More than *at most*: possible meanings of modified numerals

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Thanks

- to the organisers
- to Stavroula for her thesis, continuing to raise interesting questions…

Speaker knowledgeability

- "By using *at least n* the speaker asserts that the quantity in question is in a certain range, i.e. in [*n*, …), hence she is competent and specific about which particular values are excluded (i.e., those that are lower than *n*), which is not applicable or clear in the case of uttering *approximately n*, whereby the speaker just gives an estimation and the listener cannot tell precisely where the speaker's knowledge starts and ends. That is to say, in the former case a speaker uttering the target sentence of our experiment could be understood as being specific and knowledgeable to some extent because she excludes certain values." (p.132f)

Intimations of knowledge?

- What does the use of a particular modified numeral tell us about the speaker's knowledge?
  - Implicature is one case in which we draw inferences of this kind, but not the only one

"More than *n*" revisited

- Cummins, Sauerland and Solt (2012): looking at interpretation of *more than n*
  - Responding to a claim from Fox and Hackl that these expressions fail to give rise to scalar implicatures
  - e.g. *John has more than four children* !-> *...not more than five...*
  - *This case holds more than 80 CDs* similarly doesn't convey *not more than 81...*
  - ...but it does convey *not more than 100*, for instance

"More than *n*" revisited

- On the account in Cummins et al., this last interpretation is a scalar implicature
  - SIs arising on scales conditional by granularity, this being akin to "equal lexicalization" in Horn's work
- However, some issues arising
  - Why is 5 not a scalar alternative to 4?
  - And if it isn't, why does *Bill can jump 4m* still seem to convey (implicate?) *…not more than 5m*?

Intimations of knowledge?

- What does the use of a particular modified numeral tell us about the speaker's knowledge?
  - Implicature is one case in which we draw inferences of this kind, but not the only one
  - Technically this assumes intentional communication
  - Clearly it supposes that the speaker is knowledgeable about the stronger proposition: otherwise interpreting *more than 80* as *not more than 100* runs the risk of miscommunication

When can we say *more than 80*?

- Seems to be OK for a speaker who has exact knowledge about the quantity, and it's <100
  - *At least 80* somewhat odder in this case
- OK for a speaker who doesn't have exact knowledge, as long as they're sure >80 holds
  - Similarly for *at least 80*, although this might suggest that the speaker isn't sure that *more than 80* holds

So how do we interpret *more than 80*?

- Correspondingly, two possible interpretations
  - Speaker is certain that “not more than 100”
  - Speaker is not certain that “more than 100”
  - Corresponding to the full implicature and ignorance interpretations of a weak scalar like *some*
  - Although with the added wrinkle that there are perhaps different candidates for the strong scalar (85, 90, 100?)

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  - Similarly for *at least 80*, although this might suggest that the speaker isn't sure that *more than 80* holds
- Additionally, OK for a speaker who is sure >80 holds and wants to use 80 as an anchor point

Anchoring (in some sense)

- Nicklaus believes Tiger Woods can win more than 18 majors (https://www.golfmagic.com/golf-news/nicklaus-says-again-tiger-can-beat-my-18-majors)
- Fontaine…doubts whether another player will ever score more than 13 goals in a single World Cup (https://www.fifa.com/mm/Document/AF-Magazine/FIFA1904/02/76/84/37/03_EN_2016_FIFA1904_LowRes_03_EN_Neutral.pdf)
- Edurne Pasaban has climbed every mountain that is at least 8000m in height
  - Note: lowest 8027m…

Consequences?

- Subsequent reasoning different, perhaps invoking different heuristics
- Choice of a particular modifier not just about deciding what information we'll convey, but perhaps also about determining which anchor point we are able to use
  - Using *at least* versus *more than*, or *approximately* rather than either of these, might make it possible to use a particular anchor point that would otherwise be blocked on Gricean Quality grounds

Mapping utterances to knowledge states

- Recapturing the speaker's knowledge state is difficult, because multiple different states map to the same utterance
  - True even taking a reductive view of speaker knowledge in which we just assume it to be uniform over (m, n)
- *More than 80* could relate to
  - [m], for some $80 < n < 100$
  - [m, n], for some $80 < m < 100$
  - or either of these for any m if 80 is a relevant anchor point

Available in interpretation?

- Does a hearer have access to all these possibilities?
  - That would suggest an RSA-style process of reconstructing the speaker's knowledge state
  - Or are hearers more implicature-like in their reasoning, using only selected alternatives under the right conditions?
- If the readings are all available, how do we choose?
  - What factors do we rely on? Are they the right ones?
- Do we draw the pragmatic inferences that should be available under such a system?

Example: *approximately*

- Consider *approximately 90* versus e.g. *approximately 100*, *at least 90*, *at most 90*
- Might invite inferences that the quantity under discussion is
  - Potentially less than 90
  - Potentially more than 90
  - Unlikely to be sufficiently distributed across 100 in the speaker's expectation that *approximately 100* would be better…

Pragmatic (perhaps too pragmatic?)

- On this kind of view, a lot of things that we might call implicatures, ignorance inferences, etc., are available but follow indirectly
- The kinds of inferences we might be able to draw from *at least/most* in that case aren't like those we get from either
  - Placing uncertainty in the semantics, or
  - Representing the meaning as disjunctive
- To test this, we would need to probe the hearer's actual inferences more closely and thoroughly

An application: rationality

- Tversky and Kahneman (1981): framing effects leading to irrational choice patterns
  - Minimal example: “75% lean” beef preferred to “25% fat” beef (Levin 1987)
- Recent evidence that L2 users less susceptible (Costa et al. 2014, Keysar et al. 2014)
- However, ‘irrationality’ of choice depends on punctual interpretation
  - Doesn’t exhaust framing effect (in L1 users), but seems to contribute to it (Mandel 2013)

Choice in the ADP

- Version 1: "200 will be saved" vs. "1/3 probability 600 will be saved, 2/3 probability none will be"
- Version 2: "400 will die" vs. "1/3 probability no-one will die, 2/3 probability 600 will die"

- Mandel's results suggest that making "exactly" vs. "at least" readings explicit interferes with the preference
  - However, many other possible interpretations have yet to be properly considered: how can we get at them?

Summary

- Still much to be known about the details of the interpretations of numerically-quantified expressions
- Natural to approach this with the methodologies used for SI – but perhaps not the same, e.g. in crispness or subjective certainty
- Many elegant theories found wanting in certain particulars (a point emphasised by Stavroula's experimental work)