

What is the speaker's context when selecting numerically-quantified expressions?

A theoretical and experimental approach

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A model, and its implications for context

- Constraint-based model of numerical quantifier usage (and interpretation)
- Contextual information treated as a factor in the choice of expression
 - and hence source of pragmatic enrichments
- Model can be evaluated as a potential technique for handling contextual information
 - What is relevant context?
 - How is it relevant?

Motivations for a constraint-based model

- Semantic considerations do not select a unique numerically-quantified expression for a situation



More than 20/19/18...

Fewer than 25/26/27...

Between 20 and 25/19 and 26...

...boats are in the harbour

Motivations for a constraint-based model

- Intuitively we expect quantity expressions to meet certain criteria



?23, or – slightly less likely – 24, or...

?More than two... ...boats are in the harbour

?Less than a million...

Motivations for a constraint-based model

- Yet these can't necessarily all be satisfied at the same time



**(Exactly) 23...*

**(About) 20...*

**Some...*

...boats are in the harbour

Motivations for a constraint-based model

- Possible solution:
 - Consider criteria as violable constraints

e.g. informativeness, numeral salience, quantifier simplicity

Situation: 22+ boats

Candidate utterances:

“at least 22” – violates NSAL, QSIMP?

“more than 21” – violates NSAL

“more than 20” – violates INFO

Motivations for a constraint-based model

- Possible solution:
 - Consider criteria as violable constraints
 - Optimality Theory formalism:
 - Evaluate candidate outputs by their adherence to constraints
 - Select optimal output – that which incurs least serious violations
- What are the constraints?
 - Constraints established individually as factors that influence usage

Constraints and context

- Classical OT
 - Two types of constraints
 - Markedness constraints govern surface forms (e.g. *COMPLEX in phonology)
 - Faithfulness constraints govern relation of surface form to underlying form (e.g DEP in phonology)
- Here, can treat context as ‘underlying’:
 - Markedness constraints govern output in itself (e.g. NSAL)
 - Violated by ‘marked’ output, e.g. a non-round numeral
 - Faithfulness constraints govern relation of output to context
 - Violated by candidate outputs that are inappropriate to the context in some specified way

Constraints relating to context

- Numeral priming (NPRI)
 - Violated if a contextually activated numeral is not re-used
- Quantifier priming (QPRI)
 - Violated if a contextually activated quantifier is not re-used
- Evidence includes patterns of corrections to quantified statements (e.g. in Cavegirl experiment, Katsos et al.)
- Granularity (GRAN)
 - Violated if there is a mismatch between the granularity level expressed by the numeral and that required by the context
- Evidence includes Van der Henst et al.'s time studies.

Modelling usage and interpretation preferences

- Usage: optimal form used
- Interpretation:
 - Hearer reconstructs speaker's intention given information conveyed, namely what the optimal form is
 - e.g. “more than 100” $\not\Rightarrow$ “not more than 101”...
 - but “more than 90” \Rightarrow “not more than 100”
- Thus, speaker's choice of expression conveys additional pragmatic information, and this is *to some extent* recoverable by the hearer

Contextually conditioned interpretation

- In the absence of context:
 - “more than 60” \implies “not more than 100/80/70”
- What if 60 is contextually activated?
 - A: “This rack holds 60 CDs”
B: “I own more than 60 CDs”
 - Suppose B owns more than 70/80/100 CDs. Could the above utterance have been made?
 - YES, if B is doing so in order to obey numeral priming
 - Therefore, on classical pragmatic grounds, inference fails/is weakened
 - Estimates for value in primed condition are higher than in unprimed condition (Cummins, Sauerland and Solt, in prep.)

Numeral priming?

- Does this constitute unambiguous evidence for NPRI / the constraint-based model in general?
 - NO
 - Could reflect the operation of some other constraint, e.g. relating to Question Under Discussion
 - Could be modelled by some other technique, e.g. applying relevance theory (by some other means)
- However, model stands as (at least) potential means to generate non-obvious hypotheses

Defining context by constraints

- Recall:
 - Markedness constraints are evaluated against the surface form
 - In this case, the quantified expression itself
 - Faithfulness constraints are evaluated against the matching between surface and underlying forms
 - In this case, the correspondence between the quantified expression and the context
 - Can think of this as ‘optimal expression’ being selected ‘given the context’

Defining context by constraints

- OT model: all that matters is whether the utterance violates the constraints
 - Only information that is relevant to determining that is relevant to the choice of utterance
 - In particular, the only contextual information that is relevant is that which is referred to by faithfulness constraints
- Hence, model makes claim about what constitutes 'relevant context'
 - If (!) model of this type were to prove adequate for speaker behaviour, its faithfulness constraints exhaust relevant context
 - Observation holds irrespective of details of decision procedure

Tentative conclusion

- Still far from exhibiting adequate model
 - Additional constraints likely to be needed, weakening claim
- Difficult to generalise model to other domains
- Possibly necessary to refine definitions of violations

- However, model does offer possible sharpening of ‘context’, just as it does for ‘relevance’ in general
- Worth pursuing?
 - Possibly as a model of context
 - More likely as a hypothesis generation tool