



# Inferences about implicatures

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# Implicature

- A central topic for experimental semantics/pragmatics
  - Particularly **quantity implicature**, and most of all **scalar implicature**
- Why so central?
  - Intuitively appealing and comprehensible examples
  - Competing credible theories (e.g. Gricean, relevance-theoretic, defaultist, grammatical)
  - Many real-life examples, including in consequential public discourse (cf. *some of them are good people*)
- Richly studied in the lab...but with some differences to real-life communicative settings
- Today:
  - What goes into quantity implicature
  - Limitations of the experimental assumptions
  - Towards a more general model of pragmatic inference

# Basis of quantity implicature

- The speaker makes an informationally weak statement and thereby conveys the negation of a stronger alternative
  - Note: “quantity” in the sense of “quantity of information” or “Grice’s maxim of quantity”
  - This does apply to quantitative/quantificational settings, and many of the classic examples are of this kind (e.g. *some vs. all*)
  - However, the same idea is applicable to qualitative information (e.g. *Did you see her parents? / I saw her mother*)

# Mill vs. Hamilton on *some*

- *“If I say to any one, ‘I saw some of your children to-day’, he might be justified in inferring that I did not see them all, not because the words mean it, but because, if I had seen them all, it is most likely that I should have said so: though even this cannot be presumed unless it is presupposed that I must have known whether the children I saw were all or not.”*
- Offered as an argument for the semantic meaning of *some* as ‘some (and possibly all)’ rather than ‘some but not all’
  - Draws on ideas about the hearer’s expectations about the speaker’s cooperative behavior that were not systematized until a century later



# Implicature in a Gricean system

- Grice's Cooperative Principle and maxims attempt to formalise (hearer expectations about) speakers' motivations
- We can sketch out predictions about when a weak statement, e.g. using *some*, will implicate the negation of the stronger (*all*)
  - Specifically, the speaker of *some* potentially violates the first submaxim of Quantity, "Make your contribution as informative as is required (for the current purposes of the exchange)" (Grice 1989: 26)
  - One possible explanation for them saying *some* is that actually that is enough information for the current purposes (hence no violation)
    - This would apply to cases where the alternative with *all* isn't in fact more informative:
    - *It's not true that some of the students failed*
    - *If some of the students failed, I'll be upset*

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  - If Quantity is violated, a possibility is that the speaker would otherwise have violated Quality, which would be worse
    - Perhaps the speaker does not know whether the alternative would be true
    - Only if the speaker is presumed to know whether or not the alternative would be true can we conclude that their non-utterance of it is meant to convey its falsity

# Addendum to a Gricean system: politeness

- Grice's maxims (clearly not the last word on the subject) don't say anything about politeness
  - Adding this into the system, another possible reason for a speaker to refrain from making the stronger statement would be if that violates politeness
- Thus, we now want all the following conditions to be satisfied before a standard quantity implicature is drawn:
  1. The stronger statement is relevant to the current discourse purpose
  2. The speaker is presumed to be knowledgeable about the truth-value of the stronger statement
  3. There's no other social reason, such as politeness, why the speaker should refrain from making the stronger statement if it is true
- There's reasonable evidence for each of these factors bearing upon the availability of implicature in the predicted fashion

# Effect of relevance

- Manipulated by Breheny et al. (2006) in a self-paced reading paradigm

Table 4

The English translation of an item from Experiment 3

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*Upper-Bound Context with 'some'*

Mary/asked John/whether he intended to host/all his relatives/in his tiny apartment./John replied/that he intended to host/some of his relatives./The rest/would stay/in a nearby hotel.

*Upper-Bound Context with 'only some'*

Mary asked John/whether he intended to host/all his relatives/in his tiny apartment./John replied/that he intended to host/only some of his relatives./The rest/would stay/in a nearby hotel.

*Lower-Bound Context with 'some'*

Mary was surprised/to see John/cleaning his apartment/and she asked/the reason why./John told her/that he intended to host/some of his relatives./The rest/would stay/in a nearby hotel.

