

FACTIVE AND ASSERTIVE ATTITUDE REPORTS

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To my family.

ACKNOWLEDGMENT

It is often said that writing a dissertation can be a lonely experience. Yet, the journey that culminated in what is now this book(!) has been accompanied by a lot of support from a lot of people.¹

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Is it a true fact
That a clause is not a thing
It is a Given.

ABSTRACT
FACTIVE AND ASSERTIVE ATTITUDE REPORTS

Kajsa Djärv

Florian Schwarz

This dissertation investigates the semantics, pragmatics, and syntax of propositional attitude reports; in particular, how assertion and presupposition are reflected in these different parts of the grammar. At the core of the dissertation are *factive* attitude reports, involving predicates like *know*, *discover*, *realize*, *resent*, *appreciate*, and *like*. Since Stalnaker (1974), factivity is taken to encompass both the discourse status of the embedded proposition *p* as Common Ground and the projection of the inference that the speaker is committed to *p* from the scope of operators—in both cases, unlike asserted content. Syntactically, factivity and assertion are argued to provide the semantic-pragmatic underpinnings for a range of complementation patterns (Kiparsky and Kiparsky 1970, Hooper and Thompson 1973, Rizzi 1997, a.o.).

The central contributions of the dissertation are: (i) demonstrating what precise dimensions of assertion and presupposition are reflected in the syntax and semantics of clausal embedding, and (ii) decomposing the classically multifaceted notion of factivity into a set of more specific theoretical notions; importantly, dissociating the discourse status of *p* and the projection-prone speaker commitment inference.

We attribute the speaker commitment inference to a lexical presupposition of an evidential modal base that entails *p*. We argue that this evidential base is always anchored to a *Judge*, which, depending on the type of factive predicate, is bound by different individuals. In the case of doxastic factives like *discover*, the judge is bound by the speaker, whereas in the case of emotive factives like *appreciate*, it is bound by the attitude holder, and for *fact that* nominals, it is realized as an index on the noun. The discourse status of *p*, we attribute to a separate dimension of discourse new vs. Given content (in the sense of Schwarzschild 1999), which cross-cuts both factive and non-factive verbs. Among the predicates which treat their complements as Given, we differentiate between the requirement (of response

predicates like *accept* and *not say*) that p has an antecedent in the discourse, and the requirement (of emotive factives like *resent* and *appreciate*) that the situation or individual providing the attitude holder's evidential basis for p is contextually accessible. We further argue for a fundamental semantic distinction between primarily acquaintance-based predicates —which include both factives (evidentials) like *discover* and non-factives like *fear*— and fundamentally doxastic or epistemic predicates, like *believe* and *trust*.

Making these distinctions allows us to account for a wide range of apparently connected, yet clearly disparate empirical phenomena, some of which represent open problems in the literature and some of which are new observations made in the dissertation. Importantly, we are able to capture: (i) the dissociation of the discourse status of p and the commitment-to-p inference in doxastic factives (Chapters 3 and 5); (ii) a number of asymmetries between doxastic and emotive factives regarding their apparent entailment properties, interactions with operators, and sensitivities to contextual effects (Chapter 5); (iii) variations in entailment and argument-structural patterns across verbs like *know* and *believe* (Chapter 4); and (iv) the distribution of a set of proposed syntactic correlates of assertion and presupposition; in particular, V-to-C movement, *wh*-extraction, and selection for DP vs. CP-complements (Chapters 2 and 3).

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Chapter 1

Introduction

Complex sentences of the type illustrated in (1) present a number of challenges for the semanticist and the syntactician alike.

- (1) a. Mary believes that Bill is moving to Canada.
- b. Mary knows that Bill is moving to Canada.

1.1 Propositional attitude reports & factivity

1.1.1 Theoretical background

Semantically, verbs like *know* and *believe* describe *attitudes*, on the part of the *attitude holder* (*Mary*) towards the proposition *p* expressed by the embedded *that*-clause. On the standard conception of the semantics of propositional attitude reports, following Hintikka (1969), attitude verbs like *know* and *believe* are analysed as quantifiers over worlds, and semantically (*s*-)select for propositions. On this view, epistemic attitudes like *know* and *believe* both quantify over the worlds *w'* that are compatible with the attitude holder's beliefs in *w* (i.e. the modal base is a set of *doxastic* alternatives).

- (2) a. World *w'* is *doxastically accessible* for person *x* to world *w* iff *w'* is compatible with the beliefs that *x* holds in *w*.
- b. $\text{Dox}_x(w) = \{w' \in W : w' \text{ conforms to } x\text{'s beliefs in } w\}$.

Hence, while the simple sentence *Bill is moving to Canada* is true iff Bill is moving to Canada,

the truth of the complex sentence in (1-a) depends on whether or not Mary believes that Bill is moving to Canada. More formally, we say that (1-a) is true at a world w iff Bill is moving to Canada in every world w' that is doxastically accessible to Mary in w .

In this framework, the difference between different attitude predicates stems from the type of accessibility relation that determines the set of worlds quantified over: verbs like *hope* and *say* for instance quantify over the worlds compatible with the hopes and claims, respectively, of the attitude holder.

In the case of *know* vs. *believe*, however, the difference between the two predicates is generally taken not to be about the type of attitude or accessibility relation. Intuitively, we might think of *know* as a stronger version of *believe*, in the sense that for (1-b) to be true, it seems like Mary must have some pretty good reasons to believe that Bill is moving to Canada. However, this is not enough: for a speaker to utter (1-b), we find that the speaker, too, needs to share Mary's commitment to p . This property, shared by predicates like *discover*, *realize*, *resent*, *appreciate*, *be aware*, and *be happy*, is known as *factivity*, and will be a central running theme throughout this dissertation.

Standard denotations for *know* and *believe* are given in (3). On this view, both verbs require that the embedded proposition p is true in every world w' that is doxastically accessible to the attitude holder in the world of evaluation w . They differ in that *know* additionally entails (or *presupposes*) that p is true in the world of evaluation.¹ (Here, we follow the convention of Heim and Kratzer 1998, where the presupposition is the underlined material between the colon and the period.)

- (3) a. $[[\text{believe}]]^w = \lambda p_{\langle st \rangle} . \lambda x_{\langle e \rangle} . \forall w' \in \text{Dox}_x(w) \rightarrow p(w')$
- b. $[[\text{know}]]^w = \lambda p_{\langle st \rangle} . \lambda x_{\langle e \rangle} : \underline{p(w)} . \forall w' \in \text{Dox}_x(w) \rightarrow p(w')$

Part and parcel of the Hintikkan approach to attitude reports is the view that finite declarative *that*-clauses denote propositions. In linguistics and philosophy, propositions are standardly treated as intensional objects, as functions from worlds to truth values, such that (4)

¹A perspective standard also in the philosophical tradition, where knowledge is typically taken to involve 'justified true belief' (though see Gettier 1963 and subsequent literature).

is true at a world w iff Bill is moving to Canada in w .

- (4) $\llbracket \text{that Bill is moving to Canada} \rrbracket = \lambda w. \text{Bill is moving to Canada}(w)$

The compositional meaning of the sentence in (1-a), *Mary believes that Bill is moving to Canada*, evaluated at w , can thus be spelled out as in (5).

- (5) a. $\|[\text{believe}]^w([\text{that Bill is moving to Canada}])\|(\text{[Mary]}) =$
 b. $[\lambda p_{\langle st \rangle}.\lambda x_{\langle e \rangle}.\forall w' \in \text{Dox}_x(w) \rightarrow p(w')] (\lambda w.\text{Bill is moving to Canada}(w))(\text{Mary}) =$
 c. 1 iff $\forall w' \in \text{Dox}_{\text{Mary}}(w) \rightarrow \text{Bill is moving to Canada}(w')$

In terms of their semantics and pragmatics, factive predicates are a classic type of *presupposition trigger*. While there is substantial variation among different kinds of presupposition triggers, they all give rise to inferences which (a) tend to be *not-at issue* in the discourse, and (b) typically survive when embedded under operators that otherwise target entailments, such as modals and negation. The second of these properties is referred to as *presupposition projection*, and is illustrated with the factive predicate *be happy* in (6), and with the trigger *stop* in (7).

Regarding the first property, it is probably intuitive that the sentences in (6) are statements about Anna and her emotive attitude towards Lisa getting the job, and not primarily claims

about Lisa and her getting the job. Similarly, it should be intuitive that the sentences in (7) are not claims that Anna used to smoke, but statements about whether she gave it up or not. This point can be made more clearly using explicit Question-Answer pairs, such as (8) and (9) (this diagnostic draws on the notion of a Question Under Discussion, from Roberts 1996, 2012, Büring 2003).

- (8) Q. Why is Anna looking so mopey?
 A. She's upset that Lisa got the job.
- (9) Q. Why is Lisa looking so giddy?
 A. She got the job.
 A'. #Anna is upset that Lisa got the job.

In the tradition following Stalnaker (1974, 1978) and Heim (1982, 1983), among many others, each of these properties —the *not-at issue* status of p, the projection of p from the scope of operators, and the requirement that the speaker is committed to p—, are taken to follow from the requirement of factive predicates that p is Common Ground, or entailed by the context. (The same reasoning applies to the inference that Anna used to smoke, triggered by the verb *stop* in (7), and to presuppositions more broadly.) This is unlike asserted content, which in the Stalnakerian tradition is seen as the flip-side of presupposition: this is what gets added to the Common Ground by an utterance, it is what's *at-issue* in the discourse, and it takes scope under embedding operators like modals and negation.

In addition to the view that *that*-clauses denote propositions, as in (4), there is a parallel tradition of research into the syntax-pragmatics interface, going back to Kiparsky and Kiparsky (1970), Hooper and Thompson (1973), Rizzi (1997), and Speas and Tenny (2003), where the notions of assertion and presupposition are invoked to explain an array of complementation patterns, including the availability of *wh*-extraction, V-to-C movement, topicalization, speech act adverbs, and different types of clausal anaphora, as well as the selection or licensing of particular types of CP and DP complements.

1.1.2 Challenges from the interface

While each of these approaches provide an elegant perspective on the different aspects of meaning and composition of propositional attitude reports, there are several challenges both to the individual approaches, as well as to the compatibility of the three perspectives.

To start, as we show in Chapters 2 and 3, factive verbs are not uniformly ‘non-assertive’, neither in terms of the pragmatics of their complements, nor in terms of the proposed mappings to the syntax. By investigating a range of attitude predicates from different semantic classes through a combination of cross-linguistic experimental work, statistical analysis of large-scale corpus data, and careful consideration of fine-grained semantic and syntactic judgements, we find that a subtype of factives, the doxastic factives (e.g. *discover* and *realize*), allow for both the assertion of the embedded proposition, and for V-to-C movement and *wh*-extraction, contrary to a commonly held view that these operations are both blocked in presuppositional contexts. In these chapters, we also observe that the other subtype of factive verbs, the emotive factives like *resent* and *appreciate*, select only for DPs (unlike the other types of attitude verbs examined, which are compatible with both DP and CP-complements), and require their complement to be Given (in the sense of Schwarzschild 1999). We find, however, that the Givenness-novelty distinction *per se*, is not what determines the status of the complements of emotive factives as DPs: response predicates like *accept* and *not say*, too, require their complements to be Given, but still allow for both CP and DP-complements. (We account for this observation in Chapter 5.)

Moreover, as we observe in Chapter 4, *know* and *verb* show a surprising contrast in whether a sentence like *John believes the rumour that Lisa is moving to Canada* entails the corresponding CP-sentence, *John believes that Lisa is moving to Canada*. While *believe* gives rise to this entailment, *know* does not. We further observe that the presence of this entailment tracks the availability of a different type of DP, denoting the source of the attitude holder’s belief that p, as in *John believes Bill that Lisa is moving to Canada*: we show that this Source-construction is available with *believe*, but not with *know* and other factive verbs. This pattern presents a number of challenges for the Hintikkan view, and further complicates

the idea that factive verbs like *know* are essentially doxastic predicates which require p to be Common Ground.

Overall, what these observations point to, is that the theoretical notion of factivity has been stretched too thin, in terms of the range of phenomena it is intended to account for. To answer the question of how and to what extent the lexical semantics of attitude verbs constrain the interpretation of their complements as asserted or presupposed, and how these pragmatic dimensions are reflected in the syntactic and semantic composition of attitude reports, we need not just a theory of the semantics of attitude verbs and clausal complementation, but also a theory of assertion, a theory of factivity, and a theory of the syntax-meaning interface —and we need them all to add up. However, as we find from surveying the empirical and theoretical landscape, the theoretical and empirical pieces often don't add up.

Adding to these complications, we find in Chapter 5 that current theoretical approaches to factivity themselves face a number of challenges regarding the distribution of the kinds of (non-)embedded contexts that allow for suspension of the speaker commitment to p inference with emotive and doxastic factives. Viewed in the context of the challenges from the interface, these issues raise the question of whether we can provide an empirically satisfactory account of factivity, that is not at odds with our broader theoretical understanding of assertion and presupposition, and which does not pose a problem for the interface.

With this background in mind, the following section provides a chapter-by-chapter overview of the three dimensions of propositional attitude reports investigated here: the syntax-pragmatics interface (the focus of Chapters 2 and 3); the compositional semantics (the focus of Chapter 4); and the issue of factivity itself (the focus of Chapter 5). Chapter 6 concludes with the main findings of the dissertation and points to interesting directions for future research.

Section 1.3 spells out the theoretical framework and assumptions of the dissertation, and introduces important terminology.

1.2 Chapter overview

1.2.1 The syntax & pragmatics of clausal embedding: Part I (Ch 2)

In a tradition of research on clausal embedding going back to Hooper and Thompson (1973), it is observed that, while (10-b) would typically be understood as an assertion about Mary's beliefs, there is also a reading of this sentence whereby the *embedded* proposition is intuitively the 'main assertion', as illustrated with the question-answer pair in (10) (cf. Roberts 2012, 1996, Simons 2007).

- (10) a. Where is Bill?
b. I believe that he's in Philly.

Interestingly, the availability of this kind of reading seems to depend on the type of attitude verb: unlike *believe*, the factive verb *resent*, for instance, does not allow for embedded assertions in this sense:

- (11) a. Where is Bill?
b. #I resent that he's in Philly.

The assertion of the embedded proposition has moreover been argued to have a number of syntactic correlates, including the availability of *wh*-extraction from the embedded clause (12), CP anaphora (13), as well as the licensing of a family of constructions known as Main Clause Phenomena, illustrated with Swedish V-to-C movement (V2) in (14).²

- (12) a. What_i do you believe (that) Lisa likes t_i?
b. *What_i do you resent (that) Lisa likes t_i?

(13) a. I believe so.
b. *I resent so.

²Indicated by the positioning of the finite verb relative to negation.

- (14) a. Jag tror att Lisa är_i inte t_i kapabel att komma i tid.
 I believe that Lisa is not capable to arrive on time.
 ‘I believe that Lisa is not capable of arriving on time.’
- b. *Jag avskyr att Lisa är_i inte t_i kapabel att komma i tid.
 I resent that Lisa is not capable to arrive on time.
 ‘I resent that Lisa is not capable of arriving on time.’

This correlation has led a number of researchers to propose a link between the pragmatic status of the embedded proposition as asserted, and the syntactic properties of the embedded clause. In particular, a popular idea, building on work by Rizzi (1997), is that complements of verbs like *believe* are ‘larger’ than the complements of verbs like *resent*. In an extension of ideas of Kiparsky and Kiparsky (1970), it has also been proposed that the complements of verbs like *resent* are in fact underlyingly DPs, and not CPs; thus tying the syntactic category of the embedded clause to its status as presupposed. While these ideas are both intuitively appealing, they turns out to face a number of empirical challenges, regarding both the role of the matrix predicate, and the issue of identifying a precise characterization of what *specific* dimensions of assertion and presupposition are relevant to the syntax.

In Chapter 2, we explore a number of approaches to these questions, finding that we are facing a highly complex landscape, with substantial disagreement not just on the theoretical side, but also in terms of what the empirical facts actually are. A set of commonly used tests for CP vs. DP-status, including those illustrated in (12)-(14) shows us that while a subtype of factive verbs (namely the emotive factives) select for DPs, this is neither a general requirement of factive verbs (cf. *discover* and *notice*), nor of verbs that require that their complements have an antecedent in the discourse (cf. *accept* and *not say*), contrary to the Kiparsky-Kiparsky account.

However, the insight that there is variation among factive verbs in terms of the syntactic and pragmatic status of the embedded proposition has in fact been present since early work on the topic (e.g. Karttunen 1971, Hooper and Thompson 1973). Circumventing the thorny issue of factivity, a number of researches following Hooper and Thompson (1973) have instead appealed to another ‘aspect’ of assertion, such as speaker (or attitude holder) commitment

to p (in the sense of Stalnaker 1974, 1978), or the status of p as the Main Point or *at-issue* content with respect to the Question Under Discussion (in the sense of Simons 2007, a.o.). A review of previous experimental work (e.g. Djärv et al. 2017) allows us to rule out the latter type of approach.

However, we are left at the end of this chapter with the conclusion that without comparative data from a larger number of speakers and a wider range of verbs and constructions, making further theoretical progress is difficult. The main empirical problem is that we are unable to disentangle true empirical disagreement from the possibility of variation (across speakers, types of Main Clause Phenomena, and languages). Providing such cross-linguistic quantitative data, and arriving at an empirically supported theory of embedded Main Clause Phenomena is the objective of Chapter 3.

1.2.2 The syntax & pragmatics of clausal embedding: Part II (Ch 3)

With many outstanding questions both regarding the pragmatic properties of different types of attitude verbs, and the pragmatic and lexical restrictions on different kinds of Main Clause Phenomena, Chapter 3 presents two quantitative studies probing these questions: a corpus study of Swedish embedded V2, and a large-scale cross-linguistic study of four types of Main Clause Phenomena (embedded V2, topicalization, scene setting adverbs, and speech act adverbs) in three languages (German, English, and Swedish).

Based on the results from these studies, we propose that the relevant notion of assertion for licensing V-to-C movement and *wh*-extraction is *Discourse Novelty*, where this is the flip-side of Givenness, in the sense of Schwarzschild (1999). An interesting, and surprising, finding for the theoretical study of the left-periphery and the syntax-pragmatics interface, is that the Givenness-Novelty dimension is not relevant to any of the other types of Main Clause Phenomena investigated. Regarding the role of the verb, we find, looking at interactions with the polarity of the matrix verb, that while the embedding predicate plays a large role in constraining the interpretation of the embedded proposition as new vs. Given, ultimately the availability of a (syntactically and pragmatically) ‘assertive’ CP, is still a matter of the

pragmatics of the utterance as a whole, rather than the selectional properties of the verb itself. We moreover find that factive predicates vary with respect to the discourse status of their complement, such that *doxastic* factives like *discover*, but not *emotive* factives like *appreciate*, allow for the embedded proposition to be asserted, in the sense of providing discourse new content. In this regard, the doxastic factives pattern with speech act verbs (e.g. *say*), and doxastic non-factives (e.g. *believe*), whereas the emotive factives pattern with the response stance verbs (e.g. *accept*).

This, then, takes us to one of those critical points of tension mentioned in Section 1.1.2 above, where the theoretical pieces of the puzzle don't fit together. Chapters 2 and 3 brought us an empirically substantiated theory of what particular pragmatic dimension of assertion is relevant to *wh*-extraction and V-to-C movement, namely Givenness vs. discourse novelty, a dimension which split the class of factive predicates into two sets. While this finding aligns with some intuitions and judgements reported in previous work on the syntax and pragmatics of attitude reports and clausal embedding, it actually goes counter to the way that factivity is standardly understood in the semantics literature. As mentioned in Section 1.1, presuppositions are typically understood to be conditions on the context: in the case of factive predicates, p must be Common Ground. The problem here is that while Givenness doesn't imply Common Ground status (cf. the response verbs), Common Ground status clearly implies Givenness.

Further, as we observe in Chapter 2, emotive factives require their complements to be DPs (unlike the other attitude verbs investigated here, which allow for both CP and DP complements). This observation raises a related question: does the syntactic status of the complements of emotive factives as DPs follow from their lexical semantics, and if so, in what way? We know from the doxastic factives that it cannot be a consequence of their factivity, and we know from the response verbs that it cannot be a consequence of Givenness per se. We return to these two problems —the pragmatic status of the complements of the doxastic factives, and the DP-selection of emotive factives— in Chapter 5, where we examine the semantics and pragmatics of factivity and factive verbs.

First, we turn to a more basic question, raised by the observation that most attitude verbs are compatible with both DP and CP complements: given that DPs typically denote individuals, how does this fit with the Hintikkan view (Section 1.1) whereby attitude verbs s-select for propositions?

1.2.3 The semantics of attitude reports (Ch 4)

The idea that *attitude verbs* like *believe* and *know* s-select for propositions (type <st>) (see Section 1.1) is complicated by the observation that they may also combine with individuals (type *e*):

- (15) a. Mary {knows, believes} that Bill is moving to Canada.
- b. Mary {knows, believes} the claim that Bill is moving to Canada.

A challenge for the idea that *know* is simply the factive cousin of *believe* moreover arises when we consider the availability and interpretation of different types of individuals under *know* vs. *believe*. As we observe in Chapter 4, *believe*, but not *know*, allows for a DP-argument (which unlike *the claim* in (15-b), is structurally independent of the *that*-clause), which refers to the Source of the attitude holder's belief that p:

- (16) a. Mary believes Bill that he is moving to Canada.
- b. *Mary knows Bill that he is moving to Canada.

This contrast has a further correlate in cases where the two verbs take only a DP-complement like *Bill*: with *believe* in (17-a), *Bill* is understood to refer to the source of some contextually provided proposition p, which the attitude holder, *Mary*, believes. With *know* in (17-b), on the other hand, *Bill* is the object of Mary's acquaintance, and no epistemic relation to a proposition is inferred.

- (17) a. Mary believes Bill.
- b. Mary knows Bill.

If *know* and *believe* both describe doxastic relations to propositions, why should there be such contrast? Importantly, this contrast is not due to some lexical quirk of *know* or *believe*, but generalizes across attitude verbs: we find both factive and non-factive verbs to pattern with *know*; for instance, *discover*, *appreciate*, *forget*, *fear*, and *mention*, whereas a subset of non-factive verbs, e.g. *trust* and *doubt*, pattern with *believe*.

The key empirical contributions of Chapter 4 are (i) the observation of this contrast, and (ii) the observation that this split among verbs correlates with an entailment contrast noted by Prior (1971), Pietroski (2000), King (2002), Uegaki (2015) and Elliott (2016), shown in (18)–(19):

- (18) a. Sue believes [CP that Anna is to blame]. (b) \models (a)
b. Sue believes [DP the rumour/claim that Anna is to blame].

(19) a. Sue knows [CP that Anna is to blame]. (b) $\not\models$ (a)
b. Sue knows [DP the rumour/claim that Anna is to blame].

With verbs like *believe*, the DP-case (18-b) entails (18-a). With verbs like *know*, on the other hand, there is no entailment from (19-b) to (19-a). These and related data lead us to propose a basic distinction between *know*-verbs, which describe (broadly speaking) acquaintance-relations to individuals, and *believe*-verbs, which describe epistemic or doxastic relations to propositional content. A schematic analysis of the two types of verbs is given in (20):³

- (20) *know* and *believe*-verbs [Meaning Schema]

 - a. *know*-verbs : $\lambda x_e. \lambda s_l. \text{VERB}_{AQ}(s)(x)$
 - b. *believe*-verbs : $\lambda x_e. \lambda s_l. \text{VERB}_{DOX}(s)(\text{CONT}(x)(w_s))$

We further argue (contra Kratzer 2006 and Moulton 2009b) that clausal complements of content nouns are propositions (mediated by a nominal C-head of type $\langle st, st \rangle$) (22), and that the clausal complements of verbs are content individuals (mediated by a verbal C-head

³The subscript s on w_s in (20) denotes the world of the belief-state (or situation; see Section 4.2).

of type $\langle st, e \rangle$) (21):

(21) Clausal complements of verbs

- a. $[[C_{V-cont}^o]]^w = \lambda p_{st}. \iota x_c. \text{CONT}(x_c)(w) = p$
- b. $[[CP_{V-cont}^o]]^w = \iota x_c. \text{CONT}(x_c)(w) = p$

(22) Clausal complements of nouns

- a. $[[C_N^o]] = \lambda p_{\langle st \rangle}. p$
- b. $[[CP_N^o]] = \lambda w. \text{John moved to Canada}(w)$

In Chapter 5, we expanded on our analysis of the factive members of the *know*-class, arguing that these verbs are *evidentials*. In particular, we attribute the source of the (generally projective) inference of speaker commitment to p to a presupposition of an evidential modal base which entails p .

1.2.4 Factivity (Ch 5)

In Chapters 2 and 3, we observed that factive predicates vary with respect to the discourse status of their complement, such that *doxastic*, but not *emotive* factives allow for the embedded proposition to be asserted, in the sense of providing discourse new content. Meanwhile, in the literature on factivity, we find the doxastic-emotive split to track a separate semantic distinction. The observation, originally due to Karttunen (1971) (23), is that doxastic factives, like *discover* and *realize*, unlike emotive factives like *regret* and *resent*, tend to lose the inference that p is true in certain embedded environments. Specifically, where the context is inconsistent with the speaker being committed to the truth of p .

(23) Karttunen (1971, p. 64)

- a. ‘Soft’ trigger: doxastic factives $\rightsquigarrow p$

If I realize later that [P I haven’t told the truth], I’ll confess it to everyone.

- b. ‘Hard’ trigger: emotive factives $\rightsquigarrow p?$

If I regret later that [P I haven't told the truth], I'll confess it to everyone.

In the broader presupposition literature, this contrast has been linked to a general split between ‘soft’ and ‘hard’ triggers, following Abusch (2002, 2010). While this might seem to conform to the emerging view that doxastic factives are ‘more assertive’, whereas emotive factives are ‘more presuppositional’, the exact relationship between these two dimensions—novelty vs. Givenness on the one hand, and presupposition projection on the other—is not straightforward. As we observe in Chapter 4, the ability of doxastic factives to introduce discourse new content is only present in *unembedded* sentences. Suspension of the speaker commitment inference with the doxastics, on the other hand, requires embedding.

Adding to this complicated picture, we further observe that in a different respect, emotive factives actually appear to be the ‘weaker’ of the two, allowing for contextual suspension of the factive inference in certain *unembedded* contexts:

- (24) a. John is happy that [P his parents are coming to visit him], though they actually had to cancel their trip because of the weather. (Poor John will be sad when he finds out!) $\not\rightarrow p$
- b. #John is aware that [P his parents are coming to visit him], though they actually had to cancel their trip because of the weather.

From examining these contexts in some detail, we propose a new analysis of the meaning of factive predicates in terms of a presupposition of an evidential modal base which entails p (cf. (2) above). To account for a number of observed asymmetries in the types of linguistic and pragmatic contexts that allow for cancellation or suspension of the speaker commitment inference across factive predicate, we propose that this evidential modal base is always anchored to a *Judge*, which, depending on the type of factive predicate, is bound by different individuals. In the case of the doxastic factives, the judge is bound by the speaker, whereas in the case of the emotive factives, the judge is bound by the attitude holder. This, then accounts for the observation that doxastic factives only allow suspension of the speaker

commitment inference in *embedded* contexts that are inconsistent with the speaker having evidence for p (e.g. explicit ignorance contexts and first person conditionals); consistent with the view that such contexts trigger local accommodation of the relevant presuppositions (Heim 1982, 1983). Emotive factives, on the other hand, allow suspension or cancellation of the speaker commitment inference also in unembedded contexts, provided that there is sufficient ‘cognitive distance’ between the evidential base of the speaker and that of the attitude holder. We further extend our analysis of factivity to *fact that* nominals, arguing that these carry the same presupposition, though unlike in the case of the verbal factives, the judge is not intrinsically tied to either speaker or attitude holder, but is realized as an index on the noun, which might either be bound or receive its value through the assignment function.

While this approach is able to capture a number of asymmetries regarding the sensitivity to operators and contextual effects, observed across sub-types of factives, the analysis still identifies a common source for the inference that the speaker endorses p across all factive predicates, which does not rely on the discourse status of p.

We finally return to the observation regarding the syntactic status of the clausal complements of emotive factives as DPs. In previous work, the presence of a D-layer in the complements of emotive factives has been tied either to their status as factive, or to the status of their complements as Given information. In Chapters 2 and 3, we observed that neither of those claims can be correct. The account developed here, instead links the presence of this D-layer under emotives to a particular type of Givenness; a requirement that the situation or individual providing the source of the attitude holder’s evidential basis for p has a contextual antecedent.

This chapter also tests experimentally the predictions of a set of recent proposals tying the speaker commitment inference to the status of p as (*not-)**at issue* with respect to the Question Under Discussion, especially as mediated by prosodic focus (e.g. Beaver 2010, Simons, Tonhauser, Beaver, and Roberts 2010, Simons, Beaver, Roberts, and Tonhauser 2017, Abrusán 2011b, 2016, Anand and Hacquard 2013, Tonhauser 2016). While the pre-

dictions of these pragmatic accounts are not borne out for English (but rather support a lexical approach, such as that offered here), we *do* observe certain intriguing weak focus-based interactions, which are not predicated on either type of account. This chapter ends with a short section on how to model these interactions probabilistically, and a note on the cross-linguistic picture.

1.2.5 Methodological contribution

In addition to the empirical and theoretical contributions of the dissertation, an important contribution of this dissertation is bringing together and connecting three separate, but mutually relevant, strands of research on propositional attitude reports: the literature on the syntax of assertion and presupposition, the literature on the semantics of attitude verbs and clausal complementation, and the literature on presupposition and factivity. The core challenge of this topic, as we have seen, lies not in each individual question, but in the issue of how the different dimensions of grammar and meaning relate to one another. To meet this challenge, this dissertation aims at carefully considering the different theoretical and empirical options both in the context of each individual phenomenon, and in terms of their interaction.

Moreover, we find that judgements about the phenomena examined here are often subtle, context sensitive, and potentially variable—and in many cases, issues of data sparsity or (apparently) contradictory data points reported in the literature make it difficult to properly evaluate the available theoretical options. Another important contribution of this dissertation is the use of a broad range of experimental methods to empirically substantiate or falsify competing theoretical claims, while carefully controlling for possible points of variation (e.g. among lexical items and apparently similar constructions, among pragmatic contexts, and among speakers and languages). The experimental methods used in the dissertation include a large-scale corpus study, a set of semantic and syntactic acceptability and inference studies, using both written and auditory stimuli, as well as a cross-linguistic experiment which incorporates both judgements of well-formedness and judgements of interpretation. Importantly,

the use of software like **Ibex** (Schwarz and Zehr 2018) and platforms for subject recruitment online, allows us to incorporate both a quantitative and a comparative perspective in this work.

1.3 Assumptions and terminology

I believe that the central empirical points made in this dissertation do not depend in a crucial way on the adoption of a specific formal framework. I do, however, make certain theoretical assumptions, mostly importantly the *principle of compositionality*, also known as *Frege's principle*, adapted from Krifka (1999, p. 8):

The meaning of a complex expression is a function of the meanings of its immediate syntactic parts and the way in which they are combined.

Regarding the nature of these compositional mechanisms, I assume a distinction between lexically encoded meaning and pragmatically derived inferences; though I don't assume a one-to-one correspondence between asserted and entailed content. Lexically encoded meaning, I assume, has the specific property of being cancellable only when occurring in the scope of entailment-targeting operators such as modals and negation. I also assume that the semantics (both in terms of lexical items and the principle of compositionality) makes reference to *semantic types*. The simple types referred to here are individuals of type *e*, eventualities of type *l*, truth-values of type *t*, and world (or situation) arguments of type *s*. Higher types are functions, composed of these simple types, and include predicates of type *<et>*, propositions of type *<st>*, etc. I assume, as is standard in the literature, that the grammar sometimes makes reference to more specific sub-types of individuals and eventualities. In particular, I assume (following Bach 1986), that eventualities cover both states and events. I also assume that the set of individuals cover both particulars and content individuals (e.g. Kratzer 2002, 2006, Moulton 2009b; see Section 4.2 for more detailed discussion). I take it to be a (minimal) requirement on composition that for two lexical items to compose, their semantic types must be compatible. I implement this assumption using the

formalism offered by the lambda-calculus. I further assume that the following compositional mechanisms are provided by the grammar:

- (25) **Functional Application [FA]** (Heim and Kratzer 1998, p. 49)

If α is a branching node, and $\{\beta, \gamma\}$ is the set of α 's daughters, then α is in the domain of $[[\cdot]]$ (the interpretation function, KD) if both β and γ are, and $[[\beta]]$ is a function whose domain contains $[[\gamma]]$. In this case, $[[\alpha]] = [[\beta]]([[[\gamma]]])$.

- (26) **Predicate Modification [PM]** (Heim and Kratzer 1998, p. 65)

If α is a branching node, and $\{\beta, \gamma\}$ is the set of α 's daughters, and $[[\beta]]$ and $[[\gamma]]$ are both in $D_{e,t}$, then $[[\alpha]] = \lambda x \in D_e . [[\beta]](x) = [[\gamma]](x) = 1$.⁴

I assume also, following Kratzer (1996), that the external argument is introduced by $Voice^o$ (27), the functional head which assigns Accusative case. $Voice^o$ combines with the *vP* via Event Identification (28).⁵

- (27) $[[Voice^o]] = \lambda x_e. \lambda e_l. agent(e)(x)$

- (28) **Event Identification [EID]** (Kratzer 1996, p. 122) (own formulation)

If α is a branching node, and $\{\beta, \gamma\}$ is the set of α 's daughters, and $[[\beta]]$ is of type $\langle e, lt \rangle$ and $[[\gamma]]$ of type $\langle lt \rangle$, then $[[\alpha]] = \lambda x_e. \lambda e_l. [[\beta]](x)(e) \& [[\gamma]](e)$.⁶

In terms of the syntax, I adopt a generative perspective along the lines of Chomsky (1995) (*bare phrase structure*), assuming in particular that the grammar is binary branching, and includes the operations *merge* and *move*. I also assume that DPs need to be syntactically licensed (via case-assignment) (Vergnaud 2008, *et seq*). To the extent that I discuss word-internal composition, I assume a broadly *Distributed Morphology* framework (Halle and Marantz 1993, Harley and Noyer 1999, Embick and Marantz 2008, among others).

⁴This can be extended to include intensional predicates, where $\{\beta, \gamma\}$ are both of type $\langle e, st \rangle$ as in Moulton (2015, p. 313). Here, $[[\alpha]] = \lambda x_e. \lambda w_w. [[\beta]](x)(w) = [[\gamma]](x)(w) = 1$.

⁵The focus here is on the internal, rather than the external arguments of attitude verbs, so nothing in the current discussion hinges on the choice to sever the external argument.

⁶I assume that the same operation is available with states to give us state holders, in addition to agents of events. Again, I assume that this can be straightforwardly extended to include intensional predicates.

A note is also in order about the empirical scope of the dissertation. Here, we look only at finite declarative *that*-clauses. Our primary theoretical and empirical focus is moreover on the clausal complements of verbs, though in some places, we also turn our attention to the clausal complements of adjectival attitude predicates (like *be aware* and *be happy*) and content nouns (like *the claim* and *the fact*). These choices are essentially practical, due to limitations of time. Despite these limitations, I hope that this dissertation will provide a valuable contribution to the larger enterprise of developing a comprehensive theory of the syntax, semantics, and pragmatics of clausal embedding and propositional attitude reports.

Finally, a note on the terminological choices made here: This dissertation brings together and connects several, more or less inter-connected, strands of research on propositional attitude reports. For this reason, the predicate classes discussed here have been referred to by many different names, depending on the theoretical and empirical context. To make it clear how the present discussion connects to previous work, I will introduce these labels when necessary and relevant. For consistency and clarity, I will, however, use the labels introduced in (29) throughout the dissertation:

- (29) a. Jane said that [P Bill is moving to Canada]. Speech act verbs
b. Jane believed that [P Bill is moving to Canada]. Doxastic non-factives
c. Jane doubted that [P Bill is moving to Canada]. Response (stance) verbs
d. Jane resented that [P Bill is moving to Canada]. Emotive factives
e. Jane discovered that [P Bill is moving to Canada]. Doxastic factives

Chapter 2

The syntax of assertion and presupposition

2.1 Introduction

2.1.1 Chapter goals and overview

Recall the questions posed above, of how and to what extent the lexical semantics of attitude predicates constrains the interpretation of their complements as asserted or presupposed, and to what extent these pragmatic dimensions are reflected in the syntactic and semantic composition of attitude reports. As we pointed out above, answering this question requires several theoretical and empirical pieces to fit together. In this and the following chapter we address the following, more specific, questions:

- (1)
 - a. Are attitude predicates of different classes, semantically defined, selective with regard to the category of their complement as a CP or a DP?
 - b. Does the availability of different types of complementation patterns, syntactically defined, depend on the discourse pragmatics of the embedded proposition as asserted or presupposed?
 - c. Is there a correlation between on the one hand, CP vs. DP syntax, and on the other hand, the pragmatic status of the embedded proposition as asserted vs. presupposed?
 - d. What specific dimensions of assertion and presupposition are relevant to the syntax?

The first part of this chapter is devoted to the question of the c-selectional properties of different types of attitude verbs, and the extent to which they track various semantic and pragmatic dimensions. Section 2.2 reviews a set of proposals (going back to Kiparsky and Kiparsky 1970) arguing that certain predicate types, namely factive verbs like *discover* and *resent*, and response stance verbs like *doubt* and *accept*, select DPs as the consequence of the presuppositional status of their complements. In Section 2.3, we show that at least some aspects of these proposals must be incorrect. Based on a set of commonly applied diagnostics, we show that while a subset of factive verbs (namely emotive factives like *resent* and *appreciate*) only select DP complements, both the response stance verbs and the doxastic factives (e.g. *discover* and *notice*) allow both CP and DP complements, just like speech act verbs like *say* and *argue* and doxastic non-factives like *believe* and *think*; thus answering the question in (1-a).

The second part of this chapter (Section 2.4 and 2.5) examines the popular idea that the status of the embedded clause as asserted makes available a particular type of construction in the embedded clause, namely constructions that require an extended C-domain. This family of constructions is known as (embedded) Main Clause Phenomena, and is commonly taken to include topicalization, embedded Verb Second and speech act adverbs (see Section 2.1.3). While our review of the previous empirical and theoretical claims in this area allows us to set aside certain theoretical options, the picture which emerges is one of substantial disagreement, not just theoretically, but also about the nature of the data, thus making it difficult to address the remaining questions in (1). In particular, we conclude that without *comparable* data from different Main Clause Phenomena across different languages, to rule out the possibility of variation (among speakers, languages, and different verbs and constructions), it is difficult to falsify and evaluate competing theoretical accounts.

