Updating Alternatives in Pragmatic Competition

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Overview

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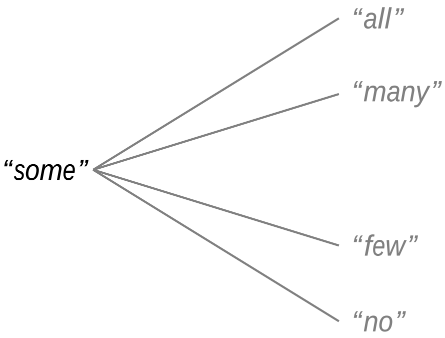

The basic recipe

A Gricean inference (an abbreviated "basic recipe" from Geurts 2009):

(1)
a. Assume: The speaker utters "some".
b. Assume: The speaker is cooperative.
c. The alternative "all" is more informative than "some".
d. By (b) and (c), the speaker must lack evidence to assert "all"
e. Assuming the speaker is knowledgeable, she lacks evidence because "all" is false.

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But why did we pick "all" in (c) as opposed to some other expression?

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f. *"some" conjoined with "not(some but not all)" is* ***all***

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For a Gricean theory to be non-contradictory, we need some principl reason why all is an alternative but some but not all isn't.

Lexicalized alternatives

The neo-Gricean solution (Horn 1972, Gazdar 1979, Atlas and Levinson 1981 etc.): alternatives are lexicalized.

(3)

$$\begin{bmatrix} \text{phon}: & \text{“some”} \\ \text{cat}: & \text{Det (DP/NP)} \\ \text{sem}: & \{\langle A, B\rangle \mid A \cap B \neq \emptyset\} \\ \text{alts}: & \langle \text{few, many, all} \rangle \end{bmatrix}$$

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Horn and Abbott 2012: evidence for alternative scales comes from paradigmatic contrastive expressions.

not only X but Y

X if not Y

X or even Y

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A theory which hard-codes alternatives via lexicalization need a way of verifying when and how items are lexicalized as alternatives.

Structural approaches

Katzir 2011: alternatives aren't lexicalized. An expression can compete withany expression of the same syntactic category.

Structurally de ned alternatives

The alternatives of a sentence S is any S^0 derived from S by:

- deleting nodes or,
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(4) a. Some of the students left.
b. All of the students left.
c. Some but not all of the students left.

(b) is an alternative to (a) as it is derived by lexical substitution.

(c) is not an alternative as we have to insert extra material.

Cost-based approaches

An intuition from Grice: speakers prefer less complex expressions.

e.g., Bergen et al 2016: *some but not all* is less preferred to *all* because of its structural complexity.

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Cost (Potts et al. 2016)

$C : M \mapsto R$ is a cost function on messages.
For lexical items, costs are specified. For a non-terminal node A with daughters $B_1 \ldots B_n$, $C(A) = \sum_{i=1}^{n} C(B_i)$.

At what cost?

Our goal today: delve deeper into this notion of cost.

Our guiding intuition about cost

An expression X's cost re ects its \ease of use", determined by several factors including structural complexity (e.g., frequency, politeness).

Our study focuses on the relevance of an expression's frequency in the immediate discourse.

More frequently used expressions should be \easier to use", and thu have lower cost.

Key hypothesis

Y should implicate: JXK more strongly each time X is used in the immediate discourse.

Motivation & general design

Testing the hypothesis experimentally in the domain of epistemic modals (see also: Schuster & Degen 2018, Lassiter 2016)

(6) It {might | will | is likely to} rain.

- *might* competes with more informative modals *will* / *likely*, implicating lower probabilities.
- This implicature should become stronger the more times the alternative expressions are used in the interaction.

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The main task Rating the naturalness of a modal statement given contexts that vary in likelihood of rain

Stimuli

Weather report with chance of rain in increments of 10%:

0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%

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Stimuli

Between-subject condition Di erent range of alternatives:

(7) Condition without `likely' : It f might j will g rain.

- a. might: 3 times
- b. will: 3 times

(8) Condition with `likely' : It f might j will j is likely to g rain.

