Experimental Pragmatics

Advanced Pragmatics

LIN 266

October 5, 2012
1. What is experimental pragmatics?

2. Scalar implicatures

3. Definite reference and common ground
Domains of experimental pragmatics

- scalar implicature
- common ground
- metaphor
- idioms
- speech acts
- jokes
- ...
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- scalar implicature
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1. What is experimental pragmatics?

2. Scalar implicatures

3. Definite reference and common ground
Scalar implicatures

(1) Mary: Who did John date?
Sarah: He dated some of the girls on his swim team.
\[ \rightsquigarrow \text{He dated some, but not all of the girls on his swim team.} \]

(2) Mary: Who went to the party?
Sarah: John or Peter did.
\[ \rightsquigarrow \text{Either John or Peter, but not both, went to the party.} \]

*generalization*: use of a statement with a weak element (on a scale of a strong and a weak element) implicates the negation of the stronger statement
A key feature of scalar implicatures: cancelability

(3) *Explicit cancellation*
Anne: Was the exam hard?
Bill: Some students failed. In fact, all of them did.

(4) *Implicit cancellation*
John: Is there any evidence against them?
Mary: Some of their identity documents are forgeries.
“He dated some of the girls on his swim team.”

- Sarah uttered the statement with *some* instead of *all*, which would have been relevant (in compliance with *Relation*) and more informative (flouting of *Quantity-1*).
- If Sarah knew that John dated *all* of the girls on his swim team, she would have said so.
- Sarah is well-informed and complies with *Quality* (i.e. she is honest).
- Thus, it is not the case that John dated *all* of the girls on his swim team.
Why experiments?

Different theories about pragmatic inference have developed from an argument about communicative efficiency.

The argument (Levinson, 2000)

1. There is a significant bottleneck in the rate of information that can be transmitted via human speech.
2. Nevertheless, linguistic communication proceeds at a miraculous speed.
3. Thus, the communicative system must have evolved a solution to the problem of the articulatory bottleneck.

What is the solution?
The Default Model (Levinson, 2000)

Particularized Conversational Implicature (PCI)
Implicature arises in virtue of special features of the context.

Generalized Conversational Implicature (GCI)
Implicature arises unless context blocks it.

- Default Model translates the PCI-GCI distinction into processing terms:
  - PCI: implicature not computed by default (slow)
  - GCI: implicature computed by default upon encountering lexical trigger (fast); cancellation in a second step if necessary

- solution to the bottleneck problem: make inference cheap by making GCIs cost-free
Relevance Theory (Sperber & Wilson, 1995)

- criticizes the GCI-PCI distinction as unparsimonious
- comprehenders engage in inferential processing until some threshold for relevance is met
- definition of relevance: tradeoff between processing effort necessary to derive an inference and the positive cognitive effects associated with that inference
- cognitive effect: a proposition that resolves a question under discussion
- implicatures are derived if the literal meaning of an utterance is not relevant enough in context
- solution to the bottleneck problem: powerful inferential system geared towards maximizing relevance
Literal-first hypothesis (Huang & Snedeker, 2009)

- two stages:
  - compute semantic content of an utterance
  - compute pragmatic content of an utterance
- implicatures are computed after an utterance's literal meaning
- solution to the bottleneck problem: ??
Constraint-based approaches (Degen & Tanenhaus, under review)

- inspired by constraint-based approaches to sentence processing
- comprehenders are sensitive to the multiple cues available in context
  - speaker knowledge
  - syntactic context
  - prosody
  - question under discussion
- implicatures are derived more robustly and more quickly, the more probabilistic support they receive from the available cues
- solution to the bottleneck problem: make more predictable inferences (given context and learned over the course of linguistic experience) cheaper
Processing predictions for scalar implicatures

Compared to literal controls (*all* or *weak some*), scalar implicature computation should be:

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Response times: slow implicatures Bott and Noveck (2004)

Measured response times in a sentence verification paradigm:

**Stimuli**

1. Some elephants are mammals. TRUE (weak) or FALSE (strong)
2. Some mammals are elephants. TRUE
3. All elephants are mammals. TRUE
4. Some elephants are insects. FALSE
5. All mammals are elephants. FALSE
6. All elephants are insects. FALSE

**Results**

Participants took longer to respond FALSE than TRUE to (1) sentences, i.e. they took longer to respond in a way that reflected they had derived the implicature than when they didn’t.

- Reading: what focus structure are subjects assigning to the utterance?
- Response time: what goes into it? Sentence verification vs. inference computation
- Naturalness of utterances
- People are trained to respond TRUE or FALSE

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Eye-tracking

- sensitive, time-locked measure of linguistic processing
- eye movements more implicit measure of comprehension than overt judgments
- fine-grained measure of how interpretation unfolds over time
Target = beaker
Cohort = beetle
Unrelated = carriage

Look at the cross. Click on the beaker.
“Point to the girl that has some/all/two/three of the socks/soccer balls”
Eye-tracking: slow implicatures Huang and Snedeker (2009)

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“Point to the girl that has **some/all/two/three** of the **socks/soccer balls**”
Eye-tracking: slow implicatures Huang and Snedeker (2009)

“Point to the girl that has some/all/two/three of the socks/(ccer balls)"

- measure: eye movements
- predictions:
  - default: same pattern in all conditions (fast convergence on target after quantifier)
  - 2-stage: delayed looks to target only for “some”
“Point to the girl that has some/all/two/three of the so...”
“Click on the girl who has some of the balls/all of the balloons.”

