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## The prosody of presupposition projection in naturally-occurring utterances

Some accounts of presupposition projection predict that pragmatic focus influences whether the presupposition projects (i.a., Abrúsan 2011, 2016; Simons et al. 2017; Beaver et al. 2017). In several experimental studies, prosodically-marked pragmatic focus has indeed been found to influence the projection of factive presuppositions of utterances like *these parents didn't know the kid was gone* (Cummins & Rohde 2015; Tonhauser 2016; Djärv & Bacovcin 2017). However, no prior work has explored whether this effect extends beyond lab speech to naturally-occurring utterances. In this paper, we investigate the relation between prosodically-marked focus and projection in a large set of naturally-occurring utterances. We find that prosodically-marked focus influences projection in utterances with factive predicates, but has no effect in utterances with non-factive predicates. Our findings therefore point toward an analysis of projection in terms of interacting information-structural utterance properties and lexically-encoded content.

**Presupposition projection and prosodically-marked focus** On the classical approach to presupposition projection, presuppositions are triggered by particular lexical items (i.e., Heim 1983, van der Sandt 1992). Another approach is to derive presupposition projection from focus-alternatives (e.g., Abrúsan 2011, 2016; Simons et al. 2017; Beaver et al. 2017). For utterances with factive predicates, focus-based accounts predict that the presupposition will not project when the complement of the factive predicate is pragmatically focused, and will project otherwise. Several perception experiments provide support for this prediction by manipulating focus prosodically. Cummins & Rohde (2015), Tonhauser (2016), Djärv & Bacovcin (2017) found that factive presuppositions project more when they are not prosodically-focused than when they are. For non-factive predicates, however, prosodic focus seems to have the opposite effect: Djärv & Bacovcin (2017) found that the content of the complement of a non-factive predicate was more projective when the complement was prosodically-focused than when it was not. In this paper, we go beyond prior experimental work on prosodic focus and presupposition projection by exploring this relationship in naturally-occurring utterances with both factive and non-factive predicates.

**Methods** We used 350 discourses from the Switchboard part of CommitmentBank (de Marneffe et al., 2018), extracting the corresponding sound segments. Each discourse, as in (1), contains a target utterance (underlined) with a clause-embedding predicate under an entailment-canceling operator (negation, question, modal, or antecedent of conditional) preceded by up to two turns.

(1) A: Okay. So Frank, what, uh, type of, uh, budget do you or your family have?

B: Well, uh I don't know that we really have a budget.

**Focus Annotations** 3 annotators (the authors) identified the prosodically-focused constituent. For each utterance, 2 annotators indicated whether the most prosodically-prominent constituent was in the complement clause or in the matrix subject/predicate. Of the 350 utterances, the annotators agreed on 219 utterances. We restrict our analysis to these 219 utterances.

**Projection Annotations** At least 8 annotators from Amazon's Mechanical Turk listened to each discourse and indicated how certain the speaker was about the content of the complement in the target sentence. They provided their response on a 7-point Likert scale labeled at 3 points: -3/The speaker is certain that it is false, 0/The speaker is not certain whether it is true or false, 3/The speaker is certain that it is true. Positive ratings are taken to indicate that the content of the complement projects. Ratings  $\leq 0$  indicate a non-projecting interpretation.

**Results** Table 1 tabulates the number of utterances annotated as having matrix vs. complement focus by the factivity of the predicate in the utterance.<sup>1</sup> Mean projectivity ratings are shown in

<sup>1</sup>factive predicates: *know, realize, find, notice, recognize, see, foresee, bother*; non-factive predicates: *believe, feel,*

	Matrix	Complement	Total
Factive	19	36	55
Non-Factive	18	146	164
Total	37	182	219

Table 1: Distribution of focus annotations by factivity of embedding predicate.

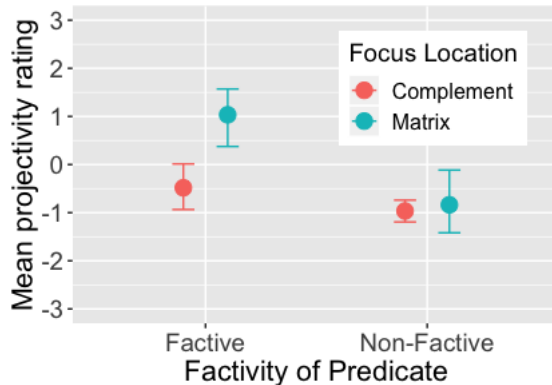


Figure 1: Mean projectivity ratings by predicate factivity and focus location (with 95% confidence intervals).

Figure 1. As expected, utterances with prosodic focus within the matrix clause received higher projectivity ratings than utterances with prosodic focus within the complement clause. In addition, projectivity ratings were higher in utterances with factive predicates than with non-factive predicates. These qualitative observations about the relation between prosodic focus, factivity, and presupposition projection were confirmed statistically by an ordinal mixed-effects regression model predicting projectivity ratings from fixed effects of prosodic focus, factivity, and their interaction; complement focus and non-factive predicates were used as reference levels. The random effects structure included by-participant random intercepts and slopes for prosodic focus and predicate factivity. A log-likelihood comparison between the full model and a model without the interaction between focus and factivity revealed that the interaction was significant ( $\beta = 1.39$ ,  $SE = .224$ ,  $\chi^2(1) =$ ,  $p < 0.001$ ): only when the predicate is factive are projection ratings significantly higher for utterances with matrix focus (mean = 1.03) than with complement focus (mean = -0.48).

**Discussion** These findings are consistent with experimental research showing that prosodically-marked focus influences factive presupposition projection: for utterances with factive predicates, we found that content is more projective when that content is not prosodically-focused (i.e., focus on the matrix clause) than when it is prosodically-focused (i.e., focus on the complement clause). However, we found no evidence that prosodically-marked focus influences presupposition projection in utterances with non-factive predicates. An interaction between factivity and focus was also reported in Djärv & Bacovcin’s (2017) experimental study, though the nature of the interaction differs from the one found here: focus on the complement subject *increased* projectivity for utterances with non-factive predicates. Crucially, Djärv & Bacovcin’s complement-focus condition was restricted to complements with focus on the complement-subject, whereas we investigated utterances with focus on *any* constituents. Hence, these conflicting results for utterances with non-factive predicates suggest that the information-structure of the complement influences inferences about the clausal complement content. In the context of these and other experimental studies, our findings suggest that an empirically adequate account of presupposition projection must account for complex interactions between information structure and lexically-encoded content.

**Selected References** de Marneffe M., M. Simons, and J. Tonhauser. 2018. Factivity in doubt: Clause-embedding predicates in naturally occurring discourse *Sinn und Bedeutung* 23•Djärv, K. and H. Bacovcin. 2017. Prosodic effects on factive presupposition projection. *SALT* 27, 116–133.

*guarantee, guess, imagine occur, say, seem, swear, think*