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The interaction of contextual & linguistic factors in the selection of quantified expressions

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A model of quantifier usage: and context

- Constraint-based model of numerical quantifier usage (and interpretation)
  - Motivation
  - Construction
  - Predictions
  - Validation

- A (proposed) *definition* of relevant context

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...   ...boats are in the harbour

Between 20 and 25/19 and 26...

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...   ...boats are in the harbour

*Some...

Motivations for a constraint-based model

- Possible solution:
  - Identify the criteria
  - See which utterance fits them best

  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

Proposed constraints

- Markedness constraints
  - Numeral salience
  - Quantifier simplicity
- Faithfulness
  - Quantifier priming
  - Numeral priming
  - Granularity
  - (Informativeness)

Modelling usage and interpretation preferences

- Usage:
  - Optimal form used, given speaker's constraint ranking

- Thus, choice of expression conveys information about
  - (pragmatic) meaning
  - speaker's constraint ranking

- Interpretation:
  - Hearer reconstructs speaker's intention given information conveyed, namely what the optimal form is
  - e.g. "more than 100" $!\Longrightarrow$ "not more than 101"….
  - but "more than 90" $\Longrightarrow$ "not more than 100"

Contextually conditioned interpretation

- In the absence of context:
  - "more than 60" $\Longrightarrow$ "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