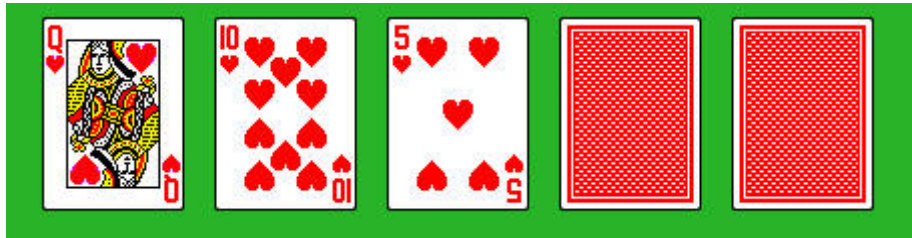
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Note: The critical phrases are in italics (but were presented in the standard font in the experiment).



# Effect of speaker knowledge

- Manipulated similarly by Bergen and Grodner (2012)
  - Full: After the babysitter left, I carefully examined my liquor collection.
  - Partial: After the babysitter left, I went to my liquor collection and made a drink.
  - Trigger: Some of my new bottles of vodka were opened.
- This is supported by the intuition that we can use *some* cooperatively in conditions of partial knowledge
  - e.g. *Some of the cards are hearts*



# Effect of politeness

- Tested by Bonnefon et al. (2009)
  - *Some people hated your poem vs. Some people liked your poem*
  - “not all” interpretation is more available in the case where *all* would have been face-threatening
  - (Indication that we go for the most negative interpretation, to counterbalance the expectation that a friend might be biased towards giving us good news!)

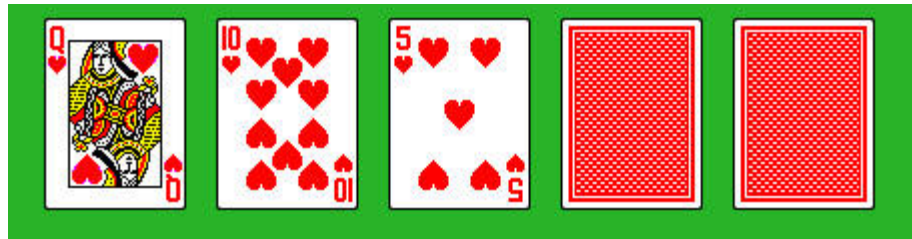
# A limitation: one factor at a time

- Work following customary scientific practice in trying to manipulate the variable of interest and control everything else
- But is this possible/ecologically valid?
- For instance, in the Bergen and Grodner (2012) vignette
  - Full: After the babysitter left, I carefully examined my liquor collection.
  - Partial: After the babysitter left, I went to my liquor collection and made a drink.
  - Trigger: Some of my new bottles of vodka were opened.

is it legitimate to assume that the utterance of *some* doesn't, in itself, tell us anything about the speaker's knowledge state?

# Evidence for speaker's knowledge

- The 'cards' example makes this slightly clearer – assuming that the speaker sees what we see...

