Can usage of scalar adjectives predict scalar inference rates?

Elizabeth Pankratz, Leibniz-Centre General Linguistics (ZAS), Berlin
Bob van Tiel, Donders Institute for Brain, Cognition, and Behaviour, Nijmegen

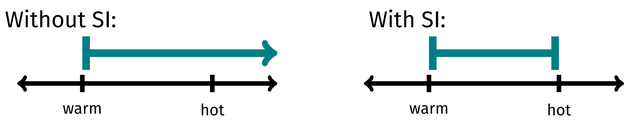
Leibniz-Zentrum Allgemeine Sprachwissenschaft

DONDERS INSTITUTE

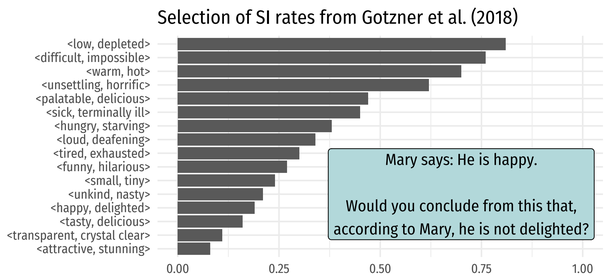
Diversity in scalar inference rates

"It was **good**." ⇝ The speaker thinks it was **not perfect**.
"It's **warm** out." ⇝ The speaker thinks it's **not hot** out.

Where does this scalar inference (SI) come from? If a speaker could have used an informationally stronger word like *hot* but uses *warm* instead, the hearer reasons that the speaker believes that *hot* does not hold [5, 7].



Interestingly, SIs are not always derived. SI rates vary between different scalar words [4, 11]. **How can we account for this?**



Relevance of the stronger scalemate

SIs are more likely to be drawn when the stronger scalemate is more relevant, given the weak adjective [2].

A usage-based approach to determining relevance: We assume that the relevance of a stronger scalemate for some weak adjective is reflected in the frequency of co-occurrence in scalar constructions (e.g. *warm but not hot*; *warm, even hot*). Scalar constructions like these serve to highlight distinctions between adjectives.

Our research question

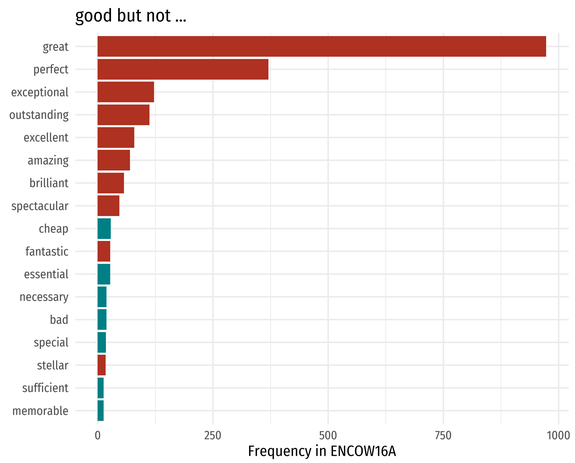
Are SI rates for scalar adjectives higher when the adjective is more frequently used in scalar constructions together with a stronger scalemate?

Method: Counting usage in ENCOW16A

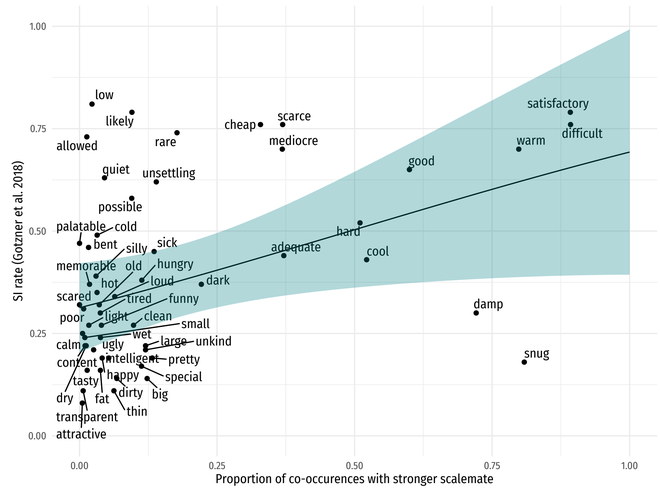
Assumption: The kind of usage people are likely to experience is **approximated by very large, diverse corpora.** We used the 16.8-billion-token web corpus ENCOW16A [9, 10].

