WE EVOLVED TO READ MINDS

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Outline:

• To what extent, if at all, do we integrate shared representations in linguistic communication?

• Two rival accounts of common ground processing
  - Theoretical framework for distinguishing between hypotheses
  - Considerations toward an adaptationist psycholinguistics

Common ground debate in psycholinguistics broadly polarised between two camps
Live debate with no current resolution - a framework that allows us to integrate or distinguish between hypotheses
Such a framework complements an overarching approach of using biological adaptation as an additional constraint when considering rival hypotheses in psycholinguistics
Theoretical work in progress with Thom at Centre for the Coevolution of Biology and Culture - Durham University
Common Ground

- Mutual knowledge against which utterances are produced and comprehended

- We know that people tailor their production to their audience (Snow, 1972; Shatz & Gelman, 1973; Bell, 1984; Fussel & Krauss, 1992; Brennan & Clark, 1996)

- In order to do this, speakers/listeners must design/interpret speech according to a particular kind of knowledge called common ground. (Clark & Marshall, 1981; Clark, 1992; 1996) i.e. information that they share and know that they share.

Best explained through triadic communication; if we must refer to a thing, we both need to know that we both know what that thing is. Production = Snow (motherese) Shatz (4yos shorter utterances for younger) Bell (radio sociolinguistic variable [t]) Fussel (longer descriptions for uninformed. Audience effects.
Common Ground

“I hear they found moles digging in the garden”

“Yes. I hear pest control is coming at noon tomorrow”
Debate is broadly polarised between two opposing positions on the extent to which we integrate the knowledge of other people. Give background on both.

Bounded, cheap, relatively low level processes somehow give rise to ostensibly more complex coordination behaviour.

Viable referents only identified on the basis of a referent label.
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**Common Ground: Egocentric Model**

- Communicators as Cognitive Misers (Fiske & Taylor, 1984)

- Communication predicated upon most easily-accessible information, including privileged information (e.g., memory, private knowledge, perceptual instance)

- Optional adjustment stage uses common ground to detect and correct errors. (Keysar, Barr, Balin & Brauner, 2000)

- Tasks of referent-label comprehension most conducive to experimental study…
“Move the small candle”
Found that search for referent was subject to private information interference because of its perceptual availability
Complements wider pragmatic and cognitive-pragmatic literature based on watching what people do with language via transcripts of IRL discourse, discourse analysis (Politeness theory, Gricean maxims) identifying components necessary to complete

Common Ground: Full Constraint Model

- Common ground is the critical foundation upon which all utterances are produced and comprehended

- Therefore constrains all levels of linguistic processing

- “The speaker designs his utterance in such a way that he has good reason to believe that the addressee can readily and uniquely compute what he meant on the basis of the utterance along with the rest of their common ground” - Clark, Shrauder & Buttrick, 1983, p.246

- Approach that complements wider pragmatic and cognitive-pragmatic literature (Clark & Marshall, 1978; 1981)
  - identifies components necessary in observed communication to achieve successful discourse

- Defines discourse as “joint action”
Helpers were asked to do something with a referent when the cook’s hands were either empty or full; when full, search domain extended to first include Cook’s referents.
Literal meaning as consequence of lab controlled measures, 
Language in use ---> used to characterise what must be involved for discourse as a task
Levels of analysis (Marr, 1982)

- Computational (what and why?)
- Algorithmic (how?)
- Physical (what structures implement this?)

computational level: what does the system do (e.g.: what problems does it solve or overcome) and, equally importantly, why does it do these things
algorithmic/representational level: how does the system do what it does, specifically, what representations does it use and what processes does it employ to build and manipulate the representations
physical level: how is the system physically realized (in the case of biological vision, what neural structures and neuronal activities implement the visual system)
Processing costs and conception of language in terms of literal meaning as this is most amenable to processing measures

Top-down approach of describing task of discourse and identifying necessary components of the solution

Phenomena should have complementary levels, and so this requires some theoretical resolution
Levels of analysis

• “An algorithm is likely to be understood more readily by understanding the nature of the problem being solved than by examining the mechanism (and the hardware) in which it is embodied” (Marr (1982), p. 27)

• “The analysis of behavior need not wait until brain scientists have done their part. The behavioral facts will not be changed. Brain scientists may discover other kinds of variables affecting behavior, but they will turn to a behavioral analysis for the clearest account of the effects of these variables” (Skinner, 1989, pp. 18)

• “If you wanted to study the neurology of an ant, let’s say, you begin by asking what does the ant do? [...] You want to find the units of computation.” (Chomsky, recent interview on applying Marr to neuroscience)
Adaptationist considerations

- Psycholinguists invoke adaptationism whenever they make a functional claim (Tooby & Cosmides, 1990)

- Consilience with evolutionary theory is certainly desirable...
  “If current theory of language is truly incompatible with the neo-Darwinian theory of evolution, one could hardly blame someone for concluding that it is not the theory of evolution that must be questioned, but the theory of language” (Pinker & Bloom, 1990)

- To establish how an adaptation works, finding out what it is doing (and why) makes predictions about the necessary components.

In order to consider why a functional trait has been selected for, we MUST ask what task it is solving in order to establish its adaptive value. All functionalism is ultimately attributable to natural selection.

We can safely say our communicative architecture is an adaptation to the task of communication. Form FOLLOWS function.

TINBERGEN LOOSELY MAPS TO MARR’S LEVELS
To answer algorithmic, can have expectations based on what system does (FUNCTION)

To answer computation from the bottom up requires you to build an organism and then observe its behaviour anyway.
The task of human communication

- Triadic communication as joint action (Clark, 1992; 1996)

Triadic communication requires joint action which requires partner-specificity
Task must overcome underdeterminacy of meaning
Speaker-meaning is need - pragmatics varies on detail, but unanimously ostensive-inferential communication
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Speaker-meaning is need - pragmatics varies on detail, but unanimously ostensive-inferential communication
Different pragmatic theories disagree on details, but production is ostensive and that its goal is to induce a particular change in the listener’s mind, and that comprehension is inferential and its goal is to discover the speaker’s intended meaning.

Often huge gap between literal and speaker meaning. How do speakers must plug this gap - they use the information they have in common with their partner. NOT JUST CODE-DECODE
The question is not how we can decode linguistic meaning cheaply, but how we can establish mutual knowledge cheaply.

Giving evidence to your partner of your speaker meaning, requires you exploit common ground

**Common ground integration**

- The signal meaning is underdetermined if the goal is speaker meaning
- Speaker meaning must be reached inferentially
- Utterances must be produced in evidence of one’s own speaker meaning
- Both can be achieved by exploiting common ground
- This cannot be achieved by an algorithmic level that is not constrained by partner-specific mutual knowledge
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Common ground integration

- Applying an adaptive heuristics approach requires that we characterise the task being solved
- Communication is not a trait: it is not an individual performance

• The question is not:
  How do we decode linguistic meaning cheaply?

• Rather:
  How do we establish common ground cheaply?
To infer all of what another person knows is incredibly costly and probably impossible. Common ground, however, is stuff we BOTH have access to.

Establishing definite reference is also probably impossible - so we use Clark’s copresence heuristics.

If this guy says BOX, he’s going to be talking about the one we share, as we’re trying to do joint action. Emergent properties of RELEVANCE THEORY.
CRUCIALLY the difference here is how both camps conceive of what communication IS. By considering the task FIRST, we are able to have better expectations about how these are carried out, rather than trying to characterise communication as something individuals do.
References

References