To close this data-theory gap, we take a broad empirical approach, combining cross-linguistic experimental work and statistical analysis of large-scale corpus data to investigate the availability of different kinds of MCP in different languages, across lexical and pragmatic contexts. Due to their scope, these two studies, and the answers and conclusions that we

are able to draw from them, are presented separately in Chapter 3: Section 3.1 presents results from a large-scale corpus study, investigating the distribution of embedded V2 in Swedish (based on Caplan and Djärv 2019). Section 3.2 follows up on this study with a cross-linguistic experimental study looking at the distribution, and the pragmatic licensing conditions, of four purported Main Clause Phenomena in English, German, and Swedish (speaker oriented adverbs in all three languages; embedded V2 in Swedish and German; topicalization and scene-setting adverbs in English). Importantly, this study allows us to probe the possibility of variation, a significant empirical problem, as we will see in this chapter: between speakers; between different kinds of MCP; between languages; as well as between (classes of) attitude predicates, in terms of their semantic and pragmatic inferences.

Together, these two studies provide strong empirical support for a distinction between predicates that pragmatically treat the embedded proposition as Given, in the sense of Schwarzschild (1999) (response stance verbs and emotive factives), and predicates that are flexible with respect to the discourse status of p as new vs. Given information (speech act verbs, doxastic non-factives, and doxastic factives). It is this dimension of Givenness vs. discourse novelty, we show, that is relevant to the licensing of (a subset of) Main Clause Phenomena, namely embedded V2 (other Main Clause Phenomena turn out not to be sensitive to any of the pragmatic dimensions investigated here^{1,2}). In particular, we show that embedded V2 is licensed in contexts where p is discourse new; and blocked when p is Given. These, it turns out, are the same types of contexts that allow *wh*-extraction from the embedded clause in English (Section 2.3.1). This then, answers one part of the remaining questions in (1): (1-b)–(1-d).

The other part of these questions, regarding the possible semantic and pragmatic underpinning of the status of the complements of emotive factives as DPs, are left for Chapters 4 and 5, where we look in more detail at factivity (Chapter 5) and the s-selectional properties of

¹This finding is intriguing, given that Hooper and Thompson's (1973) original work on Main Clause Phenomena was based on English; the study of V2 as a type of Main Clause syntax came later (e.g. Andersson 1975, Den Besten 1983).

²Note that throughout the dissertation, our empirical focus is on subject-initial V2, to avoid the confound of topic or focus initial V2-clauses. See examples of the two types of V2 in Section 3.1.1.

the different types of attitude verbs, including the interpretation imposed by different types of verbs on their DP and CP-complements (Chapter 4). Importantly for these questions, however, this and the following chapters show: (i) that Givenness is not about selection per se, but follows from the semantic and pragmatic properties of the matrix clause more broadly, (ii) that neither factivity nor DP-selection track the Givenness-novelty dimension, and (iii) that factivity does not track DP-selection. A final important contribution of the experiments in Chapter 3 (Section 3.2.6.1) is that they provide a solid empirical underpinning for the common assumption in theoretical syntax and semantics, that predicates cluster into classes, based on their pragmatic properties, and moreover, that this association is robust, both across different languages and across different types of discourse conditions.

2.1.2 Introducing the syntax and pragmatics of clausal embedding

The enterprise of examining fine-grained semantic, pragmatic, and syntactic distinctions among *classes* of attitude predicates, and the way in which these dimensions are connected, goes back at least to Kiparsky and Kiparsky (1970), Karttunen (1971, 1974), Hooper and Thompson (1973) and Cattell (1978). Since these early authors, a key distinction has been made between ‘assertive’ and ‘non-assertive’ predicates. For *unembedded* sentences, the notion of assertion is relatively well-understood. Following Stalnaker (1974), it is generally assumed that for a speaker to assert a proposition *p*, it is required that:

- (2) a. The speaker is committed to *p*;
- b. The speaker is attempting to add *p* to the Common Ground (the set of propositions mutually taken to be true by the discourse participants).

But what does it mean for an *embedded* proposition to be asserted? There is an intuitive sense in which the embedded proposition in the (a)-sentence, but not the (b)-sentence in (4), can be understood as asserting that *p*.³

³On this reading, the matrix clause plays a parenthetical function. The availability of this reading is often illustrated using a slinging construction, as in (3).

- (4) a. John said that [_P Lisa and Bill broke up].
 b. John regrets that [_P Lisa and Bill broke up].

In this and the following chapter, we address some of the questions involved in answering the broader question of what it means for an embedded proposition to be asserted.

On the view examined in Section 2.2, a key distinction is drawn between factive and non-factive predicates, such that doxastic non-factives like *believe*, *assume*, and *think* are taken to be assertive, whereas doxastic factives like *know*, *discover*, and *realize* are assumed to be non-assertive. On this view, factive predicates (encompassing also emotive factives like *appreciate* and *resent*), are understood to be a subset of a more general class of ‘presuppositional’ or ‘referential’ predicates.⁴

Sections 2.2 and 2.3 examine, and reject, the claim (going back to Kiparsky and Kiparsky 1970, and taken up in recent work by Kastner and Haegeman, among others), that ‘assertive’ predicates select for CPs, whereas ‘presuppositional’, or ‘non-assertive’, predicates select for DPs. We will refer to this idea as the *CP/DP Interface Hypothesis*. Importantly, this idea is based primarily on the second component of assertion, as presented in (2), that for a proposition to be asserted, it must not already be part of the Common Ground. This idea is illustrated in (5), with the (by hypothesis) assertive verb *say* and non-assertive verb *regret*:

- (5) a. Anna said [_{CP} that Lisa got the job].
 b. Anna regretted [_{DP} D [_{CP} that Lisa got the job]].

An overview of the proposed empirical consequences of this hypothesis is given in (6)–(7).⁵

- (6) Assertive attitudes
 a. Pragmatic consequence: p is discourse neutral, potentially new
-

- (3) a. Lisa stole the money, I believe.
 b. *Lisa stole the money, I regret.

⁴Though as we mentioned in the introduction (Chapter 1), a central contribution of this dissertation will be to formally dissociate the ‘truth’-presupposition of factive predicates from the discourse status of p.

⁵Topicalization, shown in (6)/(7) (b-1) is part of the family of Main Clause Phenomena, discussed in more detail in Section 2.1.3.

- b. Syntactic consequences:
 - (i) ✓Embedded Main Clause Phenomena: *I said that pizza, she doesn't eat.*
 - (ii) No weak island effects: *Who did you say doesn't eat pizza?*
 - (iii) Clausal anaphora: *I said so/#it.*
- (7) Non-assertive attitudes
- a. Pragmatic consequence: p is discourse old/Given/presupposed
 - b. Syntactic consequences:
 - (i) ✗Embedded Main Clause Phenomena: **I regret that pizza, she doesn't eat.*
 - (ii) Weak island effects: **Who did you regret doesn't eat pizza?*
 - (iii) Clausal anaphora: *I regret it/*so.*

In Section 2.4, we examine another set of proposals, developed in the context of the first of the syntactic consequences in (6)–(7), embedded Main Clause Phenomena (henceforth, MCP). These proposals take as their central tenet the first part of (2): commitment to p. While this ‘criteria’ is relatively straightforward to implement with unembedded sentences, it becomes complicated with embedded propositions. The main issue is whether an embedded assertion requires reference to the *speaker*, or whether—at least for the purpose of the syntax—it is sufficient that the sentence describes a ‘reported assertion’, i.e. an assertion of the attitude holder. The question of the role of the identity or class of the embedding predicate will again become important. As will become clear, quite little is in fact known about the extent to which different predicates *lexically* encode speaker or attitude holder belief.

Section 2.5 discusses a third kind of approach, which relies on a somewhat different pragmatic notion, similar, but crucially distinct from the notion of assertion offered in (2). Building in particular on Simons (2007) (and more recent work by Simons, Tonhauser, Beaver, and Roberts 2010), the idea is that an embedded proposition is asserted when it provides the Main Point of the Utterance (or what is *at-issue*, given the Question Under Discussion; Roberts 1996, 2012). Again, the role of the matrix predicate *vis à vis* the discourse

context will come under scrutiny.⁶ Based on a review of previous experimental work testing this hypothesis, we are able to reject this hypothesis and set it aside for the remainder of our discussion. Next, we briefly introduce the class of (embedded) Main Clause Phenomena, and some of the central questions in the study of this family of constructions.

2.1.3 Introducing Main Clause Phenomena

The study of Main Clause Phenomena [MCP] goes back to Emonds (1970), who identified a class of transformations that he took to occur only in main clauses.

Classic instances of English MCP involve, but are not limited to: VP-preposing (8-a), topicalization (8-b), subject-auxiliary inversion (8-c), left/right-dislocation (8-d), and speech act adverbs (9). Another well-studied MCP, which we will investigate in great detail in Chapter 3, is V-to-C movement, or verb second (henceforth, V2) (10): V2 is not present in English, but is found in several other Germanic languages, including Swedish and German.

- (8) Hooper and Thompson (1973, p. 467-8)

- a. Mary plans for John to marry her, and [marry her]_i he will t_i.
- b. [Each part]_i Steve examined t_i carefully.
- c. Will_i James t_i ever finish reading that book?
- d. (i) [This book]_i, it_i has the recipe in it.
- (ii) You should go to see it_i, [that movie]_i.

- (9) I could seriously_{Speaker} use a holiday.

- (10) Holmberg (2015, p. 1)

Jag har ärligt talat aldrig sett huggormar i den här skogen.
I have honestly speaking never seen adders in this here forest.DEF

‘To be honest I’ve never seen adders in this forest.’

In an important update of Emonds’s (1970) work, Hooper and Thompson (1973) showed

⁶We return to the notion of the Question Under Discussion and the (*not-*)*at issue* status of p in more detail in Chapter 5 where we investigate factivity.

that some MCP are also possible in certain embedded environments:⁷

- (11) Hooper and Thompson (1973, p. 474-479)
 - a. Sally plans for Gary to marry her, and he vows that marry her, he will.
 - b. *Sally plans for Gary to marry her, and it bothers me that marry her, he will.
- (12) McCloskey (2006, p. 32)
 - a. A referendum on a united Ireland . . . will be a good thing, because frankly *Speaker* they need to be taken down a peg and come down to earth and be a little bit more sober in their approach to things.
 - b. *I didn't drop the class because frankly *Speaker* I didn't like it, I dropped it because it was too expensive.

The study of MCP has been centered around two problems: (a) identifying the types of lexical and/or pragmatic *contexts* that license MCP; and (b) properly characterizing the syntactic and interpretive properties associated with the MCP *themselves*. Here, we will focus on the first question; we don't aim or attempt to provide a syntactic analysis of the fine-grained syntactic properties of the left-periphery. Of primary interest here are the lexical and pragmatic properties proposed to correlate with or predict different kinds of complementation patterns, including the availability of MCP.

The intuition about the licensing of MCP, going back to Hooper and Thompson (1973), is that MCP are licensed by *assertion* —hence, its relatively free occurrence in main clauses, and its restricted availability in embedded clauses. Regarding the role of the embedding predicate, Hooper and Thompson (1973) claimed that only certain *classes of predicates*, given

⁷A comprehensive literature review is well beyond the scope of the current discussion. A selection of work on this topic includes Andersson (1975), Hooper (1975), Green (1976), Maki et al. (1999), Bhatt and Yoon (1992), Den Besten (1983), Wechsler (1991), Holmberg and Platzack (1991), Hegarty (1992), De Haan (2001), Zanuttini and Portner (2003), Emonds (2004), Truckenbrodt (2006, 2009), Heycock (2006), Heycock et al. (2010), Aelbrecht et al. (2012), Julien (2009, 2015), Wiklund (2010), Bentzen (2010), Woods (2015, 2016a,b), Gärtner and Michaelis (2010), Wiklund et al. (2009), Bianchi and Frascarelli (2009), Jensen and Christensen (2013), Djärv et al. (2017), Kastner (2015), Haegeman and Ürögdi (2010), De Cuba and Ürögdi (2009), Haegeman (2012, 2014), Holmberg (2015), De Cuba (2017a,b), Jiménez-Fernández and Miyagawa (2014), Miyagawa (2017), Caplan and Djärv (2019), Jacob (2018).

in (13), but not others, in (14), allow MCP in their complements (Hooper and Thompson 1973, p. 473-4):⁸ Again, the intuition is that the predicates in (13) are somehow assertive, unlike those in (14). Providing a precise characterization of what exactly this amounts to, and how it is reflected in the grammar, is the focus of the proposals examined in Sections 2.2–2.5.⁹

(13) Predicates that allow MCP:

- a. Speech act non-factives, e.g. *say, argue, tell, claim*
- b. Doxastic non-factives, e.g. *think, guess, believe, imagine*
- c. Doxastic factives, e.g. *know, find out, realize, discover* (also known as “semifactives”, following Karttunen 1971)

(14) Predicates that do not allow MCP:

- a. Emotive factives, e.g. *regret, appreciate, like, resent*
- b. Response predicates, e.g. *deny, doubt, accept, admit*

Regarding the status of the complement itself, there are (very broadly speaking) two prominent approaches. On one type of approach, assertion is encoded in some kind of extended C-domain, such as (15), which syntactically encodes illocutionary force, as well as other discourse features like topic and focus:

⁸The labels used here are not those used originally by Hooper and Thompson; nor are the current labels a perfect description of the five categories they assumed. For instance, they do not invoke the doxastic/emotive distinction in their discussion, but use the notions of ‘semifactive’ vs. ‘factive’ from Karttunen (1971), however, as we will see in Chapter 5, this terminology is somewhat misleading and will not be adopted here. Moreover, while the class of verbs in (14-b) (Hooper and Thompson’s (1973) Class C) does involve the response stance predicates *doubt, deny, be (un)likely, be (im)possible, be(im)probable*; the term ‘response (stance) predicate’ is from a separate classification due to Cattell (1978), who in his discussion of interrogative adverbs distinguishes between three classes of predicates: response stance predicates; ‘volunteer stance’ predicates (which include the speech act and doxastic non-factives); and ‘non-stance’ predicates (which include the factive predicates). Hooper and Thompson (1973, p. 478) describe these verbs as “neither asserted nor presupposed”.

⁹Note that the current discussion (and empirical investigation) is focused entirely on MCP in declarative complements of clause-taking attitude verbs. As we saw in (8) and (10), however, MCP is also possible in other kinds of embedded environments, for instance in interrogatives and in certain adverbial clauses. While the distribution/licensing of MCP in such environments is certainly crucial to a general theory of MCP, we will leave these cases to the side for the remainder of this dissertation, as the goal of this dissertation is not such a theory, but rather, to forward our understanding of propositional attitude reports and declarative embedding.

(15) Rizzi (1997, p. 297)

$$[\text{Force}_P \text{ Force}^o [\text{Top}_P \text{ Top}^o [\text{Foc}_P \text{ Foc}^o [\text{Top}_P \text{ Top}^o [\text{Fin}_P \text{ Fin}^o \text{ IP }]]]]]$$

A related, but different, way of modelling the syntax of asserted clauses can be found in Speas and Tenny (2003), Tenny and Speas (2004), who posit designated discourse-projections making reference to the speaker and hearer. While there are disagreements about the exact nature of the left-periphery, the idea that asserted clauses involve additional structure making reference to pragmatic dimensions of meaning has been widely adopted in the literature on MCP, in particular in the kind of approach discussed in Sections 2.4–2.5.¹⁰ On this kind of approach, the explanatory burden is placed on the contexts which *do* allow MCP—the idea being that topicalization, V-to-C movement, etc., are syntactic reflexes of the discourse-pragmatics, triggered by features in the C-domain.

On the second kind of approach, on the other hand, the explanatory burden is on the kinds of contexts that *disallow* MCP. As mentioned above, the flip-side of assertion is generally taken to be presupposition (Stalnaker 1974, 1978). Regarding the syntax-pragmatics interface, a popular view going back to Kiparsky and Kiparsky (1970) is that presupposed complements are syntactically definite DPs. Again, there are different implementations of this general perspective, but the idea, broadly, is that topicalization, V-to-C movement, and other MCP, are either blocked or simply not licensed, by the presence of the D-layer. This the kind of approach is examined, and rejected, in Section 2.2.

In this preliminary discussion, we have already encountered the central tension in this literature: the empirical (and theoretical) status of the doxastic factives. On the line of reasoning going back to Hooper and Thompson (1973), they are treated as assertive. In the tradition going back to Kiparsky and Kiparsky (1970), on the other hand, they are treated as non-assertive and presuppositional. As we will see in Chapter 5, the latter approach is in line with the received view on factivity, according to which factive predicates require (presuppose) that the embedded proposition is Common Ground. However, this is of course at odds with Hooper and Thompson's (1973) observation that MCP is available with these

¹⁰See also Bhatt and Yoon 1992, Haegeman 2002, 2003a,b, Julien 2007, 2009, Heycock et al. 2010.

predicates, and that MCP is licensed by assertion —if we accept the full Stalnakerian picture of assertion, given in (2). So something has got to give.

In this chapter, we discuss various ways of getting around this problem, either through appealing to alternative ways of understanding assertion (the proposals in Section 2.4–2.5), or by claiming that MCP are in fact *not* available under doxastic factives (the proposals in Section 2.2). With this background in mind, let us consider the CP/DP Interface Hypothesis in more detail.

2.2 The CP/DP Interface Hypothesis

In Section 2.2.1, we introduce the CP/DP Interface Hypothesis. Section 2.2.2 discusses theoretical issues with the proposal. In Section 2.3, below, we test this claim against a number of commonly adopted diagnostics for the status of the embedded clause as a CP vs. a DP, showing that this hypothesis is incorrect in its empirical claims: both regarding the verbs which (c-)select for DPs, and regarding the connection between DP-syntax and various types of complementation patterns (specifically *wh*-extraction and —as we will see in Chapter 3— Main Clause Syntax).

2.2.1 Introducing the hypothesis

The claim examined in this section is that certain, presuppositional, or non-assertive verbs select (only) for DPs. The idea, which goes back at least to Kiparsky and Kiparsky (1970), is that the pragmatic status of p as discourse old is encoded syntactically and semantically in a definite D-head in the embedded clause. We will refer to this idea as the CP/DP Interface Hypothesis (16).

(16) The CP/DP Interface Hypothesis

- a. Some clauses are DPs;
- b. Some verbs are ‘assertive’ and some verbs are ‘non-assertive’;
- c. Assertive verbs select CPs and non-assertive verbs select DPs.

Regarding the syntax-pragmatics interface, the claim of this proposal is that the availability of certain kinds of complementation patterns depends on whether the embedded clause is a CP or a DP. The following syntactic effects are often discussed: (i) Availability of MCP (17); (ii) Weak island effects (18)–(19); and (iii) Clausal anaphora (20)–(21).

- (17) a. *John {regrets, resents} that [this book], Mary read.
 (Haegeman and Ürögdi 2010, p. 112–113, 122, Haegeman 2012, p. 257, De Cuba 2017a, p. 4, De Cuba and Ürögdi 2010, p. 43; Maki et al. 1999, p. 3, Kastner 2015, p. 3)
 b. *John {denies, remembers} that this book, Mary read.
 (Kastner 2015, p. 3, 17)
 c. *Mary realizes that [this book], John read.
 (De Cuba 2017a, p. 4; Haegeman 2012, p. 257, Maki et al. 1999, p. 3; Hegarty 1992, p. 52, fn. 19)
- (18) Haegeman and Ürögdi (2010, p. 119), from Hegarty 1992, p. 1
 - a. How_i do you suppose [that Maria fixed the car t_i]?
 - b. *How_i did you notice [that Maria fixed the car t_i]?
- (19) Kastner (2015, p. 11)
 - a. Who_i do you think [t_i stole the cookies]?
 - b. *Who_i do you {deny, remember, regret} [t_i stole the cookies]?
- (20) Haegeman and Ürögdi (2010, p. 142)
 - a. John supposed [that Bill had done it]_i, and Mary supposed [it_{DP}/so_{CP}]_i too.
 - b. John regretted [that Bill had done it]_i, and Mary regretted [it_{DP}/*so_{CP}]_i too.
- (21) Kastner (2015, p. 23)
 - a. John {thought, said} so.
 - b. *John {remembered, forgot} so

This idea has gained quite a lot of traction in recent years. Here, we focus on the accounts from Haegeman and Ürögdi 2010, Haegeman 2014, and Kastner (2015), as theoretically explicit and empirically comprehensive implementations of this account (but see also Hegarty 1992, Maki et al. 1999, Basse 2008, De Cuba and Ürögdi 2009, Haegeman and Ürögdi 2010, Haegeman 2009, 2012, De Cuba 2017a,b, Hanink and Bochnak 2016, 2017, Korsah and Murphy 2017, Ishii 2017, Jarrah 2017, Berrebi and Bassel 2017, Miyagawa 2017, among others).

On the original proposal of Kiparsky and Kiparsky (1970), the important difference is between factive and non-factive predicates, the idea being that factive predicates select a clause with a potentially null DP corresponding to *the fact*, as illustrated in (22).

$$(22) \quad [_{vP} v [_{DP} D [_{NP} \text{FACT} [_{CP} \text{that p}]]]]$$

In more recent implementations of this view, the idea of a full factive NP has been abandoned, in favour of a D-layer (23), ensuring that the clause is interpreted as ‘familiar’ or that the embedded proposition refers to some type of (discourse) entity in the conversational Common Ground (following Hegarty 1992), though not necessarily factive.

$$(23) \quad [_{DP} D^o [_{CP} \text{that p}]]$$

According to Kastner (2015), factive predicates, along with response stance predicates like *accept* and *deny*, form a class of predicates which he refers to as ‘presuppositional’.¹¹

$$(24) \quad \text{Adapted from Kastner 2015}$$

- a. John said [P that the moon was made of kale]. (No one had claimed p before)
- b. Bill denied [P that he stole the cookies]. (#No one had claimed p before)
- c. Bill knows [P that the moon is made of kale]. (#No one had told him p before)

This view is typically motivated by the empirical claim that factive predicates tend to favour

¹¹Haegeman (2014) doesn’t explicitly discuss these, but it is clear from her discussion that she intends for her class of ‘referentials’ to be understood in a similar way.

complements with nominal properties, whereas speech act predicates tend to dis-prefer them, as shown in (25).

(25) Haegeman and Ürögdi (2010, p. 133)

- a. I {resent, remember, know} / *{think, said, claimed} [DP the claim that John stole the jewels].
- b. Mary resents/*asserted [DP the fact that she is pregnant].
- c. Mary resents/*asserts [DP being pregnant].

Though as was already observed by Hooper and Thompson (1973), this is not necessarily true for the doxastic factives (26). We return to this issue shortly.

(26) a. *I learned Lucy's getting a speeding ticket.
b. *Mary found out Daniel's cutting class.
c. *I see the fact that the Bruins lost.
d. *I know the fact that you're not speaking to me.

According to Haegeman and Ürögdi (2010) and Haegeman (2014), referentiality or familiarity is derived via operator movement from a TP-internal position. On this view, factive complements are essentially relative clauses.¹² Importantly for Haegeman, this also accounts for the weak-island effects found with factive complements. Non-referential clauses, on the other hand, they argue are CPs that have combined with illocutionary force and which do not involve operator movement. Importantly for Haegeman, this also captures the distribution of scene setting adverbs in English (27), which appear not to be restricted in the same way as fronted topics, despite being merged in the left-periphery. On this view, these do not involve movement, and do therefore not give rise to intervention effects. (In Chapter 3, we probe this empirical claim experimentally.)

¹²This is also the position adopted by Hanink and Bochnak (2016, 2017) in their account of clausal complements of factive vs. non-factive verbs in Washo.

(27) Haegeman (2014, p. 190)

- a. John regrets that [last week] Mary did not turn up for the lecture.
- b. I resent the fact that [last week] Mary did not turn up for the lecture.
- c. but nothing could alter the fact that [on the previous evening] he had got engaged to be married to a girl without a bean (P.G. Wodehouse. 1960. *The most of P.G. Wodehouse*. Simon and Schuster. 521, from Santorini 2001)

On Kastner's (2015) account on the other hand, the type of complement is determined by selection: presuppositional verbs select a covert definite determiner (Δ , from Adger and Quer 2001), which in turn selects a CP headed by a Force-head endowed with a presuppositional feature (he refers to these as 'Selected Embedded Presuppositionals'). According to Kastner, 'presuppositional Force' does not license topic or focus, which explains why topic/focus-movement is disallowed in these contexts. He takes 'presuppositional verbs' to select a presuppositional determiner, which in turn selects a C-head (Force or Fin) that constraints the availability of Topic and Focus in the embedded clause. When the matrix context is presuppositional, Kastner argues that a presupposition sensitive definite determiner Δ will be licensed. The choice of the C-head is thus restricted by the semantics of that higher licensor. Regarding the availability of Main Clause Phenomena, Kastner argues:

"Topic and Focus projections are not present in Selected Embedded Presuppositionals, leaving would-be fronted elements with no landing site. Force is supposed to be sensitive to the discourse environment of both the matrix predicate and the embedded predicate ... Force licenses Topic and Focus, so it stands to reason that they are sensitive to certain features on it. Now, the presuppositional embedding verb would carry a feature [F] relevant to presupposition; such a feature has been proposed before, though at this point it is not crucial whether it is [-ASSERT] (De Cuba 2007, Basse 2008), [+FACTIVE] or [+REFERENTIAL] (Haegeman and Ürögdi 2010). The end result is the same: after V checks this feature on Δ , this definite determiner imposes a selectional requirement on Force similar to that which takes place in [Unselected Embedded Questions]. Δ licenses a Force with a presuppositional feature, and a presuppositional Force does not license Topic or Focus. (Kastner 2015, p. 18-20)

Before testing the empirical underpinning of this hypothesis, let us consider some theoretical and empirical problems and questions for the approach.

2.2.2 Theoretical and empirical issues

An important question for this view concerns the theoretical and empirical assumptions about factivity and referentiality. Recall from our introduction in Chapter 1 that propositions are commonly assumed to refer to sets of possible worlds. However, it is not clear how this would distinguish between the complements of verbs like *say* and *think* and complements of verbs like *know*, *regret*, and *doubt*. (This point was raised by Bhatt 2010 in his review of Haegeman and Ürögdi 2010.) Without a more explicit definition of what is meant by ‘referential’, the proposal as it stands is not very informative or predictive.

Moreover, as we will discuss in more detail in Chapters 3 and 5, whether a predicate gives rise to a projective inference that the speaker is committed to p, must be dissociated from the predicate’s requirements regarding the discourse status of p: in (28), the factive verb *discover* patterns with non-factive *tell* and *think*, in allowing p to be presented as new information, unlike the factive verb *appreciate* and the non-factive (response stance) verb *doubt*. (See also discussion in Simons 2007.)

(28) [Uttered out of the blue:] *Guess what* — (Adapted from Caplan and Djärv 2019)

- a. John {said, thinks} that [_P Bill and Anna broke up]. Non-factive
- b. John discovered that [_P Bill and Anna broke up]. Factive
- c. #John appreciates that [_P Bill and Anna broke up]. Factive
- d. #John doubts that [_P Bill and Anna broke up]. Non-factive

Nevertheless, *appreciate* and *discover* are both *factive*, in the sense that they both give rise to the projective inference that the speaker is committed to p (unlike the other predicates):

(29) [I just saw my good friends Bill and Anna, who told me that they got engaged.]

- a. #John {discovered, appreciated} (wrongly) that [_P Bill and Anna broke up].

- b. John {said, thought} (wrongly) that [_P Bill and Anna broke up].
- c. John doubted (rightly) that [_P Bill and Anna broke up].

This is clearly a problem for proposals that take factive verbs to impose the requirement that p represents discourse old information.¹³ The response stance predicates raise a number of questions too. While it is clear that these predicates require that the issue of p is on the table, it is also clear that they neither require either speaker commitment to p, nor for p to be Common Ground, in the Stalnakerian sense:

- (31) a. Q. Where is John?
- b. A1. Well, Mary thinks that [_P he's in New York]_i, but I doubt it/that_i.
 - c. A2. [Where p is not on the table:] #I doubt/accept that [_P he's in New York].

Hence, the relevant pragmatic notion cannot be presupposition in the sense of Stalnaker (1974), Heim (1982) *et seq.* In theoretical terms then, it clearly does matter whether the relevant feature F, that Kastner posits, is [-ASSERT], [+FACTIVE], or [+REFERENTIAL].

Moreover, while Kastner is very clear about the predictions his account makes for topic and focus, it is less clear how his account would rule out V-to-C movement. It seems like this would require a further stipulation that presuppositional Force lacks an EPP-feature.

A further, empirical problem for this approach concerns the judgements reported about the availability of MCP. First, the judgements in (17), indicating that MCP are ill-formed under doxastic factives, are clearly at odds with those from Hooper and Thompson (1973):

- (32) Hooper and Thompson (1973, p. 481)

¹³Regarding (24-c), there is another salient reason why the sentence would come across as infelicitous: namely that it is implausible that someone would know that the moon is made of kale, unless they had been told (by some very reliable source) that it is. However, we could easily imagine a scenario where the sentence is fine, for instance in a fictional context where the speaker has been to the moon, discovered that it's made of kale, then says about Bill, after his trip to the moon:

- (30) After his trip to the moon, Bill now knows that it is made of kale. No one had told him this fact before, so boy, was he in for a surprise when he arrived!

- a. Sally plans for Gary to marry her, and he recognizes that, whether he likes it or not, marry her he will.
- b. I found out that never before had he had to borrow money.
- c. I noticed that playing in next month's concert would be Artur Rubinstein.
- d. The scout discovered that beyond the next hill stood a large fortress.
- e. The boys finally realized that to read so many comic books is a waste of time.
- f. We saw that each part he had examined carefully.
- g. I discovered that this book, it has the recipes in it.

However, it is also not clear that MCP are ruled out in the complements of *emotive factives*: Bianchi and Frascarelli (2009) give (33) to show that English topicalization is licensed under *emotive factives*, in direct contrast to both (17) and the judgements from Hooper and Thompson (1973) (we will come back to these judgements in Chapter 3).

(33) Bianchi and Frascarelli (2009, p. 69)

- a. I am glad that [this unrewarding job], she has finally decided to give up.
- b. Mary didn't tell us that [Bill] she had fired, and [John] she had decided to promote.

A number of empirical questions arise in this context. To start, it is not immediately clear that (17) and (33) are *in fact* contradictory judgements. First, it is possible that they represent some further relevant dimension of variation (e.g. the verbal/adjectival contrast). A second point, regarding all of these data points, is that these judgements appear to be subtle and potentially context-sensitive. Hence, it is difficult to tell whether conflicting empirical claims of this type are in fact due to a failure to control properly for potential pragmatic confounds. It is also possible that we might be dealing with inter-speaker variation. It's also true that most of these data points are based on a small number of predicates, leaving open the possibility that what appears to be correlates of certain, semantically or pragmatically defined lexical classes and their complementation patterns, are simply the effects of idiosyn-

cratic lexical properties of specific predicates (e.g. *regret* vs. *be glad*). These are empirical issues that would benefit from more systematic, quantitative, data. This will be the sole focus of Chapter 3, so we leave the issue to the side for the remainder of this discussion.

2.3 Diagnostics for CP vs. DP complementation

2.3.1 Weak island effects

As we saw above, the theoretical claim of the proposals discussed here is that A-bar movement from the embedded to the matrix clause is blocked by a (covert) D-layer embedded clause.¹⁴ The empirical claim is that factive predicates, and response stance verbs, give rise to weak island effects. However, looking at a wider range of predicates, a different picture emerges: while the island-effects appear to be robust with the response verbs (34-c) and the emotive factives (34-d), the doxastic factives are weakly degraded at best (34-e). Moreover, we find that even some of the speech act verbs are slightly degraded, on par with the doxastic factives, as shown in (34-a).¹⁵

- (34) a. Who_i did he {say, claim, (?)mention, (?)tell (to) her} [t_i stole the cookies]?
- b. Who_i did he {believe, assume, guess, suppose} [t_i stole the cookies]?
- c. Who_i did he {*accept, *admit, *doubt, *deny} [t_i stole the cookies]?
- d. Who_i did he {*appreciate, *resent, *love, *hate} [t_i stole the cookies]?
- e. Who_i did he {(?)discover, (?)find out, (?)notice, (?)hear, (?)know} [t_i stole the cookies]?

We further observe that the cases in (34-a) and (34-e) marked with (?) improve in contexts where they are interpreted as echo questions, or with added material. While this is not

¹⁴See also Rizzi (1990), Cinque (1991) and Rooryck (1992), and much subsequent literature. Accounts that appeal to the semantics of factive verbs, rather than syntactic effects include Szabolcsi and Zwarts (1993), Fox and Hackl (2006), Oshima (2006), Abrusán (2011a, 2014), Chierchia (2013), Schwarz and Simonenko (2018).

¹⁵For consistency across different tests, the verbs we look at here are the same as those used in the experiments in Chapter 3. The English judgements reported in this and the following sub-section are primarily from Luke Adamson, and have been corroborated by Julie Legate. Julian Sahasrabudhe, Larry DiBello, and David Embick have also provided judgements about a number of the English sentences.

surprising *per se* (it is often observed that A-bar movement improves with D-linking), this however, does not improve the sentences with the response verbs and the emotive factives.

- (35) a. Who_i did you notice t_i left their backpack after school?¹⁶
- b. Who_i did he know for sure t_i stole the cookies?¹⁷

- (36) a. WHO_i did he {mention, tell (to) her} [t_i stole the cookies]?
- b. WHO_i did he {*accept, ?admit, *doubt, *deny} [t_i stole the cookies]?
- c. WHO_i did he {*appreciate, *resent, *love, *hate} [t_i stole the cookies]?
- d. WHO_i did he {discover, find out, notice, hear, know} [t_i stole the cookies]?

Similar data can in fact be found in Rooryck (1992), who notes that the weak island effects can be made to go away under certain conditions. However, he doesn't distinguish between the two sub-types of factives.

It seems, then, like the doxastic factives are a problem for this kind of account given that it predicts that all factives should pattern the same. In fact, this appears to be a more general problem for accounts of factive islands: I am not aware of any accounts of propositional islands, either semantic or syntactic, that distinguishes between doxastic and emotive factives. (We return to this issue in Sections 2.3.1, 3.3, where we tie the availability of *wh*-extraction to the possibility of V-to-C movement, and the pragmatic status of p as discourse new content.)

More generally, we might conclude that *if* the island effects are a reliable guide to the categorical status of the embedded clause, then the conclusion ought to be that the clausal complements of emotive factives and response stance verbs are in fact DPs.

2.3.2 Clausal anaphora

As we saw in Section 4.3.2.1, the clausal proform *so* is a CP-anaphor. This is based on distributional evidence, as shown in (37). Based on similar considerations, it is standardly

¹⁶Thanks Julie Anne Legate, p.c., for this data point.

¹⁷Thanks Luke Adamson, p.c., for this data point.

assumed that the clausal proform *it* is a DP-anaphor (38).¹⁸

(37) Moulton (2015, p. 306)

- a. It seems [_{CP} so].
- b. It seems [_{CP} that John left].
- c. *[_{DP} That/it] seems.
- d. *It seems [_{DP} that/it].
- e. *It seems [_{DP} the fact/idea/notion/claim/rumor that John left].
- f. *It seems [_{DP} John's leaving].

(38) Haegeman and Ürögdi (2010, p. 142), Kastner (2015, p. 23): from Kiparsky and Kiparsky (1970, p. 166)

- a. Mary believes [_{DP} the claim that John left]_i, and Bill believes [it/*so_i] too.
- b. Mary believes [_{CP} that John left]_i, and Bill believes [it/so]_i too.

Again, however, we find that the distribution of proform *so* is less restricted than predicted on these accounts. (39) shows naturally occurring data with *so* embedded under the doxastic factive *know*, and (40) shows examples with the response stance predicate *admit*.

(39) Moulton (2015, p. 307-308)

Rooney knew he was special from a young age. And those who nurtured a talent that comes along rarely in any sport knew so, too.¹⁹

(40) Moulton (2015, p. 308)

- a. She did pay the woman who cared for her daughter with drugs because that is what the woman asked for. She would not admit so to DYFS because she feared the consequences.²⁰

¹⁸The anaphora test goes back at least to Kiparsky and Kiparsky (1970), Adams (1985), though they draw the line between factive and non-factive clauses. See also Stowell (1987).

¹⁹<http://www.dailymail.co.uk/sport/article-389647/Walking-miracle.html>

²⁰Ryan, Edward S. 2000. Case studies of the psychological and forensic assessment of parental child abuse. *Journal of Instructional Psychology* 27:3

- b. Gebara further asserted that politically “advanced” priests and nuns favor de-criminalization, but admit so only in “very restricted circles.”²¹

Looking further at the wider set of predicates, we observe that while the emotive factives and the response verbs consistently disallow *so*, there is a fair amount of variation among different verbs of the other classes:

- (41) a. I {said, told her, *mentioned, *claimed} *so*.
- b. I {believe, assume, suppose, guess} *so*.
- c. *I {accept, admit, doubt, deny} *so*.
- d. *I {appreciate, resent, love, hate} *so*.
- e. I {*discovered, *found out, *noticed, ??heard} *so*.

However, the picture for *so* turns out to be slightly more complicated: to start, we find that *so* sometimes improves by fronting:^{22,23}

- (44) a. So I {mentioned, claimed}.
- b. So I {found out, noticed, heard, discovered}.
- c. [Mary walks into the room with soaked shoes.]
- (i) Lisa says: *Oh by the way, the basement flooded.*
- (ii) Mary responds: *So I found out/discovered (the hard way)!*²⁴

²¹Serbin, Ken. 1995. Simmering abortion debate goes public in Brazil. *Christian Century* 112(8):2666)

²²Thanks Keir Moulton, pc. for this observation.

²³The role of fronting brings to mind the pattern found with *wager*-verbs, discussed above (42), as well as that of finite clauses with null-complementizers (43):

- (42) Rezac (2013, p. 313)
 - a. We alleged them/*THEM/*the propositions to be inconsistent.
 - b. The propositions were alleged [to be inconsistent].
- (43) Pesetsky and Torrego (2004, p. 7)
 - a. *[Sue left] is obvious.
 - b. Mary thinks [Sue left].

We leave this potentially interesting connection for future research to investigate.

²⁴Thanks Julian Sahasrabudhe for this example.

(45) [Lisa is the witness in a trial, and she's on the stand. The lawyers are trying to discredit her statement by pointing out that she's done something illicit.]

