Resolving Quantity and Informativeness Implicature in Indefinite Reference

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The Phenomenon

- The man injured **his** child.
- The man injured **someone else’s** child.
- The man injured **a** child.

OWN

OTHER’S
The Phenomenon

- The man injured his child.
- The man injured someone else’s child.
- The man injured a child.
The Phenomenon...

...and the research question

What determines this variation in the directionality and strength of inferences about utterance meaning?
Gricean inferences

- **Quantity**: Be brief.
- **Informativeness**: Be informative.

**Q-implicature**

John ate *some* of the cookies
+> but *not all* of them

**I-implicature**

I’ll give you $5 *if* you mow the lawn
+> but *only if* you do

**The X V-ed a Y.**

Grice (1967, 1975); Zipf (1949); Levinson & Atlas (1987); Levinson (2000); Horn (1984, 2004); Frank & Goodman (2012)
The Rational Speech Act (RSA) model

Assumption 1: The “Lexicon”

- The man injured a child.
- The man injured his child.
- The man injured someone else’s child.

Frank & Goodman (2012)
### The Rational Speech Act (RSA) model

#### Assumption 1: The “Lexicon”

<table>
<thead>
<tr>
<th>Utterance</th>
<th>OWN</th>
<th>Other’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>The man injured a child.</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>The man injured his child.</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>The man injured someone else’s child.</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

#### Assumption 2: Utterance costs

\[
D(a) = 1 \\
D(his) = 1 \\
D(someone else’s) = 4
\]
The Rational Speech Act (RSA) model

**Literal Listener**

$L_0 \sim \text{lexicon} \ast \text{prior}$

**Gricean Speaker**

$S_1 \sim \exp \left( \log \left( \frac{L_0}{\text{cost}} \right) \right)$

**Pragmatic Listener**

$L_1 \sim \text{prior} \ast S_1$

### Utterance Cost

<table>
<thead>
<tr>
<th>Utterance</th>
<th>OWN</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>The man injured a</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>The man injured his own child.</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>The man injured someone else's</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Frank & Goodman (2012)
Predictions

1. Interpretations track priors
2. Baseline $Q$-implicature towards OTHER’S
3. Reduced $Q$-implicature in “headlines”
4. Strengthened $Q$-implicature where $X$'s $Y$ is unique

$D(a, \text{OWN}) > D(a, \text{OTHER'S})$

Frank & Goodman (2012); Hawkins (1991); Jäger (2012)

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Methodology

Experiment 1: Interpretations

What do you think this sentence is about:

Man shaved leg.

- his own leg
- someone else's leg

Norming experiment: Priors

How likely is a man to save his own family compared to saving someone else's family?

100% likely to save his own family equally likely 100% likely to save someone else's family

response ~ prior + X Y uniqueness + relatability + headline + (1 + headline | item)
man saving family

teacher injuring student

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Results

Model Predictions

Regression Results

Model Coefficients

Prior

Posterior

OWN

OTHER’S

OWN

prior only

The X V-ed a Y.

X V-ed Y.

The X V-ed a Y.

(\(X^{'}s\) Y unique)

(\(X^{'}s\) Y unique)

***

(\(X^{'}s\) Y unique)

Prior

OWN

OTHER’S

Model Predictions

Regression Results

Prior

OWN

OTHER’S

Model Coefficients

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Discussion point 1 of 3: No effect of the prior?

3 possibilities:
1. Noisy measures
2. Maybe RSA got it wrong?
3. Event priors vs. “Intention priors”

Norming experiment: Priors

How likely is a man to save his own family compared to saving someone else's family?

100% likely to save his own family

100% likely to save someone else’s family

equally likely

Model Coefficients

OWN

Other’s

ns

***

***

***

ns

***

***

II Resolution in Indefinite Reference

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Discussion point 2 of 3: Support for RSA

RSA excels at predicting Q-implicatures:
1. Overall OTHER’S skew
2. Opposing trend in headline versions
3. Enhanced Q-implicature where X’s Y is unique
Discussion point 3 of 3: Relatability – Q or I (or neither?)

**The X** V-ed **a Y.**

The *man* injured a child.
The *father* injured a child.

2 possible reasons:
- *Ad hoc* Q-implicature about referring expressions (e.g. *man* vs. *father*)
- I-driven inference from real-world knowledge about the event participants (cf. I almost bought a *car* today but the *engine* was too noisy.)

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Hirschberg (1985); Clark (1975); Prince & Cole (1981); see also Cohen & Kehler (in prep)
Conclusion

What we have learned

• Forced-choice experiments and mixed-logit models: great for studying interpretational preferences
• $Q/I$ resolution is determined by multiple interacting factors
• RSA captures the essence of $Q$-implicature
• We don’t understand Informativeness nearly as well
• Inference taxonomies may become explanatorily obsolete

Where to go from here

• Cross-linguistic validation of RSA
• More research on $I$-driven inferences
Thank you.
References


RSA predictions by disambiguation costs
Comparing RSA implementations
Regression results

- Intercept: $p < .001$
- +Relatable: $p < .001$
- +X's Y unique: $p < .001$
- Prior: $p = .13$

Model Coefficients

<< OTHER'S  |  -2  |  -1  |  0  |  1  |  2  | OWN >>
Logit transform