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AG13 – Proportions and Quantities

The granularity of fractions

Chris Cummins
University of Edinburgh
c.r.cummins@gmail.com



Modified fractions

- Expressions relating the quantity under discussion to a (proper) fraction
 - *more than a half*
 - *less than two-thirds*
 - *about one tenth, etc. etc.*
- Generally seem to have been little-studied, with one notable exception

“More than a half”

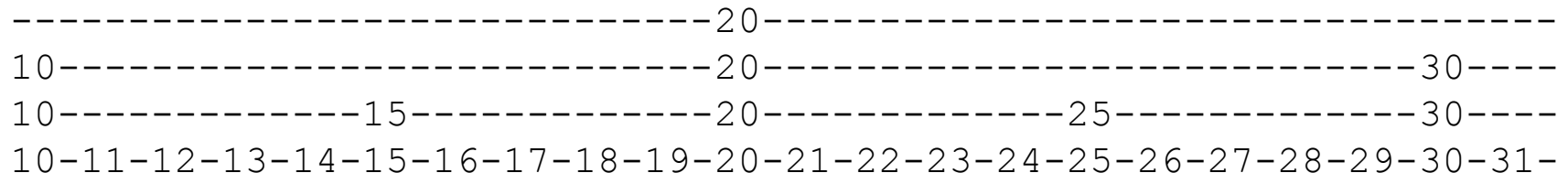
- See Solt (in press)
- Particularly of interest for its contrast with “most”, which naively we might think has the same truth-conditions
- Critical data include differences in distribution
 - More than half of Americans are female*
 - ?With 36%, the Conservatives won most of the votes*
- Broad question of how the modified fraction “competes” with (simpler?) quantifier

Today, a slightly different question...

- How do modified fractions “compete” with other modified fractions?
 - And what kind of pragmatically enriched meanings arise as a result?

Motivation: granularity

- Krifka (and others): scales can differ in their density of representation points
- Time domain a notable example
 - *I got home at 6:07pm vs. I got home at 6pm*
- Similar point can be made for number (Krifka 2009)
 - *103 people were there vs. 100 people were there*
- Apparent simplicity/precision trade-off



Granularity and modified numerals

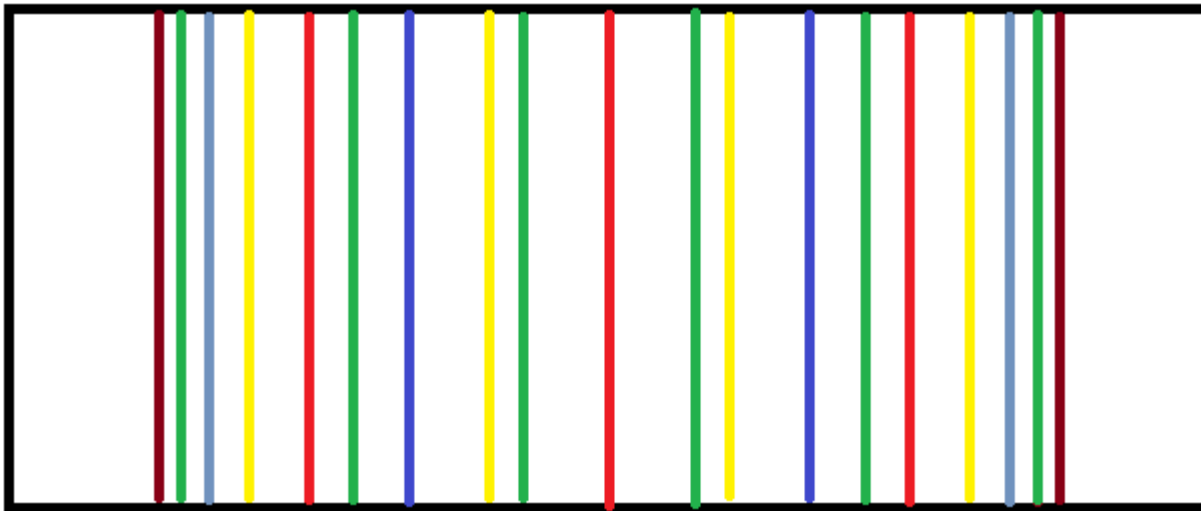
- Expressions such as “more than n ” give rise to pragmatic enrichments that are apparently conditioned by granularity (Cummins, Sauerland and Solt, 2012)
 - “more than 70” conveys “not more than 80”, but does not convey “not more than 71/72/...”
 - Could be explained by (implicit) reasoning about the use of alternatives, given granularity considerations
 - 80 a good alternative to 70 here; 71, 72, ... would not be – use of fine-grained numbers (presumably) dispreferred