- a. Lawyer: *But isn't it true that you killed a man?*
- b. Lisa: *So I've already admitted.*²⁵

(46) [Mary has been waiting, hopelessly, for weeks, for her lover, who said he'd soon return.]

- a. Lisa: *You know he's gone, you know he's not coming back... He's skipped town.*
- b. Mary: *So I've accepted./So I've come to accept.*²⁶

However, this is not a fully general rescue strategy for *so*.²⁷

- (49)
- a. *So he keeps denying/doubting.
 - b. *So I've come to love/hate/appreciate/resent.²⁸

An observation that we will come back to in more detail in Chapter 3, is that matrix negation gives rise to an inference, similar to that of response predicates, that *p* is somehow already present in the discourse; a property we observe correlates with the availability of embedded V2 (though surprisingly not other MCP; see Caplan and Djärv 2019 and discussion in Chapter 3). Based on this, we might expect that *so* (as a potential correlate of MCP) should also be bad in negated contexts. However, what we find is that matrix negation changes the judgement for some, though not all, of the verbs that allow *so* in the positive

²⁵Thanks Luke Adamson for this example.

²⁶Thanks Luke Adamson for this example.

²⁷*know* is different in that it appears to *disallow* fronting:

- (47)
- a. Bill believes that [_P John and Mary broke up]_i, but I know {it/?so}_i.
 - (i) Bill doesn't believe that [_P John and Mary broke up]_i, but I KNOW {it/so}_i.
 - (ii) *So I know.

A similar pattern is found with *not seem*:

- (48)
- a. So it seems.
 - b. *So it doesn't seem.

²⁸Some speakers find *appreciate* and *resent* marginally acceptable here.

polarity:

- (50) a. He didn't {say, *mention, tell her, *claim} so.
b. He didn't {believe, assume, suppose, ?guess} so.
c. He didn't {*accept, *admit, *doubt, *deny} so.
d. He didn't {*appreciate, *resent, *love, *hate} so.
e. He didn't {*discover, *find out, *notice, *hear, know} so
f. I don't KNOW so for sure, but I definitely believe it.²⁹

And moreover, *so* is still preferred with matrix negation for *think* (even in a context where *p* is clearly given in the discourse):

- (51) Bill believes that [_P John and Mary broke up]_i, but I don't think {so/#it}_i.

To summarize, we seem to find four distinct patterns (52). Importantly, the verbs that never allow *so*, seem to be the emotive factives, and the negative response stance verbs.

- (52) a. Allow *so* in any position: {say, tell me, believe, guess, suppose, assume, hear}
b. Allow *so* only when fronted: {mention, claim, admit, accept, discover, find out, notice}
c. Allow *so* only in object position: know
d. Never allow *so*: {deny, doubt, love, hate, appreciate, resent}

It seems, then, that the contexts that disallow *so* are even more specific than what we saw with the island effects. Given the pattern observed with matrix negation (51), it doesn't seem as though this is related to the status of *p* as referential or presupposed.

While the apparently complex licensing conditions on *so* suggest that more can be said on this topic, what's important here is what *so* can tell us about the availability of a CP-complement with a given predicates. Setting further complications aside, then, we can

²⁹As in (47), contrastive focus appears to play a role with *know*.

conclude that *if* a predicate allows for *so* in any position (setting any complications about fronting and negation aside), then it allows for a CP-complement. If that is correct, then we may conclude, based on this test, that all of the verbs investigated here, apart from the emotive factives and the negative response verbs, permit CP-complements.

2.3.3 Expletive associate construction

Given the various interactions observed with *so*, however, it might still be the case that the negative response verbs (*doubt*, *deny*) and the emotive factives (*appreciate*, *resent*, *love*, *hate*) do license CP-complements, and that *so* is bad for independent reasons.

To test this, let us consider one more test for whether a verb may take a CP-complement, this is the expletive associate construction [EAC] (53), as we saw in (37), repeated in (54). As with *so*, this test is based on distributional evidence.

- (53) It seems [_{CP} that John left].

- (54) Moulton (2015, p. 306)

- a. It seems [_{CP} so].
- b. *[_{DP} That/it] seems.
- c. *It seems [_{DP} that/it].
- d. *It seems [_{DP} the fact/idea/notion/claim/rumor that John left].
- e. *It seems [_{DP} John's leaving].

As expected at this point, the EAC is generally available with the speech act verbs (55), the doxastic non-factives (56), and the doxastic factives (57):

- (55) a. It was always said that John would get the job.
b. It's often mentioned that John would get the job.
c. It had been claimed that John would get the job.
d. It's been told to me that John would get the job.

- (56) a. It was generally {believed, assumed, supposed} that John would get the job.
 b. It had been guessed before that John would get the job.
- (57) a. It was recently {discovered, noticed, ??heard} that John got the job.
 b. It was recently found out that John was the culprit.
 c. It was always known that John would get the job.

However, we find that, unlike *so*, the EAC is also available with *all* of the response verbs:

- (58) a. It was generally {accepted, doubted} that John would get the job.
 b. It had finally been admitted (by the other candidates) that John deserved it.
 c. It had been denied (by multiple new sources) that John would get the job.

Among the emotive factives, there is some variation, with *love* and *hate* being more degraded in the EAC than *appreciate* and *resent*:

- (59) a. (?)It's always been appreciated by the residents that the landlord doesn't raise the rent every year.
 b. ?(?)It has long been resented by the residents that the landlord keeps raising the rent every year
 c. *It's always been loved by the residents that the landlord doesn't raise the rent every year.
 d. *It's long been hated by the residents that the landlord keeps raising the rent every year

For completeness sake, we might note that there is no effect of matrix negation on the acceptability of the EAC:

- (60) a. It hasn't always been said that John would get the job.
 b. It hadn't yet been mentioned (by anyone) that John would get the job.
 c. It wasn't generally {believed, assumed, supposed} that John would get the job.

- d. It wasn't ever doubted that John would get the job.
- e. It hadn't yet been admitted (by any other candidate) that John deserved it.
- f. It hasn't been denied (by the accused) that the allegations are true.
- g. It hadn't yet been {discovered, noticed} that the moon isn't made of cheese.
- h. It wasn't generally known that John would get the job.

Compared with the *so*-test, this test shows fewer complications. Overall, the results align with those from the *so*-test, with the exception of the negative response stance verbs, *doubt* and *deny*. Based on this, and the proform *so*-test, we might conclude that all of these verbs, apart from the emotive factives allow CP-complements. It seems likely, given these tests, that the emotive factives select for DP-complements.³⁰ To test this hypothesis, let us look at one more test: the DP-requirement.

2.3.4 The DP-requirement

Another potential test for the status of the embedded clause as a DP or a CP is what is known as *The DP-requirement* (see for instance Koster 1978, Alrenga 2005, Takahashi 2010, Moulton 2013, Ott 2017). This is the observation that (apparently) fronted CPs are only possible if a DP is licensed in its base-position. This hypothesis is motivated by data such as (62)–(63):

- (62) a. Bill expected that John would be unqualified.
 b. That had been expected.

³⁰Though note that there might be some variation within this class; as indicated by (59). A further important caveat to note in this context is that *adjectival* emotives like *be sad* and *be surprised* do not license overt DP-complements and do license expletive subjects (thanks Keir Moulton, p.c., for this comment) (though note that e.g. *be happy* does not license expletive subjects, thank L:

- (61) a. Lisa is surprised *(about) it/the rumour that John got the job.
 b. It is surprising that John got the job.

This raises a number of questions regarding the syntactic and semantic differences between the verbal and *adjectival* (factive) predicates. An interesting point in this context, is the data in (65) (discussed in fn. 31), showing some variation in the availability of dropping propositions in clausal contexts, depending on the position of the clause. The verbal-*adjectival* contrast represents its own interesting dimension of variation, which we will not focus on here (though see for instance the results from Section 5.3.2.5; Figure 5.5).

- c. That John would be unqualified had been expected.
 - d. Bill expected it.
 - e. Bill expected him to be unqualified.
- (63) a. Bill objected that John would be unqualified.
- b. *That had been objected.
 - c. *That John would be unqualified had been objected.
 - d. *Bill objected it.
 - e. *Bill objected him to be unqualified.
 - f. That John would be unqualified had been objected to.

The same pattern is found for instance in Swedish, as shown in (64)–(65). This data further shows us that there may be difference across verbs of the same predicate class: while the response verb *acceptera* ('accept') licenses a DP-complement, this is not the case with *tvivla* ('doubt'), as we see with both the availability of overt DPs, and with CP-fronting:³¹

(64) Swedish (own judgement)

- a. Jag accepterar inte att Lisa alltid fuskar.
Jag accept not that Lisa always cheats.
'I don't accept that Lisa always cheats.'
- b. Jag accepterar inte det.
I accept not it.
'I don't accept it.'
- c. Jag accepterar inte [DP {det, ditt påstående} att Lisa alltid fuskar].
I accept not it, your claim that Lisa always cheats.
'I don't accept the idea/your claim that Lisa always cheats.'
- d. Att Lisa alltid fuskar accepterar jag inte.
That Lisa always cheats accept I not.
'That Lisa always cheats, I don't accept.'

³¹Interestingly, with a bare *that*-clause (65-a), it is marginally acceptable to drop the proposition. Crucially, both overt DPs (65-c) and fronted CPs (65-d) are sharply ungrammatical without an overt PP. This pattern is not unique to the response verbs, or to verbal predicates: we also find this pattern also with adjectival attitude predicates, such as *vara säker* (be sure) and *vara glad* (be happy).

(65) Swedish (own judgement)

- a. Jag tvivlar inte ??(på) att Lisa alltid fuskar.
I don't doubt on that Lisa always cheats
'I'm not happy that Lisa always cheats.'
- b. Jag tvivlar inte *(på) det.
I doubt not on it.
'I don't doubt it.'³²
- c. Jag tvivlar inte *(på) [DP {det, ditt påstående} att Lisa alltid fuskar].
I doubt not on it, your claim that Lisa always cheats
'I don't doubt the idea/your claim that Lisa always cheats.'
- d. Att Lisa alltid fuskar tvivlar jag inte *(på).
That Lisa always cheats doubt I not on
'That Lisa always cheats, I don't doubt.'

For a theoretical discussion of the DP-requirement, see the authors cited above. For current purposes, what matters is the observation that fronted CPs distribute like overt DPs, in that they need to be syntactically licensed (either by a verb or a PP). We can thus use CP-fronting to test whether or not an attitude verb licenses a DP.

Given the basic empirical claim of the CP/DP Interface Hypothesis, and the findings regarding *wh*-extraction, the CP proform *so*, and the expletive associate construction, as well as the simple observation that emotive factives are clearly acceptable with overt DPs (67), it is surprising that several of the emotive factives disallow CP-fronting, as shown in (68).³³

(67) I {appreciated, resented, loved, hated} the claim/fact/rumour that Bill and Mary broke up.

(68) a. That John was unqualified for the job had been {said, mentioned, told (to) me,

³²Note that in Swedish, the proform *det* ('it') is used with both CP and DP complements.

³³One might ask whether topicalized CPs are better than passivized ones. This does not seem to be borne out, as shown in (66):

(66) That John broke up with Mary, I really/totally {?appreciated, ?(?)resented, *loved, *hated}.

- claimed} for a long time.
- b. That John was unqualified was generally {believed, guessed, assumed, ??supposed}.
 - c. That John was unqualified was generally {accepted, admitted, doubted, denied}.
 - d. That John broke up with Mary was {?appreciated, ?(?)resented, *loved, *hated} by most of our friends.
 - e. That John was unqualified has been {discovered, found out, noticed, (is) known, ?heard} by almost everyone.

We might note here that some speakers find CP-fronting somewhat degraded also with *suppose* and *hear*. Note also that, unlike with English *object* or Swedish *tvivla* (doubt), there is no PP-option to “rescue” the ill-formed examples in (68).

2.3.5 Conclusions: DP/CP diagnostics

Taken together then, the tests discussed in this section seem to speak in favour of the seemingly paradoxical conclusion that clausal complements of emotive factives are underlyingly DPs (according to the weak island effects, *so*-anaphora, and the expletive associate construction), while the emotive factives themselves do not in fact license DPs (according to the DP-requirement).

However, this conclusion is obviously too simplistic. To start, it is clear that emotive factives can combine with content nominals, as we saw for instance in (67).

A natural thing to ask, at this point, is what these tests actually show. Clearly, one thing that these commonly used tests tell us, when taken together in this way, is that a lot more work has to be done in order for it to be clear exactly what conclusions we can draw from them. Here, some headway has been made in this direction.

To see if there are more helpful conclusions to be drawn, let us do a brief recap of the tests and the conclusions they each lead us to (recall that the first two tests involved DP-diagonstics, and the last two CP-diagnostics):

Test	License CP	License DP
Weak islands		Response Stance, Emotive Factive
Fronted CP		Speech Act, Doxastic Non-factive, Doxastic Factive, Response Stance
<i>so</i> -anaphora	Speech Act, Doxastic Non-factive, Doxastic Factive, Positive Response Stance	
Expl. Assoc.	Speech Act, Doxastic Non-factive, Doxastic Factive, Response Stance	

Table 2.1: Tests for the status of the embedded clause as a CP or a DP: conclusions.

Regarding the CP-tests, we saw that *so*-anaphora imposed various pragmatic restrictions on its occurrence and distribution. We might thus conclude that if a verb is possible either with proform *so* or with the expletive associate construction, then the verb allows a CP-complement. This appears to be the case for all verbs except the emotive factives.

The question of the status of the complement as a DP is clearly more complicated. In Chapter 4, we will see that the interpretation of content DPs matters for their felicity with a given verb, which is an altogether different matter from the verb syntactically licensing a DP. Given the availability of content nominals and proform *it* across verbs, along with the DP-requirement, we might conclude that *all* of these verbs are in principle capable of taking DP-complements (with the possible exception of *suppose*).

It must be then, that the weak island and CP-fronting tests are picking up on more specific properties of the complements (as we saw in the case of content nominals). Fore-shadowing conclusions to come, we will find that the weak island test tracks (a) the distribution of embedded V2 in Swedish and German, and (b) the pragmatic requirement of the predicate that p is discourse old content. See discussion in Section 3.3. Regarding the seemingly paradoxical findings about the emotive factives, a possible answer is that CP-fronting requires both that the predicate can syntactically (case) license a DP-operator in the complement of the verb, but also that the verb can combine with a CP. Emotive factives

meet only one of those criteria, and are hence incompatible with CP-fronting. As the goal here is not to provide a theory of CP-fronting, but simply to use its distribution to examine the selectional properties of the various classes of attitude verbs, we leave this intriguing possibility for future research.

To conclude, this section examined a core empirical tenet of the CP/DP Interface Hypothesis, namely that a subclass of ‘presuppositional’ attitude verbs —the response verbs and the emotive factives— only c-select for DPs (the proposed syntactic reflex of ‘presupposition’). Looking at a set of proposed diagnostics for DP vs. CP status, we found that all of the verbs investigated allow DP-complements; and that all verbs except the emotive factives allow CP-complements. In the previous section, we also saw that this theory ran into problems also regarding the pragmatic side of the proposal. This hypothesis framed the restriction on Main Clause Phenomena, clausal anaphora, and weak island effects in terms of the second component of assertion, given in (2): whether or not the speaker attempts to add *p* to the Common Ground. In Section 2.2.2, however, we saw that this account ran into a number empirical and theoretical problems, in particular with regards to the class of the doxastic factives.

While these obstacles might lead us to reject this hypothesis, as we saw in Section 2.2.2, it is still an open empirical question what drives the availability of Main Clause Phenomena: in particular, is the licensing of MCP sensitive to factivity, or a more general notion of ‘presupposition’ (in tour terms, Givenness)? This section also raised the complication of inter-speaker variation. In the following section, we find that there might also be substantive variation among both languages and among different MCP.

2.4 Embedded V2: belief or commitment to *p*

In this section, we examine a set of accounts of the syntax and pragmatics of embedded assertions, which focus on the first component of assertion, as stated in (2): that the speaker (or the attitude holder) is committed to *p*. The accounts discussed in this section are all formulated in the context of embedded V2.

A central issue for these theories concerns the question of whose belief or commitment is at stake. (2) is formulated as a statement about *unembedded* propositions; clearly what matters in this case is whether or not the speaker is committed to p. Regarding propositions embedded under attitude verbs, however, there are in principle two different agents available for evaluating the embedded proposition. As we have seen above, and will discuss in more detail in Chapter 5, different verbs differ in terms of whether they make reference to the speaker or the attitude holder, or both. For instance, while factive predicates generally require that the speaker is committed to the embedded proposition, this is typically not the case for non-factive predicates, as illustrated in (69).

- (69) a. Mary {thinks, claims, is sure, is convinced} that John left the country, but she's clearly wrong—I just saw him on the bus this morning. [Non-factive]
b. #Mary {discovered, knows, resents, loves} that John left the country, but she's clearly wrong—I just saw him on the bus this morning. [Factive]

While it seems intuitive that verbs like *think*, *believe*, *assume*, *know*, and *accept* all express some epistemic commitment to the embedded proposition on behalf of the attitude holder, it is less clear to what extent this is the case for speech act predicates like *say*, *tell*, and *mention*. This point is reminiscent of Anand and Hacquard (2014), who draw a key distinction between reports of private mental states (doxastic predicates) and reports of public communicative acts, that make reference to a reported common ground (speech act predicates). Anand and Hacquard (2014) refers to the latter type as “assertives”. However, if speaker commitment is what’s at stake, for an embedded proposition to be understood (and syntactically represented) as asserted, then it might make more sense to think about the doxastics as “assertive”.

Of course, it is ultimately an empirical question —which we probe in some detail in Chapter 3— exactly to what extent a given verb actually gives rise to these inferences. Testing for these inferences, for a set of verbs of different classes, alongside with the ability of the same verbs to take MCP-complements, will allow us to tease apart the various lexical,

pragmatic, and syntactic properties that are argued to characterize embedded assertions.

Next, we briefly review there proposals pointing to *commitment to p* as the dimension of assertion relevant for licensing embedded V2.

2.4.1 Truckenbrodt (2006), Julien (2015)

Looking at embedded V2 in German, Truckenbrodt (2006) argues that V2 is possible as long as there is *someone* in the context who believes p. Formally, he implements this as a context index <Epist> on C, which triggers movement of the finite verb. This index carries a presupposition that there is a belief that p in the context, which he argues can be satisfied either by speaker or attitude holder belief that p (e.g. “the beliefs in [the speaker’s] assertion can satisfy the presupposition of <Epist>”; p. 300).

According to him, main clause V2 additionally requires that the speaker wishes to add p to the Common Ground. He implements this via a second context index: <Deont>, which involves “expanding the common ground by desires of the part of [the speaker]” (Truckenbrodt 2006, p. 301). Unembedded CPs therefore carry <Deont+Epist>.

Regarding the availability of embedded V2 under the different classes of predicates discussed here, an intuitively correct prediction of this account is that V2 is available under *glauben* (believe), as shown in (70):

- (70) German (Truckenbrodt 2006, p. 278)

Maria glaubt, Peter geht nach Hause.
Maria believes Peter going to home

‘Maria believes Peter is going home.’

He also gives examples of V2 under *sagen* (say):

- (71) German (Truckenbrodt 2006, p. 287)

Maria sagt, Peter geht nach Hause.
Maria says Peter going to home

‘Maria says Peter is going home.’

The claim is that verbs of saying, like *behaupten* (claim), *erzählen* (narrate), *berichten* (report), as well as manner of speech verbs like *flüstern* (whisper) and *schreien* (yell), allow V-to-C, because they “entail committing to a belief of p.” (p. 288).

However, Truckenbrodt (2006) also discusses what he takes to be a separate category of doxastic non-factives, e.g. *sich vorstellen* (imagine) and *annehmen* (suppose), which also allow V2 complements, and which he describes as “verbs in which the degree of commitment to p is noticeably weaker than belief” (p. 290). To account for what he takes to be a lack of attitude holder belief with these verbs, he relaxes the condition on V-to-C to allow for other attitudes aside from beliefs to satisfy the presupposition of <Epist> (such as “an act or imagination or a dream”; p. 290).

In his Section 4.5., Truckenbrodt also discusses negated attitude verbs, and inherently negative predicates (like *doubt* and *deny*), arguing that, on the reading where (72) reports not just the negation of the belief, but the belief that not p (i.e. the neg-raising reading), V-to-C is blocked. Similarly, to the extent that verbs like *doubt* (73) mean something like ‘believe not p’, these should also block verb movement, given that the presupposition of <Epist> is not satisfied.

- (72) German (Truckenbrodt 2006, p. 295)

*Hans glaubt nicht, Peter geht nach Hause.
Hans believes not, Peter going to home

‘Hans doesn’t that believe Peter is going home.’

- (73) German (Truckenbrodt 2006, p. 297); from Romberg (1999, p. 5)

*Hans bezweifelt, Peter geht nach Hause.
Hans doubts, Peter going to home

‘Hans doubts that Peter is going home.’

In terms of the types of types of attitude verbs discussed here, then, Truckenbrodt’s theory makes some fairly clear predictions about the availability of embedded V2. For instance, we expect to find a contrast between positive response stance predicates like *accept* and *admit*,

and negative ones like *doubt* and *deny* (as well an interaction with negation for attitude verbs that do express an epistemic commitment to p).

Truckenbrodt doesn't distinguish between asserted beliefs and presupposed beliefs. However, given that speaker belief that p is said to able to satisfy the presupposition of <Epist>, we should expect that both emotive and doxastic factives should be able to license V2, given that they assert (in the case of doxastics) attitude holder belief, and presuppose either speaker belief (in the case of doxastics) or attitude holder belief (in the case of emotives). This also seems to be in line with the very liberal condition that attitudes like *dreaming* or *imagining* that p can satisfy <Epist>. Given projection —i.e., the ability of the presupposed inference to survive under entailment-targeting operators such as negation— we should expect also negated factives to be able to license embedded V2.

Finally, while Truckenbrodt claims that the speech act predicates express the attitude holder's belief that p, it is not clear to me that this is correct. Unlike beliefs, one can easily say or claim things, without being committed to them (for instance, when lying, or telling stories). It seems to me, then, like an empirical question whether or not Truckenbrodt's account makes the right predictions for these predicates: i.e., whether the availability of V2 is actually due to the presence of a belief context (as opposed to some other lexical or pragmatic property of these verbs).

A related proposal can be found in Julien (2015), who looks at embedded V2 in Mainland Scandinavian (primarily Swedish and Norwegian). She argues that V2-clauses are “speech act potentials”, in the sense that they are syntactic objects that can become assertions when uttered (drawing on Krifka 2014). Like Truckenbrodt (2006), she allows for the assertion of the embedded proposition to be anchored to both the speaker and the attitude holder (what she refers to as ‘direct’ vs. ‘indirect’ assertions):

“[T]he generalization that can be made is that an embedded declarative V2 clause represents either a direct assertion, an assertion made by the actual speaker, or an indirect assertion, an assertion attributed to an implicit speaker and reproduced by the actual speaker, who does not then have to be committed to its truth.”
(Julien 2015, p. 167)

Formally, Julien (2015) takes a speech act potential to require a C-domain which includes: a Force head, specifying the type of illocutionary force (question, assertion, etc), as well as a set of C/edge ‘linkers’, which represent the speaker and hearer (following Sigurðsson 2011; see also Speas and Tenny 2003, Tenny and Speas 2004).

Regarding the role of the embedding attitude predicates, she states that: “embedded V2 in Mainland Scandinavian is not dependent on formal licensing by any element in the matrix clause. What matters is that the matrix clause is semantically compatible with an asserted embedded clause” (Julien 2015, p. 172). Looking at a range of embedding environments (pp. 164-167), she takes V2 to be possible under what she refers to as ‘strongly assertive predicates’ (including verbs like *say* and *claim*, as well as adjectives like *be true* and *be clear*), as well as a class of predicates that she calls ‘weakly assertive’ (which includes doxastic non-factives, as well as predicates like *seem to* and *be possible*). In line with the judgements reported by Hooper and Thompson (1973), she also takes doxastic factives, like *discover* and *notice*, to allow V2 (see also Julien 2009, Wiklund et al. 2009, Bentzen 2010, Jensen and Christensen 2013, Djärv et al. 2017, a.o.). She includes among her examples of factives (74), which she translates as ‘I thought about the fact that p’.³⁴

- (74) Norwegian (Julien 2015, p. 166)

Jeg tenkte på at jeg greide ikke jobben slik jeg skulle.
 I thought on that I managed not job.DEF such I should
 ‘I thought about (the fact) that I was not able to do the job as I ought to.’

In my native judgement, V2 is possible also with an overt *fact* nominal (75). This is interesting, given the claim in Section 2.2, that MCP are blocked in ‘definite’ contexts.

- (75) Swedish, adapted from (74) (own judgement)

Jag tänkte på det faktum att jag klarade inte jobbet som jag skulle.
 I thought on the fact that I managed not work.DEF as I should.

³⁴As pointed out by Julie Anne Legate, p.c., the presence of a preposition seems like a fairly robust diagnostic for the status of a clause as a DP (in line with the so called DP-requirement, discussed in Section 4.3.2.2).

‘I thought about the fact that I wasn’t able to deal with my job the way I was supposed to.’

Regarding factives, she takes their ability to embed V2-complements to follow from their status as ‘asserted’ (building on Krifka 2014): “in an assertion, the speaker takes on the commitment to guarantee that the content of the assertion is true” (Julien 2015, p. 167-8). Thus, she claims, that what is *technically presupposed* (i.e. factive complements) can still be asserted, for instance as a reminder.

2.4.1.1 Empirical issues

As for Truckenbrodt (2006) and the approaches examined in Section 2.2, Julien takes embedded V2 to be disallowed under negative response stance predicates like *deny* and *be impossible*. Like Truckenbrodt (2006), she doesn’t mention the positive response predicates (e.g. *accept*, *admit*), which would provide an important test case for the view that V2 is licensed by commitment to p. However, she claims that V2 is possible with verbs like *doubt* and *deny* in negative contexts, as in (76):

(76) Swedish (Julien 2015, p. 165)

Det är ingen som tvekar på att dom gör det alltid för att få upp
There is no.one who doubts on that they do it always for to get up
försäljningen.
sales.DEF

‘Nobody doubts that they always do it to raise sales.’

In my judgement, however, (76) is strongly ill-formed, and crucially, no different from a version of the sentence with a referential subject:³⁵

³⁵It’s worth noting here, too, that I get a different reading of the sentence with the adverb *alltid* (always); closer to a discourse particle rather than the universal quantifier. If we substitute *alltid* for *inte* (not) in the embedded clause, the sentence becomes even more sharply ungrammatical.

(77) Swedish (own judgements)

- a. Det är ingen som tvekar på att dom inte gillar varandra.
There is no.one who doubts on that they not like each.other

(78) Swedish (adapted from Julien 2015, p. 165; own judgements)

- a. ??/*Det är ingen som tvekar på att dom gör det alltid för att få upp
There is nobody who doubts on that they do it always for to get up
försäljningen.
sales.DEF
'Nobody doubts that they always do it to raise sales.'
- b. ??/*Han tvekar på att dom gör det alltid för att få upp försäljningen.
He doubts on that they do it always for to get up sales.DEF
'He doubts that they always do it to raise sales.'

A more serious problem for any theory that takes the presence of a belief context to be a sufficient condition on V2 licensing comes from matrix clause disjunction.³⁶ As discussed by Gärtner and Michaelis (2010) in the context of German, in these sentences, the speaker is actually committed to neither disjunct. Nevertheless, V2 is obligatory here:

(79) German (Gärtner and Michaelis 2010, p. 4)

In Berlin schneit es oder in Potsdam scheint die Sonne.
in Berlin snows it or in Potsdam shines the sun

'It is snowing in Berlin or the sun is shining in Potsdam.'

For current purposes, we might observe that the same is true also in Swedish:

(80) Swedish (Caplan and Djärv 2019, p. 13)

Antingen snöar det i Umeå, eller så skiner solen i Skellefteå.
either snows it in Umeå or so shines sun in Skellefteå

'It is either snowing in Umeå or the sun is shining in Skellefteå.'

Gärtner and Michaelis (2010) present a view according to which V2 involves a weaker notion

-
- b. *Det är ingen som tvekar på att dom gillar inte varandra.
There is no.one who doubts on that they like not each.other
'Nobody doubts that they don't like each other.' V-in situ
 - 'Nobody doubts that they don't like each other.' V2

³⁶The following discussion in this section is adapted from joint work with Spencer Caplan (Caplan and Djärv 2019) (p. 13; prepared by the second author).

of assertion than that given in (2); rather than operating at the level of speech acts, they take the relevant notion of context update to be one which operates only at the propositional level. Their analysis of a sentence like (79) is given in (81):

$$(81) \quad [[p\text{-}V2 \text{ or } q\text{-}V2]] = [p \cap \text{CG}] \cup [q \cap \text{CG}]$$

Noting however, that their account nevertheless over-generates, in the case of matrix negation and conditionals, neither of which allow V2, they add a so called “progressivity requirement on assertive update”:

Progressive update: “An assertive update CG’ of a common ground CG by an utterance u_d containing meaning components $\triangleright\phi_1 \dots \triangleright\phi_n$ is *progressive* if $\text{CG}' \subseteq [\text{CG} \cap (\phi_1 \cup \dots \cup \phi_n)]$. (Gärtner and Michaelis 2010, p. 9)

They further state that ‘Progressive update captures the intuition that (dependent) root phenomena [MCP] in general, and V2-declaratives in particular, come with an informativity requirement related to providing “new information”’ (Gärtner and Michaelis 2010, p. 10). I will return to the role of discourse novelty of p below.

Before ending, it is worth pointing out that this problem does not only arise in the context of matrix clause V2; V2 disjunction is also possible in embedded clauses:

$$(82) \quad \text{Swedish (own judgement)}$$

Jag sa att antingen snoär det i Umeå, eller så skiner solen i Skellefteå.
I said that either snows it in Umeå or so shines sun in Skellefteå
‘I said that either it’s snowing in Umeå or the sun is shining in Skellefteå.’

Next, we move on to a different account, found in Woods 2016a. On this proposal, German V2-clauses are anchored unambiguously to the speaker, whereas non-V2 clauses, like certain other proposed MCP, including Mainland Scandinavian embedded V2 and speech act adverbs (e.g. *honestly*, *seriously*), can be anchored to either the speaker or the attitude holder.

2.4.2 Woods (2016a)

In a different version of the general perspective, Woods (2016a) (see also Woods 2015, 2016b) suggests that embedded V2 is part of a broader class of utterances, which she refers to as Embedded Illocutionary Acts.³⁷ Syntactically, these involve merging elements in Force^o, either through verb-movement to Force or through realizing Force as a particular complementiser.³⁸ Pragmatically, she argues that these involve what she calls ‘perspective disambiguation’.³⁹

Her empirical discussion focuses primarily on embedded inverted questions [EIQs] (84), thought she extends her account to embedded V2. Looking at a range of factors, including speech act adverbs (85), and binding of discourse particles and expressive elements in the embedded clause, she argues that only attitude holder orientation is available in EIQs.

(84) Adapted from Woods (2016a, p. 77)

Jane asked him would he cook her dinner.

(85) Woods (2016a, p. 77)

³⁷Woods’ data is primarily from different varieties of British and Irish English, though she also mentions data from Indian English and certain varieties of English spoken in North America, including Newfoundland English and African American English.

³⁸She points to the Japanese *to/koto* distinction and Romance recomplementation as examples of this.

³⁹A similar line of reasoning can be found in Wiklund (2010), who suggests that while a V-in situ clause can be associated with either the attitude holder or the speaker, V2 clauses are associated only with the point of view of the speaker. In her words: “being responsible for evaluating the truth of the embedded proposition” (Wiklund 2010, p. 88). Unlike Woods, she doesn’t take speaker *commitment* to p to be required. To support her claim, Wiklund gives the sentence in (83); the idea being that her proposal correctly predicts that speaker-oriented discourse elements like swear words should be compatible with both word orders:

(83) Wiklund (2010, p. 88)

- a. Hon såg att han fan-i-mig inte hade läst brevet.
she saw that he devil-in-me not had read letter.DEF
'She saw that he hadn't read the letter, dammit.'
- b. Hon såg att han hade fan-i-mig inte läst brevet.
she saw that he had devil-in-me not read letter.DEF
'She saw that he hadn't read the letter, dammit.'

V-in situ

V2

This is unlike Woods (2016a, p. 150), who claims that while German V2-clauses must speaker-oriented, speech act adverbs can be anchored to either the speaker or the attitude holder. In either case, it should be clear that the distribution of discourse particles are not going to be a useful diagnostic for testing the claim that V2-clauses are speaker anchored, *if* it is also the case that V-in situ clauses can be associated with either the speaker or the attitude holder: in either case, discourse particles should be available with both word orders.

- a. Jane_i asked him seriously_{*i/*speaker*} would he cook her dinner. EIQ
- b. Jane_i asked him, “Seriously_{*i/*speaker*}, will you cook me dinner?” Quote
- c. *Jane asked him if seriously he would cook her dinner. Regular Embedded Q

Regarding the difference between embedded V2 and EIQs, and the possibility of variation across languages, Woods states that:

“[W]hile perspective disambiguation also occurs in EV2, it is not the same as perspective disambiguation in EIQs. In fact, there are also differences across the EV2 languages I am treating here: in German, all attitudinal, epistemic and expressive elements in EV2 are evaluated with respect to the speaker, not the matrix subject, and the proposition expressed in the embedded clause is also interpreted as being asserted by the speaker. In Mainland Scandinavian [MScl], however, both fully speaker-oriented and fully subject-oriented EV2 clauses are possible.”. (Woods 2016a, p. 212)

Building on Speas and Tenny (2003), McCloskey (2006), Sudo (2012, 2016), Woods (2016a) formally implements this proposal in what she refers to as an Illocutionary Act Phrase [IAP], which hosts in its specifier a ‘Center of Evaluation’. This is a pair consisting of a situation pronoun (fixes the relevant world and discourse context) and a ‘perspectival monster operator’ (Sudo 2012, 2016) which can be indexed to either the speaker or the attitude holder. Woods follows previous literature in taking embedded V2 to involve verb movement to Force^o. She argues, however, that the illocutionary force features themselves are inherited by Force^o from the Illocutionary Act head that selects it; if Force^o is not selected by such a head, V-to-C should not be possible.

With respect to role of the embedding attitude verb, Woods takes these to select for an (optionally realized) nominal argument, of type *e* (a conclusion we will reach on independent grounds in Chapter 4); the embedded V2-clause she argues, is a type of non-restrictive modifier on the nominal, providing its content and discourse properties.⁴⁰ Woods argues that V2-clauses (and other clauses representing Embedded Illocutionary Acts) are appositives;

⁴⁰Hence, the relationship between the attitude predicate and the Embedded Illocutionary Act (the V2 or EIQ clause) is indirect. Thus, any seemingly local effects of the matrix predicate follows in the same way as more global discourse pragmatic effects.

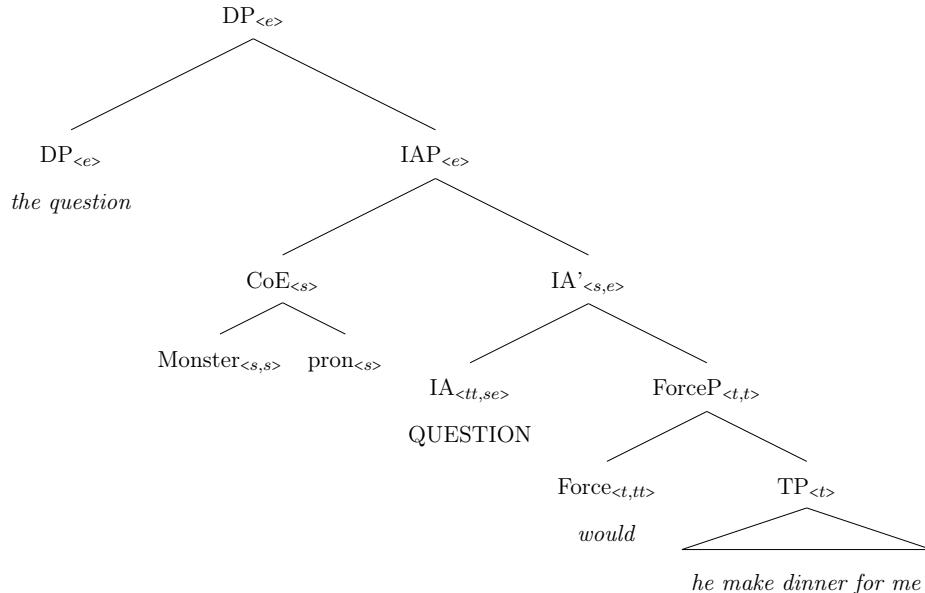
specifically, a type of apposition involving two semantically saturated objects (what Potts 2005 refers to as ‘isolated conventional implicatures’):

- (86) Woods (2016a, p. 218), from Potts (2005, p. 65)

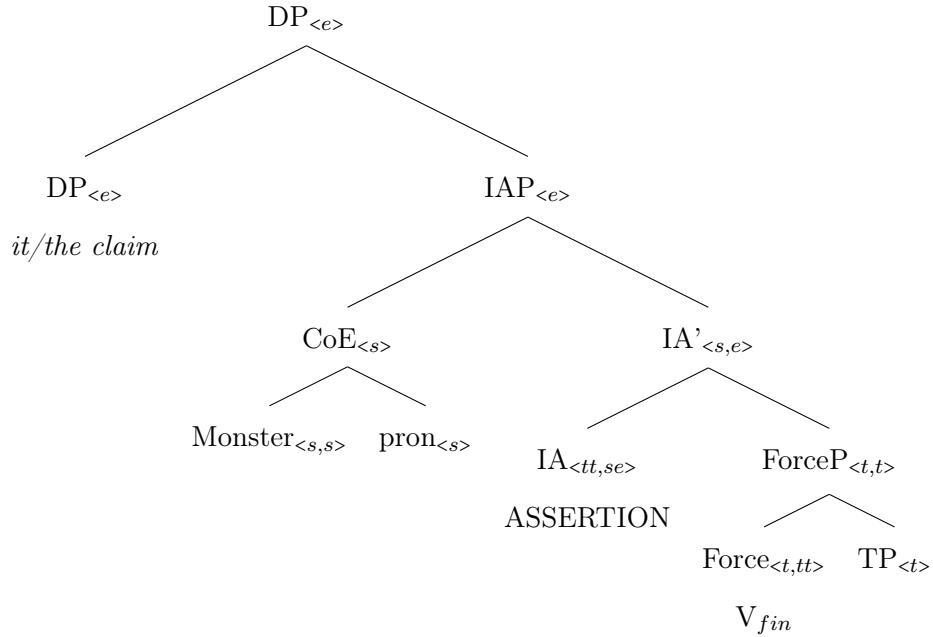
Luke—and you’ll never believe this—ate 50 eggs!

