Guess Who's Coming (and Going): Bringing Perspective to the Rational Speech Acts Framework

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PERSPECTIVAL EXPRESSIONS

Expressions like *come* and *to the right* are **perspectival**: in order to interpret them, the listener must decide from whose point-of-view they are being used. We propose a Rational Speech Acts model of interpreting perspectival expressions, positing that listeners reason jointly about the speaker's intended message and their choice of perspective.

PERSPECTIVAL MOTION VERBS

1. *Thera is coming to Northampton in an hour*
2. *Thera says that I am coming to the cafe.*

- Convey information about the perspective holder's location as well as their literal meaning (that someone is in motion)
- Their perspectival component is presuppositional (Oshima 2006; Barlew 2017)
- In English, allow 3 kinds of perspective-holders: speaker, addressee, and subjects of attitude verbs.

LEXICAL SEMANTICS

Semantics of *come* (Barlew 2017):
For any world w, perspective a, destination d, and entity x,
$[[\text{Come}(x, d)]]^{w,a} = T$ iff
(a) *Motion implication*: $[[\exists e.\text{Move}(x, e) \,\&\, \text{Dest}(d, e)]]^{w,a} = T$
(b) *Anchoring implication*: $[[\exists y.\text{Loc}(y, d)]]^{w,a} = T$ and
y is a salient perspective-holder with perspective a.
Semantics of *go*:
For any world w, perspective a, destination d, and entity x,
$[[\text{Go}(x, d)]]^{w,a} = T$ iff
(a) *Motion implication*: $[[\exists e.\text{Move}(x, e) \,\&\, \text{Dest}(d, e)]]^{w,a} = T$

MODELING PERSPECTIVE

GOALS

- Show how the listener decides which perspective is in use and generate experimentally falsifiable predictions
- Capture the preference for speaker perspectives explored in Harris (2012) and Roberts (2015).
- Show how the anti-perspectival interpretation of *go* can arise through pragmatic competition with *come*, as posited by Wilkins & Hill (1995) and Sudo (2018)

RATIONAL SPEECH ACTS MODEL

- Listeners interpret utterances according to a mental model of how the speaker picks an utterance (Frank & Goodman 2012).
- Has been applied to a variety of phenomena, including projective content (Qing et al. 2016); scalar implicatures (Potts et al. 2016); and lexical uncertainty (Bergen et al. 2012; Kao et al. 2014; Bergen et al. 2016).

PERSPECTIVAL RSA MODEL

Literal listener:

$$L_0(w|m, a) \propto [[m]]^{w,a}\, p(w)$$

where w = world
m = message
a = perspective

Literal speaker:

$$S_0(m|w, a) \propto \text{softmax}(\log L_0(w|m, a) - \text{Cost}(m) - \text{Cost}(a))$$

Pragmatic listener:

$$L_1(w, a|m) \propto S_0(m|w, a)p(w)p(a)$$

As in lexical uncertainty RSA models (Bergen et al. 2012; Kao et al. 2014), the pragmatic listener reasons jointly over two terms, in this case, world and perspective.

COST FUNCTIONS

The perspective cost function penalizes non-speaker perspectives, reflecting the preference for speaker perspectives explored in Harris (2012).
The utterance cost function penalizes complexity (Bergen et al. 2012).

SET OF UTTERANCES

X is going to Northampton
X is coming to Northampton

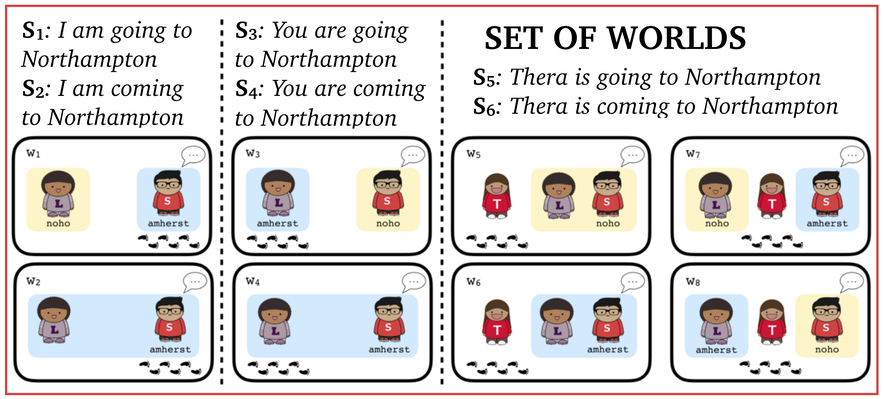
SET OF PERSPECTIVES

Sarah's (speaker)
Lydia's (listener)