- semantic interpretation of some (some and possibly all) does not disambiguate
- pragmatic interpretation of some (some but not all) does
- all disambiguates (literal control)
looks to target increase 200-300ms after quantifier onset (both for *some* and *all*)
→ rapid computation of the implicature
Conflicting evidence

- under certain conditions pragmatic enrichment from *some* to *not all* is delayed (Bott & Noveck, 2004; Breheny et al., 2006; Huang & Snedeker, 2009), under others it’s not (Grodner et al., 2010; Breheny et al., 2012).

- let’s focus on the crucial difference between Huang & Snedeker, 2009 and Grodner et al., 2010: use of *number terms* as filler items.
What would you say?

“Point to the girl who has…”
the subitizing game
Subitizing (Kaufmann et al 1949)
Delays in implicature processing may not be caused by going through discrete stages of semantic and pragmatic processing, but by evaluating contextual alternatives.
The gumball paradigm
The gumball paradigm
• Utterance: You got some of the gumballs.
Utterance:
You got some of the gumballs.

Task:
- Experiment 1 & 3: rate naturalness of description
- Experiment 2: 2AFC (agree/disagree)

→ This allows us to correlate naturalness with response times.
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Independent variables:
- Quantifier: *some*, *summa*, *all*, *none*, *number terms*
- Set size in lower chamber: 0 - 13
Experiment 1 - results

Set size vs. Mean rating

Quantifier
- exact
- some
- some of the

Mean rating

Set size
Experiment 2 - results

The graph illustrates the mean response time (ms) as a function of set size for two quantifiers: exact and some. The data points show an increase in response time with larger set sizes, especially noticeable for the quantifier "exact."
Regions of interest: subitizing range, unpartitioned set. Note: these are all YES responses! Ie interference effect even in the absence of implicatures
Presence vs. absence of number terms

Previous results:

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<tr>
<td>number terms</td>
<td>present</td>
<td>absent</td>
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<td>target set size</td>
<td>small (2)</td>
<td>small (2)</td>
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<td>effect</td>
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Possible explanations:

1. pre-coding (e.g. Huang & Snedeker)
2. interaction of number term presence with naturalness of some (us)

Experiment 3: Does adding number terms to the alternatives reduce naturalness in subitizing range but not for large sets?
Experiment 3 - results

![Graph showing the relationship between set size and mean rating for different number terms and quantifiers.

- Number terms:
  - absent (Exp 1)
  - present (Exp 2)

- Quantifiers:
  - exact
  - some

The graph displays the mean rating against set size, with error bars indicating variability. The x-axis represents set size, ranging from 0 to 13, and the y-axis represents mean rating, ranging from 0 to 6.]
Scalar implicature processing - state of the art

- early studies found that implicatures are delayed relative to processing of literal meaning
- newer evidence for rapid integration
- ongoing work testing the effect of contextual cues on the time course of scalar implicatures
  - speaker competence (Bergen & Grodner, 2012; Grodner & Sedivy, 2011)
  - naturalness of lexical alternatives (Degen & Tanenhaus)
  - relevance of stronger alternative (Zondervan, 2008; Laurel Raymond)

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October 5, 2012  34 / 50
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What is experimental pragmatics?

Scalar implicatures

Definite reference and common ground
Gricean reasoning requires taking into account our interlocutor’s belief state (and vice versa) as well as common ground (shared beliefs).

...but are we really this sensitive to our interlocutor’s perspective?
Common vs. privileged ground

**Common ground:**

information (direct and inferred propositions and beliefs) assumed by an interlocutor to be shared by the other interlocutor

**Privileged ground:**

information that is assumed to be unavailable to the other interlocutor
second mentions of a referring expression are durationally shorter and less intelligible than first mentions in a narrative

is this a purely speaker-based effect, or are we sensitive to our listeners’ knowledge state?

Gregory et al: repeat stories from memory twice, either to same or different hearers
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effect of hearer knowledge!
Is language processing egocentric?

- If comprehenders treat privileged ground differently from common ground → comprehenders take into consideration the state of their interlocutor → language processing would not be egocentric
- Early experiments suggested that listeners are egocentric (Keysar et al., 2000, 2002)
- Later experiments provided evidence for non-egocentricity (Hanna et al., 2002, 2003; Brown-Schmidt & Tanenhaus, 2008, Heller et al., 2008)
The general framework: Sedivy et al 1999

- reference resolution via pragmatic inference (Quantity-2 maxim)
- size contrast between only one pair of objects makes pre-nominal modification felicitous for that pair (over-informative otherwise)
- if we’re aware of the contrast in the display, we should expect pre-nominal modification only for the objects of the contrast pair

“Pick up the small basket.”
One contrast: Point of disambiguation (POD)

“Pick up the big duck.”

recognition of object already during processing of adjective (“big”)
→ pragmatic inference due to contrast immediately integrated
One vs. two contrasts: Heller et al. 2008

- prediction: recognition should be delayed until noun because adjective does not carry sufficient information to disambiguate

“Pick up the small pot.”
Two contrasts: Point of disambiguation (POD)

“Pick up the big duck.”
One vs. two contrasts

- early effect of adjective due to pragmatic inference about adjective choice in one-contrast condition
“Put the big duck on the bottom.”

- same as just discussed
Heller et al. 2008: privileged vs. common ground

“Put the big duck on the bottom.”

- same as just discussed
- egocentric and non-egocentric view make same predictions
- egocentric view predicts late POD
- non-egocentric view predicts early POD
Result: fixations on target

- comprehenders take into account what the speaker knows
early evidence for ego-centric language processing, where common ground is only used as a cue to the speaker’s intention once hearer-internal heuristics apply

later evidence that common ground information is accessed immediately to derive implicatures in incremental language comprehension

ongoing work testing the effect of contextual cues on the time course of common ground integration
  - goodness of fit of object in privileged ground to referential expression (Gorman, 2012)
  - speaker reliability (Grodner & Sedivy, 2011)

References II