The following is her analysis of the composition of Embedded Illocutionary Acts: she gives (87) to account for EIQs; (88) represents my understanding of how her analysis applies to embedded V2:

- (87) EIQs (Woods 2016a, p. 222, 224)



- (88) Embedded V2 (Based on Woods 2016a, p. 222, 224)



Importantly, for current purposes, apposition involves a very particular type of discourse structure, such that the material in the content in the appositive provides non *at issue* content, as shown in (89) and (90).

- (89) Potts (2012, p. 2)

Even Bart passed the test.

- a. At issue content: Bart passed the test
- b. Non *at-issue*: \approx Bart was among the least likely to pass

- (90) Woods (2016a, p. 218); from Potts (2005, p. 65)

Luke—and you'll never believe this—ate 50 eggs!

- a. At issue content: Luke ate 50 eggs
- b. Non *at-issue*: \approx You'll never believe what I'm about to tell you

Following Potts (2005), Woods (2016a, pp. 218–219) assumes that only the *at-issue* content ends up composing with the matrix predicate. According to Potts 2005, p. 128, this mode of composition is only available to elements with conventionally implicated content

that are fully saturated; an assumption that is satisfied on Woods' analysis, according to which both the IAP-projection and the associated DP are of type *e*. On this perspective, then, a V2-clause contains both a DP that is part of the *at-issue* content, and a *non-at issue* IAP-clause. According to Woods, aside from implying speaker/attitude holder commitment to p, a V2-clause additionally involves the information structure in (91).

- (91) German (Woods 2016a, p. 220)

Hans glaubt, Peter hat gewonnen.

Hans thinks, Peter was won.

'Hans thinks Peter has won.'

- a. QUD = What is happening; what is Hans thinking?
- b. Sub-QUD = Did Peter win?

2.4.2.1 Empirical issues

The discourse structure proposed in (91) fits with Woods' descriptions of the pragmatics of EIQs, which she convincingly shows "presuppose that the embedded question was at some point the QUD of the original discourse, regardless of the matrix predicate and whether or not it usually communicates an explicit questioning act." (Woods 2016a, p. 101).

For embedded V2, the claim is that the sentence in (91) —by virtue of having embedded V2—presupposes the existence of two QUDs in the discourse. To the main question (91-a) it gives the answer: 'Hans thinks something (namely Peter won)'. However, it is also interpreted as providing the following answer to the sub-QUD in (91-b): ' $I_{Speaker}$ think that Peter won'. For a sentence with embedded V2 in MSc, the answer to the sub-QUD could presumably also be 'Hans thinks that Peter won'.

A prediction of Woods' proposal then, is that embedded V2 should be licensed in contexts that make available such a QUD. However, as we will see in Section 2.5.2, Djärv, Heycock, and Rohde (2017) tested this claim for Swedish embedded V2 (in the context of a similar proposal from Jensen and Christensen 2013; also discussed in Section 2.5.1), and found that such a context manipulation had no effect at all on the acceptability of embedded V2. This

then, is problematic for the application of Woods' analysis of EIQs to embedded V2.⁴¹

Another issue that arises in the context of Woods' proposal concerns the question of whether EV2 (and other MCP) clauses differ *semantically*, as well as pragmatically, from their unmarked counterparts. Woods supports her analysis with data showing that V2-clauses can co-occur with the standard definite neuter pronoun *det* in object position (93), as well as data showing that EIQs are possible in equative constructions (94)–(96):

- (93) Swedish (Woods 2016a, p. 131; from Petersson 2010, p. 141)

Han sa det att Gusten har faktiskt inte höns längre.
he said it.3.NEUT.DEF that Gusten has actually not chickens any.more

'He said that Gusten actually doesn't have chickens any more.'

V2

- (94) Woods (2016a, p. 202–203)

- a. Seems like Wilko is the bookies favourite for the England job when it becomes available. This is quite distressing news, but [the question] is [would he take it if offered]? BNC, J1G 1639
- b. I asked (him) would he take it if offered.
- c. [The question] is [what did she truly take away from the culture]? medium.com
- d. I asked (her) [what did she truly take away from the culture]. EIQs

- (95) Norwegian (Julien 2015, p. 166)

Poenget er at dette appellerer ikke til unge jenter.
point.DEF is that this appeals not to young girls

'The point is that this does not appeal to young girls.'

V2

- (96) Swedish (own judgement)

⁴¹ Further evidence for the pragmatic difference between EIQs and embedded V2 concerns their availability in negated contexts: Woods reports that EIQs are available under matrix negation (92). This appears to be different from V2, as we saw in (72)–(73) above (and confirmed by corpus and experimental data in Ch. 4).

- (92) Woods (2016a, p. 67)

- a. He didn't know why did they come. Irish Eng., (Berizzi 2010)
- b. I can't remember did you want to practise tonight. North West Eng., attested

Påståendet var att det funkar inte med ungdomar.
claim.DEF was that it works not with youths

‘The claim was that it doesn’t work with young people.’

V2

However, these are both possible also with non-V2 clauses, as shown in (97)–(98).

(97) Swedish (own judgement; adapted from (93))

Han sa det att Gusten faktiskt inte har höns längre.
he said it.3.NEUT.DEF that Gusten actually not has chickens any.more

‘He said that Gusten actually doesn’t have chickens any more.’

V-*in situ*

(98) Swedish (own judgement)

Påståendet var att det inte funkar med ungdomar.
claim.DEF was that it not works with youths

‘The claim was that it doesn’t work with young people.’

V-*in situ*

In Chapter 4, we use similar data from English to argue that embedded declaratives are of type $\langle e \rangle$. What this seems to show us then, is that V2 clauses are of the same semantic type as V-*in situ* sentences (and embedded declaratives in English). However, it doesn’t tell us anything about the semantic composition of embedded V2 *per se*.

Woods also points to the observation that V2-clauses (unlike V-*in situ* clauses) are weak islands for extraction as support for her claim that V2-clauses are complex nominals. Woods only gives data from EIQs to illustrate this claim; the following is my own judgement (without the complementizer *att*, the sentence becomes even more ill-formed).

(99) Swedish (own judgement)

a. Vem_i sa John att Peter inte gillar t_i.
who said John that Peter not likes
‘Who did John say that Peter doesn’t like?’

V-*in situ*

b. *Vem_i sa John att Peter gillar inte t_i.
who said John that Peter likes not
‘Who did John say that Peter doesn’t like?’

V2

There are two problems with this test, however. First, as we saw in Section 2.3.1 above, it is not clear that islandhood is a reliable test for the DP-status of the embedded clause. While sentences with response predicates are robustly weak islands for movement (in line with the DP/CP Interface Hypothesis), we saw in Section 2.3.2 that complements of response verbs pattern with CPs on the *so*-proform and Expletive Associate tests.

Second, and more problematically, this is not what we observe in German. According to my consultant,⁴² *wh*-movement is possible with embedded V2, but not with V-in situ. With V-in situ order, the *wh*-pronoun must also remain in situ:

- (100) German

 - a. *Wen_i sagte John, dass Peter t_i mag?
Who.ACC said John that Peter likes
'Who did John say that Peter likes?' V-in situ + WH movement
 - b. Wen_i sagte John, mag t_i Peter?
Who.ACC said John likes Peter
'Who did John say that Peter likes?' V2 + WH movement
 - c. John sagte, dass Peter wen mag?
John said that Peter who.ACC likes
'Who did John say that Peter likes?' V-in situ + WH in situ

This then is problematic for Woods' approach, which ties the pragmatics of embedded V2 (as a kind of new information that additionally provides perspective disambiguation) to its status as a complex nominal. As we will show in Chapter 3, Swedish and German embedded V2 show both the same distribution and sensitivity to the same pragmatic restrictions. The movement contrast is therefore interesting, and worth following up on in future research. The main focus here, however, is the question of the pragmatic licensing conditions on embedded V2. In Section 3.2, we test the approaches discussed in this and the previous section experimentally for embedded V2 in both Swedish and German, and for a wider range of MCP.

⁴²Thanks to Stefan Schulze, p.c., for this judgement.

2.5 Embedded V2: Main Point status vs. lexical licensing

2.5.1 Jensen and Christensen (2013)

In accounting for their observation that the doxastic factives allow MCP, Hooper and Thompson (1973) capitalize on their observation that while these verbs are presuppositional in the traditional sense, the doxastic factives nevertheless (similarly to verbs like *think* and *say*), “have a parenthetical reading on which the complement proposition is considered the main assertion.” (p. 481). A recent implementation of this idea comes from Jensen and Christensen (2013), looking at Danish embedded V2. These authors adopt the notion ‘Main Point of Utterance’ [MPU] from Simons (2007). The MPU corresponds to the content of an utterance which most directly addresses the Question Under Discussion (Roberts 1996, 2012, Büring 2003); more recent literature tend to use the term ‘*at-issue* content’.

Broadly speaking, the QUD is the topic of discussion in the present discourse. It may, but need not, correspond to an actual question asked. Theoretically, the QUD is formulated as a set of alternative propositions. For instance (allowing for domain restriction), a question like that in (101-a) corresponds to the set of propositions, the QUD, in (101-b):

- (101) a. Where is Anna?
 b. {p: Anna is at home, Anna is at work, Anna is at the gym, . . . }

For a conversational move to be felicitous, it must attempt to contribute to resolving the current QUD. This can be done either by completely resolving it, thereby eliminating all the alternatives but one, as in (102-a), or partially resolving it, thereby eliminating at least one alternative, as in (102-b).

- (102) a. She’s at work.
 b. I’m not sure, though I know she’s not at home. . .

At-issueness, or Main Point status, then, is understood in terms of relevance to the QUD

(see Section 5.2.0.2.2 for more detailed discussion):

(103) **Relevance to the QUD** (Simons et al. 2010, p. 316)

- a. An assertion is relevant to a QUD iff it contextually entails a partial or complete answer to the QUD.
- b. A question is relevant to a QUD iff it has an answer which contextually entails a partial or complete answer to the QUD.

In this sense then, we can understand an embedded proposition as asserted, without getting into thorny problems about speaker vs. attitude holder commitment to *p*. As illustrated in (104), given the question *Where is John*, the Main Point, or *at-issue* content in both (104-a) and (104-b) is *John is in New York*.

(104) [Q: Where is John?]

- a. [*P* He's in New York.]
- b. I think that [*P* he's in New York].

As shown in (106), there is a clear contrast in this respect between doxastic and emotive factives in whether they allow the embedded proposition to provide the Main Point content. We find that the doxastic factives pattern with the doxastic non-factives and the speech act verbs, whereas the emotive factives are infelicitous here.⁴³

(106) [Q: Where is John?]

- a. I {think, believe, found out} that [*P* he's in New York].
- b. #I resent that [*P* he's in New York].

⁴³ As above, the response stance predicates depend on whether the possibility that John is in New York has been brought up, along the lines of (31). We saw that in (31) above, repeated here:

(105)

- a. Q. Where is John?
- b. A1. Well, Mary thinks that [*P* he's in New York]_i, but I doubt it/that_i.
- c. A2. [Where *p* is not on the table:] #I doubt/accept that [*P* he's in New York].

The claim advanced by Jensen and Christensen (2013) is that it is this notion of Main Point content that distinguishes between those embedding environments that allow MCP, and those that do not. On this view, any observed predicate restriction on embedded V2 is essentially epiphenomenal, reflecting simply the relative ease with which a given predicate may function parenthetically.

In support of their view, Jensen and Christensen (2013) look at the rates of embedded V2 in a manually tagged corpus of sociolinguistic interviews in Danish. They find the highest rates of V2 under speech act predicates and doxastic factives, with lower rates under doxastic non-factives, and the lowest rates under emotive factives (they did not look at response predicates). Their results are reproduced in Figure 2.1.⁴⁴

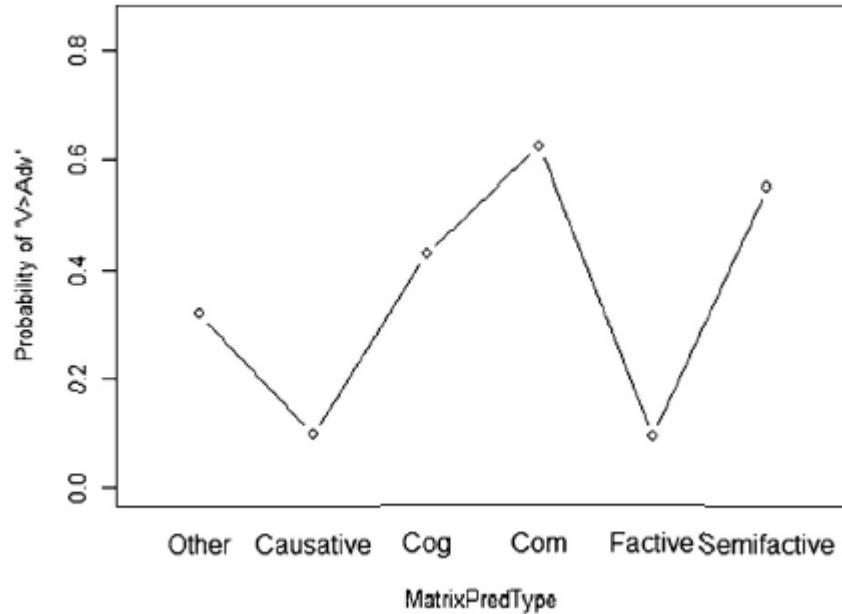


Figure 2.1: Results plot from Jensen and Christensen (2013, p. 50): rates of Danish embedded V2 under different predicate types: doxastic non-factives (“Cog”), speech act predicates (“Com”), emotive factives (“Factive”), doxastic factives (“Semifactive”).

While these data are purely distributional, in the sense that no further elements of the context were taken into account, Jensen and Christensen (2013) interpret the distribution

⁴⁴I'm leaving to the side the categories they refer to as 'Other' and 'Causative'.

as reflecting an underlying effect of the Main Point status of p under the different predicate types. This account then predicts that in a discourse such as (107), embedded V2 should be very strongly favoured, if not obligatory.⁴⁵ Importantly, on this view, any apparent predicate restrictions should be able to be overwritten by pragmatic factors, to the extent that it is possible to construe a relevant or plausible parenthetical reading of the matrix predicate.

- (107) Q. Where's John?
 A. I think [_P he's in New York].

In Section 2.5.2, next, we review previous experimental work from Djärv, Heycock, and Rohde (2017), testing both of these predictions.

2.5.2 Testing the QUD-approach

Regarding the hypothesis of Jensen and Christensen (2013) discussed in the previous section, Wiklund, Bentzen, Hrafnbjargarson, and Hróarsdóttir (2009) present judgement data suggesting that neither is V2 obligatory in these contexts, nor is it ruled out in a context where the embedded proposition is not the pragmatic Main Point:

- (108) Swedish (Wiklund et al. 2009, p. 1929)
 ['Why didn't he come to the party?']

Kristine sa att han fick inte.
 Kristine said that he was.allowed not.

‘Kristine said that he wasn’t allowed to.’

V2

According to Wiklund et al. (2009), the answer in (108) can either be read as ‘he didn’t come to the party because he wasn’t allowed to, as Kristine told me’, or ‘he didn’t come to the party because Kristine said that he wasn’t allowed to go’. However, on a strong version

⁴⁵This view is presented primarily as a ‘licensing approach’ to embedded V2, in the sense that Main Point status makes V2 available, rather than non Main Point status removing the possibility of V2.

of Jensen and Christensen's (2013) hypothesis, the second reading should not be available, given their claim that embedded V2 is only possible when the embedded proposition (he wasn't allowed to go), is the Main Point of the Utterance, and not when the content of the main clause (Kristine said something) is the Main Point of the Utterance.

On the alternative view advanced by Wiklund et al. (2009), a predicate allows V2 and other MCP if it *also* allows for the embedded proposition to have Main Point status. Unlike the above accounts then, they take the availability of MPU to be essentially a matter of selection: the predicates in (13) select for a larger CP, like that in (15) from Rizzi (1997), which is *compatible* with V-to-C movement, as well as with the illocutionary force of assertion (on this view, p being the Main Point of the Utterance). The predicates in (14), however, select for a smaller CP, which they take to be compatible with neither V-to-C and other MCP, nor with illocutionary force and related pragmatic notions.

Noting that the critical judgements are subtle and based on the intuitions of only a few speakers, Djärv, Heycock, and Rohde (2017) tested experimentally whether participants' judgements of acceptability for sentences with embedded V2 in Swedish were sensitive to this type of context manipulation. To test this, we looked at whether it would be possible to manipulate the discourse context experimentally to give rise to a reading such that the embedded proposition would provide the Main Point of the utterance. The form of the manipulation is illustrated in (109)–(110) from Djärv et al. (2017, p. 6)

- (109) a. Q. Why didn't Kate come to the party?
 - b. A. John thinks that [*P* she's left town].
- (110) a. Q. Why didn't John invite Kate to the party?
 - b. A. John thinks that [*P* she's left town].

As a measure of Main Point status, they asked participants to rate how directly they thought that a given answer addressed a particular question. Using a 2×3 design, they manipulated both the type of question and the type of answer, as shown in (111).

(111) Djärv et al. (2017, p. 17)

- a. [Background]: *I hear that you went to Paris last summer.*
- b. [Q-Cond=Match]: *What was the city like?*
- c. [Q-Cond=NonMatch]: *How was it?*
- d. [A-Control=Direct]: *The city was really great.*
- e. [A-Control=Emb]: *I got the impression that the city was really great.*
- f. [A-Critical=EmoFact]: *I was surprised that the city was really great.*

The point of interest were the scores assigned to answers like *I was surprised that the city was really great.* (involving emotive factives), to questions such as *What was the city like?*. If emotive factives indeed imposed a strong, lexical restriction on the ability of the embedded proposition to constitute the Main Point, these should receive generally low scores, since they did not directly address the previous question. As controls, they also included unembedded sentences (*The city was really great.*) as a ceiling-condition for directness, and sentences embedded under predicates like *I got the impression*, which by hypothesis would yield lower directness scores, given the hedging function of the matrix predicate. A more general question (*How was it?*) was also included to provide a floor baseline for directness for all three response conditions. Here, unlike in the more specific question (*What was the city like?*) the wording of the question did not match the wording of the answer.

As shown in Figure 2.2, reproduced from Djärv et al. (2017, p. 20), they found that the sentences with emotive factives [A-Critical=EmoFact] did not differ significantly from the unembedded sentences [A-Control=Direct] ($p=0.54$). However, the factives did show significantly higher ratings than the hedged non-factive responses ($p<0.001$).

The experiment used only emotive factives in the factive condition, which are generally expected to be bad with embedded Main Point or *at-issue* content. Simons (2007) takes this to be due to an essentially Gricean reasoning process, such that the doxastic factives are able to provide a source of information for p (e.g. someone else discovering that p); whereas it is not clear how the emotional state of the attitude holder would be relevant to a question

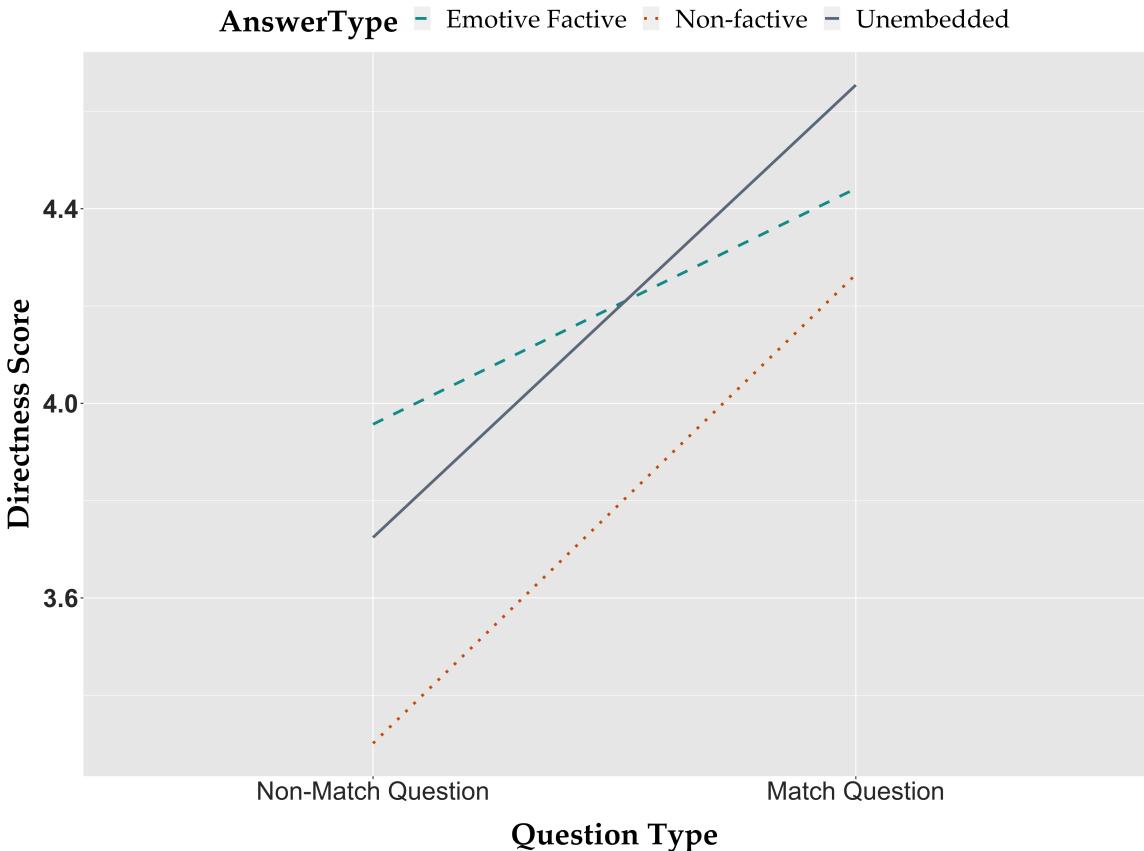


Figure 2.2: Directness ratings by question type (NonMatch vs. Match) and response type (Emotive Factive vs. Non-Factive Embedding vs. Unembedded) [n=47]. Adapted from Djärv et al. (2017, p. 20).

concerning p (this is reflected in the formulation in (103)).

Importantly, Djärv et al. (2017) were able to show that this type of Question-Answer manipulation is in fact a good way of setting up the context to mark particular content as having *at-issue* or Main Point status. This, then, supports the prediction that if Jensen and Christensen's (2013) account of MCP is right, then we should indeed expect that in a discourse such as (107), the embedded clause should show V2-order (or at least that this kind of context manipulation should influence the acceptability of V2 across predicate types, including emotive factives).

Hence, in a second experiment, Djärv et al. (2017) tested this prediction for Swedish embedded V2. This time, the manipulation of Main Point status was achieved via a com-

bination of the question asked and the ‘position of mention’ of the two individuals in the target sentence, as shown in (112). Here, the target sentence mentions Carina as the matrix subject and Albin as the embedded subject. The question to trigger main clause Main Point status therefore asked about Carina; the embedded clause Main Point trigger is a question about Albin. The word order (V2 vs. V-in situ) manipulation was indicated via the position of negation relative to the verb (V>Neg vs. Neg>V). Both Main Point status and word order were manipulated within items, such that each item occurred in 4 conditions (Matrix Main Point + V2; Embedded Main Point + V2; Matrix Main Point + V-in situ; Embedded Main Point + V-in situ). They also varied the type of matrix predicate across items: speech act predicates, doxastic non-factives, doxastic factives, and emotive factives.

(112) Djärv et al. (2017, p. 20)

a. **Background:**

Lille Albin och hans mamma Carina gick och såg en film på bio.

‘Little Albin and his mother Carina went to see a movie in the cinema.’

b. **Embedded Clause At-issue Trigger:**

Hur upplevde **Albin** biobesöket?

‘How did Albin find the visit to the cinema?’

c. **Main Clause At-issue Trigger:**

Hur upplevde **Carina** biobesöket?

‘How did Carina find the visit to the cinema?’

d. **Target:**

Carina gissade att [_P {han_{EC} / Albin_{MC}} (**hade**) nog inte (**hade**)
 Carina guessed that {he / Albin} (had) probably not (had)
 väntat sig så mycket action].
 expected SELF so much action.

‘Carina guessed that {he / Albin} probably hadn’t expected that much action.’

As indicated in Figure 2.3, there was a main effect of word order such that V-in situ was rated higher than V2 ($p < 0.001$). There was also a significant effect of predicate type

($p < 0.001$): speech act predicates and doxastic factives were rated higher than the doxastic non-factives and the emotive factives. The main effect of predicate class was driven by a word order \times predicate type interaction ($p < 0.001$): As predicted under an account in which the licensing of embedded V2 is lexically defined, ratings for V<Neg vs. Neg<V order varied by predicate type. However, there was no main effect of the Main Point manipulation ($p=0.88$), and no interaction with Main Point status (p 's > 0.75).

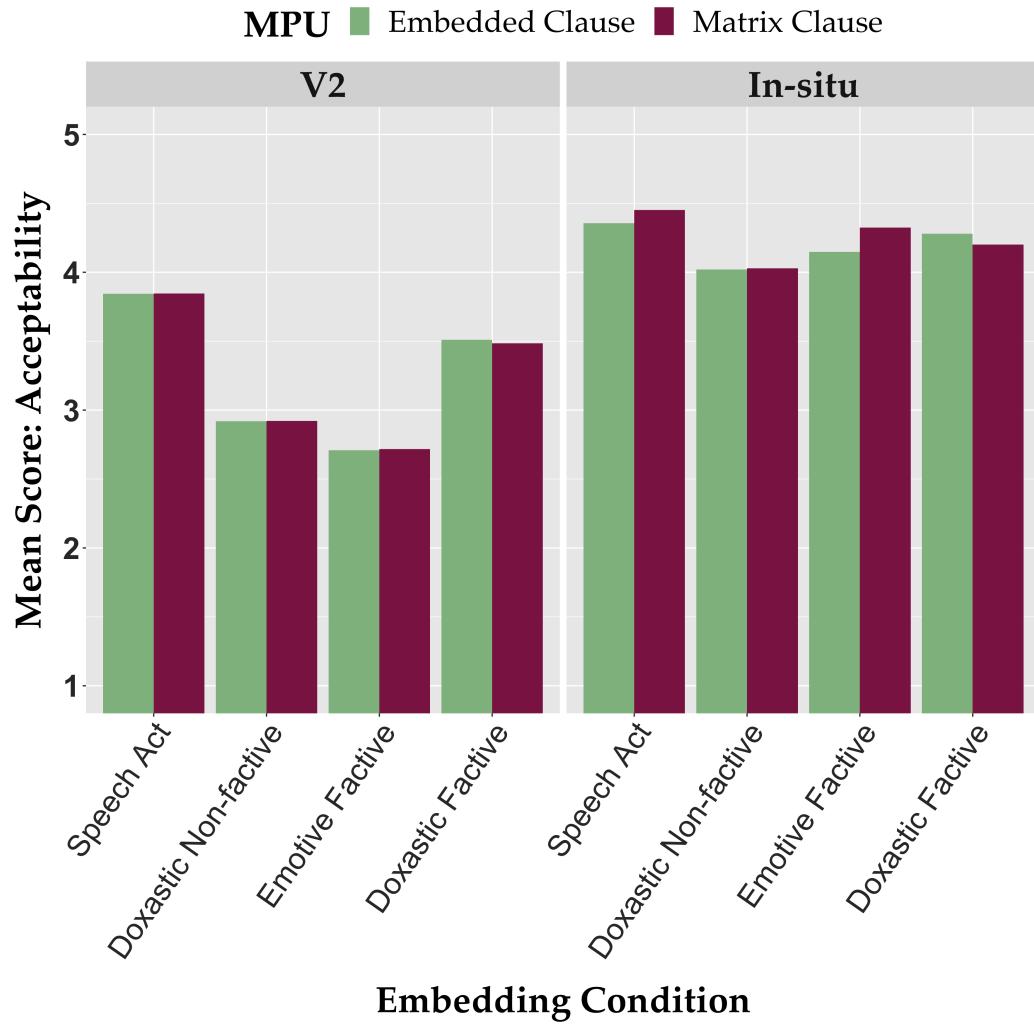


Figure 2.3: Acceptability judgements of target sentences, by MPU status, predicate class; and word order [n=104]. Adapted from Djärv, Heycock, and Rohde (2017, p. 24).

Based on these results, Djärv et al. (2017) rejected the view that embedded V2 is driven by the Main Point status of the embedded proposition (proposed by Jensen and Christensen

2013, and implied also by Woods 2016a). Rather, the results are in line with the lexical licensing account proposed by Wiklund et al. (2009), whereby V2 is lexically licensed by certain predicates selecting for a ‘large enough’ CP, compatible with V-to-C movement.

2.6 Discussion

In this chapter, we examined a set of proposals attempting to account for various distinctions in the complementation patterns of different attitude verbs, in terms of (a) fine-grained semantic and pragmatic distinctions among (classes of) attitude verbs, and (b) different ways of understanding what it means for an embedded proposition to be asserted.

What we found was a rather complicated theoretical and empirical landscape: neither is there agreement on what semantic and pragmatic notions are actually at play when an embedded proposition is interpreted as asserted; nor is there agreement on what dimension(s) of assertion are relevant to the syntax. Before moving on, let’s take stock of what we have seen so far.

In Section 2.2 we discussed what we called the CP/DP Interface Hypothesis, according to which the pragmatic status of *p* as referential/presupposed is encoded syntactically and semantically in a D-head in the embedded clause. We saw in Section 2.2.2 that this view faced some challenges regarding (a) the proper theoretical implementation of the referentiality/presupposition restriction, and (b) the availability of Main Clause Phenomena: specifically, it has been reported, since the earliest work on this topic, that MCP are allowed under doxastic factives, contrary to the empirical and theoretical assumptions of this hypothesis. Section 2.3 then looked at the other purported syntactic correlates, along with a set of other tests for the status of the embedded clause as a DP or a CP, finding syntactic evidence for the claim that the emotive factives select for DPs. Both the doxastic factives and the response verbs, however, were found to pattern with doxastic non-factives and speech act verbs, in that they allow both CP and DP-complements.

In Section 2.4, we examined a set of approaches arguing that what matters for an embedded proposition to count as asserted, from the point of view of the grammar, is whether

or not the speaker (or the attitude holder) is committed to p. Among these accounts, we saw quite a lot of variation in the precise nature of the theoretical and empirical claims: while some authors point to speaker commitment only, others argue that either speaker or attitude holder commitment to p will suffice to make an embedded proposition count as asserted for the purpose of the syntax. Another point of disagreement concerned the issue of cross-linguistic variation, as well as variation among MCP. According to Woods (2016a), German embedded V2 is obligatorily speaker-oriented, while Mainland Scandinavian embedded V2 can be either speaker or attitude holder oriented (like speaker oriented adverbs). According to Truckenbrodt (2006), however, German embedded V2 can be licensed by either speaker or attitude holder belief that p. For Wiklund (2010) and Julien (2015), on the other hand, Mainland Scandinavian embedded V2 is licensed by speaker commitment to p.

Finally, we looked at an approach, which took the relevant pragmatic notion to be whether or not the embedded proposition constituted the Main Point or *at-issue* content of the utterance, relative to the Question Under Discussion. We saw, in Section 2.5.2, however, experimental evidence from Djärv, Heycock, and Rohde (2017) showing that this kind of approach, while appealing from a semantic and pragmatic point of view, does not explain the intended syntactic effects, namely the availability of embedded V2.

In the following chapter, we take a broad empirical approach to the empirical questions that we are left with at the end of this discussion. Here, we examine in much greater empirical detail the role of different kinds of context updates, and the discourse status of p as new vs. given, first in the context of embedded V2 in Swedish (Section 3.1) and then for a wider range of MCP across Swedish, English, and German (Section 3.2). The main empirical questions that we are faced with, which the following chapter will begin to answer, are summarized here:

(113) **What dimension of assertion is relevant to the syntax:**

- a. Speaker commitment to p?
- b. Attitude holder commitment to p?

- c. The status of p as ‘old’ vs. ‘new’ information?

(114) **What is the role of the embedding predicate:**

- a. To what extent do different verbs encode the pragmatic dimensions in (113)?
- b. Are MCP/assertion-compatible clauses lexically selected for?
- c. Are the pragmatic and syntactic properties of verbs like *think*, *say*, *doubt*, *regret*, and *know* reflective of broader classes of predicates?
- d. What, if any, is the role of factivity?

(115) **Is there variation:**

- a. Across languages (e.g. Mainland Scandinavian, German, English)?
- b. Between different MCP (e.g. embedded V2, topicalization, speaker oriented adverbs, embedded inverted questions)?
- c. Among speakers?

(116) Are conflicting judgement due to not controlling for elements of the context?

Without *comparable* data from different kinds of MCP across different languages, which controls for contextual and lexical properties of the relevant sentences (as per (116)), it is difficult to falsify and evaluate competing theoretical accounts. Ideally, to get around the issue of possible inter-speaker variation, we would like such comparative data to come from a greater number of theoretically naive speakers. In the following chapter, we present such quantitative data. Regarding the questions in (113), we show that while discourse novelty vs. Givenness is a clear predictor of one type of MCP, namely embedded V2 (in both German and Swedish), neither speaker nor attitude holder commitment to p are in themselves active in the licensing of embedded V2. As for the questions in (114): We find that the different pragmatic dimensions discussed are (cross-linguistically) robust properties of the different classes of verbs. However, MCP/assertion compatible clauses are not selected for. Nor does factivity play any role in the licensing of V2. Regarding the question in (115), we find that the acceptability of the other MCP investigated is not predicted by any of the accounts

examined here, or sensitive to any of the lexical and pragmatic dimensions tested for; an observation which is fully in line with the extensive disagreement about the acceptability of these constructions across contexts, as we saw in particular in Section 2.2.2. We do not find variation either between speakers, or among languages (e.g. German vs. Swedish embedded V2). We now turn to these studies.

Chapter 3

The syntax-pragmatics interface: new quantitative data

In the previous chapter, we began to address the guiding question of this dissertation, of how, and to what extent, the lexical semantics of attitude predicates constrain the interpretation of their complements as asserted or presupposed, and to what extent these pragmatic dimensions are reflected in the syntactic and semantic composition of attitude reports. Specifically, this chapter examined a set of hypotheses aimed at accounting for variation in the complementation patterns of different attitude verbs, in terms of (a) various semantic and pragmatic distinctions among (classes of) attitude verbs, and (b) different ways of understanding what it means for an embedded proposition to be asserted. Recall from Chapter 2 that in the Stalnakerian tradition, it is generally understood that for a speaker to assert a proposition p , it is required that:

- (1) a. The speaker is committed to p ;
- b. The speaker is attempting to add p to the Common Ground (the set of propositions mutually taken to be true by the discourse participants).

We found that previous accounts fall into two broad camps, regarding which dimension of assertion they take to be relevant to the syntax of clausal embedding. In Section 2.2, we examined a set of proposals, referred to here under the label of the DP/CP Interface Hypothesis, for which the focus is on the second dimension of assertion (1-b). Given the standard understanding of factivity in the semantics literature (see Section 1.1 and further

discussion in Chapter 5), it follows from this view of assertion that propositions embedded under factive verbs cannot be asserted. The syntactic consequence, on this hypothesis, is that namely factive verbs like *discover* and *resent*, along with response stance verbs like *doubt* and *accept*, select DPs as a consequence of the presuppositional status of their complements. In Section 2.3, however, we showed using a battery of tests, that this claim is incorrect: while emotive factives select specifically for complements that are (overtly or underlyingly) DPs, both the doxastic factives and the response stance verbs allow both CP and DP complements.

In the second part of this chapter (Section 2.4 and 2.5), we looked at a set of proposals which focused primarily on the first part of assertion (1-a). These proposals argue that the status of the embedded clause as asserted makes available a particular set of constructions in the embedded clause, namely constructions that require an extended C-domain. This family of constructions is known as (embedded) Main Clause Phenomena [MCP] (see Section 2.1.3). We concluded our discussion of the syntax of embedded assertion and presupposition by noting that there is neither agreement on which specific semantic and pragmatic notions are at play when an embedded proposition is interpreted asserted; nor is there agreement on what dimension(s) of assertion are relevant to the syntax. Moreover, we found a fair amount of disagreement about the nature of the data, an observation which raised the possibility of variation, both among speakers, among languages, and among different types of MCP.

One important contribution of the previous chapter was to spell out and carefully consider the various theoretical and empirical options. To make further progress, and to close the various data-theory gaps identified, this chapter presents two large-scale quantitative studies, a corpus study of Swedish embedded V2 (Section 3.1), and a cross-linguistic experimental study investigating the pragmatics associated with different classes of attitude verbs, along with the lexical and pragmatic licensing conditions on four different MCP: embedded V2 in Swedish and German, topicalization and scene-setting adverbs in English, and speaker oriented adverbs in all three languages (Section 3.2).

From the corpus study we develop the hypothesis that the dimension of assertion which

is relevant to the licensing of Swedish embedded V2 is in fact status of p as discourse new information, which we will argue in Chapter 5 is orthogonal to factivity (we propose an analysis which dissociates the inference that p is Given from the projective inference of speaker commitment to p). In the experimental study in Section 3.2, we test this hypothesis against the theoretical alternatives identified in Chapter 2. The results from this study allow us first to derive an independent and empirically motivated measure of the various pragmatic dimensions claimed to be responsible for the licensing of the various MCP, which we then use to test the various (anti-)licensing accounts. The main findings of this study are: (i) embedded V2 tracks the status of p as discourse new; (ii) the availability of embedded V2 and discourse novelty across different types of predicates tracks the verb classification of Hooper and Thompson (1973) (Section 2.1.3), such that emotive factives and response verbs disallow discourse new information in their complement; (iii) embedded V2 and discourse novelty are not selected for, but are sensitive to the polarity of the matrix clause; (iv) none of the other MCP investigated are sensitive to assertion, in either of the senses in (1).

Finally, in Section 3.3, we sharpen the notion of ‘discourse new’ invoked here, arguing that the relevant dimension is in fact novelty as it contrasts with Givenness, in the sense of Schwarzschild (1999). The main conclusion then, is that embedded V2 is licensed in contexts where p is discourse new; and blocked when p is Given. Relating these findings to those of the previous chapter: while the novelty-Givenness dimension is orthogonal to both factivity and DP-licensing, it does interestingly track the availability of *wh*-extraction across different predicates (Section 2.3.1), a finding which is in line with the claim, going back to Weerman et al. (1986), Iatridou and Kroch (1992) and Vikner (1995) (see also more recent work by Featherston 2004), that V2 is licensed in the complements of so-called *bridge verbs*. It is surprising, however, given the received view, discussed in Section 2.2, that *wh*-extraction is conditioned by factivity or DP-licensing. Section 3.4 concludes.