Orderliness of granularity scales

- The time and number scales share the following features:
 - Coarse-grained scale points line up with fine-grained scale points
 - Facilitates conversion between levels; perhaps crucial to meaning of coarse-grained scale points that there is a choice
 - Scale points divide the possible range of values up sensibly
 - Number scales appear to be locally uniform, globally logarithmic (see Jansen and Pollmann 2001)
 - Communicatively efficient for obvious reasons
- Neither of these considerations apply for the domain of fractions, unless we consider only one denominator at a time

Fractions' potential scales

- e.g. thirds and quarters – erratic distribution, no points in common except endpoints
- Or all denominators up to 8, integer numerators...



Impact on interpretation?

- Might expect this to lead to some complication in the interpretation of modified fractions
- For instance, *more than seven tenths* should implicate “not more than eight tenths [= four fifths]” on its own scale...
- ...but might also implicate “not more than three quarters”
- Similarly, *less than seven tenths* might implicate “not less than sixth tenths” or (stronger) “not less than two thirds”
- Choice of interpretation should give us some insight into the hearer’s system of fraction representation

Relatedly: motivation

- Practically, expressions of this kind (along with modified percentages) used to convey much high-stakes information
- From a semantic/pragmatic perspective, a test case for how we navigate between different levels of granularity
- Conceivably relevant to questions of how we cognise about number (which operations are more primitive? etc.)

Introducing some pilot data...

- Many possible subquestions of the overarching issue: these include
 - Do we get range interpretations from modified fractions that take into account the location of the next scale point?
 - If so, do these interpretations get influenced by coarser-grained scale points on the way (*more than 7/10 -> not more than 3/4*)?
 - And do they get influenced by finer-grained scale points (*less than 1/4 -> not less than 1/10*)?

Pilot studies

- Two questionnaires (15 and 14 items) fielded separately on Mechanical Turk (n=20 for each)
 - v1 aimed at “less than one quarter/fifth...” and counterparts
 - v2 aimed at quarters, fifths, tenths

A market research company has conducted a detailed survey on a large group of people, and has written up the results. For instance, “More than 50% of the participants are female”, “Less than 20% of the participants own two cars”, and so on.

You’re now going to read some expressions that have been used to summarise the results from the survey. For each one, please state the range of possible values, in percent, that you think the expression means.

For example, if the expression is “about half”, you might say that that means between 45% and 55%, or between 40% and 60%, etc.

There are no ‘correct’ answers: we’re interested in knowing what you think.

Summary of results

- We do get pragmatically restricted ranges
 - v1: 300 responses: 75 incorrect, 114 literal, 111 pragmatic
 - v2: 280 responses: 18 incorrect, 119 literal, 143 pragmatic
- Many of these reflect granularity
 - Examples: *more than one tenth* – 7 UBs at 19% or 20%;
less than nine tenths – 7 LBs at 81%
- Some bounds based on “coarser” alternatives
 - Examples: *more than seven tenths* – 4 UBs at 74% or 75%;
more than two fifths – 6 UBs at 49% or 50%
- Some bounds based on “finer” alternatives
 - 10% and 90% as bounds; 75% as UB for *more than a half* (but...)

Outlook

- Would like to gather some more data, more systematically
- Some potential usefulness to this from a purely practical perspective...
- ...but from a theoretical point of view, results already suggest that the landscape of alternatives in the domain of fractions is somewhat complex
- Data about interpretation might give us some insight into the way hearers (and speakers) represent this mentally
- Might also offer insight into the general relation between economy of expression and informativeness