

Emotion entailments modulate projection inferences

This work investigates the relationship between meaning components of clause-embedding predicates and the projectivity of the content of their complement clause (CC). Recent research has shown that projection inferences to the CC arise from utterances like (1), where the CC is in the scope of negation, not only for factive predicates like *know* but also for non-factive predicates, like the communicatives *admit* and *announce* (see, e.g., Degen and Tonhauser 2022).

(1) Morgan didn't know / admit / announce that the balloon popped.

These results indicate that lexical semantic properties other than factivity play a role in projection inferences. However, there is little research on what these properties might be. This work presents evidence that the entailment that the subject has an emotion about the CC ('emotion entailment') is systematically associated with higher ratings of projection of the CC from under negation. This is based on a subset of White and Rawlins's (2018) MegaVeridicality dataset (473 predicates) as well as a new dataset (192 predicates) annotated for projection inferences.

Emotion entailments modulate projection. The relevant portion of the MegaVeridicality dataset contains projection ratings for 473 clause-embedding predicates as in (2) by 159 participants who answered the question "Did that thing happen?" by selecting "no", "maybe or maybe not" or "yes", coded here as -1, 0 and 1. These predicates include 52 cognitives (like *think* or *know*), 201 communicatives (*admit*), 143 emotives (*be annoyed*) and 77 evidentials (*discover*). We coded them for whether they have an emotion entailment, using the diagnostic in (3), on which *rant* but not *shout* has an emotion entailment. (None of the cognitives or evidentials had such an entailment.)

(2) Someone didn't think that a particular thing happened. (based on White and Rawlins 2018)

(3) Bo shouted / #ranted that a particular thing happened, but he had no emotion about the matter.

Fig. 1 plots the mean projection ratings for the CC of the 473 predicates by predicate type. The results show that the mean projection rating for the CC of emotive predicates is higher than that of the other predicate types, and that the mean projection rating for the CC of communicatives with an emotion entailment (28 predicates) is higher than that of communicatives without an emotion entailment (173 predicates). These results were confirmed by linear mixed effects models predicting projection ratings from predicate type with by-participant random intercepts.

Replication. These results were replicated in a novel dataset that differed from the former in that the attitude holder-denoting subjects and CCs were contentful, as shown in (4). The novel dataset contains 190 of the above-mentioned communicatives, including all 28 with an emotion entailment.

(4) Reese didn't point out that the room darkened.

314 participants were recruited on Prolific to provide projection ratings for the 190 communicatives as well as the cognitives *know* and *think* paired with 11 distinct CCs and embedded under negation. Participants were asked to rate whether the event described by the CC occurred. They gave their ratings on a slider marked 'no' (coded as -1) at one end and 'yes' (1) at the other.

In the new dataset, like in the MegaVeridicality dataset, the mean projection rating for the CC of communicatives with an emotion entailment ($M = 0.592$, 95% bootstrapped CI [0.542, 0.643]) is higher than that of communicatives without an emotion entailment ($M = 0.351$, 95% bootstrapped CI [0.323, 0.377]). This result was confirmed by a linear mixed effects model predicting projection ratings from predicate type with by-participant random intercepts.

Towards an explanation. The observation that the presence of an emotion entailment leads to higher projection ratings raises the question of why that would be. We entertain several possible explanations here. **Status of the CC as a presupposition:** Theoretical accounts of presupposition triggering and projection (see, e.g., Heim 1983, van der Sandt 1992, Abrusán 2011, Simons et al. 2017) do not make any predictions about utterances with communicative predicates, which neither presuppose nor entail their CC. **Context:** The observation that the CC of some communicatives may