3.1 Swedish embedded V2: a corpus study

This study is based on co-authored work with Spencer Caplan (Caplan and Djärv 2019). The study uses large-scale data extracted from a series of Swedish corpora to investigate the factors responsible for conditioning the choice of embedded Verb Second [V2] in Swedish. Through statistical analysis of the Swedish corpus data, combined with results from a semantic-inference task, we are able to falsify certain previous (theoretical and empirical) claims about the distribution and interpretation of embedded V2. We argue instead, based on the current results, that the relevant interpretive notion driving the distribution of embedded V2 is ‘discourse novelty’; whether the embedded proposition is treated as discourse new or given information. While this is fundamentally a pragmatic notion, it is nevertheless tightly constrained by both lexical-semantic properties of the matrix predicate and other aspects of the grammatical context.¹

In Section 2.1.3, we introduced the general class of MCP. However, given the focus on embedded V2 in this chapter, the following section provides some more theoretical detail.

3.1.1 Introducing embedded V2

Syntactically, the type of embedded V2 found in German and the Mainland Scandinavian languages involves movement of the finite verb to CP.² In this way, V-to-C languages are different from V-to-T languages.³ In the latter type, V2 is obligatory in *all* tensed matrix and embedded clauses.

In the Mainland Scandinavian languages, which are SVO, it is not always clear from the surface constituent order whether a subject-initial clause has undergone V-to-C movement

¹Caplan and Djärv (2019) additionally evaluate—and find no evidence to support—a processing or usage-based view of optionality in embedded V2. The paper also contains a discussion of the methodological consequence of this work: that statistical analysis of usage data can be used to test specific predictions made by syntactic and semantic-pragmatic theory (see also Caplan 2019).

²Note that this description is likely somewhat simplified. As we saw in Section 2.1.3, much work on V2 and related phenomena has argued that the C-domain consists of an ordered sequence of syntactic heads; as our focus is the pragmatic and lexical licensing conditions on embedded V2, we leave those distinctions to the side.

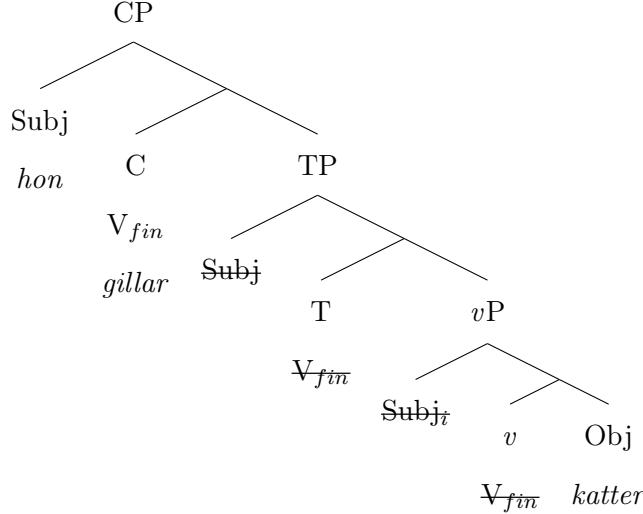
³As in Romance, e.g. Pollock (1989). See also Platzack (1987), Platzack and Holmberg (1989), Holmberg and Platzack (1991, 1995), Holmberg (2015), for differences between the different Scandinavian languages in this respect. See also Holmberg (2015) for a recent survey of V2-phenomena.

or not. This is because such movement often results in the same surface-order as a clause without movement, as shown in (2).

(2) Swedish

- a. Hon gillar katter.
she likes cats
'She likes cats.'

b.



In these languages, there are two common diagnostics for identifying verb movement. The first is the presence of a topicalized or focused non-subject XP in Spec,CP (3). The second is the presence of sentence adverb (including negation), occupying the left edge of vP (4) (illustrated in (4-b)). As these examples illustrate, V2 is obligatory in main clauses.

(3) Swedish

- a. [Den filmen]_i gillade hon t_i.
[that movie]_i liked she
'That movie, she liked.'

V2

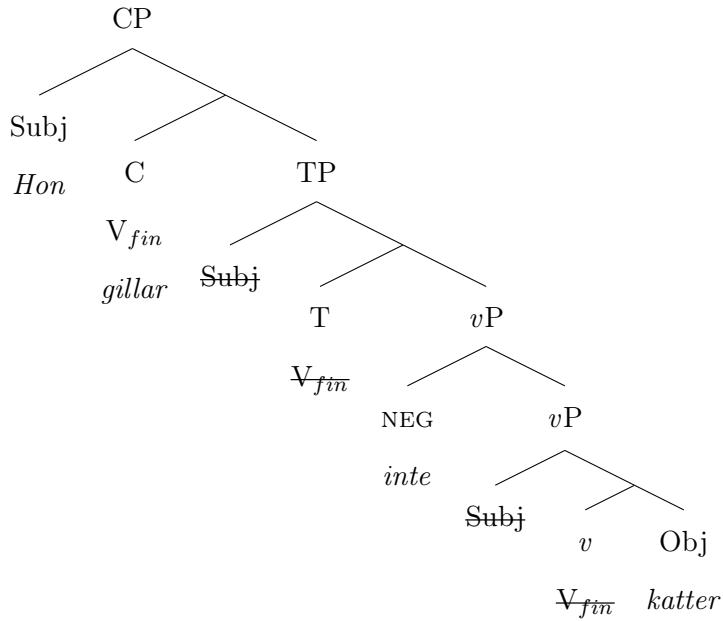
- b. *[Den filmen]_i hon gillade t_i.
[that movie]_i she liked
'That movie, she liked.'

*V-*in situ*

(4) Swedish

- a. Hon gillar inte (*gillar) katter.
she likes not likes cats
‘She doesn’t like cats.’

b.



While V2 is possible in certain embedded contexts, it is by no means *obligatory* here:

(5) Swedish

- a. Jon sa att han hade inte sett filmen.
Jon said that he had not seen movie.the.
‘Jon said that he hadn’t seen the movie.’

V2

- b. Jon sa att han inte hade sett filmen.
Jon said that he not had seen movie.the.
‘Jon said that he hadn’t seen the movie.’

V-*in situ*

As we saw in the previous chapter, the syntax of German V2 is different. First of all, V2 is in complementary distribution with the complementizer *dass*. Secondly, given that German has SOV word order, V-to-C movement can be detected without the presence or absence of negation or other sentence adverbs, as in the Mainland Scandinavian languages.

(6) German

- a. Peter hat gesagt, (*dass) Anna wurde gefeuert.
 Peter has said (that) Anna was fired
 ‘Peter said that Anna was fired.’ V2
- b. Peter hat gesagt dass Anna gefeuert wurde.
 Peter has said that Anna fired was
 ‘Peter said that Anna was fired.’ *V-in situ*

With this background in mind, let us look at the way in which we coded for both the status of the embedded clause as V2 vs. *V-in situ* and for the semantic class of the embedding predicate.

3.1.2 Corpus methods

Natural language usage data was extracted from several very large Swedish corpora (Borin, Forsberg, and Roxendal 2012) totaling 12,873,778 sentences, subsequently referred to as BFR. BFR represents a balanced set of genres ranging from informal blogs and forums to formal academic writing and government texts. These are summarized in Table 3.1.

Owing to the Zipfian distribution of frequencies inherent to language use (Piantadosi 2014, Yang 2013), the majority of sentences only include a limited number of highly frequent verb types, with most predicates occurring only rarely. As such, the large sample of extracted data is required for the type of analysis presented here. This is particularly relevant since only about 5% to 10% of sentences provide a diagnostic test of embedded V2 status, and of those, V2 order is only used approximately 5% of the time. This means that one would need to analyse on the order of 40,000 sentences to encounter 100 diagnosably positive examples.

As the goal of this study is to examine sentences with the potential for embedded V2 order (regardless of whether or not that was actually realized), we created a subcorpus for analysis according to the following method.⁴ Data was collapsed according to the ‘lemma’ tags which were automatically assigned in BFR. The use of ‘lemma’ here does not reflect a theoretical assumption regarding underlying roots, but is simply a limited technical implementation aimed at providing a single representation across surface-divergent inflected

⁴ Code is available open-source at <https://github.com/scaplan/V2-optionality> under the MIT license for replicability and extension to related data sets and analyses.

Genre	Corpus	Sentences	Proportion Non-ambiguous	$p(V2)$
Blogs/Forums	Familjeliv-känsliga	5971907	0.1163	0.0636
	Familjeliv-nöje	458699	0.0809	0.0555
	Familjeliv-adoption	77008	0.0936	0.0545
	Familjeliv-expert	57478	0.0966	0.0522
	Bloggmix	2713376	0.0765	0.0502
	Flashback-Politik	2841872	0.0972	0.0457
Historical News	Tidning 1870	17084	0.06	0.0724
	Tidning 1860	58839	0.062	0.0512
Academic	Sweacsam	52678	0.0736	0.0375
	Academy-humanities	60931	0.0741	0.0283
Goverment	Rd-bet	372054	0.0698	0.0163
	Rd-ds	172657	0.0848	0.0141
	Rd-fpm	5259	0.0686	0.0138
	Rd-skfr	81800	0.0865	0.0098
Accessible news	Ättasidor	8059	0.0768	0.0081

Table 3.1: Rates of embedded V2 across corpora of varying formality. ‘Genre’ represents a coarse categorization of corpora by source material. ‘Corpus’ is the division provided within BFR. ‘Sentences’ is the total number of sentences extracted from the original sub-corpus. ‘Proportion Non-ambiguous’ represents the proportion of sentences within each subcorpus over which our extraction algorithm is able to apply the diagnostic for estimating V2 vs. in-situ status. ‘ $p(V2)$ ’ is the proportion of such sentences surfacing with embedded V2 order rather than embedded in-situ. Note that while the proportion of diagnostic cases is more or less steady by corpus, there is a clear effect of genre on the rates of embedded V2. Formal or more heavily prescriptive content has lower rates of V2 compared to colloquial and informal material. Even in the most formal styles V2 is still consistently attested.

forms.⁵ The analysis was also replicated over raw inflected verb forms: we did not identify any major qualitative differences. However, the use of lemmas reduces data sparsity; even in a large corpus many possible inflected forms are unattested, and so grouping together inflectional variants can alleviate that. BFR data are not parsed and automatic syntactic parsing faces numerous technical limitations on data of this diverse type and size (McClosky et al. 2010, Sekine 1997). Instead, we utilized several filters over BFR-provided part-of-speech tags (Brill 2000) in order to differentiate cases in which an embedded verb has remained in

⁵For example, ‘spring’, ‘springa’, ‘springer’, ‘sprang’, are all identified by the unifying lemma ‘spring’ (run) and identified as such in the subsequent analysis.

situ rather than undergone V-to-C movement.

For technical simplicity, we only consider single, rather than multiple, embeddings (approximately 20% of all sentences with the overt complementizer *att* contain more than one instance). Sentences are further excluded if the complementizer is directly followed by a verb, with no intervening potential subject information, since this is indicative of a non-finite complement rather than a tensed embedded clause. Additionally, we exclude sentences in which the matrix verb is the copula, since these can correspond to a broad range of predicate types. A few additional filters exclude potential false-positives such as future-marking *kommer att* ('will'), adverbial clauses involving *eftersom/(där)för att* ('because'), and embedded clauses with relative clause subjects, as these are problematic for unambiguously identifying the tensed verb of the embedded clause.

This set of embedded declaratives is then diagnosed for V2 status by considering the relative linear order of the embedded verb and negation (as outlined in Section 3.1.1). Theoretically, this diagnostic can be applied with any adverb in the embedded clause, however for tractability we limit our diagnostics to negation (*inte*, *icke*, etc.).

This results in a set of embedded V2/in-situ sentences which is necessarily a subset of the total instances in the corpus.⁶ However, we have no theoretical reason to expect factors such as the type of adverbial (in the embedded clause) or multiple embedding to have a profound and significant impact on the availability of embedded V2. Limiting our search to single-embedded sentences with negation allows technical tractability and high-confidence in the quality of output data while still providing a representative sample of over one million diagnosed sentences.

A highly frequent but limited set of 108 lemmas was tagged for semantic class based on their classification in previous literature on the topic (Hooper and Thompson 1973, Cattell 1978, Wiklund et al. 2009, Djärv et al. 2017, Kastner 2015). A range of statistical information was additionally extracted for each sentence and for each lemma overall. This includes frequencies, lexical semantic information such as lexical class à la Hooper and Thompson

⁶Though not necessarily a proper subset.

(1973), polarity information, and several conditional probability events (e.g. matrix introducing embedded clause, matrix introducing V2 clause, embedded predicate surfacing in embedded clause, embedded predicate surfacing with V2 order, etc.) A full enumeration of extracted information is available in the source code.

3.1.3 Lexical information and variation

At a descriptive level, Table 3.1 provides a summary of embedded V2 by corpus. We find that overall rates of V2 are graded by formality, with more colloquial Swedish such as blog and forum text exhibiting higher rates than formal writing. This potentially reflects a sociolinguistic property of a (perceived) prescription against embedded V2. It is striking, though, that V2 appears stable diachronically, without a significant change between historical newspaper texts dating back to the 1860’s and modern online forums.⁷ This stability suggests that synchronic proportions of use do not represent a case of language change in progress, but rather a fact about the interaction of grammatical representation and use in context.

In Caplan and Djärv (2019), we show that the rates of embedded V2 across predicates cannot be accounted for in terms of a processing or usage-based view of optionality. A curious reader is encouraged to look at Section 2.3. of the paper. In the following sections, we evaluate a set of the theoretical accounts discussed in the previous chapter, focusing in particular on the claims about factive predicates made by Haegeman and Ürögdi (2010), Haegeman (2014), and Kastner (2015) (§ 3.1.4.1), as well as the kind of lexical licensing account provided by Wiklund et al. (2009) (§ 3.1.4.2).

3.1.4 Lexical accounts of V2

In this section we test the predictions of the two types of lexical accounts discussed above. First, in Section 3.1.4.1, we test the predictions of the DP/CP Interface Hypothesis (discussed in Section 2.2 above) for Swedish embedded V2. Secondly, in Section 3.1.4.2, we

⁷As in Table 3.1 the rates of embedded V2 in historical newspaper data (1860-1880) range from 5% to 7% in line with the contemporary rate in online forums.

test the predictions of the type of account discussed in Section 2.5, proposed by Wiklund, Bentzen, Hrafnbjargarson, and Hróarsdóttir (2009), according to which V2 is available, though essentially optional, under certain predicate types; i.e., those that (independently) license embedded assertions. We test the predictions made by these accounts against BFR data, showing that for neither of these accounts are their predictions straightforwardly borne out.

3.1.4.1 Factivity

On the CP/DP Interface Hypothesis, discussed in Section 2.2, factive verbs are predicted to categorically disallow embedded V2, given the (standard) assumption that factives require p to be Common Ground. We noted that this line of analysis is at odds with the observation made by Hooper and Thompson (1973) and subsequent work, that the doxastic factives allow MCP and V2 complements. Nevertheless, given that judgements in this area appear to be subtle and prone to variability, we wanted to test the empirical claim that factive and non-factive predicates differ fundamentally in their ability to license MCP in the context of V2, against the large scale data available in the BRF-corpora. If these views were correct, we would expect significantly lower rates of V2 under factive than under non-factive verbs.

However, as shown in Figure 3.1, we find that factivity does not influence the rates of embedded V2. In fact, from this plot, it looks as though factive verbs (the gold bar) show slightly higher rates of V2 than the non-factive verbs (the gray bar); though this difference is not statistically significant.

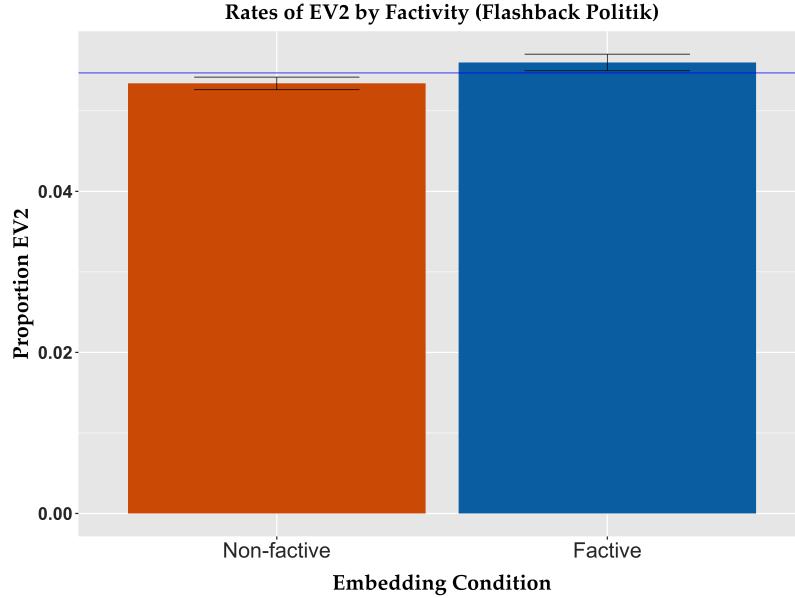


Figure 3.1: Rates of V2 under factive vs. non-factive verbs; plot based on data from the Flashback-Politik corpus (2,841,872 sentences)

We also ran a Wilcoxon Rank Sum test (a non-parametric alternative to the two-sample *t*-test), which allowed us to reject the hypothesis that the distribution of V2 sentences is different for factive as opposed to non-factive verbs ($W = 748$, $p = 0.6949$). This was true for all corpora that we investigated.

3.1.4.2 ForceP selection

On the view advanced by Wiklund et al. (2009), discussed in Section 2.5, V2 is optional in the complements of certain predicate types, namely speech act predicates, doxastic non-factives, and doxastic factives; but not in the complements of emotive factives and response predicates. The rationale for this claim was that the former set of predicates select for a ForceP, which is compatible with embedded V2 (and other MCP), whereas the latter set of predicates select for a smaller clause, incompatible with V-to-C movement. They argued, however, that there is no direct link between embedded V2 and assertion.

In terms of the distribution of embedded V2 in the corpus, this account predicts that the relevant factor determining the rates of V2 is simply membership of a particular lexical

class. Moreover, given that pragmatic factors play no explanatory role on this account, we expect that if it were correct, then the rates of V2 across predicate classes should be more or less constant, both across different discourse types; represented by the genre of the corpora (see Table 3.1), as well as across the different predicates within a given predicate class. More specifically, we expect that if there is an effect of formality and genre (for instance), then we should observe this effect categorically for all predicates in this context.

Contrary to the first of these two predictions, we find that, while the distribution of V2 to some extent varies across predicate classes along the lines predicted by this account (overall higher rates of V2 in the complements of speech act predicates, doxastic non-factives, and doxastic factives), the rates of V2 across predicate classes varied *substantially* across different corpora, as shown in Figure 3.2. What we found was a type of ‘genre effect’, i.e. an overall effect of lexical class, but where the distribution of V2 by verb class varied across corpora representing different discourse types,

It is also worth noting that in neither corpus do the rates of V2 straightforwardly track the rates of V2 found in Jensen and Christensen’s (2013) Danish corpus, which were also reflected in the Swedish judgement data from Djärv, Heycock, and Rohde (2017), where the speech act and doxastic factives showed the highest rates/judgements of acceptability for V2, followed by the doxastic non-factives and the emotive factives. This is suggestive of a scenario whereby the rates of embedded V2 is sensitive to pragmatic properties of the discourse; however, in an experimental context, the identity of the predicate might impose some default assumptions about the context. We return to this possibility in Section 3.2.

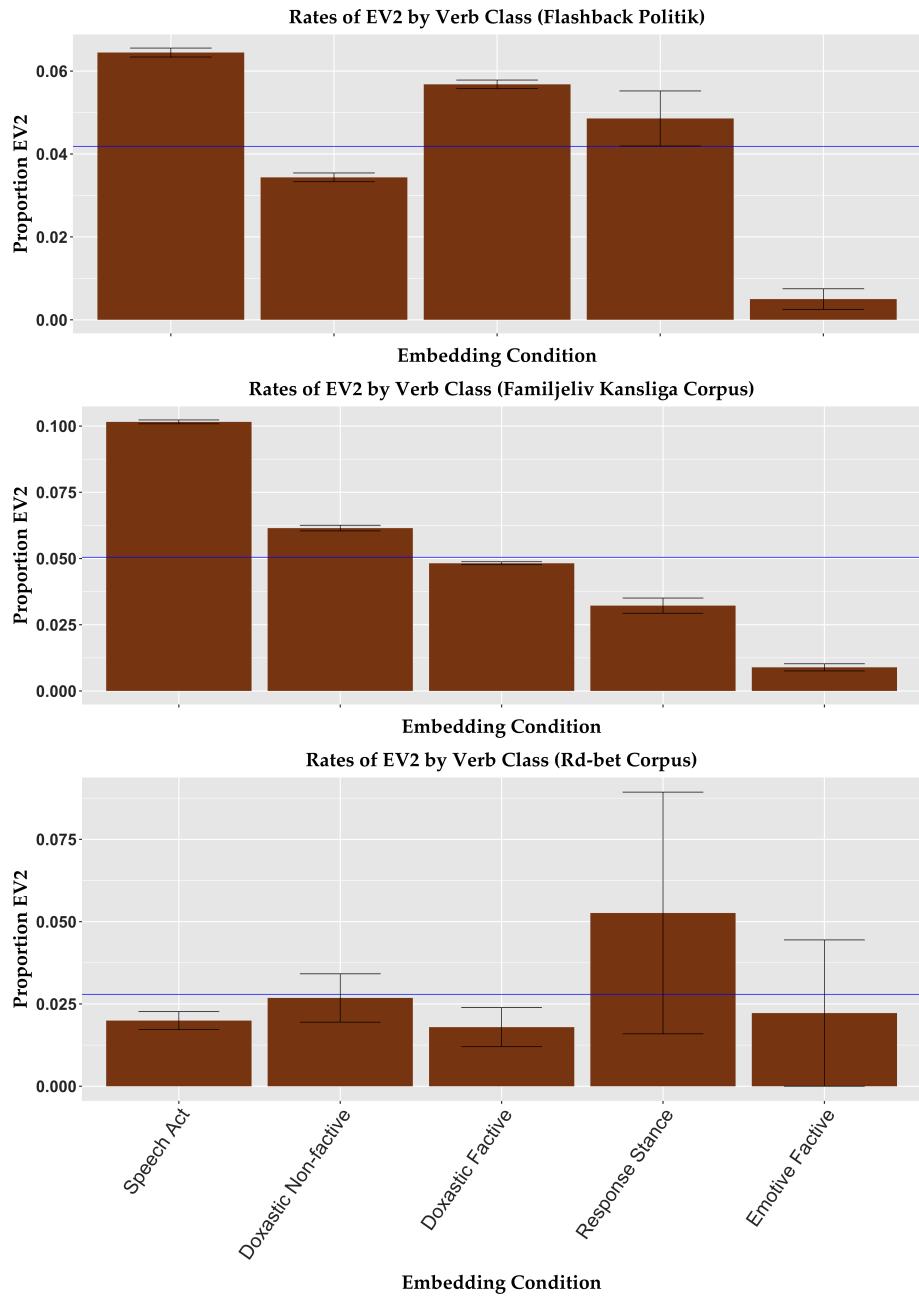


Figure 3.2: Rates of embedded V2 from three of the BRF-corpora. From top to bottom: *Familjeliv-känsliga* (family-oriented discussion forum; 5,971,907 sentences), *Flashback-Politik* (online forum for political discussion; 2,841,872 sentences), and *Rd-bet* (government texts; 372,054 sentences)

Moreover, contrary to the second prediction made by this account, we also found that there was significant variability *within* the different verb classes: Figure 3.3 shows the vari-

able rates of V2 for the 21 speech act predicates in our data set. Note that similar variation was found across the other verb classes as well.

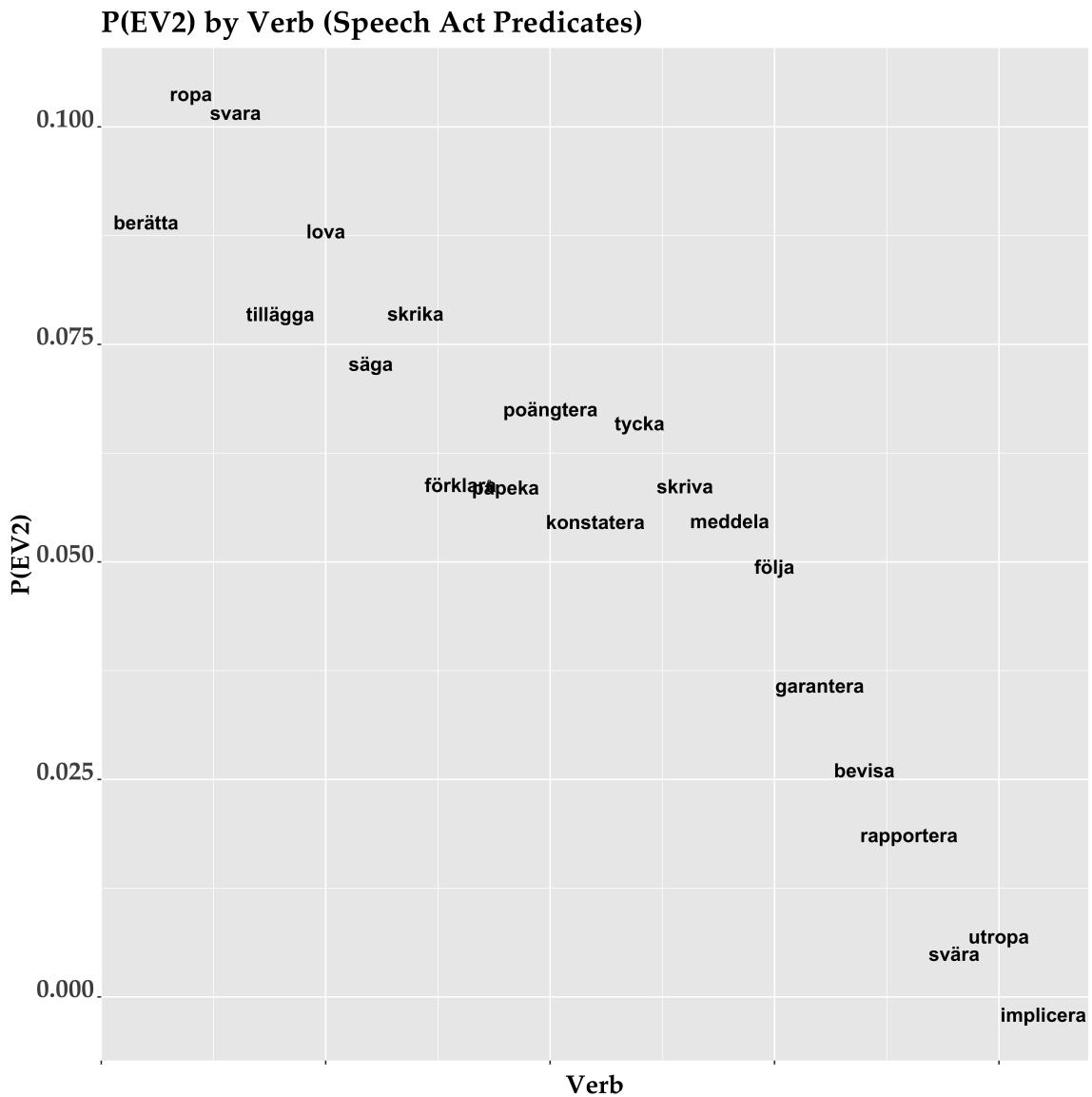


Figure 3.3: Probability of V2 by lemma within the class of speech act verbs (the x-axis represents the 21 different verbs in this class ordered by proportion of V2); plot based on data from a corpus of text from a political online forum (Flashback-Politik corpus; 2,841,872 sentences)

We take this as evidence against this type of strong lexical licensing account, whereby membership of a given lexical class is what determines whether V2 is available or not.

In this section, we tested the predictions made by the two types of lexical accounts discussed in Chapter 2 against large-scale data from the BRF corpus: one according to which embedded V2 should not be available in the complements of factive verbs; and one whereby V2 is available, but optional, in the complements of certain predicate types, but not others. We found that for neither of the two accounts were their predictions straightforwardly borne out. Rather, the distribution illustrated in Figure 3.2 suggests to us that, in addition to the lexical semantics of the embedding predicate, discourse factors play a significant role in driving the distribution of embedded V2. In particular, the distribution we observe looks like what we would expect if it were the case that embedded V2 is associated with some kind of pragmatic meaning; the use of which is influenced by (but not solely determined by) the meaning of the embedding predicate, along with the type of discourse context in which the sentence is uttered. In the following section, we suggest that this pragmatic meaning is whether or not the embedded proposition p is discourse-new.

3.1.5 Proposal: embedded V2 and discourse novelty

To account for the interaction of discourse context and lexical semantics illustrated in Figure 3.2, we proposed that:⁸

- (7) a. V2-clauses have some interpretive effect. The distribution or use of this interpretive effect is influenced both by the meaning of the embedding predicate, and the type of discourse context in which the sentence is uttered.
- b. The proposition denoted by a V2 clause is interpreted as constituting discourse-new information.

While (7-a) was based on the effect observed in Figure 3.2, the motivation for (7-b) came from considering the kinds of discourse contexts in which the relevant predicate types can felicitously be used. We observe that the different types of predicates vary in their ability to introduce entirely new information into the discourse; essentially, whether or not p has

⁸This was the proposal made and tested in Caplan and Djärv (2019): our proposal for the licensing of embedded V2 will be developed further in Section 3.3.

been previously discussed by the speaker and hearer. As shown in (8), this ability appears to correlate with the availability of V2.⁹

- (8) [Uttered out of the blue:] *Guess what — / You know what —*
- a. John told me that [_P Bill and Anna broke up]. ✓V2
 - b. John thinks that [_P Bill and Anna broke up]. ✓V2
 - c. John discovered that [_P Bill and Anna broke up]. ✓V2
 - d. #John appreciates that [_P Bill and Anna broke up]. ✗V2
 - e. #John doubts that [_P Bill and Anna broke up]. ✗V2

A reader might object that these judgements are based on English rather than Swedish. In Section 3.2 (in particular Section 3.2.6.1) we present experimental results that provide empirical support for the hypothesis that these judgments do in fact reflect robust semantic-pragmatic properties of these different (classes of) attitude verb across Swedish, English, and German.

Caplan and Djärv (2019) argued, in the spirit of the proposals in Haegeman and Ürögdi (2010), Haegeman (2014), Kastner (2015) a.o., that V2 is not licensed in contexts where the embedded proposition p is discourse old information. However, this proposal differed crucially in terms of our assumptions about factive predicates: whereas those authors assumed all factive predicates to require p to be Common Ground, we followed Simons (2007), in disassociating givenness and factivity (in the sense of projecting speaker commitment to p).¹⁰

However, we observed that the lexical semantics of the embedding predicate is only *one* factor that constrains the ability of an embedded proposition to be presented as discourse-

⁹The # notation refers to the readings where p is presented to the hearer as discourse new information, as opposed to where the sentence makes a comment about the attitude holder. The same holds for (10) and (11).

¹⁰In Chapter 5 we present a novel analysis of factivity, different from that of Simons (2007), which ties the projective inference of speaker commitment to presuppositions of evidential support for p, rather than p being Common Ground, or any type of entailment of factive verbs. This account is based primarily on judgements about the types of contexts that allow suspension or cancellation of the inference that p is true for emotive and doxastic factives in (un-)embedded contexts.

new information. The type of discourse, along with other properties of the sentence, matter too. The following examples with embedded V2 from the Flashback-Politik corpus (a political forum), involving the response verb ‘acceptera’ (accept) illustrates this point:

- (9) a. kan du inte bara slappna av och acceptera att socialisterna kan inte vinna
can you not just chill out and accept that socialists.DEF can not win
alla gånger ?
every time ?
‘Why can’t you just relax and accept that the socialists aren’t going to win every time?’
- b. acceptera att du kan inte älska alla men du kan inte hata alla
accept that you can not love everyone but you can not hate everyone
heller
either
‘Accept that you can’t love everyone, but you can’t hate everyone either.’

What appears to be happening in these cases is indeed that the speakers are presenting the embedded propositions ('the socialists can't win every time', and 'you can't love everyone, but you can't hate everyone either') as new information, in an attempt to update the Common Ground.

If the relevant dimension is truly the discourse status of the embedded proposition, the issue arises of how to test the hypothesis against corpus data, given that there is no direct way of measuring the discourse status of a given proposition in a corpus—especially not in one of this scale. However, it turns out that we *can* test whether or not the embedded proposition may constitute discourse-new information in a way that is quantifiable—but nevertheless independent of the identity of the matrix predicate—thus providing an independent test for our hypothesis. What we observe is that the speech act predicates and the doxastic non-factives, under negation, take on the property of requiring their complement to be discourse-old (similarly to the response predicates and the emotive factives):

- (10) [Uttered out of the blue:] *Guess what — / You know what —*
- a. John told me that [_P Bill and Anna broke up].

- b. John thinks that [P Bill and Anna broke up].
- c. #John didn't tell me that [P Bill and Anna broke up].
- d. #John doesn't think that [P Bill and Anna broke up].
- e. #John appreciates that [P Bill and Anna broke up].
- f. #John doubts that [P Bill and Anna broke up].
- g. #John doesn't appreciate that [P Bill and Anna broke up].
- h. #John doesn't doubt that [P Bill and Anna broke up].

Of course, as has been observed in previous work (e.g. Truckenbrodt 2006, Gärtner and Michaelis 2010), negating these verbs also negates their belief components. This has been taken to support a view such as that discussed in Section 2.4, whereby V2 is licensed by a belief context. The experimental study in Section 3.2 is designed to tease these two accounts apart.

Based on this observation then, our hypothesis now predicts that the speech act and non-factive doxastic predicates, when negated, should show equally low rates of V2 as the response predicates and the emotive factives (in both polarities), as shown in (11).

(11) V2: predicted distribution (verb type by negation interaction)

- | | |
|---|------|
| a. John told me that [P Bill and Anna broke up]. | ✓ V2 |
| b. John thinks that [P Bill and Anna broke up]. | ✓ V2 |
| c. #John didn't tell me that [P Bill and Anna broke up]. | ✗ V2 |
| d. #John doesn't think that [P Bill and Anna broke up]. | ✗ V2 |
| e. #John appreciates that [P Bill and Anna broke up]. | ✗ V2 |
| f. #John doubts that [P Bill and Anna broke up]. | ✗V2 |
| g. #John doesn't appreciate that [P Bill and Anna broke up]. | ✗V2 |
| h. #John doesn't doubt that [P Bill and Anna broke up]. | ✗ V2 |

Before testing these predictions in the BRF-corpus, we wanted to make sure that this was indeed a robust property of these *predicate classes*, beyond our own intuitions about

the particular verbs in (11). To this end, we carried out an experimental judgement task, which we describe in the following section.

3.1.6 Experiment: negation & discourse novelty

The predictions illustrated in (11) are based on the observation that the speech act predicates and the doxastic non-factives, under negation, require their complement to be discourse-old. To make sure that this observation is empirically robust, we ran an experiment probing the effect of negation on whether or not p can be interpreted as discourse-new information under the different predicates types.

3.1.6.1 Methods

3.1.6.1.1 Design and Materials

The experiment employed the “Guess what” test used above; here, framed in the context of a conversation between two friends, as shown in (12).

- (12) Two friends, Tom and Sue, run into each other. Tom says to Sue:

Guess what! I just ran into Aaron, and he VERBS/DOESN'T VERB that [P Joel left his wife].

To measure the perceived discourse status of p, the participants were asked to complete a statement in which they had to rate on a Likert scale how likely they thought it was that the speaker and the hearer had talked about p before (7=not likely; 1=very likely), as shown in Figure 3.4.

Two friends, Tom and Sue, run into each other. Tom says to Sue:

Guess what! I just ran into Aaron, and he denies that Joel left his wife.

It is **not likely** **very likely**

that Tom and Sue have talked about Joel leaving his wife before?

Figure 3.4: Screenshot of an experimental trial

Since our predictions were specifically about the interaction of negation with the speech act predicates and the doxastic non-factives, compared to the emotive factives and the response predicates, we did not include the doxastic factives in this experiment. We included three verbs from each lexical class:¹¹

- (13) a. Speech act predicates: *say, mention, tell (me)*
 b. Doxastic non-factives: *believe, think, assume*
 c. Response predicates: *accept, deny, admit*
 d. Emotive factives: *appreciate, regret, resent*

The experiment included 24 critical items, and 24 fillers, plus two practice items that were excluded from the analysis. Each item consisted of one verb and one (unique) complement clause, with variations in the two polarity conditions: positive (no matrix negation) vs. negative (with matrix negation). Whereas each embedded clause content occurred only in one item, every verb occurred in two items, so that each participant would see all conditions; [speech act vs. doxastic non-factive vs. emotive factive vs. response] × [negative vs. positive], across items, but with the specific content of the embedded clause shown only in one condition, counterbalanced across subjects using a latin-square design. Each subject thus

¹¹The doxastic factives were excluded for the purpose of keeping the experiment size manageable; we had no specific prediction about how they should interact with negation. In the experiment reported in Section 3.2, we replicate this experiment, but include also the doxastic factives, as well as a larger set of predicates of each class.

saw each verb twice, once in the negative and once in the positive polarity (with different contents for the interlocutors and embedded clauses). Since there were three verbs per verb class, each participant saw each predicate type six times (three positive and three negative).

We also included baseline floor and ceiling conditions for discourse-old vs. new status, as illustrated in (14).¹² There were eight items of each kind.

(14) Control conditions:

- a. Discourse-new baseline (predict high ratings):

Guess what! Joel left his wife.

- b. Discourse-old baseline (predict low ratings):

Guess what! John thinks, like you do, that Joel left his wife.

Additionally, the experiment included eight pure fillers, involving conditionals (15). For these, the participants rated the likelihood of the proposition in the antecedent being old vs. new (here, that Nadine traveled to Asia).

(15) *Guess what! I just ran into Lisa, and she said that if Nadine traveled to Asia, then she must have lots of interesting stories to tell.*

Importantly, the “Guess what” experiment was run in English rather than Swedish with translations of the original predicates. Because of this, we remove any potential lexically-specific confounds present between acceptability judgements in English and rates of V2 in Swedish; the only properties shared between translations are abstract semantic ones rather than Swedish-specific distributional information (frequency, rates of V2, etc.). This was to ensure that the link between the judgments for discourse novelty and the rates of embedded V2 is not attributable to something like learned co-variation.¹³ Empirical support

¹²A reader may wonder whether participants' judgements of acceptability might influence their behaviour in the experiment, thus creating a confound in the data. In the experiment in Section 3.2, we test the same items both for acceptability and for discourse novelty, as well as for speaker and attitude holder commitment to p. The results from this study both replicates the current findings (for English, Swedish, and German), and show us that participants' judgments of acceptability do not influence their judgments of interpretation.

