A diverse family (of sentences)
Projectivity differs across embedding operators—but not like you think

We present experimental evidence that the projectivity of attitude complements varies across different entailment-cancelling operators, and that this effect of entailment-cancelling operator differs between various attitude verb triggers. However, our findings about the interaction of operator and trigger do not support Karttunen's (1971) classification of factive vs. semi-factive verbs.

Projection across various entailment-cancelling operators. Certain attitude ascriptions come with an inference to the truth of their complement, even if embedded under entailment-cancelling operators (illustrated for *'discover'* in (1)), in which case this inference is said to *project*, (e.g. Karttunen, 1971).

(1)   a.   Polar Questions: *'Did Cole discover that Julian dances Salsa?'*
        b.   Negation: *'Cole didn't discover that Julian dances Salsa.'*
        c.   Modals: *'Perhaps Cole discovered that Julian dances Salsa.'*
        d.   Conditionals: *'If Cole discovered that Julian dances Salsa, Logan will be joyful.'*

Previous work on projection showed that it is not a categorial property of lexical triggers (Tonhauser et al., 2018), but a gradient one affected by various contextual factors (Simons et al., 2010; de Marneffe et al., 2012; Beaver et al., 2017; Degen and Tonhauser, 2021). In light of this, we expect that the hetergeneous entailment-cancelling operators in (1) affect projection differentially.

Generalizations to this effect were suggested by Karttunen (1971), who distinguishes between *factive* verbs (*regret, forget, resent*) and *semi-factive* verbs (*discover, realize, see, find out, notice*), suggesting that factives always project, while semi-factives always project across negation, but not always in polar questions or conditionals. SMITH study, Djärv on conitive/emotive difference. We experimentally test these generaliztions in a study addressing the questions: **(i)** Is the projection of content affected by differences in entailment-canceling environments? **(ii)** Do these effects vary for different verbs (and in what way)?

Experimental investigation. To investigate differences in projection behavior across various entailment-cancelling operators as in (1), and between various types of attitude verbs, we used a response task which elicitied participant judgments about how strongly they thought a speaker would be committed towards the embedded clause. We presented sentences like in (1) as asserted by a named speaker (on screen as e.g. "**Daniel:** *'Did Cole…?'*"). Participants were then asked to provide a judgment in response to a prompt like: *"Is Daniel certain that Julian dances Salsa?"*), by moving a slider on a scale from 'no' (coded as 0), to 'yes' (coded as 1).

Design and Expectations.

(2)   20 clause-embedding predicates
        a.   canonically factive: *be annoyed, discover, know, reveal, see*
        b.   nonfactive:
             (i)   nonveridical nonfactive: *pretend, suggest, say, think*
             (ii)   veridical nonfactive: *be right, demonstrate*
        c.   optionally factive: *acknowledge, admit, announce, confess, confirm, establish, hear, inform, prove*

   • Expectations based on Karttunen:

      – no variation for factive verbs

      – semi-factives (like *discover*) should project more strongly across negation than questions

- expectations based on Djärv:
  - emotive predicates (like *be annoyed*) behave like Karttunen's factives
  - cognitive predicates (like *discover, see…*) behave like Karttunen's semi-factives

Method.   …

Results and Analysis.

- pooled data across experiments

Figure 1 shows the mean certainty-ratings by operator and predicate, and 95% bootstrapped confidence intervals.
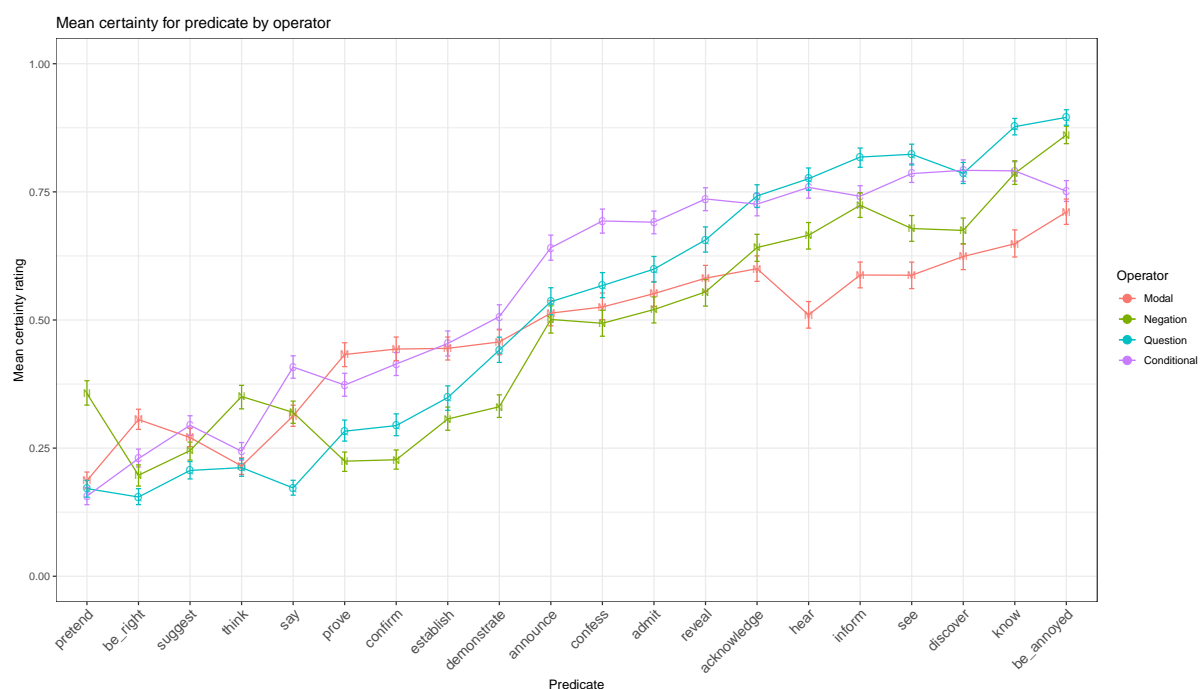

Figure 1: Mean certainty ratings by operator and predicate

- The embedding operator affects projection (main effect of embedding operator)
- This effect differs by verb (interaction effects of operator/verb)

Discussion and Conclusion.   …

References

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