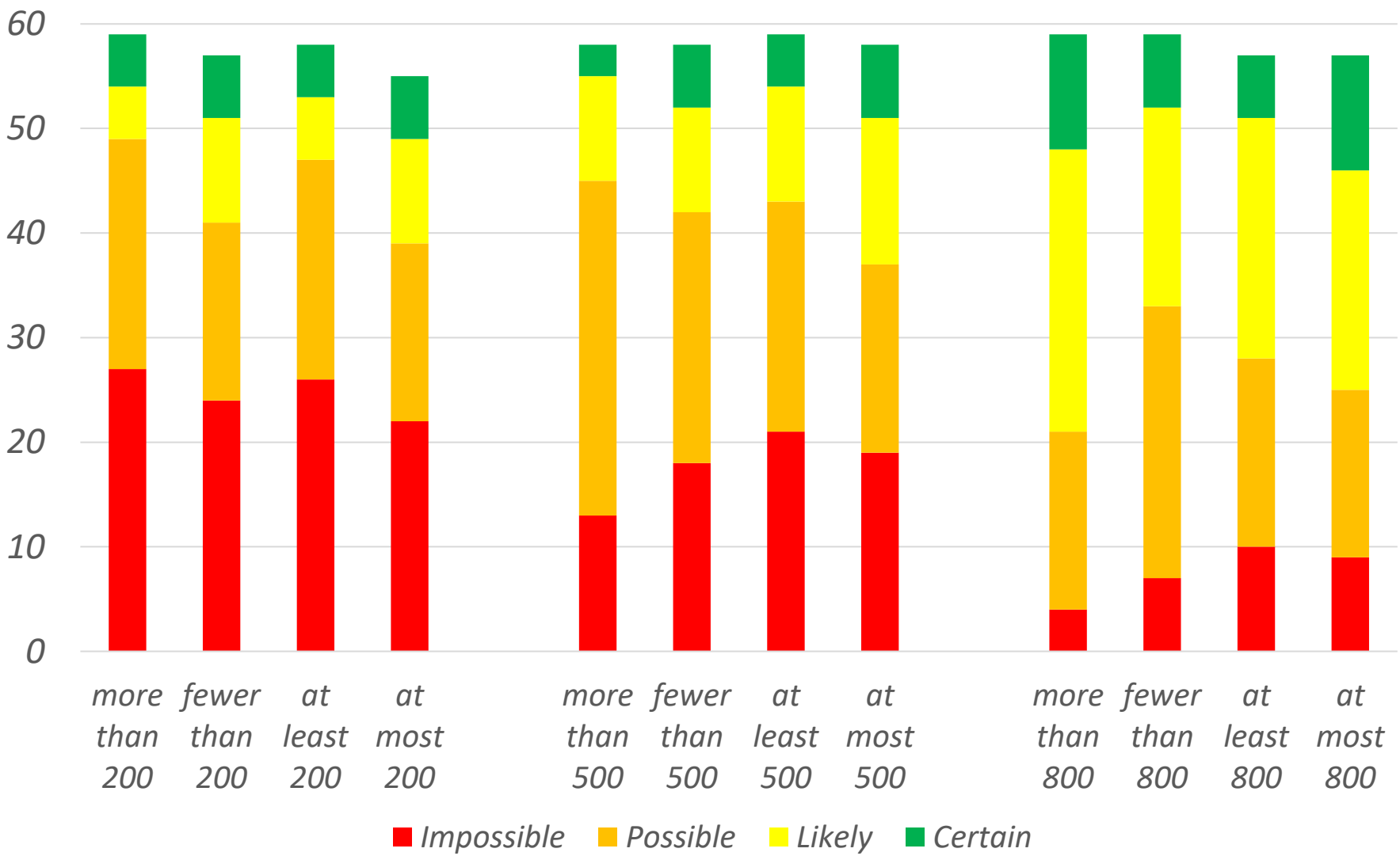


- Even here, what is depicted might not be the reality (indeed, with confederates, it typically is not)
- In the vignettes, we have no clear evidence of the speaker's knowledge state at the time of utterance
  - And that's typical of real-life situations: we're also potentially trying to figure out what the speaker does and doesn't know
- We could think of the utterance as **leaking** (in the sense of Sher and McKenzie 2006) information about the epistemic condition of the speaker, which bears on interpretation

# Eliciting guesses about speaker knowledge

- Some pilot data from a study with Michael Franke
- Scenario: reports on vote counting in progress
  - 1000 voters in each district
  - Reports of the form *Q of the votes are for the red/blue party*
  - Participants are asked, given that utterance,
    - how many of the votes they think have been counted so far
    - the minimum number of votes that must have been counted
    - the maximum number of votes that could have been counted
    - how many votes they think have been cast for the relevant party
  - In the following, the first three answers are used to establish whether the hearer thinks that full knowledge on the part of the speaker is certain, likely, possible or impossible
  - 94 participants from volunteer panel in PPLS, Edinburgh – 59 reliably gave logically consistent answers