¹³Thanks Spencer Caplan for this point.

showing that these (classes of) verbs in English and Swedish share these abstract semantic-pragmatic properties, comes from the experimental results reported in Section 3.2.6.1: this study replicates the findings of the current experiment in English, Swedish and German.

The experiment was implemented in `Ibex`, and took 10-15 minutes to complete.¹⁴

3.1.6.1.2 Participants

56 undergraduate students, recruited through the University of Pennsylvania’s Psychology Department’s subject pool (SONA), participated in the study for course credit. They were given a link to the experiment to take it online in their own time. Based on responses in the control conditions, we excluded the responses from five participants who appeared to have reversed the scale, leaving us with the responses from 51 participants.

3.1.6.1.3 Analysis

The data was analysed in R (version 3.5.0). To test our predictions, we carried out a regression by fitting a linear mixed effects model, using the `lmer` function from the `lme4` package. The package `lmerTest` was used to generate p-values. The dependent variable was the perceived likelihood of p being new information. The model included Predicate Type, Polarity type, and their interaction (base levels: predicate type=Speech Act; polarity=Positive) as fixed effects. It also included a random intercept for participant and item.

We also ran a model predicting the responses from the individual predicates (Verb Lemma). The conditional fillers (15) were excluded from the analysis.

To identify outliers we created two sets of subjects based on their responses in the two control conditions (14): (a) subjects whose average response was more than one standard deviation below the mean in the discourse-new condition, and (b) subjects whose average response was more than one standard deviation above the mean in the discourse-old condition. We then took the intersection of the two sets, thus giving us only the participants who were outliers for *both* control conditions (n=5). Thus, the subjects that we excluded from

¹⁴An archived version of the experiment is available at: <http://spellout.net/ibexexps/SchwarzLab/DiscFamArchive/experiment.html?id=archive>.

the analysis were those who deviated from the mean by more than one standard deviation in the ‘unexpected’ directions for the two control conditions. To compare the data with and without the outliers, we used `r.squaredGLMM()` from the *MuMin* package, to calculate the (marginal and conditional) R squared values for a model with the full data set ($n=56$), and the subsetted data set ($n=51$), to determine how well the model fits the data. R squared is a statistical measure of how close the data are to the fitted regression line ($R^2 = \text{Explained variation} / \text{Total variation}$). The data was plotted using `ggplot` from the *ggplot2* package; error bars represent the standard error of the mean.

3.1.6.1.4 Predictions

We predict that matrix negation will interact with predicate type, such that the speech act predicates and the doxastic non-factives receive significantly higher ratings in the positive than in the negated condition. We predict that the response predicates and the emotive factives should receive low ratings in both polarity conditions.

3.1.6.2 Results

Figures 3.5–3.6 show the responses for the critical items and the two control conditions (14) (the responses for the conditional fillers (15) are not included).

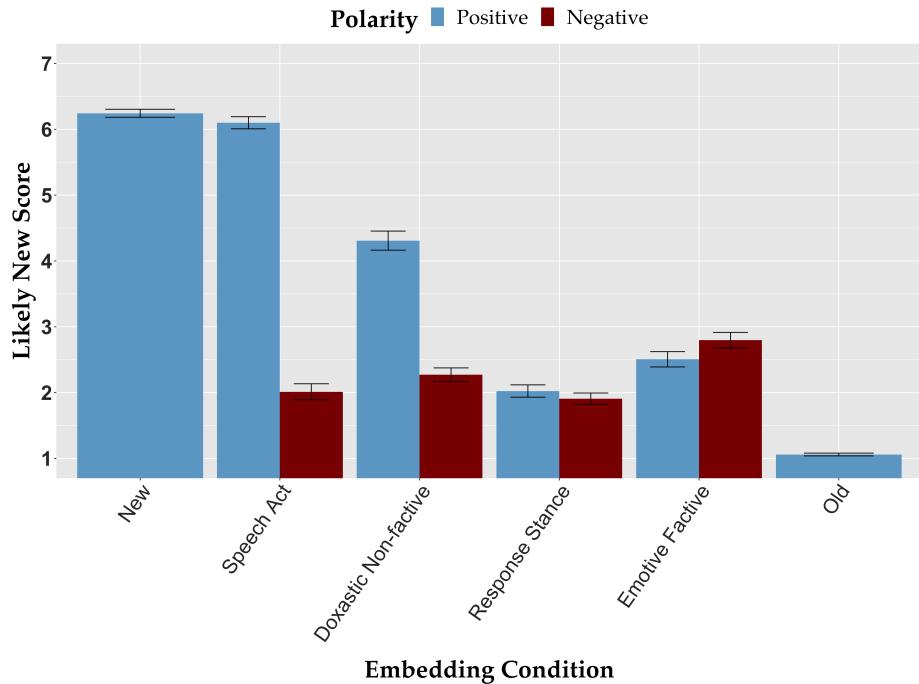


Figure 3.5: Response patterns by embedding predicate type and polarity (critical and control conditions). The blue horizontal line shows the overall mean.

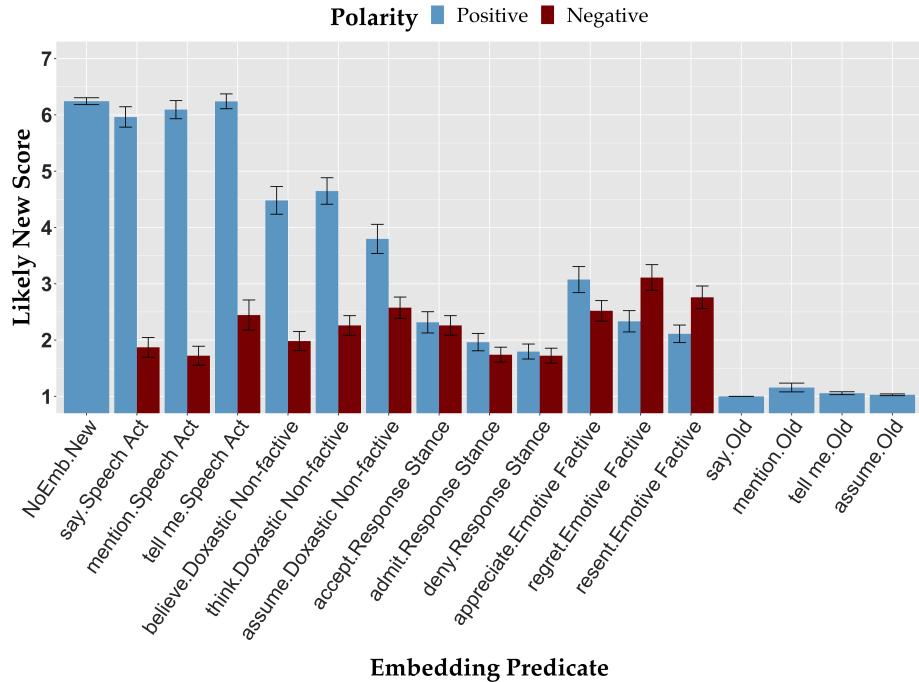


Figure 3.6: Response patterns by embedding verb and polarity (critical and control conditions). The blue horizontal line shows the overall mean.

The R squared values for the data with and without the outliers are given in Table 3.2. As expected, we find that with the subsetted data (without the outliers) the model fits the data better than with the full data set. This is true both for the models based on predicate type and verb lemma. We also observe that for none of the models is there a big difference between the conditional and the marginal R squared values, showing us that most of the variation in the data is explained by the fixed effects.

Data	Marginal R ²	Conditional R ²
Predicate Type: With outliers (n=56)	0.67	0.71
Predicate Type: Without outliers (n=51)	0.71	0.75
Verb Lemma: With outliers (n=56)	0.61	0.65
Verb Lemma: Without outliers (n=51)	0.72	0.75

Table 3.2: R squared values for the data set with and without outliers. Marginal R squared values consider only the fixed effects; the conditional R squared values consider both the fixed and the random effects.

The linear mixed effects model (based on predicate type, without outliers, n=51) shows a main effect of predicate type. Relative to the intercept (6.0920; this is the mean of the dependent variable for the two base levels: predicate type=Speech Act and polarity=positive), the model shows that the following conditions are significantly different (p's < 0.001) (the numbers represent the model estimated difference relative to the base levels): Doxastic Non-factive ($\beta = -1.7744$); Response ($\beta = -4.1227$), Emotive Factive ($\beta = -3.5806$), old information controls ($\beta = -5.0297$), and polarity ($\beta = -4.0726$, p < 0.001). The new information controls did not differ significantly from the base levels ($\beta = 0.1532$, p = 0.361).

Additionally, the model shows the following significant interactions (p's < 0.001): the difference between the positive and the negative polarity is greater for the Speech Act predicates than for the other predicate types; Doxastic Non-factives ($\beta = 2.0267$), Response ($\beta = 3.9924$), and Emotive Factives ($\beta = 4.3679$). Given the fixed effect of polarity we just observed ($\beta = -4.0726$, p < 0.001), this means that the difference between the two polarity conditions for the Doxastic Non-factives is about half the size of that for the Speech Act predicates, whereas for the Response predicates and Emotive factives, there is essentially no difference between the two polarities: in these conditions, the effect of negation is close to zero. (In fact, the Emotive Factives appear to show a small difference in the opposite direction from the other conditions.)

These results then are precisely what we predicted (Section 3.1.6.1.4). Additionally, the

difference between the Speech Act and Non-factive Doxastic predicates is in line with the observation that the Speech Act predicates show the overall highest levels of V2.

3.1.7 Testing our predictions: negation interaction

Having confirmed that matrix negation independently impacts the interpretation of the embedded proposition as discourse-old vs. -new information, for the Speech Act predicates and the Doxastic Non-factives, we were able to test our prediction that the rates of V2 in the corpus should be notably lower for the negated Speech Act and Doxastic Non-factive predicates, than for their non-negated counterparts. As shown in Figure 3.7, this prediction was borne out. This effect was confirmed by a Wilcoxon Rank Sum test ($W = 749$, $p=0.007677$), and holds across all corpora we looked at.

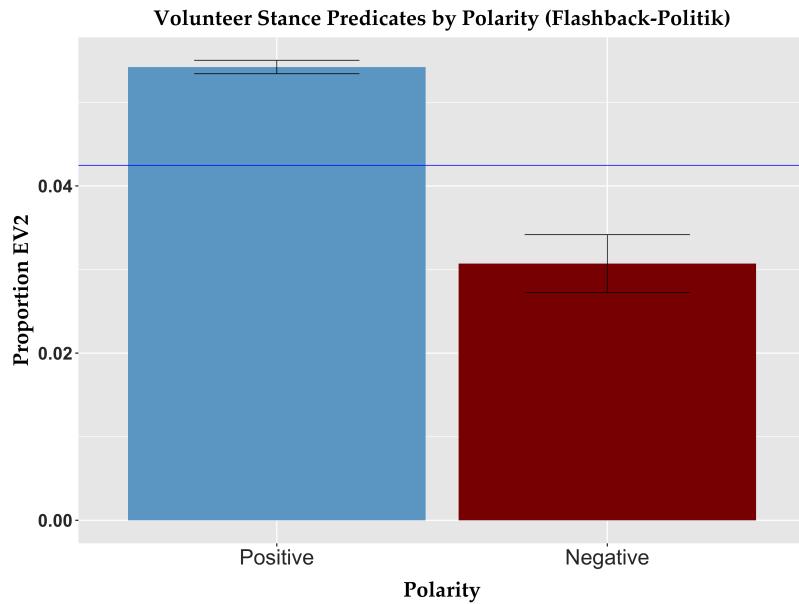


Figure 3.7: Rates of V2 with the speech act predicates and the doxastic non-factives under negative and positive polarity.

Importantly, this was not due to a main effect of negation, but reflects specifically the interaction of negation and the speech act and non-factive doxastic predicates, as predicted from the experimental results in Section 3.1.6. We also predicted that negation should not significantly impact the rates of V2 for the Response stance predicates and the Emotive

factuals, as is borne out in Figure 3.8. This (lack of) effect was confirmed by a Wilcoxon Rank Sum test ($W = 133$, $p\text{-value} = 0.7322$).

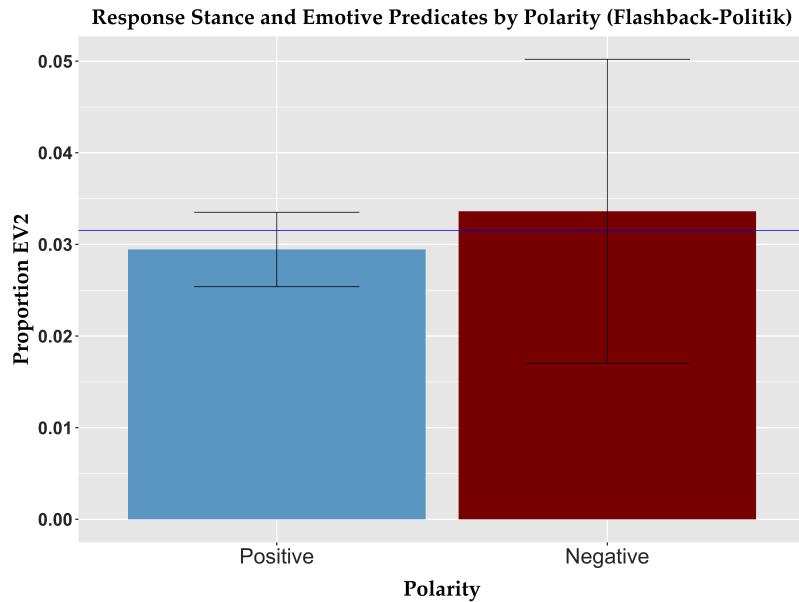


Figure 3.8: Rates of V2 with the response stance predicates and emotive factives under negative and positive polarity.

On the account discussed in Section 2.4, that takes V2 to be licensed by a context that entails speaker or attitude holder belief that p , we predict an asymmetry between the positive and the negative response stance verbs (e.g. *accept* and *admit* vs. *doubt* and *deny*), as well as an interaction with negation. In particular, this hypothesis predicts: (i) that V2 should be possible under the positive, but not the negative response predicates; and (ii) that the *negated* positive response predicates should show lower rates of V2 than the non-negated ones, and vice versa for the negative response predicates. Looking at the rates of V2 under the response predicates in the BRF corpus, we observe no clear difference between the positive and the negative response predicates. A Wilcoxon Rank Sum test shows no significant difference in V2 under negated vs. positive response stance verbs ($W = 13$, $p\text{-value} = 0.4396$). This supports the view whereby V2 is licensed in contexts where p is treated as discourse new information. Further evidence for this conclusion comes from the experimental results in Section 3.2.

3.1.8 Summary

The findings presented here are clearly problematic for a selection-based account of embedded V2. The results also show clearly that factivity is not relevant for the distribution of embedded V2. Rather, the results suggested that V2 is licensed in contexts where the embedded proposition constitutes discourse new information. Importantly, this is a pragmatic property of an utterance in context — constrained, but not determined, by the lexical semantics of the matrix predicate. Other factors that play a role include the pragmatic context of the utterance, as well as other grammatical properties of the sentence. Here, we investigated the effect of one such factor, namely matrix negation, and showed that certain predicates interact with negation in a way that constrains the potential discourse-status of a sentence. These results then made novel predictions regarding the distribution of embedded V2 in the corpus, which we showed were borne out. Note that while we only looked at the interaction with negation, the naturally occurring sentences in (9), from the BRF corpus, suggest that negation is only one potentially relevant grammatical factor.¹⁵

An open issue is whether the observation that Swedish embedded V2 is licensed by discourse novelty can be extended to other MCP in a wider range of languages, For even to V2 in other languages. Given the range of empirical and theoretical claims seen in Chapter 2, it is far from clear that this should be the case. Recall for instance Bianchi and Frascarelli's (2009) examples in (33), repeated here, suggesting that English topicalization is available both under emotive factives and under negated speech act verbs:

- (16) Bianchi and Frascarelli (2009, p. 69)

- a. I am glad that [this unrewarding job], she has finally decided to give up.
- b. Mary didn't tell us that Bill she had fired, and John she had decided to promote.

¹⁵In addition to the effect of discourse novelty, we also observed that the rates of V2 are graded by formality, such that rates of V2 are much lower in written, formal contexts. This replicates results from Heycock and Wallenberg (2013), and is in line with the observation that (at least in Swedish) there exists a prescriptive bias against V2. Given the rates of V2 found in the Danish corpus-study by Jensen and Christensen (2013), the overall low rates of V2 in our corpus data were somewhat surprising. We leave this a question for future work to investigate.

It is also worth noting that some of the proposals discussed in Chapter 2 invoke discourse novelty as a condition alongside other pragmatic effects: On the account of Woods (2016a), for instance, the main driving force of embedded V2 was speaker commitment to the embedded proposition, whereas on the CP/DP Interface Hypothesis, discourse novelty was taken to depend on factivity. While the latter claim was clearly not borne out by the Swedish corpus data, it might nevertheless be the case that factivity is relevant to other MCP, such as topicalization. Similarly, with most predicates, the predictions of discourse novelty and speaker commitment are difficult to tease apart. While the Swedish data was more line with the former hypothesis, it will be helpful to substantiate our findings against experimental data, to further differentiate between these possibilities.

The experiments reported in Section 3.2 will also allow us to address these issues, and to address a number of other empirical questions identified in Chapter 2, summarized in (113)–(116) of that chapter and repeated here:

(17) **What dimension of assertion is relevant to the syntax:**

- a. Speaker commitment to p?
- b. Attitude holder commitment to p?
- c. The status of p as ‘old’ vs. ‘new’ information?

(18) **What is the role of the embedding predicate:**

- a. To what extent do different verbs encode the pragmatic dimensions in (113)?
- b. Are MCP/assertion-compatible clauses lexically selected for?
- c. Are the properties of verbs like *think*, *say*, *doubt*, *regret*, and *know* reflective of more general features of larger classes of predicates?
- d. What, if any, is the role of factivity?

(19) **Is there variation:**

- a. Across languages (e.g. Mainland Scandinavian, German, English)?
- b. Between different MCP (e.g. embedded V2, topicalization, speech act adverbs,

- embedded inverted questions)?
- c. Among speakers?
- (20) Are conflicting judgement due not controlling for elements of the context?

3.2 MCP across languages: new experimental data

The core aim of this section is to address the questions in (17)–(20). As we saw in Chapter 2, many of the theoretical accounts we looked at use *distributional* data —observations about the availability of MCP under different predicates or predicate types— as the basis for claims about the *pragmatic* licensing conditions of different MCP. However, as we also observed, it is far from clear (a) what pragmatic properties are in fact associated with different verbs, and (b) which of those properties are in fact relevant to the availability of MCP.¹⁶

Using distributional data as a ‘proxy’ for discourse pragmatics is not necessarily in itself a big problem in itself. Empirically, however, it becomes problematic as a basis for theoretical analysis, given that: (a) theoretical claims are often based on sparsely selected observations, involving a small set of verbs and sentences (e.g. *say*, *think*, *know*, and *regret*); and (b) in a lot of these cases, different accounts end up making exactly the same predictions. The negated speech act and doxastic non-factive verbs (e.g. *not say*, *not believe*), discussed in the previous section, is a case in point: do they disallow embedded V2 (and other MCP?) because they negate the speaker’s (or attitude holder’s) commitment to p, or because they require p to be a given issue in the discourse?

Fortunately, there are contexts where the predictions of these accounts come apart, for instance in the case of the positive and negative response stance verbs (e.g. *accept/admit* vs. *doubt/deny*), as mentioned in the previous section, or in the case of negated and non-negated doxastic and emotive factives (e.g. *not appreciate*, *not discover*). To disentangle these accounts, the current experiment therefore looks at the availability of MCP across a wider set of lexical contexts (20 verbs from the five verb classes discussed above).

As we noted above, however, while *believe* clearly entails the attitude holder’s belief that

¹⁶See Djärv (2019) for a more condensed version of the experiments reported in this section.

p, it is less clear to what extent this holds of other “assertive” predicates (e.g. *say*, *tell*, *claim*, *assume*, *guess*, *imagine*, etc.). To tease apart lexical and pragmatic accounts, therefore, the current experiment further derives independent, empirically motivated estimates of the pragmatic dimensions at stake, for each verb (class)–polarity combination, and use those as independent predictors of different MCP; enabling us to address questions (17)–(18).

Recall the accounts discussed in Chapter 2. Regarding the role of the embedding verb, we identified the following two proposals taking the availability of MCP to be predicted by the lexical class of the embedding attitude verb (the labels and short-hands introduced will be used throughout this chapter to refer to these proposals):

- (21) **Lexical Class à la Hooper and Thompson (1973)** [Lex-HT]
- ✓ {Speech act, Doxastic non-factives, Doxastic factives}
 - ✗ {Response verbs, Emotive factives}
- (Hooper and Thompson 1973 for MCP in general; Wiklund et al. 2009 for Mainland Scandinavian embedded V2¹⁷)
- (22) **Lexical Class à la The CP/DP Interface Hypothesis** [Lex-CP/DP]
- ✓ {Speech act, Doxastic non-factives}
 - ✗ {Response verbs, Emotive factives, Doxastic factives}
- (Kastner 2015, Haegeman and Ürögdi 2010, De Cuba and Ürögdi 2009, Haegeman 2009, 2012, 2014, De Cuba 2017a,b, a.o., for MCP in general)

We also identified the following accounts, taking the availability of the different types of MCP to be predicted by pragmatic factors.

- (23) **Speaker believes p** [Prag-Sp]
- (Wiklund 2010 for Mainland Scandinavian V2 and speech act adverbs)
- (24) **Speaker believes p & p is new information** [Prag-Sp-New]
- (Woods 2016a for German V2)

¹⁷See also Djärv, Heycock, and Rohde (2017).

- (25) **Speaker or attitude holder [AH] believes p** [Prag-SpAH]
 (Truckenbrodt 2006 for German V2; Julien 2015 for Mainland Scandinavian V2;
 Woods 2016a for speech act adverbs)
- (26) **Speaker or AH believes p & p is new information** [Prag-SpAH-New]
 (Woods 2016a for Mainland Scandinavian V2)

To this we add the pragmatic account of Caplan and Djärv (2019), outlined in Section 3.1:¹⁸

- (27) **p is discourse new information** [Prag-New]
 (Caplan and Djärv 2019 for Swedish V2)

Testing these hypotheses will be the central aim of the current experiment. To get at the question of whether there is variation along various dimensions (19), the experiment collects comparable data from four MCP (speech act adverbs, embedded V2, topicalization, scene setting adverbs) in three languages (English, German, Swedish). This allows us to test for variation in a given language across different MCP, as well as for variation for a particular type of MCP across languages. The experimental method further allows us to control for any effects of contextual factors (20).

The present experiment also allows us to ask the more open-ended question of whether there is in fact a coherent class of MCP, such that there is some set of constructions that all share a particular distributional pattern or some set of pragmatic licensing conditions.

This section is structured as follows: Section 3.2.1.1 describes the languages and MCP investigated, and Section 3.2.1.2 the pragmatic and lexical variations; Section 3.2.2 describes the controls and fillers used; Section 3.2.3 describes the participants in the study; Section 3.2.4 describes the process of trimming the data; Section 3.2.5 details the statistical analysis of the data; Section 3.2.7 looks at the question of inter-speaker variation; Section 3.2.6 states the results of this study; and Section 3.2.8 summarizes this section.

¹⁸See also Gärtner and Michaelis (2010) on German V2; Section 2.4.1.1.

3.2.1 Experimental variations

3.2.1.1 Language and MCP-type

The experiment investigated four MCP in three languages, as shown in Table 3.3. Each language and MCP-condition was varied between participants.

Types of MCP	Ex.	Languages		
		English	German	Swedish
Speech act adverbs	(30)	English	German	Swedish
Topicalization (Object DP)	(31)	English	—	—
Scene Setting Adverbs	(32)	English	—	—
Embedded V2	(29)	—	German	Swedish
Unmarked Control Sentences	(28)	English	German	Swedish

Table 3.3: Languages and MCP varied in the experiment.

In addition to the MCP-manipulations, each item also occurred in an unmarked condition (28), which served as a (ceiling) baseline for the acceptability of each of the sentences used, independently of any MCP-manipulation. This is important, since while the consensus among linguists that a sentence like *John doubts that Mary and Bill broke up* is grammatical, this does not mean that naive participants in an experiment will judge such sentences to be as acceptable or natural as *John thinks that Mary and Bill broke up*. Thus, including unmarked versions of each sentence, provides a baseline relative to which we can measure the effect of the MCP variation, independently of the effect of the embedding predicate, or the particular choice of embedded clause.

As discussed in Section 3.1.1, V2 in Swedish is diagnosed using the order of the finite verb and negation. In German, the V2-manipulation is achieved by varying the order of the finite verb with respect to its complement:

- (28) Unmarked (English, German, Swedish)

- a. Anna said that Lisa got fired. Eng

- b. Anna hat gesagt, dass Lisa gefeuert **wurde**.
 Anna has said that Lisa fired was
 ‘Anna said that Lisa got fired.’ Ger
- c. Anna sa att Lisa inte **har** fått sparken.
 Anna said that Lisa not has got fired
 ‘Anna said that Lisa didn’t get fired.’ Sw
- (29) Verb Second (German, Swedish)
- a. Anna hat gesagt Lisa **wurde** gefeuert.
 Anna has said Lisa was fired
 ‘Anna said that Lisa got fired.’ Ger
- b. Anna sa att Lisa **har** inte fått sparken.
 Anna said that Lisa has not got fired
 ‘Anna said that Lisa didn’t get fired.’ Sw
- (30) Speech Act Adverbs (English, German, Swedish)
- a. Anna said that Lisa **honestly** got fired.
- b. Anna hat gesagt, dass Lisa **offen gestanden** gefeuert wurde.
 Anna has said that Lisa frankly.said fired was
 ‘Anna said that Lisa, to be frank, got fired.’ Ger
- c. Anna sa att Lisa **ärligt talat** fått sparken.
 Anna said that Lisa honestly speaking got fired
 ‘Anna said that Lisa, to be frank, got fired.’ Sw
- (31) Topicalization (English)
- Anna said that **the people he lived with**, Tom didn’t like. Eng
- (32) Scene Setting Adverbs (English)
- Anna said that **in college**, Tom didn’t like the people he lived with. Eng

A note is in order regarding the scene setting adverbs. As mentioned in Section 2.2.1, Haegeman claims that these are less restricted than other MCP like topicalization, despite being merged in the left-periphery, as illustrated in the following examples from English:¹⁹

¹⁹Haegeman also makes the same claim for Romance CLLD. However, Bianchi and Frascarelli (2009) argue from Italian that this generalization is in fact only partially correct, and that CLLD is possible in contexts not otherwise compatible with MCP (e.g. under verbs like *regret*), only to the extent that they

(33) Haegeman (2014, p. 190)

- a. John regrets that last week Mary did not turn up for the lecture.
- b. I resent the fact that last week Mary did not turn up for the lecture.

Recall, however, (33) from Bianchi and Frascarelli (2009), repeated here:

(34) Bianchi and Frascarelli (2009, p. 69)

- a. I am glad that [this unrewarding job], she has finally decided to give up.
- b. Mary didn't tell us that Bill she had fired, and John she had decided to promote.

If the judgements reported in (34) are indeed representative of English topicalization under emotive factives and negated speech act predicates, we shouldn't necessarily expect a difference between embedded topicalization and embedded scene setting adverbs: while they might both be somewhat marked compared to completely ‘unmarked’ sentences with no material in the left-periphery, they should not be sensitive to *specific* aspects of the lexical and pragmatic contexts. On the other hand, on a view where emotive factives simply do not select a complement with the appropriate kind of left-periphery (as in both Wiklund et al. 2009 and Kastner 2015), both constructions should be degraded here. Given the amount of disagreement found in the literature about the empirical facts, it seems reasonable to treat this as an open empirical question.

It should also be mentioned that the choice of constructions investigated across these different languages was partially constrained by practical considerations. To start, English does not have V2, which made it impossible to investigate. While both Swedish and German allow for Topicalization of a DP in object position and high Scene Setting Adverbs, such sentences are obligatorily V2, as we saw in Section 3.1.1, thus making it difficult to disentangle the impact of topicalization from that of V-to-C movement.

The current design, illustrated in Table 3.3, nevertheless has the advantage of allowing us

to instantiate “G(iven)-topics” (topics that pick up on referents already in the Common Ground). This then is unlike English (left-peripheral) topicalization (e.g. (31)), which is necessarily contrastive, and therefore (in their terms) “pertain to Common Ground management”. Contrastive CLLD topics in Romance are equally restricted in “non-root contexts”, i.e. contexts endowed with illocutionary force.

to compare both the distribution and licensing conditions of particular constructions across different languages (V2 in German and Swedish, and speech act adverbs in English, German, and Swedish), as well as the distribution and licensing conditions of different constructions within a particular language. Thus, the current study is able to address both the question of whether there is variation across different constructions, and whether there is variation among particular constructions across different languages.

To achieve the language manipulation, the embedded clauses were first constructed, in the unmarked condition, by the author in English, and subsequently translated to Swedish and German. The unmarked stimuli were then varied, for each language, in each of the MCP-variations. The materials were then checked for naturalness and typos, etc, by bilingual native speakers of English, German and Swedish, respectively.²⁰ The names of the attitude holder were also replaced in the different languages to seem more natural.

3.2.1.2 Pragmatic and lexical variations

The study collected judgements of acceptability for 20 sentences, which were varied between participants in each of the language and construction combinations outlined in Table 3.3. One item consisted of one sentence, which occurred in two conditions, corresponding to the presence or absence of matrix negation, as illustrated in (35).

(35) Example item

- a. John said that Lisa decided to break up with the guy she's been dating.
- b. John didn't say that Lisa decided to break up with the guy she's been dating.

In total, the critical items included 20 verbs from five classes of attitude verbs, with four verbs per class.²¹

As illustrated in (36)–(37), each verb occurred in exactly two items (i.e. with different

²⁰In the case of English, a set of small pilot studies were run online (on [Prolific.ac](#)) to minimize the variation in the unmarked items. In the case of Swedish, the translator was the author. The German stimuli were translated by Lukas Stein at the University of Tübingen and Astrid Gößwein at Goethe-Universität Frankfurt, and extensively checked by Florian Schwarz at the University of Pennsylvania. Melanie Hobich at Goethe-Universität Frankfurt, and Alex Göbel at the University of Massachusetts at Amherst also

Verb Class	English	German	Swedish
Speech Act Verbs (A)	<i>say</i> <i>mention</i> <i>tell me</i> <i>claim</i>	<i>sagen</i> <i>erwähnen</i> <i>mir erzählen</i> <i>behaupten</i>	<i>säga</i> <i>nämna</i> <i>berätta</i> <i>hävda</i>
Doxastic Non-factives (B)	<i>believe</i> <i>assume</i> <i>reckon</i> <i>guess/suppose</i>	<i>glauben</i> <i>annehmen</i> <i>meinen</i> <i>vermuten</i>	<i>tro</i> <i>anta</i> <i>förmoda</i> <i>gissa</i>
Response verbs (C)	<i>accept</i> <i>admit</i> <i>doubt</i> <i>deny</i>	<i>akzeptieren</i> <i>zugeben</i> <i>bezweifeln</i> <i>aleugnen</i>	<i>acceptera</i> <i>erkänna</i> <i>vivla</i> <i>förneka</i>
Emotive Factives (D)	<i>appreciate</i> <i>resent</i> <i>love</i> <i>hate</i>	<i>gefallen</i> <i>missfallen</i> <i>lieben</i> <i>hassen</i>	<i>uppskatta</i> <i>avsky</i> <i>älska</i> <i>hata</i>
Doxastic Factives (E)	<i>discover</i> <i>find out</i> <i>notice</i> <i>hear</i>	<i>entdecken</i> <i>herausfinden</i> <i>merken</i> <i>hören</i>	<i>upptäcka</i> <i>få veta</i> <i>märka</i> <i>få höra</i>

Table 3.4: Verbs and verb classes manipulated in the experiment. The letters in parenthesis represent the names assigned to each class in Hooper & Thompson's classic 1973-paper, and which are commonly used in the MCP literature as a short-hand for the different classes.

subjects and embedded clauses). To avoid effects specific to particular combinations of matrix negation and material in the embedded clause, the experiment used a Latin square design with two subject groups (Gr1, Gr2):

(36) Example Item 1

Gr1. John **said** that Lisa decided to break up with the guy she's been dating.

Gr2. John **didn't say** that Lisa decided to break up with the guy she's been dating.

(37) Example Item 2

Gr2. Mel **said** that Becky ignored the people at the party.

contributed helpful input and feedback to the German translations.

²¹*Guess* was used in the MAXCONTRAST condition, and *suppose* in the MAXNEWNESS condition. To the extent possible, the closest counterparts were chosen for each verb in the different language variations (aiming for similarities in entailments, presupposition, and conventional use).

Gr1. Mel **didn't say** that Becky ignored the people at the party.

In total, then, each participant saw 40 items involving 20 attitude verbs from the five predicate classes in Table 3.4. Because of the group-design, the participants saw each verb twice (with different contents), once with matrix negation, and once without.

The items were all presented in the same discourse context. The English study was carried out in two discourse conditions, varied between participants: one designed to promote an interpretation of the utterance as constituting a discourse new issue (MAXNEWNESS) (this was the set-up used in Caplan and Djärv 2019; see Section 3.1.6); and one designed to promote an interpretation of the utterance as containing contrastive information (MAXCONTRAST); this was partially to test the ‘pragmatic flexibility’ of the different predicates, given the discourse context. The MAXCONTRAST condition also served the purpose of promoting the licensing of English topicalization, which is known to be contrastive (e.g. Bianchi and Frascarelli (2009)). The MAXNEWNESS context on the other hand was designed to promote the kind of ‘discourse new’ context that we have argued is relevant to the licensing of V2. This allowed us to better tease apart any effects due to the predicate from the context manipulation. Due to limitations of resources (time, funds, participants), the Swedish and German experiments were only run in the MAXNEWNESS condition. The two discourse conditions are illustrated in 3.9 and 3.10, which show screen-shots from the two variants (in the Attitude Holder belief condition).

Imagine that you're at a party, and you overhear part of a conversation between your friends, Bill and Jack.

Jack says:

...however, Anne says that Lisa broke up with the guy she's been dating!

Figure 3.9: Discourse Condition 2: Maximize Contrast [MAXCONTRAST]

Two friends, **Bill** and **Jack**, run into each other.

Jack says:

*Guess what! I just talked to **Anne**, and she says that Lisa broke up with the guy she's been dating!*

Figure 3.10: Discourse Condition 2: Maximize Newness (MAXNEWNESS)

The participants' task was to rate the acceptability (naturalness) of the target sentences on a 9-point Likert Scale with the endpoints marked, as shown in Figure 3.11; a screenshot from the experiment instructions (from the English MAXCONTRAST condition).

Please read the instructions carefully before you continue!

In this experiment you will be presented with short scenarios, like those illustrated below:

Imagine that you're at a party, and you overhear part of a conversation between two of your friends:

...however, John said that Lisa decided to break up with the guy she's been dating!

You will then be asked to complete a statement, of the type illustrated below, about the sentence you just saw:

To me, this sentence sounds:

Completely unnatural **Completely natural**

Note that there is no right and no wrong answer. Simply choose the answer that you prefer.

Figure 3.11: Task Instructions (MAXCONTRAST)

For an independent, empirically motivated, measure of the pragmatic dimensions of interest (i.e. one that is not inferred by the researcher, based on the identity or class of the embedding predicate), the 40 critical items were independently tested in the unmarked control version for: speaker commitment to p; attitude holder [AH] commitment to p; likeli-

hood that p is discourse new. The manipulations are illustrated in Tables 3.12–3.14 (again, from the English MAXCONTRAST condition). As with the naturalness ratings, the judgements were given on a 9-point Likert Scale with the end/mid-points marked. The type of judgement was varied between participants, so that each participant only gave one type of judgement.

Imagine that you're at a party, and you overhear part of a conversation between your friends, **Sally** and **Rory**.

Rory says:

*... however, **Sophia** maintains that Tammy doesn't like the landlady.*

As far as **Sophia** is concerned, Tammy doesn't like the landlady.

No Yes
Maybe

Figure 3.12: Attitude holder belief, task Instructions (MAXCONTRAST)

Imagine that you're at a party, and you overhear part of a conversation between your friends, **Sally** and **Rory**.

Sally says:

... however, Sophia maintains that Tammy doesn't like the landlady.

As far as **Sally** is concerned, Tammy doesn't like the landlady.

No Yes
Maybe

Figure 3.13: Speaker belief, task Instructions (MAXCONTRAST)

Imagine that you're at a party, and you overhear part of a conversation between your friends, **Sally** and **Rory**.

Sally says:

... however, Sophia maintains that Tammy doesn't like the landlady.

It is likely **not likely**

that **Sally** and **Rory** have previously talked about Tammy not liking the landlady.

Figure 3.14: Discourse familiarity, task Instructions (MAXCONTRAST)

The reason for using the unmarked sentences here was to get an estimate of the pragmatic constraints placed on each target sentence, given its specific lexical content, including the attitude holder, the type of embedding verb, the presence or absence of matrix negation,

and the content of the embedded clause. If, given these different factors, the sentence got high scores on any of the pragmatic dimensions, and that dimension is in fact relevant to the licensing of a given type of MCP, then we predict that this MCP variation should receive high acceptability ratings, for that particular sentence.

3.2.2 Controls and fillers

In addition to the unmarked control sentences, mentioned in Section 3.2.1.1, the acceptability studies also included three control conditions:

(38) Control conditions

- a. 8 unembedded MCP sentences, providing a baseline for each type of MCP, independently of embedding (e.g. *The new neighbors, Lisa didn't like.*)
- b. 8 unembedded unmarked items, providing an overall ceiling for acceptability (e.g. *Lisa didn't like the new neighbors.*)
- c. 16 sentences involving 8 attitude verbs taking 'fact that p' complements, providing a floor for acceptability (e.g. *Bill thought the fact that Lisa didn't like the new neighbors.*)

The *fact that p* controls involved the following 8 attitude verbs:

(39) English/Swedish/German

- a. reply/svara/entgegnen
- b. affirm/bekräfta/bekräftigen
- c. express/uttrycka/äußert
- d. suppose/menar/meinen
- e. allege/anförde/behaaupten
- f. argue/argumenterar/argumentieren
- g. respond/reagera/erwidern
- h. think/tänka/denken

These items had all been confirmed by several native speakers to be generally ill-formed with *the fact that p* complements. The idea was that these items would still be relatively close to the degraded MCP-variations —both involving relatively weak semantic/pragmatic ill-formedness. This would prevent leading the participants to give the degraded MCP items ceiling ratings, by comparison — which would be a worry if strong syntactic violations were used as floor controls.

