability, revisability

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Costs of Grounding

For each of the grounding constrains, the cost of different grounding techniques vary. Some costs that vary across media affording different constrains (see Clark & Brennan (1991) for details):

Costs paid by the **speaker**:

- Formulation and Production

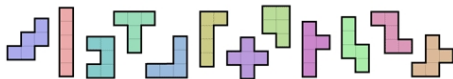
Costs paid by the **addressee**:

- Reception and Understanding

Costs paid by **both interlocutors**:

- Start-up
- Delay
- Asynchrony
- Speaker change
- Display
- Fault
- Repair

Different media have different profiles of grounding costs. Speakers trade off on the costs of grounding



- B: it's a block of three . and then one tagged on . to the edge
- A: oh it's like . . a symmetrical L and then another two blocks . attached on to another end kind of thing
- B: What? [laughter]
- A: Okay, uhm you've got . . uh (t- + two) blocks
- B: Yeah.
- A: Uhm and then on the end of those two blocks
- B: Yeah.
- A: you've got .. . another . block (it's like + it's) kind of making an L
- B: u:hm.
- A: and then . . on that block . on that edge . uhm
- B: I think I know what you're talking about, so there's three blocks up and one block across but in the middle block . of the one that's going up there's one sticking out [...]
- A: One by one block that's been taken out and it's been moved
- B: Yes and this has been put in the middle. Yeah yeah yeah yeah.
- A: In the middle. Yeah?
- B: Yeah, got it.
- A: Yeah, OK.

R. Fernández, D. Schlangen, & T. Lucht (2007) Push-to-talk ain't always bad! Comparing Different Interactivity Settings in Task-oriented Dialogue. In *Proc. of SemDial*.

R. Fernández, T. Lucht, & D. Schlangen (2007) Referring under Restricted Interactivity Conditions. In *Proc. of SIGdial*.