# Snapshot of results for numerical quantifiers

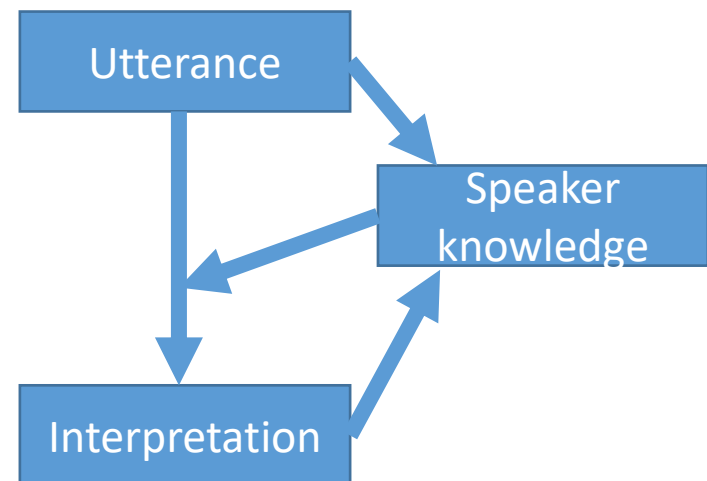
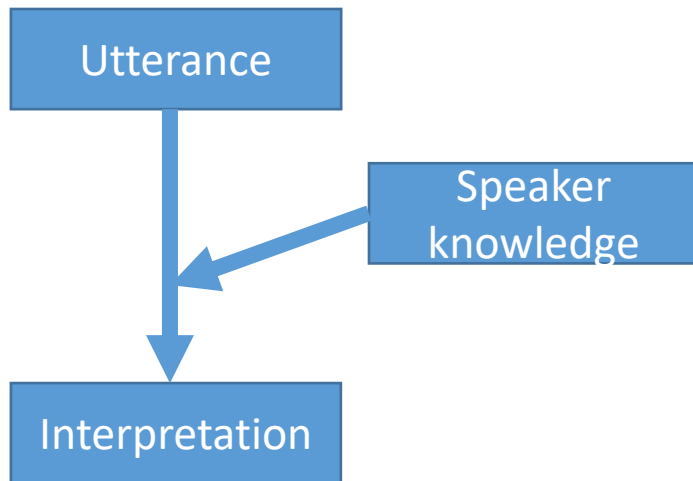


# Interpretation?

- Cautious, as several things are going on here...
- ...but the simplest explanation is that expressions with larger numbers are taken to index richer knowledge
- This inference goes beyond what is logically necessary

# Role of speaker knowledge in the process

- Uncontroversial that we might draw inferences about speaker knowledge given an utterance
- Potentially more controversial that those inferences should enter into the interpretation process again





# Similarly for relevance

- *Russell Westbrook has achieved more than 181 triple-doubles in the NBA*
  - Why *more than 181*?
  - Speaker ignorance?
  - Or a salient threshold?
- If you infer (correctly) that 181 is a relevant reference point, you should not derive a quantity implicature that is otherwise predicted to be available
  - This is also potentially 'leaked' by the utterance