Our procedure:

- Identification of scalar constructions in the corpus
- Querying for all adjectives that co-occur with the 68 unique weak adjectives tested by Gotzner, Solt, and Benz [4]
- Manual annotation of whether or not each co-occurring adjective is a stronger scalemate
- For each weak adjective, determining the proportion of tokens that are **stronger scalemates** vs. **something else**



Results



A binomial GLM predicting SI rate for each adjective as a function of its co-occurrence proportion with stronger scalemates shows a **positive association** between the two (β = 1.6, $\text{logit}^{-1}(\beta)$ = 0.83, $p < 0.0001$).

Future work will test our hypothesis on a more balanced and empirically motivated sample of adjectival scales.

Relevance and cognition

Distinctions that are cognitively useful are more frequently expressed [8], but increased usage also perpetuates the cognitive distinction [1, 3, 6]. Thus it is likely that cognition and usage mutually reinforce the relevance of a stronger scalemate for the weaker adjective.

cognitive distinction of scalemates ⇄ **linguistic distinction of scalemates**

Take-aways

A hearer-based view: The relevance of the cognitive distinction between weak adjectives and their stronger scalemates influences how likely a hearer is to draw a SI upon hearing only the weak adjective. Relevance can be assessed by looking at co-occurrences of two concepts in language usage.

A speaker-based view: If speakers frequently hear a weak scalar adjective in scalar constructions together with a stronger scalemate, they can assume that their interlocutors have experienced this as well. This means that they know that the distinction is also relevant for the hearer, so speakers can communicate the bounded meaning of e.g. *warm but not hot* using only *warm*.

References

[1] Joan Bybee. "Word frequency and context of use in the lexical diffusion of phonetically conditioned sound change". In: *Language Variation and Change* 14 (2002). **[2]** Bart Geurts. *Quantity implicatures*. Cambridge: Cambridge University Press, 2010. **[3]** Adele E. Goldberg. *Constructions at work: The nature of generalization in language*. Oxford: Oxford University Press, 2006. **[4]** Nicole Gotzner, Stephanie Solt, and Anton Benz. "Scalar diversity, negative strengthening, and adjectival semantics". In: *Frontiers in Psychology* 9.1659 (2018). **[5]** Paul Grice. *Studies in the way of words*. Harvard University Press, 1989. **[6]** Stefan Th. Gries and Nick C. Ellis. "Statistical measures for usage-based linguistics". In: *Language Learning* 65.Suppl. 1 (2015). **[7]** Laurence Robert Horn. "On the semantic properties of logical operators in English". Distributed by Indiana University Linguistics Club. PhD thesis. UCLA, 1972. **[8]** Eleanor Rosch. "Principles of categorization". In: *Cognition and categorization*. Ed. by Eleanor Rosch and Barbara B. Lloyd. Hillsdale, NJ: Lawrence Erlbaum, 1978. **[9]** Roland Schäfer. "Processing and querying large web corpora with the COW14 architecture". In: *Proceedings of Challenges in the Management of Large Corpora 3 (CMLC-3)*. Ed. by Piotr Bański et al. UCREL. Lancaster: IDS, 2015. **[10]** Roland Schäfer and Felix Bildhauer. "Building Large Corpora from the Web Using a New Efficient Tool Chain". In: *Proceedings of the Eighth International Conference on Language Resources and Evaluation (LREC'12)*. Ed. by Nicoletta Calzolari et al. Istanbul, Turkey: European Language Resources Association (ELRA), 2012. ISBN: 978-2-9517408-7-7. **[11]** Bob van Tiel et al. "Scalar diversity". In: *Journal of Semantics* 33.1 (2016).