The value of social awareness for general language understanding

Christopher Potts
Stanford Linguistics
Levinson’s analogy
Levinson’s analogy

“We interpret this sketch instantly and effortlessly as a gathering of people before a structure, probably a gateway; the people are listening to a single declaiming figure in the center. [...] But all this is a miracle, for there is little detailed information in the lines or shading (such as there is). Every line is a mere suggestion.”
Reference in context

<table>
<thead>
<tr>
<th></th>
<th>Context</th>
<th>Utterance</th>
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<tbody>
<tr>
<td>1.</td>
<td></td>
<td>darker blue</td>
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<tr>
<td>2.</td>
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<td>Purple</td>
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<td>3.</td>
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<td>4.</td>
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Monroe et al 2017, *TACL*
Lexical pacts

Round 1: All right, the next one looks like a person who’s ice skating, except they’re sticking their arms out in front.

Round 2: Um, the next one’s the person ice skating that has arms out.

Round 6: The ice skater.

Clark and Wilkes-Gibbes 1986, *Cognition*
The council refused the demonstrators a permit because they feared violence. Who feared violence?

1. The council
2. The demonstrators

Winograd 1972, *Understanding Natural Language*
The council refused the demonstrators a permit because they feared violence. Who feared violence?

1. The council.
2. The demonstrators

The council refused the demonstrators a permit because they advocated violence. Who advocated violence?

1. The council
2. The demonstrators
Sarcasm

Bla bla … sentiment … bla bla bla … networks …

I actually kind of liked it.

Dude, that was even more boring than his gray shirt, eh?!

Yeah right. Great talk… He didn’t even talk about deep learning.

West et al 2016, TACL
Sarcasm

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Social balance theory

“The friend of my enemy is my enemy”

West et al 2016, TACL
Plans and goals

Yellow boxes mark cards in your line of sight.

You are on 2D

Task description: Six consecutive cards of the same suit

The cards you are holding

Move with the arrow keys or these buttons.

Potts 2012, WCCFL
Plans and goals

What’s going on?
⇒
Which suit should we pursue?
⇒
Which sequence should we pursue?
⇒
Where is card X?

Potts 2012, WCCFL
Plans and goals

Underspecification

Player 2: Look for 2.
Player 1: and the 3?
Plans and goals

**Underspecification**

Player 2: Look for 2.
Player 1: and the 3?

**Context**

Holding \{4H, 5H\}
Plans and goals

*Domain restriction*

Player 1: lets do spades
Player 2: Ok. I haven’t found anything...lol

Potts 2012, WCCFL
Plans and goals

*Domain restriction*

Player 1: lets do spades  
Player 2: Ok. I haven’t found anything...lol
The indexical field for -ing/in’

Campbell-Kibler 2007, American Speech
Eckert 2008, Journal of Sociolinguistics
Pragmatic interpretations

Literal listener:
$L_0(\text{world} \mid \text{message, context}) \propto \text{lexicon} \cdot \text{prior}$
Pragmatic interpretations

Pragmatic speaker:
$S_1(\text{message} \mid \text{world, context}) \propto \text{Literal listener} - \text{message costs}$

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Frank and Goodman 2012, Science
Bergen et al 2016, Semantics & Pragmatics
Pragmatic interpretations

Pragmatic listener:
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Frank and Goodman 2012, Science
Bergen et al 2016, Semantics & Pragmatics
On what could have been said

Where two forms are in salient contrast, the choice of one will lead to inferences about the other.

- Community members adopt a speech style that is easily distinguished from the mainstream, enhancing solidarity.
- An individual systematically varies their speech style by context to construct different personae.
Style matching

When interacting, people unconsciously align their communicative behaviors at many levels:

- Posture
- Head nodding
- Speech rate
- Pause length
- Back-channel
- Self-disclosure
- **Function word rates**
- **Concept naming**
Style matching in corporate email

**Probabilistic language models**: the relative frequency of linguistic units used by each individual. The units we consider: words and LIWC categories.

**Jensen–Shannon distance**: symmetric measure of dissimilarity between two probability distributions.

**Linguistic reference groups**: defined by each individual’s interactional partners rather than by model-external organizational units.

See also Danescu-Niculescu-Mizil 2013, *WWW*
Adaptation predicts involuntary exit
Adaptation predicts involuntary exit
Adaptation predicts attainment
Consequences for NLU systems

- Many aspects of natural language understanding are not linguistic.
- Thus, certain problems are *impossible* with language data alone.
- Many of those problems are quite tractable when aspects of the social context, narrowly and broadly construed, are brought in.
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Thanks!