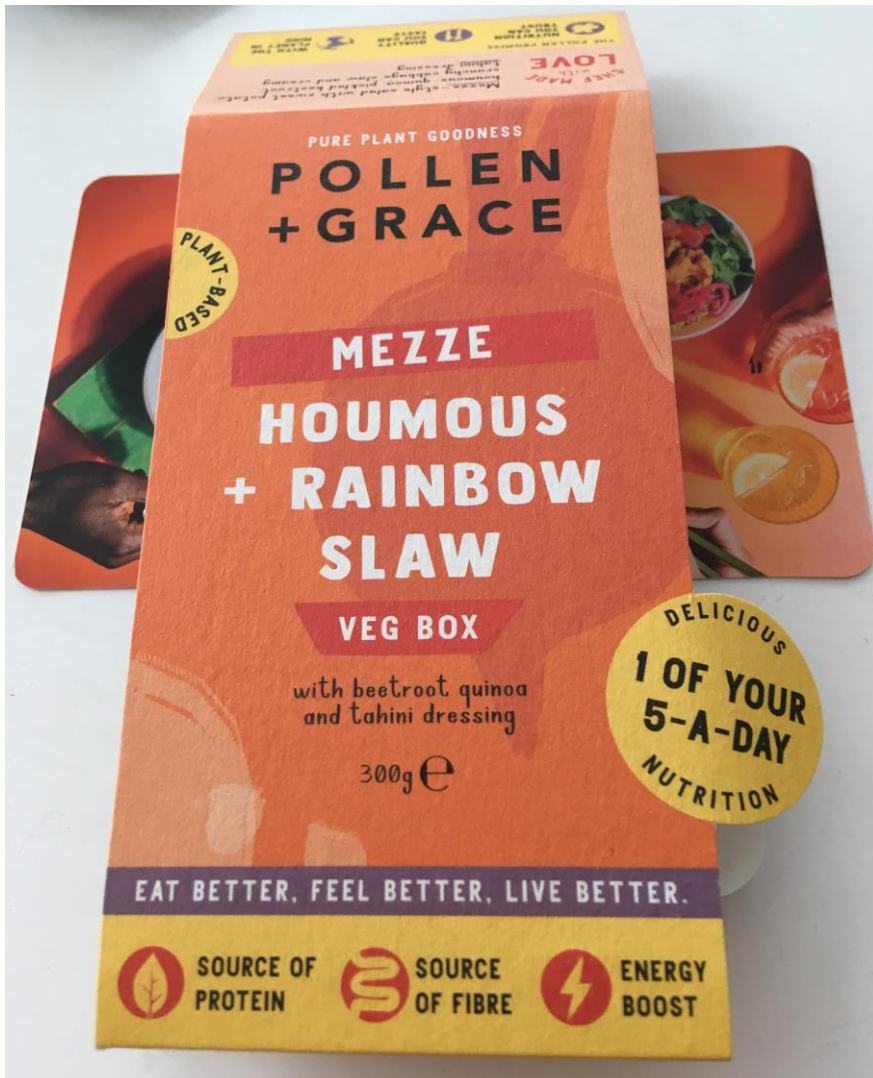
# Joint inference

- Rather than making assumptions about {speaker knowledge, speaker perception of relevance, ...} and using these to help us figure out the world state given the utterance...
- ...we're using the utterance to refine our concept of {speaker knowledge, speaker perception of relevance, ...} in addition to the world state
- This makes things more complicated to model, and to investigate experimentally
- However, it does make it possible to build in additional factors in a similar way
  - Kao et al. (2014) apply this to hyperbole
  - Savinelli et al. (2017) and Attali et al. (2021) do this for QUD and scope in quantifier scope ambiguity resolution
  - Another promising case: the extent to which the speaker is truly cooperative, in the Gricean sense

# Argumentativity vs. cooperativity

- Classic Gricean communication involves speaker and hearer in a shared cooperative project to build common ground
- However, speakers often want to present information selectively in order to lead hearers to a course of action
  - They can do this more or less effectively, and more or less overtly

# Unsuccessful argumentation



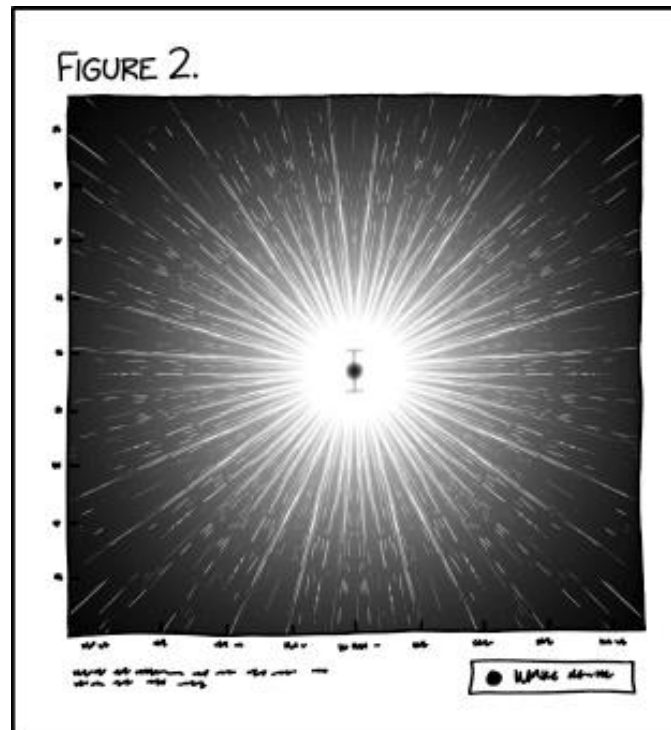
This meal is a source of **Protein** which contributes to a growth in muscle mass and high in **Manganese** which contributes to normal energy-yielding metabolism. Enjoy as part of a varied and balanced diet and a healthy lifestyle.

# Why unsuccessful?

- All things being equal, the food being high in manganese is a good thing, but not the best thing...
- By making the statement, the manufacturer indicates that they want to argue for the healthiness of the product
  - Given this, a whole bunch of negative implicatures (*not high in iron, not high in calcium, not high in vitamins*) become available
  - These would not necessarily be available if I didn't first draw an inference about the argumentative intention
  - Bill Bryson points to a similar case:  
“[The ad] says something like ‘The new Dodge Backfire. Rated number one against the Chrysler Inert for handling. Rated number one against the Plymouth Repellent for mileage. Rated number one against the Ford Eczema for repair costs.’ ...[O]ne must naturally conclude that the Dodge performed worse than all its competitors except the one cited.”