be projective nevertheless is attributed by some accounts to a special use of these predicates being permitted under specific contextual conditions (see, e.g., Schlenker 2010, Abrusán 2011). However, as the stimuli discussed here do not provide contextual cues, the observed differences in mean projection ratings between the two types of communicatives cannot straightforwardly be attributed to contextual factors. **Default at-issueness:** These differences can also not be explained solely in terms of not-at-issueness of the CC, which is taken to be positively correlated with higher projectivity (see, e.g., Tonhauser et al. 2018). It might be tempting to assume that the CC of communicatives with an emotion entailment is more projective than that of those without this entailment simply because of the presence of some additional entailment that is at-issue by default, which causes the CC to be not-at-issue and therefore more projective. If this were an appropriate analysis, then higher projection ratings should also be observed for other types of communicatives with additional entailments that are at-issue by default. One such type are manner-of-speaking (MoS) verbs (like *grunt* or *whisper*), whose manner entailment is often assumed to be at-issue by default, whilst their CC is not-at-issue (see, e.g., Erteschik-Shir 1973). **Comparison with MoS verbs:** In the two datasets, there are 17 MoS verbs with and 12 MoS verbs without an emotion entailment. The remaining 11 communicatives with an emotion entailment are “*complain* verbs” (Levin 1993). Amongst the remaining communicatives without an emotion entailment are 63 ‘*say-CC* verbs’, 67 ‘*tell-CC* verbs’ and 20 verbs that can only be used in a performative sense. Fig. 2 plots the mean projection ratings for the CC of the 190 communicatives by subtype of communicative for both datasets. As can be seen, MoS verbs with an emotion entailment have a higher mean projection rating than MoS verbs without this entailment. This finding was confirmed for both datasets by linear mixed effects models predicting projection ratings from subtype of communicative with by-participant random intercepts. Moreover, MoS verbs without an emotion entailment and *say-CC* verbs, which include basic communicatives like *say* and *state*, are the two subtypes with the lowest mean projection ratings in both datasets. In other words, the manner entailment of MoS verbs is not associated with higher projection ratings. **Emotion-related meaning matters:** These findings show that it is not merely the presence of just any default at-issue entailment in the lexical entry of clause-embedding predicates that contributes to a higher projectivity of their CC. Rather, the results presented here demonstrate that the projectivity of the CC of clause-embedding predicates is modulated by the presence of specific meaning components. This work has identified the emotion entailment as one such component.

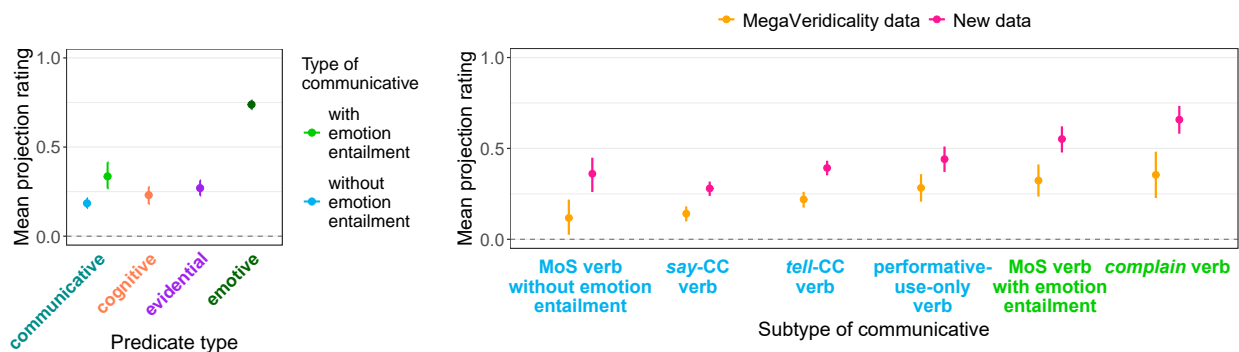


Figure 1: Mean projection rating by predicate type and emotion entailment (communicatives) in MegaVeridicality dataset. Error bars indicate 95% bootstrapped CIs.

Figure 2: Mean projection rating by subtype of communicative and dataset for the 190 communicatives included in both datasets. Error bars indicate 95% bootstrapped CIs.

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