S_1: *I am going to Northampton*
S_2: *I am coming to Northampton*
S_3: *You are going to Northampton*
S_4: *You are coming to Northampton*

SET OF WORLDS

S_5: *Thera is going to Northampton*
S_6: *Thera is coming to Northampton*



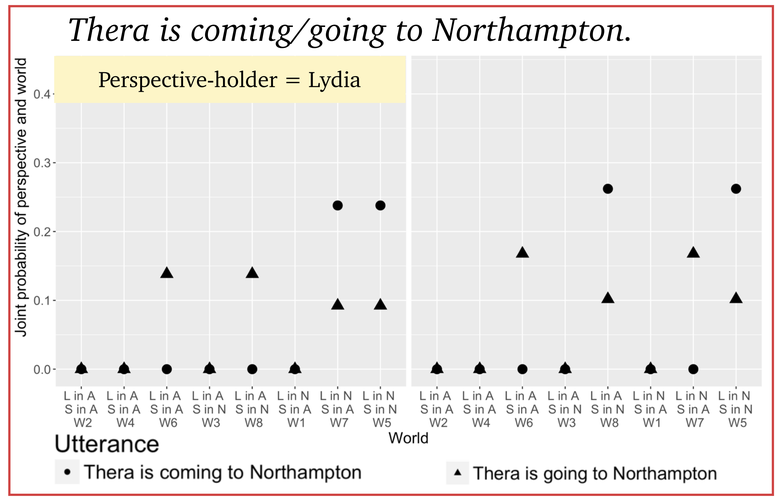
MODEL PREDICTIONS

We implemented the model in WebPPL (Goodman & Stuhlmüller 2014) and ran 100,000 iterations using Markov Chain Monte Carlo sampling. We set uniform priors over utterances, worlds, and perspectives, and explored parameter settings of {0,0.25,0.5,0.75,1.0} for perspective cost.

THE LEXICAL SEMANTICS OF *GO*

Our model shows how the anti-perspectival interpretation of *go* can arise via pragmatic competition with *come* even if its lexical semantics are not perspectival (Wilkins & Hill 1995; Sudo 2018).

Figure 1: *Model predictions for Thera is going to Northampton and Thera is coming to Northampton, speaker cost = 0.5*



CONSIDERING MULTIPLE PERSPECTIVES

Existing theories of perspectival expressions posit a default perspective-holder: the speaker (Harris 2012; Roberts 2015). In the PRSA, however, listeners take into account all possible perspectives when interpreting an utterance.

PRSA Prediction: *the marginal likelihood of worlds with multiple possible perspective-holders at the destination (W_5) will be higher than worlds with just the speaker at the destination (W_8).*
Speaker-Default Prediction: *the marginal likelihood of worlds where the speaker is at the destination (W_5, W_8) will be equal.*

Figure 2: *Non-zero posterior probabilities for Thera is coming to Northampton, speaker cost = 0.5*

AT DESTINATION	SPEAKER	LISTENER	MARGINAL
Both	0.26	0.24	0.5
Listener	0.0	0.24	0.24
Speaker	0.26	0.0	0.26

CONCLUSION

We propose a RSA model for perspectival expressions.
Key insights:
(1) Perspectival interpretations of *go* can arise through pragmatic competition even without a perspectival lexical semantics
(2) Listeners should favor worlds that are consistent with multiple perspectives.

ACKNOWLEDGEMENTS

Many thanks to Lyn Frazier, Richard Futrell, Jesse Harris, and our SCIL reviewers for their thoughtful feedback.