The pragmatic experiments included their own fillers and controls (40)–(42). Examples are given below each condition. These were relativized to the three different tasks (which are illustrated in Figures 3.12–3.14 above), such that each task had its own ceiling and floor condition (i.e. conditions designed to provide high and low ratings, respectively, for each type of pragmatic inference).²²

²²By mistake, the English MAXNEWNESS speaker belief experiment used the floor condition controls from the discourse familiarity experiments: (42-b), instead of (40-b). This variation then ended up without a proper floor condition for speaker belief.

(40) Speaker Belief Controls

- a. Ceiling: Unembedded sentences
“Scarlett really enjoyed the last concert.”
- b. Floor: Explicit denial of p (*believe, mention, tell me*, and *assume*)
“Peter believes, although he’s wrong, that Liam enjoyed the dinner.”

(41) Attitude Holder Belief Controls

- a. Ceiling: Embedding under *be sure, certain, convinced, confident*
“Allison is convinced that Ethan doesn’t like the people he works with.”
- b. Floor: Negated p followed + question about the attitude holder’s belief that p
“Scarlett assumes that Ben didn’t like the service.”

(42) Discourse Old/New Controls

- a. Ceiling: Unembedded sentences
“Scarlett really enjoyed the last concert.”
- b. Floor: Explicit reference to a previous discussion regarding p (*believe, mention, tell me*, and *assume*)
“Cole told me, like you did, that Martin insulted the visitors.”

Additionally, each of the pragmatic sub-experiments also included 8 fillers. These consisted of conditional sentences embedded under *believe, mention, tell me*, and *assume*, as illustrated in (43).

(43) Fillers: embedded conditionals (*believe, mention, tell me*, and *assume*)

“Kaylee believes that if Alyssa climbed Mount Everest, then she must be really fit.”

All experimental materials, including data sources, instructions, scripts used by **Ibex**, etc, are available for replication in a set of labeled repositories on <https://github.com/kajsaadjarv>.

3.2.3 Participants

In total, with the six types of judgements collected for Swedish and German respectively (three MCP variants and three pragmatic judgements), and the seven types of judgements collected for English (four MCP variants and three pragmatic judgements), in the two discourse conditions, we ended up with a total of 26 between-subject versions of the experiment.

A total of 1,272 participants took part in the study. The total number of participants for each between-subject condition, before and after exclusion, is listed in Table 3.5. In total, 117 participants were excluded from the data, leaving a total of 1,155 participants in the final data set for analyzing and plotting the data (details in Section 3.2.4, next).

The 845 English speaking participants were either recruited on [Prolific.ac](#), a crowd-sourcing tool for recruiting participants to participate in scientific studies online, or through Penn’s Psychology department’s subject pool (Sona). The latter group of participants were undergraduate students at the University of Pennsylvania, taking the experiment for credit. The study took approximately 15 minutes to complete. For the MAXNEWNESS sub-experiments, the responses for the MCP sub-experiments (unmarked controls, topicalization, scene setting adverbs, and speaker-oriented adverbs) came entirely from Prolific. For the discourse novelty and speaker belief sub-experiments, the responses came from Sona. For the attitude holder belief study however, responses came from one of three sources: Prolific ($n=26$), Sona ($n=20$), or the 2018 Ling001 summer class ($n=13$).²³ For all of the sub-experiments in the MAXCONTRAST condition, on the other hand, the responses came from a (roughly even) mixture of participants from Prolific and Sona. The participants taking the experiment via Proflic were paid at rate of 6.96 USD per hour for their participation.

285 German speaking participated in the study. The participants were recruited on Prolific. Participants were paid at rate of 6.80 USD per hour for their participation. 142 Swedish speakers participated in the study. Due to there being a limited number of Swedish speakers on Prolific, the participants were recruited through both Prolific and through various personal and professional contacts of the author: this was done through a combination

²³Thanks to Ava Irani, instructor of Ling001 for reaching out to these students.

of: (i) distributing a link to the experiment online, and (ii) setting up temporary labs at the Umeå Academy of Fine Arts and at the Umeå University Library, where participants were able to take the experiment directly on my computer.²⁴ The participants taking the experiment via Prolific were paid at rate of 6.80 USD per hour for their participation. Other participants took the experiment on a voluntary basis. Due to the difficulty in recruiting Swedish speakers remotely and over a relatively short period of time, the number of participants recruited for the Swedish versions of the experiment (see Table 3.5) was based on a power simulation, using pilot-data from 10 participants (using the `simr` package in R; Green and MacLeod 2016).²⁵

The experiments were implemented using `PennController` (Schwarz and Zehr 2018) on <http://spellout.net/ibexfarm/>. Thus, regardless of the recruitment method, each participant was given a link to the experiment to take the experiment over the internet. In the English MAXNEWNESS condition, counter-balancing participants across sub-experiments was done internally to `Ibex`, such that regardless of the version of the experiment they took, all participants had access to only one link on Prolific or Sona. This was a link to a so-called ‘Gateway-experiment’ on `Ibex`; essentially just a page with an internal counter that assigned participants to each of the six sub-experiments. However, as we can see in Table 3.5, this resulted in a slight imbalance in the number of subjects assigned to each sub-experiment. As a consequence, the English MAXCONTRAST version (which was run after the MAXNEWNESS experiments) listed each between-subject version as a separate experiment to better handle the counter-balancing (both within Sona and Prolific). This however, had the major disadvantage that it enabled participants on Prolific to take multiple sub-experiments. The German and Swedish versions, therefore, were run using the gateway

²⁴Thanks to Robert Djärv for letting me set up a temporary lab in the Umeå Academy of Fine Arts, as well as to all of the curious and welcoming students and staff for welcoming me and feeding me gingerbread and coffee! Thanks also to Susanne Sjöberg at the Umeå University Library for granting me access to the library for recruiting participants. Thanks also to Kicki Djärv, Amy Goodwin Davies, Anna-Sofia Lundgren (Department of Culture and Media Studies, Umeå University), Daniel Kjellander (Department of Language Studies, Umeå University), Elizabeth Coppock (Department of Philosophy, Linguistics, Theory of Science, University of Gothenburg), Christian Waldmann (Department of Swedish, Linnaeus University), Annika Nordlund (Department of Psychology, Umeå University), and Christiane Müller (Centre for Languages and Literature, Lund University) for sharing the link with their students, colleagues, and personal connections.

²⁵Thanks to Amy Goodwin Davies for this suggestion, and for help with the simulation.

method for counter-balancing.

Language	Measure	N pre-exclusion	N removed	N post-exclusion
English MAXNEW	Unm	55	6	49
	Top	63	5	58
	Scene.Adv	77	4	73
	SpAct.Adv	50	7	43
	AHbel	61	2	59
	SpBel	61	1	60
	DiscNew	61	6	55
	Total N	428	31	397
English MAXCONTR	Unm	56	4	52
	Top	62	16	46
	Scene.Adv	62	7	55
	SpAct.Adv	58	4	54
	AHbel	53	3	50
	SpBel	61	4	57
	DiscNew	65	10	55
	Total N	417	48	369
German	Unm	48	1	47
	SpAct.Adv	50	2	48
	V2	44	3	41
	AHbel	51	0	51
	SpBel	47	1	46
	DiscNew	45	5	40
	Total N	285	12	273
Swedish	Unm	34	5	29
	SpAct.Adv	20	7	13
	V2	33	12	21
	AHbel	14	0	14
	SpBel	24	1	23
	DiscNew	17	1	16
	Grand Total N	142	26	116
	Total N	1,272	117	1,155

Table 3.5: Number of participants, and outliers removed, by sub-experiment.

3.2.4 Trimming and organizing the data

3.2.4.1 Data trimming

As a first step of processing the data, the participants' responses were transformed into z-scores. This transformation involves the following steps. For each participant, we first calculate the mean and standard deviation of each their judgements. We next subtract each of that participant's judgements from their mean, and then divide each of these differences by their standard deviation. The resulting set of (z-scored) responses represent the standardized responses for each participant, such that the responses are now expressed in standard deviation units from each participant's mean. This is a linear transformation, meaning that all the relationships that existed within the original data are preserved. This was done in R using the functions `ave()` (for group wise application) and `scale()` for calculating z-scores.

There are two main motivations for z-scoring the data. First, this transformation allows us to eliminate potential scale bias, i.e. when different participants use the response scale in different ways; this can involve using only one end of the scale ("skew") or using only a limited range of responses ("compression"). Second, it normalizes the data, which allows us to run parametric statistical tests (such as linear mixed effects models, see Section 3.2.5), which are generally more powerful than non-parametric tests (see discussion in Schütze and Sprouse 2014, 18).

As a second step of processing the data, for each sub-experiment, participants were excluded from further analysis if they were unable to sufficiently distinguish between the floor and ceiling control conditions. This was done in R by creating a new data set from each of the larger ones, with one row corresponding to one participant (identified via their Subject ID), their average z-score in the ceiling condition (MEANCEILING), their average z-score in the floor condition (MEANFLOOR), as well as the difference between these two (MEANCEILING-MEANFLOOR). From this, I created a set of outliers, consisting of all participants for whom this "difference z-score" was less or equal to 0.5. These participants were then removed from the original data sets. Here, having z-scored the data came in as a further benefit, since the

effect size was generally much larger in the pragmatic interpretation experiments, than in the MCP acceptability experiments. Using the raw scores for subject-trimming would've forced me to use different ‘floor-ceiling differences’ for different sub-experiments. Using z-scores, on the other hand, allows for consistent exclusion criteria across studies.

Additionally, there were a number of participants who took the experiment multiple times. For each of these participants, only their first submission was included in the analysis. Subsequent submission were all excluded in R, using the combination of participant ID, time stamp, and IP number.

3.2.4.2 Organizing the data

Recall the theoretical proposals regarding the lexical and pragmatic licensing conditions on MCP, summarized in (21)–(27) in Section 3.2 and repeated here:

Lexical accounts of MCP licensing:

- (44) a. Lexical Class à la Hooper and Thompson (1973) [Lex-HT]
 ✓ {Speech act, Doxastic non-factives, Doxastic factives}
 ✗ {Response verbs, Emotive factives}
- b. Lexical Class à la The CP/DP Interface Hypothesis [Lex-CP/DP]
 ✓ {Speech act, Doxastic non-factives}
 ✗ {Response verbs, Emotive factives, Doxastic factives}

Pragmatic accounts of MCP licensing:

- (45) a. Speaker believes p [Prag-Sp]
 b. Speaker believes p & p is new information [Prag-Sp-New]
 c. Speaker or attitude holder [AH] believes p [Prag-SpAH]
 d. Speaker or AH believes p & p is new information [Prag-SpAH-New]
 e. p is discourse new information [Prag-New]

To test these hypotheses, the data was further coded (in R). First, to test the effect of commitment to p against that of discourse familiarity, the response verbs were split into two sub-groups: positive (*accept*, *admit*) and negative (*doubt*, *deny*). By hypothesis, these should differ in term of attitude holder commitment to p, but should both require discourse novelty. Second, to test the views in (44-a) and (44-b), two new variables were created representing these classifications. For each of these two variables, each verb was assigned one of the two levels {1,0}, as illustrated below:

(46) Lex-HT (44-a)

- 1: Speech act, Doxastic non-factives, Doxastic factives
- 0: Response verbs, Emotive factives

(47) Lex-CP/DP (44-b)

- 0: Speech act, Doxastic non-factives
- 1: Response verbs, Emotive factives, Doxastic factives

To test the different pragmatic hypotheses (45-a)–(45-e), two steps were taken. First, for each of the data frames with the pragmatic scores, new data sets were created, that took the mean z-scores across all participants in each sub-experiment, by verb and polarity. This was done using the *ddply()* function in the *dplyr* package in R. This gave us a new variable for each pragmatic dimension (discourse novelty [z.NEW], speaker commitment to p [z.SP], attitude holder commitment to p [z.AH]), directly reflecting the pragmatic scores in each verb (class)-polarity combination in the data. In order to use these scores in our models to predict the availability of a given type of MCP, the new variables were joined to the different data sets with the MCP-acceptability judgements (by verb and polarity), using the *join()* function in R.

The idea behind doing it this way, was to abstract away from any variation between the two items in which a given verb-polarity combination occurred, as in (36)–(37) above, thus getting a directly empirically motivated estimate of the pragmatic properties of that

specific verb-polarity combination, e.g. *didn't say*. As we will see when we look at the results in Section 3.2.6.3, however, these different variables ended up predicting only a very small amount of the variation in the data predicted by the different models. To see this, and how it compares with the ‘better’ models based on verb (class) and polarity, the reader may consult the (marginal and conditional) R squared values listed (for each regression model) for each MCP in Section 3.2.6.3. R squared is a statistical measure of how close the data are to the fitted regression line (i.e. how well the model fits the data), and was calculated using the *r.squaredGLMM()* function from the **MuMIn** package in R.

While this might at first glance seem discouraging for the project of using the pragmatic scores as predictors of the MCP-acceptability judgements, there are a number of practical or methodological reasons why this method didn’t work that are not due to the predictive power of the various pragmatic dimensions per se.²⁶ The first thing to bear in mind is that while the aggregate data over the sampled population comes out displaying a clear pattern at the level of the different conditions, there might still be substantial individual differences among participants, either in the judgements themselves, or in how the participants use the various scales. The problem with this method, is that it is using by-condition population average interpretation scores —itself a dependent variable— to predict specific individual by-participant, by-item, scores. Adding to this problem is the fact that the two measures came from different groups of participants, thus making it hard to control for and eliminate potential scale bias (as discussed in Section 3.2.4.1). The latter problem is also tied to the methodological choice of using a likert scale (here, transformed to z-scores), rather than a binary (or ternary) choice. The (transformed) likert scale assumes that judgements of acceptability and discourse status/commitment to p are continuous or gradient; and that if there is a correlation, gradient judgements for the one dimension should directly track gradient judgements for the other. However, this assumption may not be true: it is possible that reaching a certain level or threshold of a particular pragmatic dimension is what ‘switches the trigger’ for licensing a given type of complement. Not knowing what

²⁶Thanks to Meredith Tamminga, p.c., for helpful input on this issue.

that threshold might be was a large part of the motivation for the likert scale; however, with the results from the current study (Section 3.2.6), future quantitative work on the topic can make more informed methodological choices in this regards. For transparency and completeness, Section 3.2.6 reports the (marginal and conditional) R squared values for these models. For evaluating the different theoretical accounts, however, the method adopted will follow the reasoning standardly used in theoretical linguistics (and in previous literature on the pragmatics of MCP): if a given condition shows high ratings for a given pragmatic dimension, and some MCP is in fact licensed by that pragmatic dimension, then we expect high acceptability scores for that MCP in that condition. Conversely, if a condition shows low acceptability scores for some pragmatic dimension, then we expect low acceptability scores for that MCP in that condition.

Recall from Section 2.4.2 that Woods (2016a) claims that the contexts that license V2 in German are a subset of those that license V2 in Mainland Scandinavian: (45-b) vs. (45-d). The prediction then, should be that German embedded V2 is more restricted than embedded V2 in Mainland Scandinavian. However, this prediction really depends on the distribution of meanings across embedding predicates. And in fact, this is the case for all of the conjunctive and disjunctive hypotheses in (45-b)–(45-d). To see what I mean, imagine that we have two languages: $L1_{Ger}$ and $L2_{MSc}$, which both have (the same) 3 attitude verbs: AV1, which implies only speaker but not attitude holder belief that p; AV2, which implies only attitude holder but not speaker belief that p; and AV3, which implies speaker *and* attitude holder belief that p. Suppose that in $L1_{Ger}$, operation Ω is licensed by speaker belief only, whereas in $L2_{MSc}$, Ω is licensed by either speaker or attitude holder belief. In this scenario, it is clear that $L2_{MSc}$ will allow Ω in a wider set of contexts than $L1_{Ger}$: under 3/3 attitude verbs ($L2_{MSc}$: AV1, AV2, AV3) as opposed to under 2/3 ($L1_{Ger}$: AV1, AV3).

Clearly there are at least some verbs like AV1 in natural language: given that doxastic factives presuppose speaker commitment, but encode attitude holder commitment to p as part of their asserted meaning, negated doxastic factives (like *doesn't know* or *didn't discover*) will come out as expressing only speaker but not attitude holder belief that p. I cannot think

of a case, however, that obviously works like AV2 (implying attitude holder belief that p but not speaker belief that p). If this is indeed the case, then German and Mainland Scandinavian will simply end up allowing V2 in all of the same contexts, given that every context where the speaker is committed to p is one where the speaker or the attitude holder is committed to p.^{27,28} As we will see in Section 3.2.6.1, this turns out to be the case in our data. That is, the contexts that imply speaker or attitude holder commitment to p are exactly the same as those that imply speaker commitment to p. We find the same results with discourse novelty alone (45-e) vs. the statements that appeal to some other factor in addition to discourse novelty; (45-b) and (45-d). Hence, the remainder of this section will deal only with the pragmatic hypotheses in (45-a) [Prag-Sp: speaker believes p] and (45-e) [Prag-New: p is discourse new information].²⁹

A final step was taken in organizing the data. To account for any variation in the items or across conditions that was not due to the MCP-manipulation, the data was residualized.³⁰ Practically, this involved running a simple linear model, predicting the responses for each types of MCP from those in the unmarked control condition (recall that the only difference between these conditions was the MCP manipulation³¹). The residuals from the model (i.e. any variation not captured by the variation in the unmarked control version) were then bound to the data frames and used as the new dependent variables (for each MCP).

This was motivated by the observation that there was quite a lot of variation in the unmarked data, as an effect of both item, type of embedding verb, and polarity. This is illustrated in Figures 3.15–3.17, showing the results from the unmarked control conditions

²⁷This follows from the logical inference known as Disjunction Introduction, which states that if P is true, then P or Q must be true: $P \rightarrow (P \vee Q)$.

²⁸Of course, since verbs like *believe* are non-factive, it is possible to construe such a context pragmatically (*John believes that p, but I don't*). The prediction would then be that V2 is possible in those contexts in MSc, but not in German. However, without an explicit denial of p, by the speaker, it is plausible that a sentence like *John believes that p* as a pragmatic default gives rise to an inference that the speaker is also committed to p.

²⁹An analysis was carried out that created dummy variables for the disjunctive and conjunctive statements; however, neither of these were better predictors of any MCP than the simpler statements in Prag-Sp and Prag-New. The data is available for replication of this result. It is omitted here, however, for the purpose of brevity.

³⁰Thanks to Meredith Tamminga for this suggestion!

³¹This was done within language, and in English, for each of the two context variants, MAXNEWNESS and MAXCONTRAST.

in the English and German experiments. In Section 3.2.4.3, we discuss the Swedish controls.

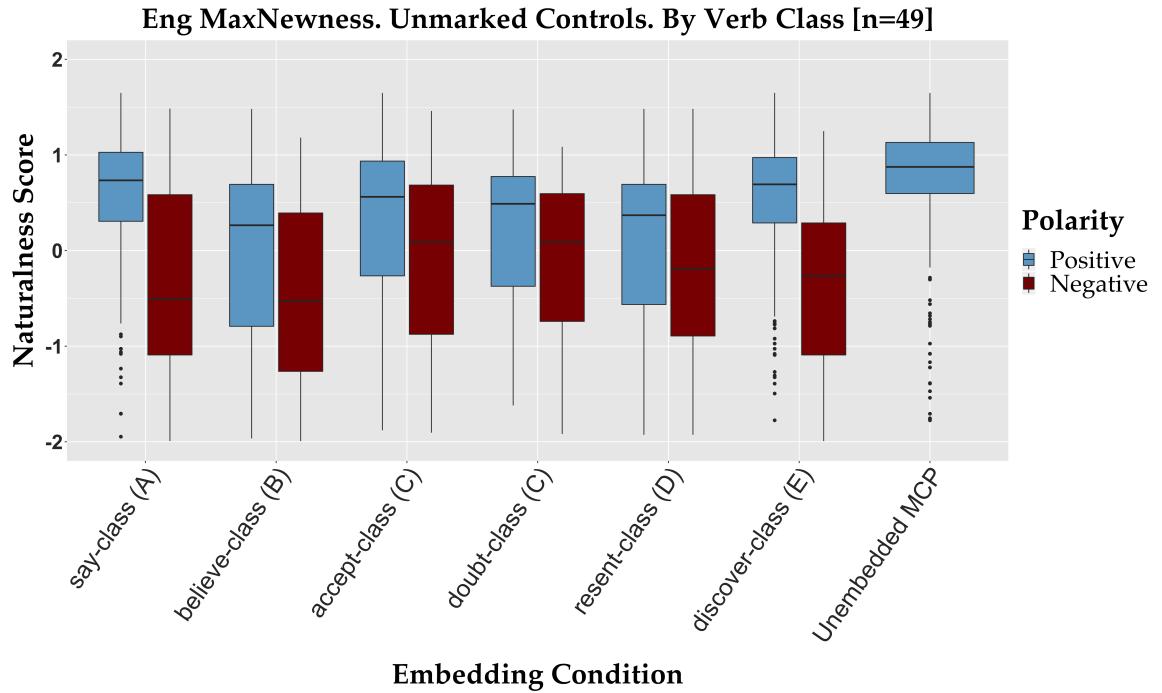


Figure 3.15: Acceptability responses in the English MAXNEWNESS unmarked control condition (by verb type and negation).

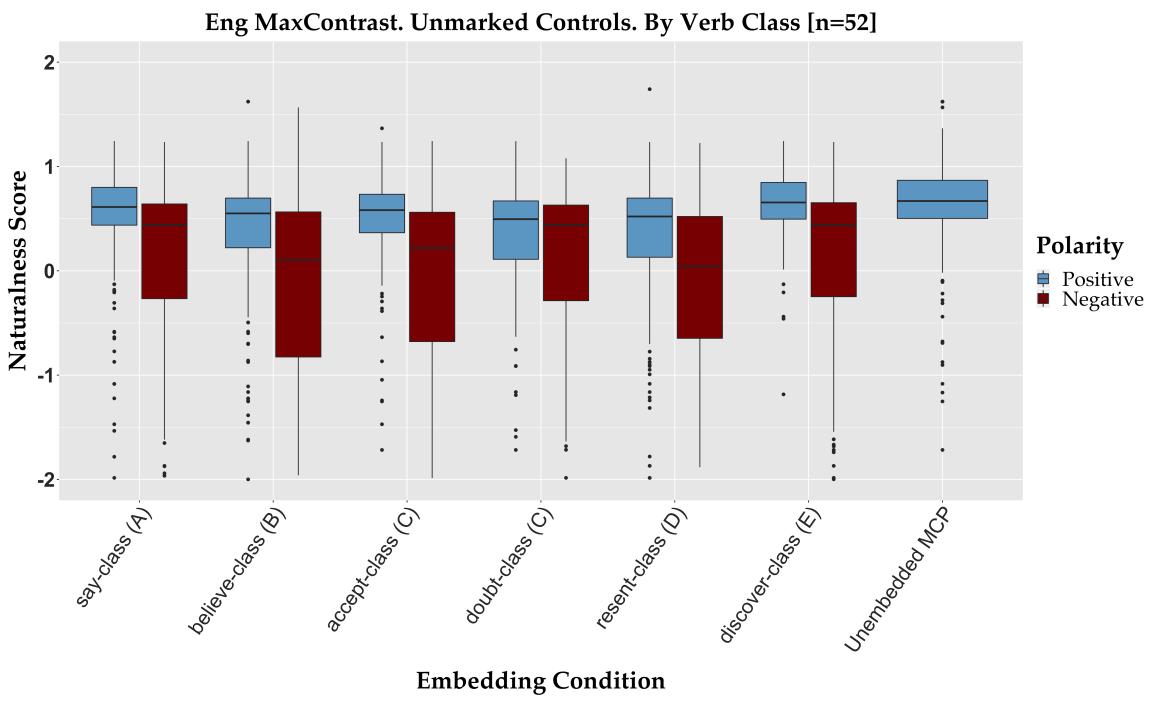


Figure 3.16: Acceptability responses in the English MAXCONTRAST unmarked control condition (by verb type and negation).

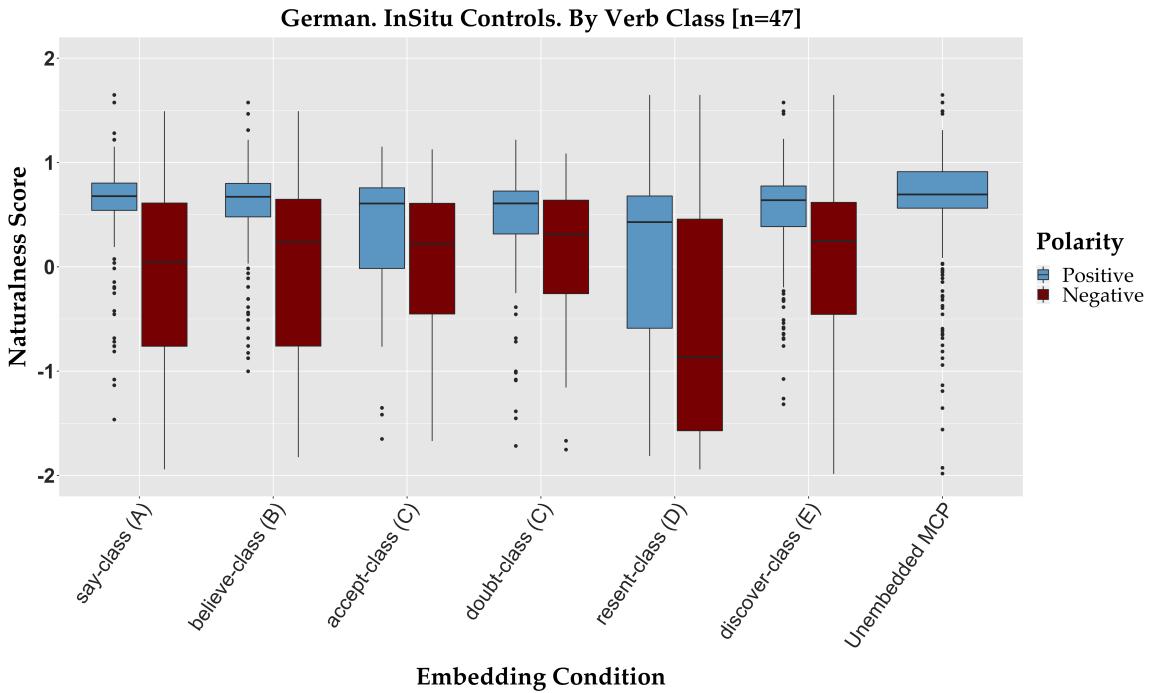


Figure 3.17: Acceptability responses in the German unmarked (InSitu) control condition (by verb type and negation).

Having thus factored out the variation inherent in the individual items, we were able to use the residuals as the new dependent variable for each type of MCP: topicalization, embedded V2, speech act adverbs, and scene setting adverbs. Effectively, this allowed us to rule out any interpretation of a pattern in the data whereby what looks like a given MCP being given low ratings in a particular embedded context, is in fact just the product of a general degradation of *any* sentence occurring in this context (perhaps further compounded by a general dis-preference for complex sentences, relative to simple, unembedded sentences).

We thus ended up with 8 final data sets, listed in (48)-(50). Each data set contained 1 observation per subject per verb-polarity combination (hence: 8 observations per subject per predicate type, and 4 observations per subject per predicate type-polarity combination — recall the number of subjects per condition from Table 3.5):

(48) English MAXNEWNESS

a. MCP = Speech act adverbs

- b. MCP = Topicalization
 - c. MCP = Scene Setting Adverbs
- (49) English MAXCONTRAST
- a. MCP = Speech act adverbs
 - b. MCP = Topicalization
 - c. MCP = Scene Setting Adverbs

- (50) German
- a. MCP = Speech act adverbs
 - b. MCP = Embedded V2

The results from the 12 pragmatic inference variations were also analysed separately. Each of the 12 data sets contained 1 observation per subject per verb-polarity combination (hence: 8 observations per subject per predicate type, and 4 observations per subject per predicate type-polarity combination).

- (51) English MAXNEWNESS, MAXCONTRAST, German, Swedish
- a. Pragmatics = Speaker commitment to p
 - b. Pragmatics = Attitude holder commitment to p
 - c. Pragmatics = p is likely discourse new

3.2.4.3 Swedish MCP experiments

In Figures 3.15–3.17 in the previous section, we saw that there was some amount of variation among conditions in the English and German control conditions. In the Swedish MCP experiments, however, there was much more substantial variation in the (intended to be) unmarked condition, as shown in Figure 3.18. Compare that to the unresidualized V2 data in Figure 3.19.

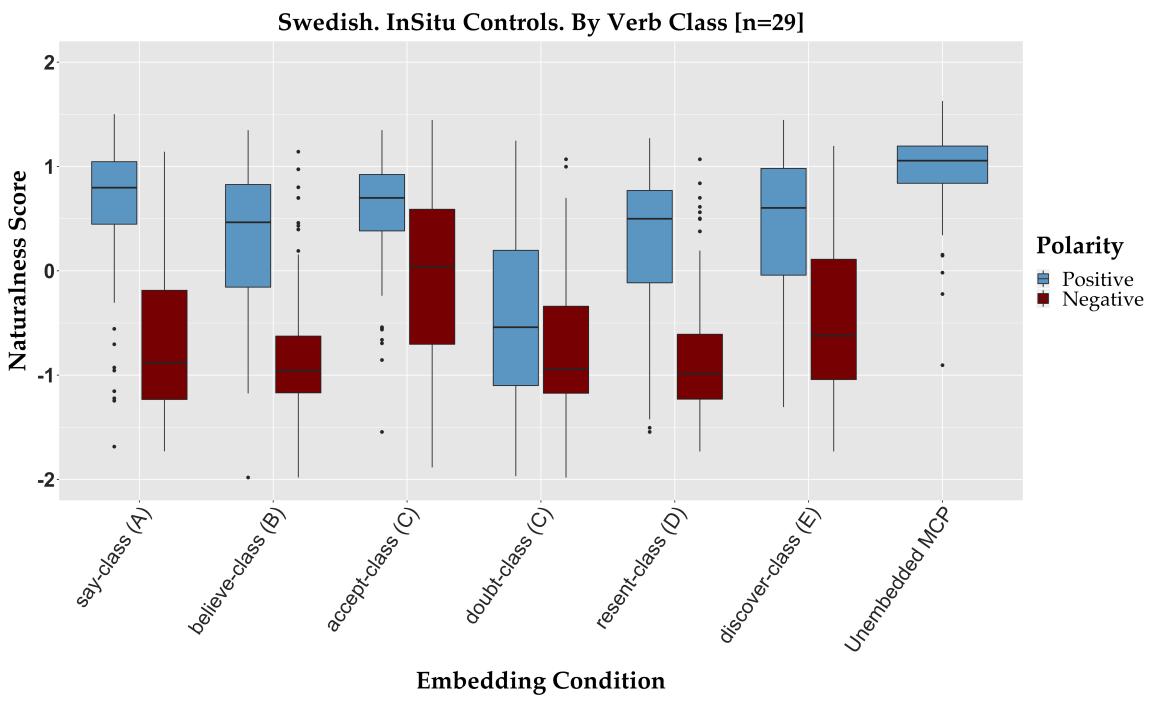


Figure 3.18: Acceptability responses in the Swedish unmarked (InSitu) control condition (by verb type and negation).

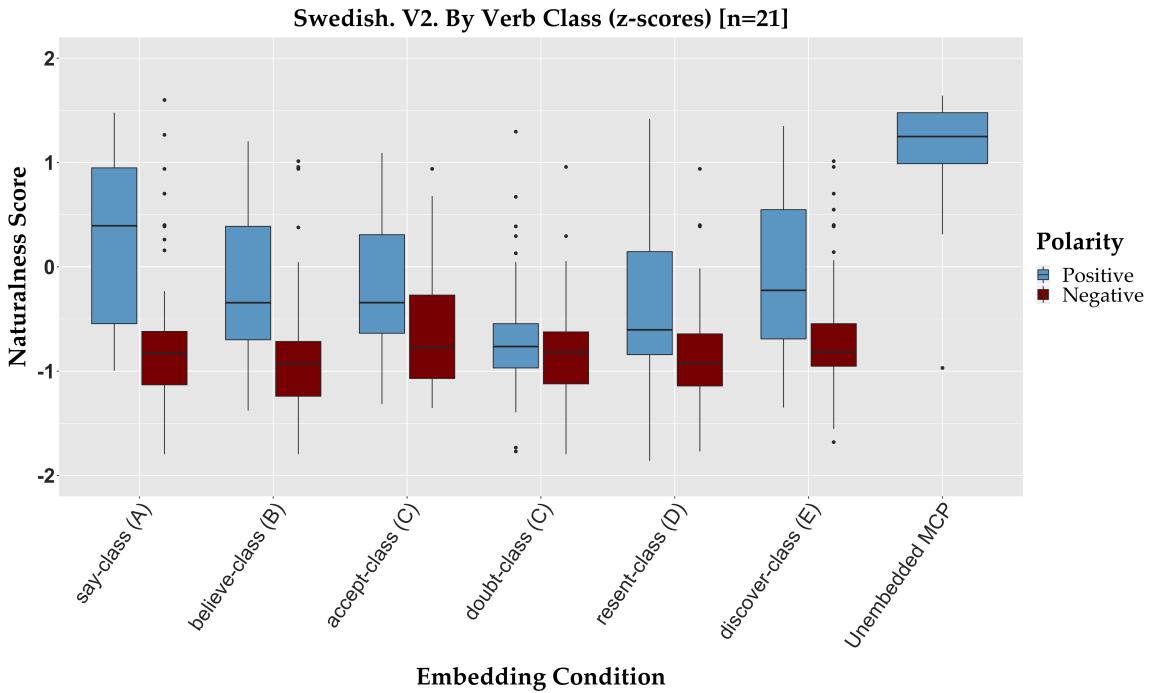


Figure 3.19: Unresidualized, raw scores for the acceptability of Swedish V2 (by verb type and negation).

As is clear from this visualization, the V2 and unmarked responses show a broadly similar pattern (similar to that found in the German V2 study, as we shall see in Section 3.2.6). This meant that residualizing the results from the V2 study would remove essentially all of the variation in the data, as shown in Figure 3.20. This posed a problem for analyzing and interpreting the Swedish V2-results. That is, do we treat the residualized data as showing the ‘true’ effect of the V2-manipulation (as in the German and English data), or do we say that something went wrong with the Swedish control condition, and treat the raw data as showing the true effect of the data? Clearly, neither option seems ideal.

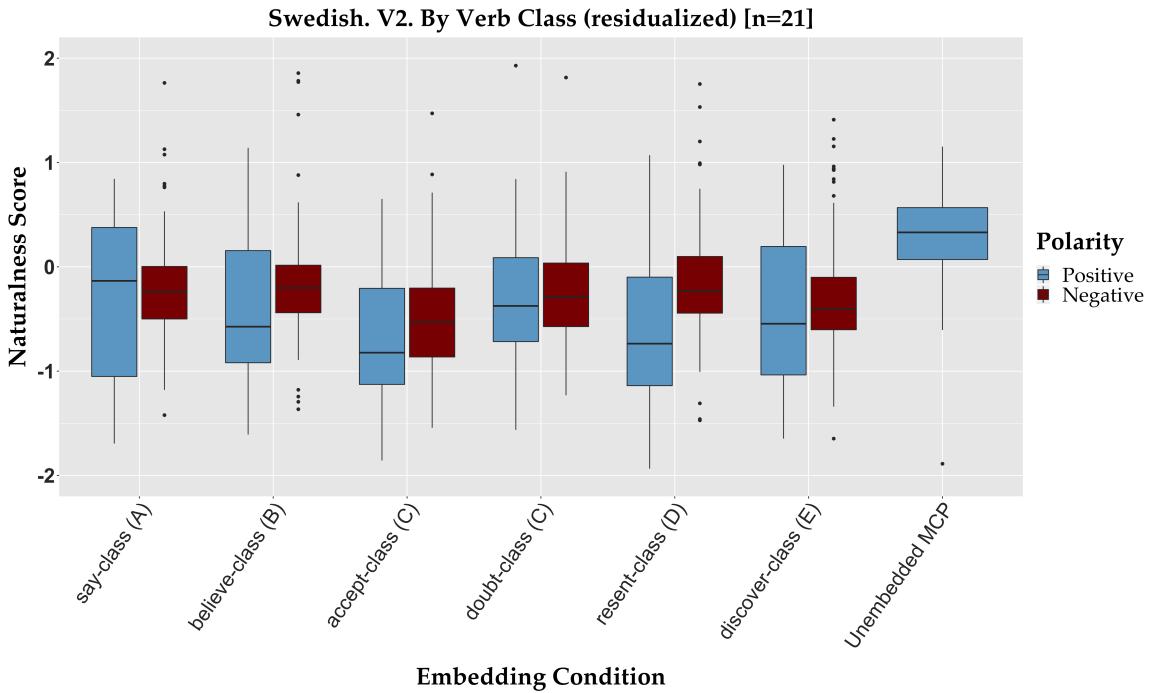


Figure 3.20: Residualized acceptability scores for Swedish V2 (by verb type and negation).

Interestingly, we find a lot less variation in the unresidualized speech act adverb responses (top graph of Figure 3.21) than in the V2 and unmarked variations in Figures 3.18–3.19.