- a. might: 2 times
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For condition with `likely' Also tracked # of `likely' encountered up to the current trial:

Procedure

Questions in a trial:

- Q1: Given what Lily knows, is her statement above true or false? (forced choice)
- Q2: How naturally does Lily's utterance describe the state of the world? (ratings from 0{100 on a slider bar)

10 trials: 6 target trials, 4 llers/controls

Target trials paired with 6 di erent contexts (pseudo-randomized)

Procedure

Participants 480 native speakers of American English from Amazon Mechanical Turk

Analysis A series of mixed e ects regression models tted to might data, with:

- Naturalness as the main dependent variable
- (i) context, (ii) condition or likely count as predictors
- interaction between the two above
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Data Here we focus solely on might trials

Results: condition e ect

Without likely With likely

Results: condition e ect

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Naturalness ofmight across 2 conditions

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= 27:10; S:E: = 3 :71; t = 7:3;

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Without likely With likely

= 27:10; S:E: = 3 :71; t = 7:3;

= 25:73; S:E: = 4 :22; t = 6:09;

- Naturalness of might across 2 conditions
- might signi cantly less natural in 80{100% region in the `likely' condition
- might signi cantly less natural in 0{20% region in the `likely' condition

Results: frequency e ect

With likely condition

Results: frequency e ect

With likely condition

Results: frequency e ect

With likely condition

= 23:11; S:E: = 9 :94; t = 2:32;

might worse in 70{100% region the more one encounterslikely

Results: frequency e ect { will?

Results: frequency e ect { will?

might worse in 100% region after encounteringwill once

Results: frequency e ect { will?

But naturalness ofmight in 100% region goes up again after encounteringwill twice

Summary of results

- Predictions broadly con rmed & hypothesis corroborated
- The implicature: JlikelyK is strengthened the more one encounters likely

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- The result suggests a model whereby listeners incorporate informati
  about frequency into their pragmatic reasoning.

Cost in pragmatic theory

Our notion of the cost of X: \ease of use" of X.

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The `speaker' in RSA (Lassiter and Goodman 2017)

The speaker weights preferences between alternatives based on utility (U).

$$\text{Util}_{S_1}(\text{uttr} ; \text{Answ}; \;) = \ln(\text{LitListnr}(\text{Ans}|\text{uttr} ; \;) \quad \text{Cost}(\text{uttr}))$$

The speaker weighs

i. the likelihood the listener will choose answer A given utterance u and contextual standard .
ii. the cost of uttering u.

What is cost?

We propose to articulate several parameters entering into the calculation of cost of u:

1. The structural complexity of u (cf. Katzir 2011, Potts et al. 2016).
2. The politeness/social appropriateness of u (cf. Yoon et al 2016).
3. The baseline frequency of u.
4. How recent was the last occurrence of u
5. The frequency of u in the immediate discourse.
6. ...

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Unpacking cost

C(u) = Freq(u) Complex(u) Polite(u) Rec(u) ::::

A priori, might is unlikely to compete with indubitably due to its baseline low frequency) (high C).

But if a speaker demonstrates a willingness to use indubitably () lower C), it should compete with might.

Discourse frequency and cost

Our primary focus: the frequency of u in the immediate discourse

DFreq(u) `the discourse frequency of u': a parameter which lowers cost each time u is encountered in the discourse.

Discourse Frequency

$$\mathrm{DFreq}(u) = \exp(\ \frac{n}{\ })$$

n | the no. times u has been used in the immediate discourse,

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Let = 6. DFreq(`likely') lowers as n increases.

The baseline cost of `likely' may be lowered when multiplied by DFreq(`likely') depending on the value of .

(9)
a. Cond1: DFreq(`likely^0) = exp(0=6) = 1
b. Cond2: DFreq(`likely^0) = exp(1=6) = 0 :846
c. Cond3: DFreq(`likely^0) = exp(2=6) = 0 :717

A simulation in RSA

- The e ect is demonstrated using RSA (Lassiter and Goodman 2017)
  - Jmight(rain)K= 1 i P(rain!) > 0
  - Jlikely(rain)K= 1 i P(rain!) >
- The likelihoodL_1 assigns to each chance of rain given an utterance might. likely becomes a better competitor each time it is used.
  - Assuming at priors on and normal distribution over rain likelihood.

n(`likely') = 0 n(`likely') = 1 n(`likely') = 2

Conclusion

- The big question: what are the constraints and factors that determin relevant alternatives in pragmatic inferences?
- Established one factor: interlocutors' willing to use an alternative in given discourse, signalled by frequency in the interaction.
- Pragmatic competition sensitive to a host of contextual factors, including metalinguistic factors like the ease of use a form.

Selected References

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