# Post hoc summaries

- These cases involve post hoc presentation of (part of) a dataset
  - Something we're familiar with, even on best behaviour: we'll try to discuss examples that are supportive of the point we're making



SCIENCE POWER MOVE: WHEN ONE OF  
YOUR DATA POINTS IS REALLY COOL,  
DEVOTE A WHOLE FIGURE TO IT.

<https://xkcd.com/2713/>

# Post hoc summaries

- These cases involve post hoc presentation of (part of) a dataset
  - Something we're familiar with, even on best behaviour: we'll try to discuss examples that are supportive of the point we're making
  - If we're being honest, we'll also want to make sure that the examples are representative of the actual data (whatever precisely that means)
    - We can enforce 'honesty' in this sense by pre-registering every way in which we're going to summarise the data
  - But less scrupulous speakers might cherry-pick data, or statistics, which are not representative
  - Often it's hard to tell whether this is happening, and very difficult to figure out how we should respond, as hearers, if it is

# Post hoc-looking example

- *Figures show one in four [Oxford] colleges failed to admit a single black British student each year between 2015 and 2017*  
(<https://www.theguardian.com/education/2018/may/23/oxford-faces-anger-over-failure-to-improve-diversity-among-students>)
  - Headline makes the argumentative orientation of this clear
  - How do we evaluate whether this is a good argument, and should cause us to change our beliefs about Oxford's admissions policy?
- We need to make an assumption about representativity
  - Do we interpret this as a typical true statement, and ask what the probability is that the policy is racist given that this is true?
  - Do we interpret this as a maximally argumentatively effective true statement, and ask what the probability is that the policy is racist given that this is the worst thing that could be truthfully said about it?
  - In practice, neither – the journalist is neither impartial in this sense, nor maximally argumentatively effective (however we define this)



# Speakers' argumentative efficacy

- To interpret potentially argumentative utterances, we need to know how effective the speaker is at framing these
  - Alongside the usual considerations of whether the speaker is honest, informed, etc.
- Preliminary work suggests rather a mixed picture
  - Carcassi et al. (in prep.)

Imagine you have been hired as a marketing consultant for Green Valley High School. Part of your job is to write a report on the results of standardized math exam questions. These results have been published for Green Valley and for your main rival, Riverside High School.

It's important that you don't tell any lies in the report, but you don't have to report objectively on the facts. **Your aim is to make Green Valley sound like a school whose students have a high probability of success on the exam questions, and Riverside sound like a school whose students have a low probability of success.**

# Speakers' argumentative efficacy

Describe these results of **Green Valley** so as to make it appear as if there is a **high** success rate without lying.

|         |   |   |   |   |   |   |   |   |   |   |   |   |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|
| Daniel  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Thomas  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Mia     | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✗ | ✗ | ✗ |   |
| Lisanne | ✓ | ✓ | ✓ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ |
| Chris   | ✓ | ✓ | ✓ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ |

In this exam **SOME** of the students got **MOST** of the questions **RIGHT**.

**ALL** **MOST** **RIGHT**

**SOME** **SOME** **WRONG**

**NONE** **NONE**

# Speakers' argumentative efficacy

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- Preliminary work suggests rather a mixed picture
  - Carcassi et al. (in prep.): naïve participants are generally effective at producing (near-)optimal argumentative utterances, by the measure we posited (weight of evidence)
  - Cummins and Franke (2021): UK universities' press releases about the 2014 REF assessment are often suboptimally argumentative (although almost invariably non-objective)

# Conclusion

- The process of inferring pragmatic enrichments about the world state is complex
  - It relies on assumptions about the speaker's honesty, knowledgeability, perception of relevance, (non-)argumentativity, etc.
  - However, all these assessments on the part of the hearer are potentially influenced by the utterance
- We can think of this in terms of a general process of joint inference
  - The hearer's ideas about all these factors are potentially updated simultaneously
  - Modelling this is a challenge but potentially opens up a range of interesting directions
    - What is included in the model?
    - How is each factor represented?
    - What does the process of update look like?

# Thank you!

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