Can predicates be classified as 'factive' and 'non-factive'? An empirical challenge

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Projection analyses have largely limited their attention to 'factive' predicates, like *know*, to the exclusion of 'non-factive' ones, like *think* (e.g., [9, 19, 1, 2, 13] and [16]). This limitation is motivated by the long-standing and widely-assumed assumption that 'factive' predicates are empirically distinct from 'non-factive' ones (see, e.g., [10, 11] and much literature thereafter): the content of the complement of a 'factive' predicate is taken to be both projective and entailed, whereas it is not both projective and entailed for a 'non-factive' one (e.g., [7], [4], [19], [15], [3], [17]).

Despite the importance of the distinction between 'factive' and 'non-factive' predicates, the distinction has not been systematically investigated. Filling this lacuna is particularly pressing given that there is disagreement about which predicates are 'factive'. For instance, [15] assumed that *inform* is 'factive', in contrast to [3] who argued that the content of its complement is not entailed. Similarly, emotive predicates like *be annoyed* are taken to be 'factive' by some (e.g., [7, 1, 3]) but not others (e.g., [12, 8, 14, 6]). We present the findings of experiments designed to investigate the distinction by measuring projectivity and entailment for 20 predicates; left panel of Fig. 1. **maybe add question marks in the figure after the predicates where people have disagreements? be annoyed, inform, establish, hear)**

Exp. 1: Projectivity was measured with the 'certain that' diagnostic: following [18], we assume that projectivity is a gradient property of utterance content.

Exp. 2: For entailment, we applied the 'inference' diagnostic: *p* entails *q* iff *q* follows from the truth of *p*; under the 'contradictoriness' diagnostic, *p* entails *q* iff *p but not q* is contradictory.

Results and discussion: As shown in the right panel of Fig. 1, the content of the complement of 'factive' predicates (in purple) is entailed and highly projective whereas that of classical 'non-factive' predicates (in grey) is not entailed and at most weakly projective, in line with intuitions reported in the literature. However, because projectivity is again observed to be a gradient property of utterance content (see also [18]), there is no non-arbitrary binary division of predicates by projectivity, thereby challenging the assumed categorical distinction between 'factive' and 'non-factive' predicates. The finding that the content of the complement of many 'non-factive' predicates is projective constitutes an exciting challenge for future projection analyses.

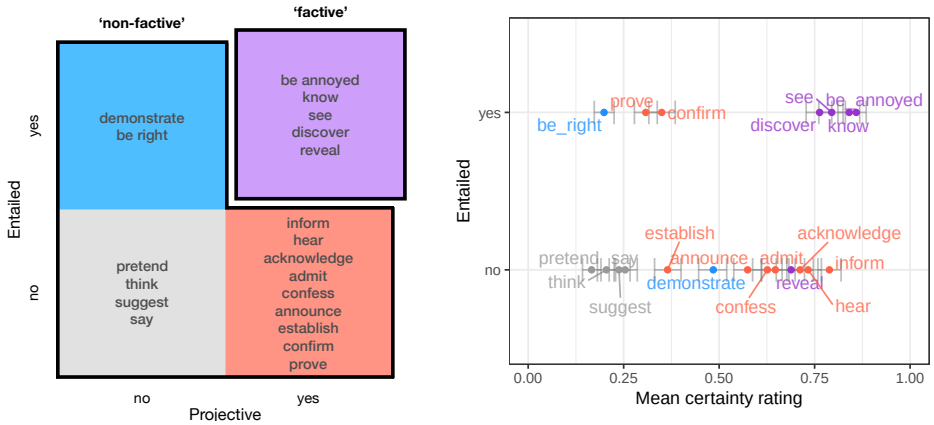

Figure 1: 20 English predicates: assumed categorical classification (left panel) vs. experiment findings (right panel; mean certainty rating with 95% CIs, inference diagnostic for entailment.

(20% mis-classified on Exp 2a, 6/20 on Exp 2b)

somehow mention second entailment diagnostic research on entailment needs to take the pragmatics of entailment judgments more seriously (see also [5]).

References

[1] M. Abrusán. Predicting the presuppositions of soft triggers. *Linguistics & Philosophy*, 34: 491–535, 2011.

[2] M. Abrusán. Presupposition cancellation: Explaining the 'soft-hard' trigger distinction. *Natural Language Semantics*, 24:165–202, 2016.

[3] P. Anand and V. Hacquard. Factivity, belief and discourse. In *The Art and Craft of Semantics: A Festschrift for Irene Heim*, pages 69–90. MIT Working Papers in Linguistics, 2014.

[4] G. Chierchia and S. McConnell-Ginet. *Meaning and Grammar*. Cambridge, MA: MIT Press, 1990.

[5] M.-C. de Marneffe, C. Manning, and C. Potts. Did it happen? The pragmatic complexity of veridicality assessment. *Computational Linguistics*, 38:301–333, 2012.

[6] P. Egré. Question-embedding and factivity. In L. Lihoreau, editor, *Grazer Philosophische Studien*, pages 85–125. Amsterdam: Rodopi, 2008.

[7] G. Gazdar. *Pragmatics: Implicature, Presuppositions, and Logical Form*. New York: Academic Press, 1979.

[8] A. Giannakidou, editor. *Polarity sensitivity as (non)veridical dependency*. Dordrecht: John Benjamins, 1998.

[9] I. Heim. On the projection problem for presuppositions. In M. Barlow, D. Flickinger, and M. Westcoat, editors, *West Coast Conference on Formal Linguistics (WCCFL) 2*, pages 114–125, 1983.

[10] L. Karttunen. Some observations on factivity. *Papers in Linguistics*, 4:55–69, 1971.

[11] P. Kiparsky and C. Kiparsky. Fact. In D. Steinberg and L. Jakobovits, editors, *Semantics. An Interdisciplinary Reader in Philosophy, Linguistics and Psychology*, pages 345–369. Cambridge: Cambridge University Press, 1971.

[12] E. Klein. Two sorts of factive predicates. Pragmatics Microfiche it 1.1. frames B5C14, 1975.

[13] J. Romoli. The presuppositions of soft triggers are obligatory scalar implicatures. *Journal of Semantics*, 32:173–291, 2015.

[14] P. Schlenker. The lazy Frenchman's approach to the subjunctive. In *Proceedings of Romance Languages and Linguistic Theory*, pages 269–309, 2003.

[15] P. Schlenker. Local contexts and local meanings. *Philosophical Studies*, 151:115–142, 2010.

[16] M. Simons, D. Beaver, C. Roberts, and J. Tonhauser. The Best Question: Explaining the projection behavior of factive verbs. *Discourse Processes*, 3:187–206, 2017.

[17] B. Spector and P. Egré. A uniform semantics for embedding interrogatives: *An* answer, not necessarily *the* answer. *Synthese*, 192:1729–1784, 2015.

[18] J. Tonhauser, D. Beaver, and J. Degen. How projective is projective content? Gradience in projectivity and at-issueness. *Journal of Semantics*, 35:495–542, 2018.

[19] R. van der Sandt. Presupposition projection as anaphora resolution. *Journal of Semantics*, 9: 333–377, 1992.