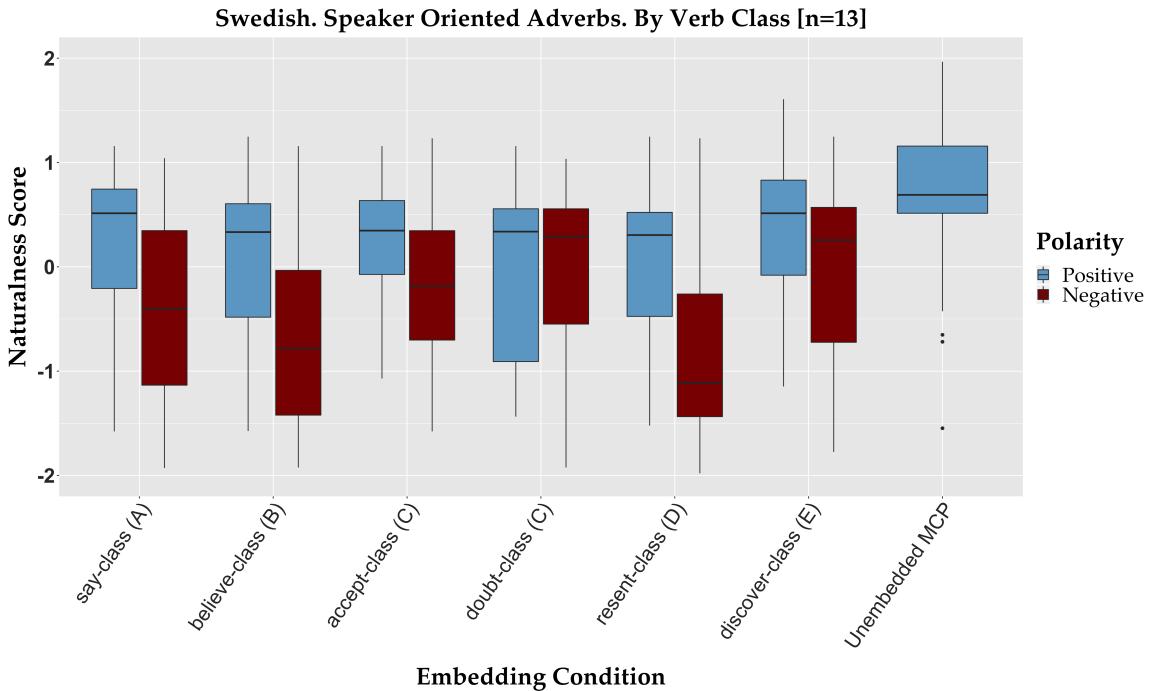


Figure 3.21: Unresidualized acceptability scores in the Swedish speech act adverb data (by verb type and negation).

This suggests that the variation is really due to the way in which V2 was manipulated: by varying the order of the finite auxiliary and negation, as shown in (28)–(29) above, repeated in (52). Crucially, to avoid a confound with V2 vs. in-situ order, the speech act adverb condition did not include a finite auxiliary at all, but only the critical adverb and the participle.

(52) Swedish MCP manipulation

- a. Anna sa att Maja inte har gjort slut med sin pojkvän.
Anna said that Maja not has made end with her boyfriend
'Anna said that Maja hasn't broken up with her boyfriend.' InSitu
- b. Anna sa att Maja har inte gjort slut med sin pojkvän.
Anna said that Maja has not made end with her boyfriend
'Anna said that Maja hasn't broken up with her boyfriend.' V2
- c. Anna sa att Maja ärligt talat gjort slut med sin pojkvän.
Anna said that Maja honestly speaking made end with her boyfriend
'Anna said that Maja honestly hasn't broken up with her boyfriend.' SpAct

Recall from Section 2.5.2 that Djärv, Heycock, and Rohde 2017 were able to use the relative order of the finite verb and a sentence-level adverb to successfully manipulating V2 vs. in-situ order, without introducing additional degradation in the unmarked control condition (see Figure 2.3 above). However, their experiment did not manipulate negation in the matrix clause. It is plausible that the large effect of negation across verb types in the Swedish V2 and in-situ data is essentially due to there being ‘too much negation’ in the sentence, perhaps leading to parsing difficulties. Recall also that the German V2 variation was simpler, in that it only varied the placement of the finite verb, and did not require additional elements like negation. This would then explain why we didn’t see such an effect in the German data.

Unfortunately, due to the difficulty in analysing and interpreting the Swedish MCP data, I’m excluding it from further analysis. While this may somewhat undermine the empirical basis for some of the discussion and conclusions about embedded V2 to follow, it is worth bearing in mind that we do already have quite a lot of quantitative data, specifically on Swedish embedded V2 vs. V in-situ (see Sections 2.5.2 and 3.1). This should reassure us then, that the pattern in the current Swedish data is not due to a weird restriction in Swedish on clausal embedding (period) under negation and under verbs like *doubt* and *resent*.³²

The Swedish pragmatic inference data is kept for analysis, as this will provide a useful empirical reference point for a theoretical interpretation of the data from both this study and the corpus study presented in Section 3.1.

3.2.5 Analysis

The data was analyzed with linear mixed-effects models (using *lmer* from the *lme4* package in R). To test the hypotheses about the licensing of MCP, now narrowed down to the smaller set in (53)–(56), I ran the 6 models in Table 3.6 for each of the 8 datasets in (48)–(50). The filler and control conditions were excluded from the statistical analysis (but included in the plots, as shown below). Subject and Item were included as random effects in all models.

³²A broader lesson from this section, is that good controls are essential for interpreting data. The moral of this story, for future work on this, is that it is worth investing in more piloting of one’s experiments than might seem called for.

- (53) Lexical Class à la The CP/DP Interface Hypothesis [Lex-CP/DP]
- ✓ {Speech act, Doxastic non-factives}
 - ✗ {Response verbs, Emotive factives, Doxastic factives}
- (54) Lexical Class à la Hooper and Thompson (1973) [Lex-HT]
- ✓ {Speech act, Doxastic non-factives, Doxastic factives}
 - ✗ {Response verbs, Emotive factives}
- (55) Speaker believes p [Prag-Sp]
- (56) p is discourse new information [Prag-New]

	Regression models to predict ✓MCP	Shorthand
(1)	Verb class × Polarity Interaction	VERBCLASS-POL
(2)	Verb × Polarity Interaction	VERB-POL
(3)	Verb-classification in (53)	LEX-CP/DP
(4)	Verb-classification in (54)	LEX-HT
(5)	Speaker believes p (55)	PRAG-SP
(6)	p is discourse new information (56)	PRAG-NEW

Table 3.6: Models predicting the (z-scored) acceptability ratings for each MCP type. Predicate types: speech act verbs; doxastic non-factives, positive response verbs, negative response verbs, emotive factives, doxastic factives. See Table 3.4 for a full list of verbs.

For each of the 12 pragmatic datasets, I ran the following four models, predicting the z-scored responses from the identity and type of predicate, polarity, and their interaction. Here, the conditional fillers were excluded from the analysis, but the controls were included.

	Regression models to predict pragmatic scores	Shorthand
(1)	Verb class \times Polarity Interaction	VERBCLASS-POL
(2)	Verb \times Polarity	VERB-POL
(3)	Verb-classification in (53)	LEX-CP/DP
(4)	Verb-classification in (54)	LEX-HT

Table 3.7: Models predicting the (z-scored) pragmatic ratings. Predicate types: speech act verbs; doxastic non-factives, positive response verbs, negative response verbs, emotive factives, doxatic factives. See Table 3.4 for a full list of verbs.

In the models based on verb class, the positive speech act predicates were used as the intercept. For the models based on verb identity, the intercept was positive *say*.

In the following section, we present the statistical and graphic data from the experiment. The tables included show the output of the Verb class \times Polarity interaction models. These include the following columns: [1.] **Coefficient:** Name of the coefficients (the levels of the independent variables). [2.] **Estimate:** The estimated values for the coefficients. [3.] **Standard Error:** The standard errors of the coefficients; can be used to construct lower and upper bounds for the coefficient, and is used to test whether the parameter is significantly different from zero (if it is, then it is understood to have an impact on the dependent variable). [4.] **t-value:** the ratio of the regression coefficient β to its standard error; it tests the hypothesis that a regression coefficient is zero (if it is, and this is not due to random variation, then it has an effect on the dependent variable); used to determine the p-values. [5.] **p-value:** the probability of seeing the observed t-value, for a given model, if the null-hypothesis were true; a low p-value indicates a low probability of seeing the observed results, if the null-hypothesis were true. For example, a significance level of 0.01 indicates that there is less than a 1% chance that the coefficient might be equal to 0 and thus be insignificant. The asterisks in this columns indicate the significance ranking of the p-values, using the following significance codes: 0.001 (**); 0.01 (**); 0.05 (*); 0.1 (.). For reasons of space, I'm not including the output of the other models in 3.6 and 3.7. However, for each dataset,

we provide a table comparing the R squared values for each model, to compare the amount of variation predicted by the different models (representing different theoretical accounts).³³ For mixed models, the marginal R squared considers only the variance of the fixed effects, whereas the conditional R squared takes both the fixed and random effects into account.

3.2.6 Results

3.2.6.1 Pragmatics of attitude verbs

Recall the main motivation for collecting the pragmatic judgement data: as we noted above, while it is fairly clear that certain verbs, like *believe* entails attitude holder's belief that p, and some verbs, like *regret*, require p to be a discourse old issue, it is less clear to what extent these properties hold across predicates. Hence, to tease apart different lexical and pragmatic accounts of MCP, we wanted to derive independent, empirically motivated estimates of the pragmatic dimensions at stake, for a given sentence in a particular context, and use those as independent predictors of the acceptability of MCP.

With this goal in mind, let us start by looking at the results from the pragmatic inference studies, as a preliminary step for establishing the pragmatics of the different verbs and verb classes. These will then form the basis for the predictions from the MCP studies, reported in the following section. We start by looking at the results for attitude holder commitment to p, then move on to speaker commitment, and finally to discourse novelty.

3.2.6.1.1 Attitude holder commitment to p

As shown in Figure 3.22 from English, the results are very much in line with the intuitive meaning of these verb types. As expected, both the speech act verbs and the doxastic non-factives show high scores in the positive polarity, and significantly lower scores in the negative polarity ($\beta=1.297$, $p < 0.001$). The same pattern is observed with the positive response stance verbs (*accept*, *admit*). The negative response verbs (*doubt*, *deny*), as hypothesized, show the opposite pattern, with high scores in the negative condition and low scores in the

³³I'm not using an ANOVA for model comparison, given that the models are not nested, but include completely different sets of predictor variables.

positive condition ($\beta=-1.980$, $p < 0.001$). The factives, too behave as we would expect. Given that (as we pointed out above, and will discuss in more detail in Chapter 5) the emotive factives presuppose attitude holder belief that p , we predict high scores in both polarities (e.g. *appreciates*, *doesn't appreciate*). The doxastic factives, we claimed above, encode attitude holder belief as part of its asserted meaning. Thus, we'd expect low scores in the negative polarity and high scores in the positive polarity (like *believe*). Both of these expectations are borne out.

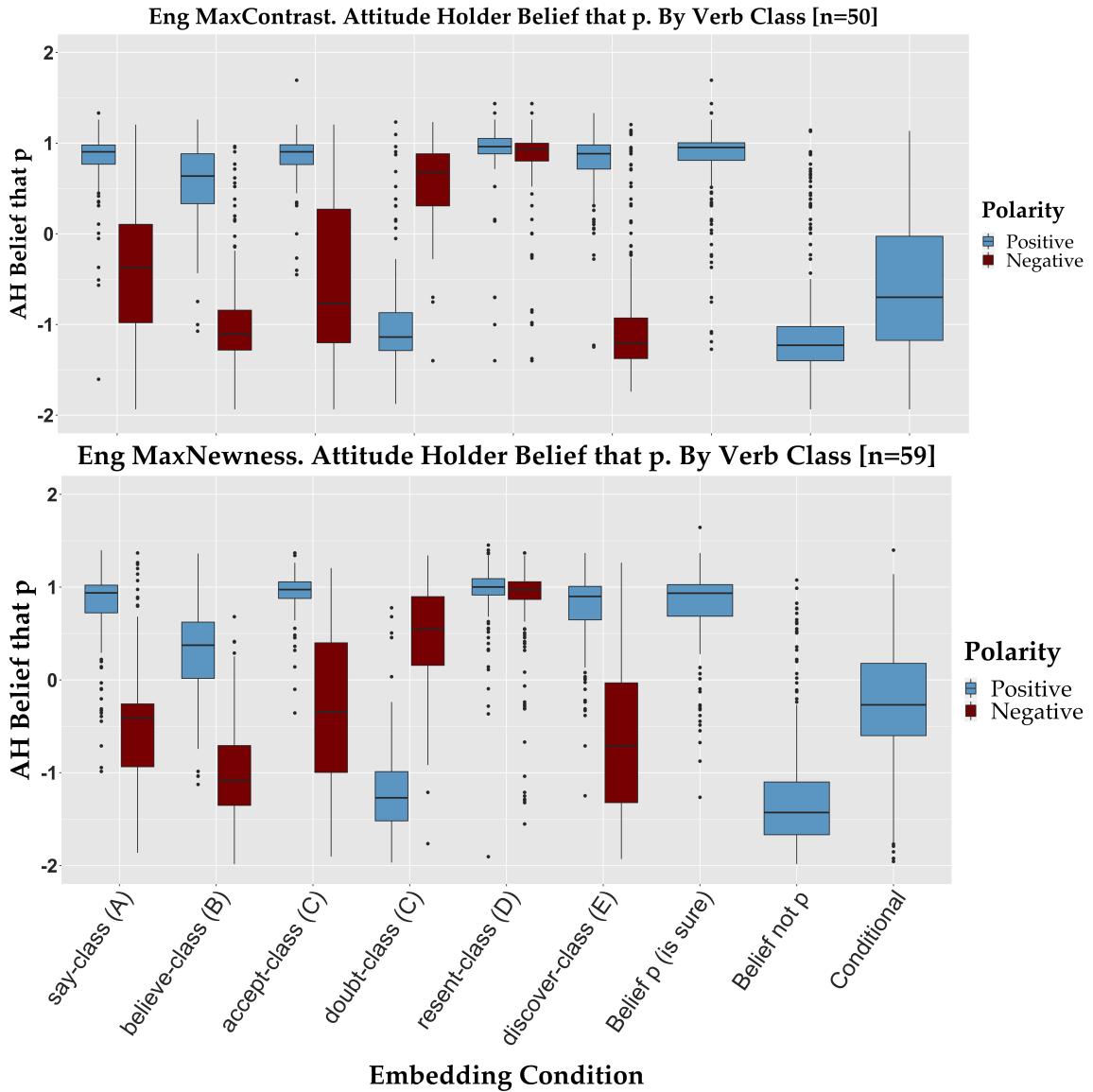


Figure 3.22: Attitude Holder commitment to p [English MAXCONTRAST; MAXNEWNESS].

Looking at Swedish and German data, in Figure 3.23, we find that while the magnitude of the effects vary slightly, the overall pattern, including the various interactions and main effects, is remarkably similar to the English data.

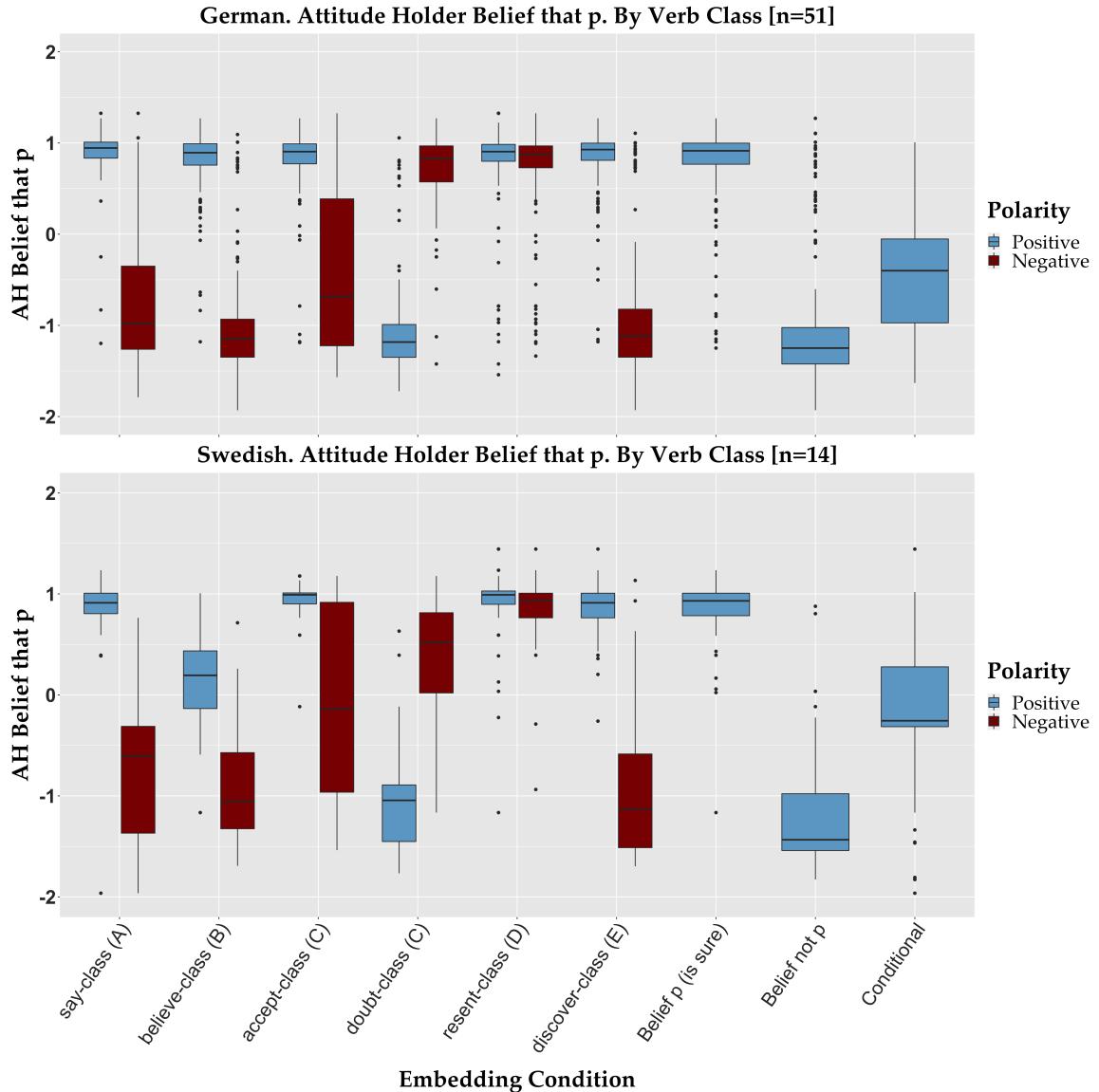


Figure 3.23: Attitude Holder commitment to p [German; Swedish].

A minor contrast between the languages is a small, but significant, difference between the speech act verbs and the doxastic non-factives in the English and Swedish data, which is not found in the German data. Aside from this, the only verb class that differed significantly

from the speech act verbs were the negative response stance verbs. Overall, then, while we find some variation across the different data sets, the pattern that emerges is remarkably stable across the three languages, and two discourse conditions. This is confirmed by the regression models, predicting the participants' estimates of the attitude holder's commitment to p, from predicate class, polarity, and their interaction (Summarized in Tables 3.8–3.11).

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	0.810	0.062	13.098	< 2e-16 ***
VerbClass = Dox.NonFact	-0.501	0.087	-5.725	2.76e-07 ***
VerbClass = Response.Pos	0.115	0.107	1.069	0.2888
VerbClass = Response.Neg	-1.980	0.107	-18.488	< 2e-16 ***
VerbClass = Emo.Fact	0.148	0.087	1.688	0.0962 .
VerbClass = Dox.Fact	-0.032	0.087	-0.370	0.7125
VerbClass = Control.be.sure	0.026	0.084	0.310	0.7576
VerbClass = Control.belief.not.p	-2.126	0.084	-25.256	< 2e-16 ***
Polarity = Neg	-1.297	0.047	-27.402	< 2e-16 ***
VerbClass = Dox.NF : Polarity = Neg	-0.030	0.067	-0.454	0.6499
VerbClass = Response.Pos : Polarity = Neg	0.073	0.082	0.893	0.3718
VerbClass = Response.Neg : Polarity = Neg	2.903	0.082	35.405	< 2e-16 ***
VerbClass = Emo.Fact : Polarity = Neg	1.188	0.067	17.740	< 2e-16 ***
Class = Dox.Fact : Polarity = Neg	-0.087	0.067	-1.300	0.1935

Table 3.8: English MAXNEWNESS data. Output of regression model: predicting attitude holder commitment to p from the embedding predicate and polarity of the matrix clause. 3304 observations, from 59 subjects and 56 items.

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	8.399e-01	5.917e-02	14.194	< 2e-16 ***
VerbClass = Dox.NonFact	-2.710e-01	8.368e-02	-3.238	0.00183 **
VerbClass = Response.Pos	-2.331e-03	1.025e-01	-0.023	0.98192
VerbClass = Response.Neg	-1.757e+00	1.025e-01	-17.141	< 2e-16 ***
VerbClass = Emo.Fact	8.317e-02	8.368e-02	0.994	0.32366
VerbClass = Dox.Fact	-3.366e-02	8.368e-02	-0.402	0.68874
VerbClass = Control.be.sure	3.039e-02	7.980e-02	0.381	0.70470
VerbClass = Control.belief.not.p	-1.960e+00	7.980e-02	-24.563	< 2e-16 ***
Polarity = Neg	-1.203e+00	5.040e-02	-23.872	< 2e-16 ***
Class = Dox.NF : Polarity = Neg	-3.265e-01	7.128e-02	-4.581	4.84e-06 ***
Class = Response.Pos : Polarity = Neg	-1.274e-01	8.730e-02	-1.459	0.14464
Class = Response.Neg : Polarity = Neg	2.648e+00	8.730e-02	30.327	< 2e-16 ***
Class = Emo.Fact : Polarity = Neg	1.089e+00	7.128e-02	15.275	< 2e-16 ***
Class = Dox.Fact : Polarity = Neg	-5.589e-01	7.128e-02	-7.841	6.35e-15 ***

Table 3.9: English MAXCONTRAST data. Output of regression model: predicting attitude holder commitment to p from the embedding predicate and polarity of the matrix clause. 2800 observations, from 50 subjects and 56 items.

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	0.91179	0.04820	18.917	< 2e-16 ***
VerbClass = Dox.NonFact	-0.11197	0.06816	-1.643	0.1036
VerbClass = Response.Pos	-0.11631	0.08348	-1.393	0.1667
VerbClass = Response.Neg	-1.89459	0.08348	-22.694	< 2e-16 ***
VerbClass = Emo.Fact	-0.13833	0.06816	-2.029	0.0451 *
VerbClass = Dox.Fact	-0.06705	0.06816	-0.984	0.3277
VerbClass = Control.be.sure	-0.09073	0.06263	-1.449	0.1518
VerbClass = Control.belief.not.p	-1.99455	0.06263	-31.845	< 2e-16 ***
Polarity = Neg	-1.64863	0.05380	-30.645	< 2e-16 ***
VerbClass = Dox.NF : Polarity = Neg	-0.17494	0.07608	-2.299	0.0216 *
VerbClass = Response.Pos : Polarity = Neg	0.41983	0.09318	4.506	6.89e-06 ***
VerbClass = Response.Neg : Polarity = Neg	3.32733	0.09318	35.709	< 2e-16 ***
VerbClass = Emo.Fact : Polarity = Neg	1.56323	0.07608	20.547	< 2e-16 ***
Class = Dox.Fact : Polarity = Neg	-0.08581	0.07608	-1.128	0.2595

Table 3.10: German data. Output of regression model: predicting attitude holder commitment to p from the embedding predicate and polarity of the matrix clause. 2856 observations, from 51 subjects and 56 items.

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	0.87260	0.10293	8.477	5.07e-13 ***
VerbClass = Dox.NonFact	-0.65995	0.14557	-4.534	1.83e-05 ***
VerbClass = Response.Pos	-0.93844	0.14557	-6.447	6.05e-09 ***
VerbClass = Emo.Fact	0.02305	0.14557	0.158	0.874575
VerbClass = Dox.Fact	-0.02856	0.14557	-0.196	0.844917
VerbClass = Control.be.sure	-0.01287	0.13591	-0.095	0.924842
VerbClass = Control.belief.not.p	-2.13081	0.13591	-15.678	< 2e-16 ***
Polarity = Neg	-1.65622	0.10431	-15.878	< 2e-16 ***
VerbClass = Dox.NonFact : Polarity = Neg	0.52716	0.14752	3.574	0.000375 ***
VerbClass = Response.Pos: Polarity = Neg	1.85194	0.14752	12.554	< 2e-16 ***
VerbClass = Emo.Fact: Polarity = Neg	1.60479	0.14752	10.879	< 2e-16 ***
VerbClass = Dox.Fact: Polarity = Neg	-0.13460	0.14752	-0.912	0.361832

Table 3.11: Swedish data. Output of regression model: predicting attitude holder commitment to p from the embedding predicate and polarity of the matrix clause. 784 observations, from 14 subjects and 56 items.

For the sake of space, I'm only stating the results from the Verb Class \times Polarity interaction models (VERBCLASS-POL), and omitting the other models (listed in Table 3.7). However, the R-squared values from the four models provide us with a simple method for comparison. As we can see from Tables 3.12–3.15, the VERBCLASS-POL models predict a lot more variation in the data (marginal $R^2 > 0.677$) than the models based on a priori verb classifications in LEX-CP/DP and LEX-HT ($mR^2 < 0.1$). (Marginal R squared values consider only the fixed effects; the conditional R squared values consider both the fixed and the random effects, i.e. item and participant.)

	Attitude holder commitment to p (English, n=50)	Marginal R ²	Conditional R ²
(1)	Verb Class × Polarity	0.727	0.745
(2)	Verb × Polarity	0.752	0.752
(3)	LEX-CP/DP	0.015	0.189
(4)	LEX-HT	0.052	0.187

Table 3.12: R squared values for the English MAXCONTRAST attitude holder commitment to p data.

	Attitude holder commitment to p (English, n=59)	Marginal R ²	Conditional R ²
(1)	Verb Class × Polarity	0.729	0.749
(2)	Verb × Polarity	0.749	0.753
(3)	LEX-CP/DP	0.048	0.244
(4)	LEX-HT	0.062	0.244

Table 3.13: R squared values for the English MAXNEWNESS attitude holder commitment to p data.

	Attitude holder commitment to p (German, n=51)	Marginal R ²	Conditional R ²
(1)	Verb Class × Polarity	0.712	0.718
(2)	Verb × Polarity	0.721	0.725
(3)	LEX-CP/DP	0.038	0.103
(4)	LEX-HT	0.016	0.104

Table 3.14: R squared values for the German attitude holder commitment to p data.

	Attitude holder commitment to p (Swedish, n=14)	Marginal R ²	Conditional R ²
(1)	Verb Class × Polarity	0.677	0.717
(2)	Verb × Polarity	0.772	0.777
(3)	LEX-CP/DP	0.050	0.203
(4)	LEX-HT	0.085	0.203

Table 3.15: R squared values for the Swedish attitude holder commitment to p data.

The R-squared values also show us that a lot of the variation in the data is captured simply by the *class* of predicate and polarity, and that hardly anything is gained by also considering the identity of the verb or the random effects. This is confirmed by the graphs in Figures 3.24–3.25, plotting the data by verb.³⁴

³⁴For purposes of space, the by-verb plots for the rest of the sub-experiments have been made available on <https://github.com/kajsadjarv> in the repository Djarr2019-Sec326-ByPredicatePlots-Prag-MCP.

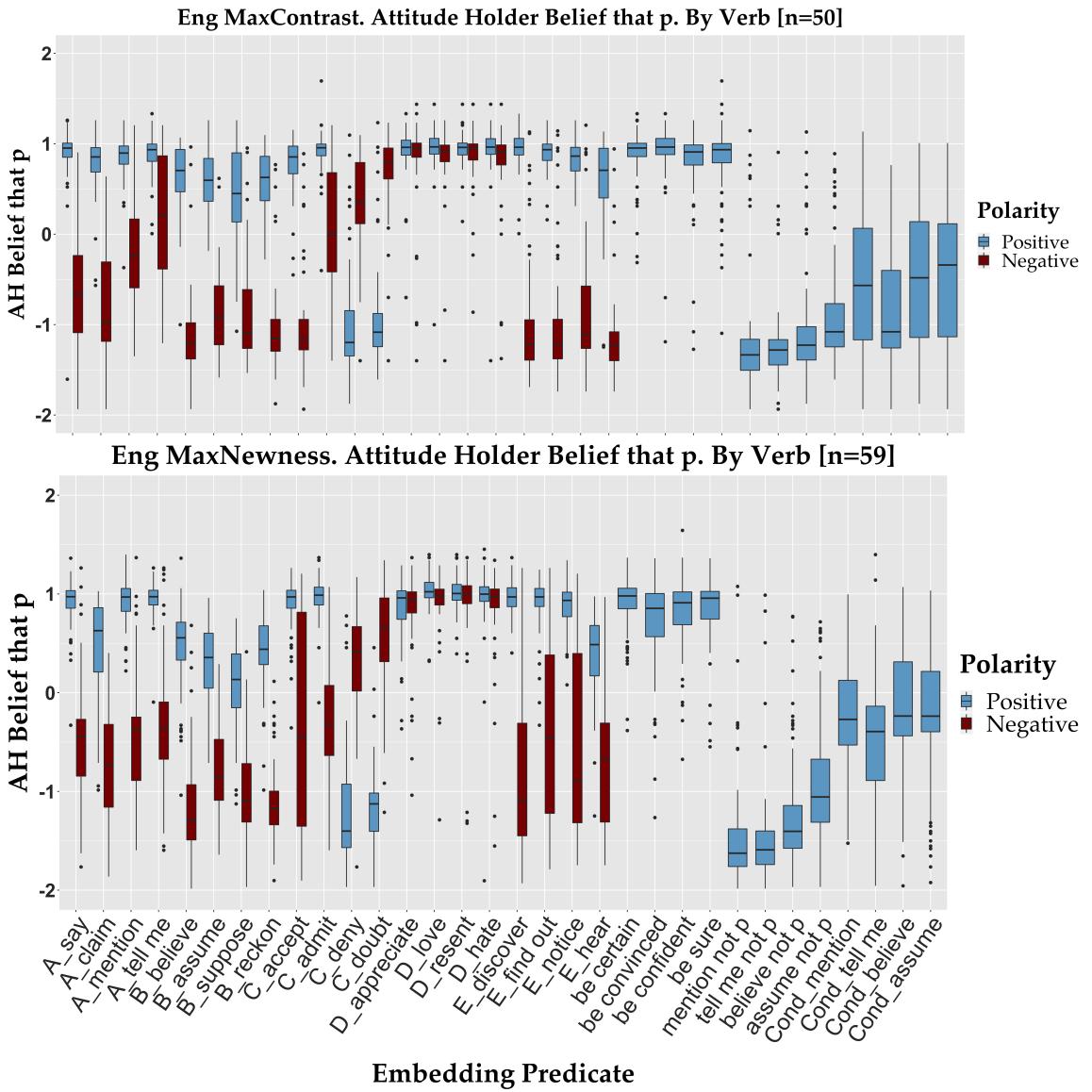


Figure 3.24: Attitude Holder commitment to p, by verb [English MAXCONTRAST; MAXNEWNESS].

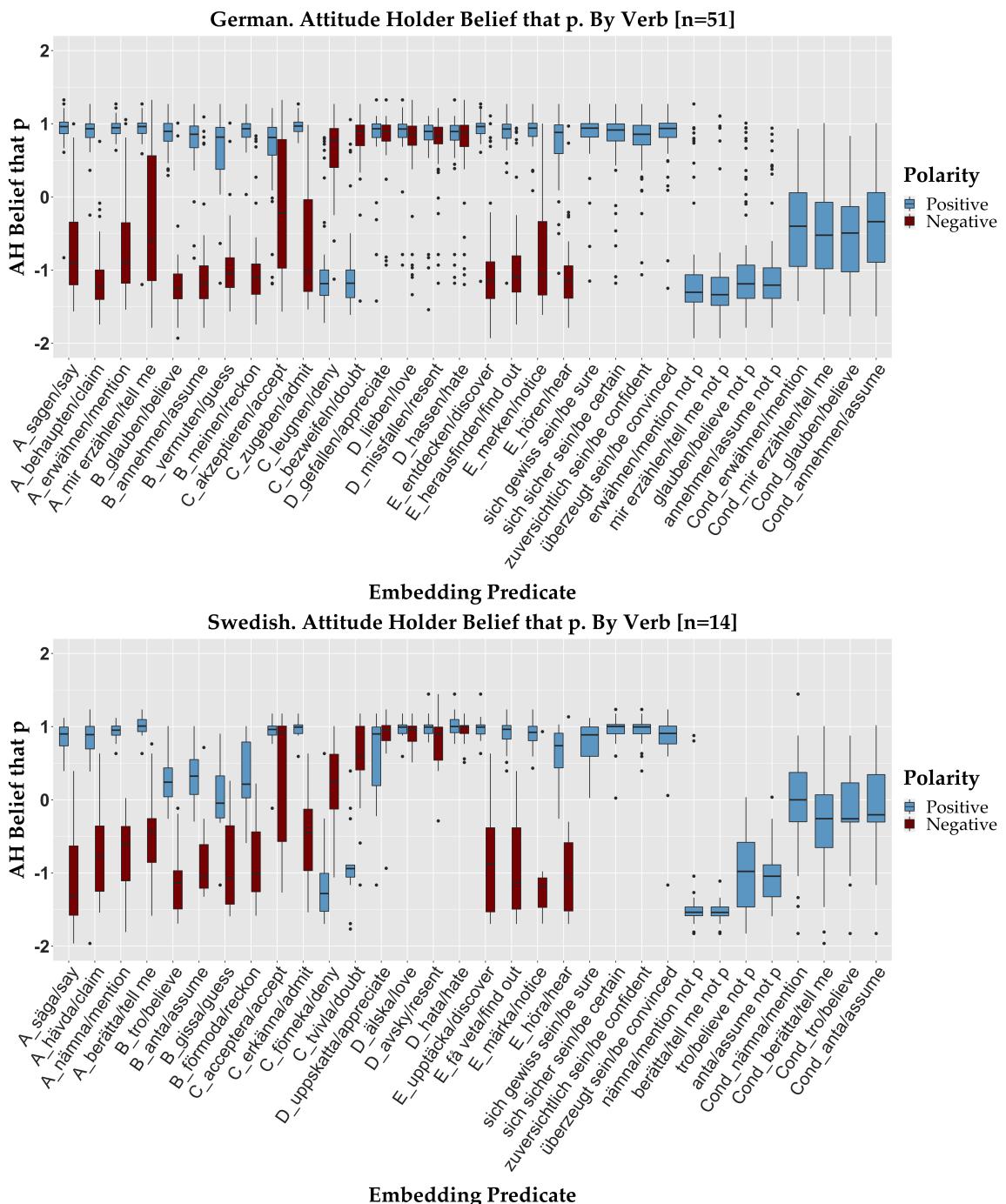


Figure 3.25: Attitude Holder commitment to p, by verb [German, Swedish].

3.2.6.1.2 Speaker commitment to p

Moving on to speaker commitment to p, we find, again, that while there is some variation across the different data sets, the pattern that emerges is again remarkably stable across the three languages, and two discourse conditions. And once again, the observed results are pretty much in line with what we would expect, intuitively, as illustrated in Figures 3.26–3.27.

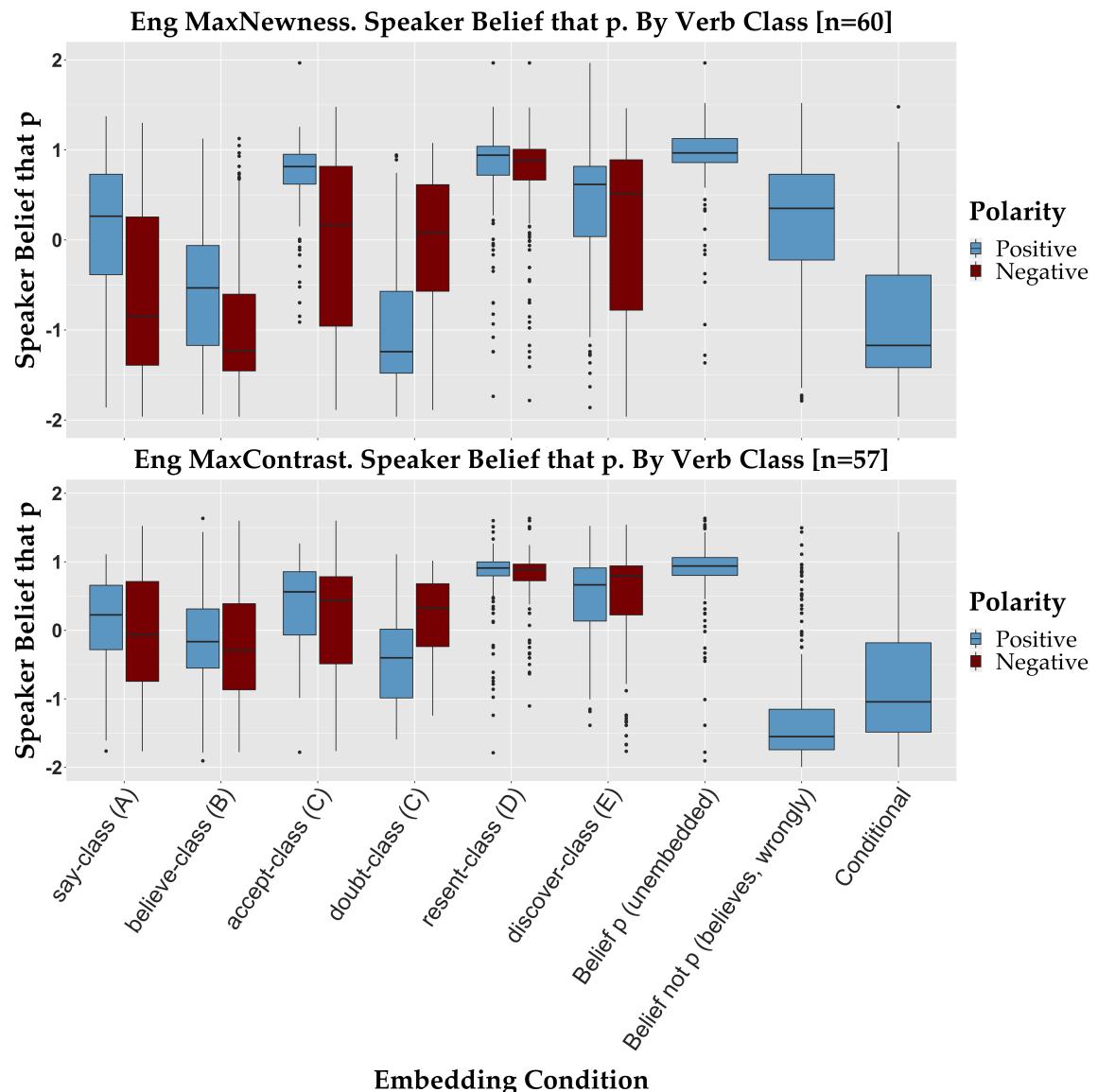


Figure 3.26: Speaker commitment to p [EnglishMAXNEWNESS, English MAXCONTRAST].

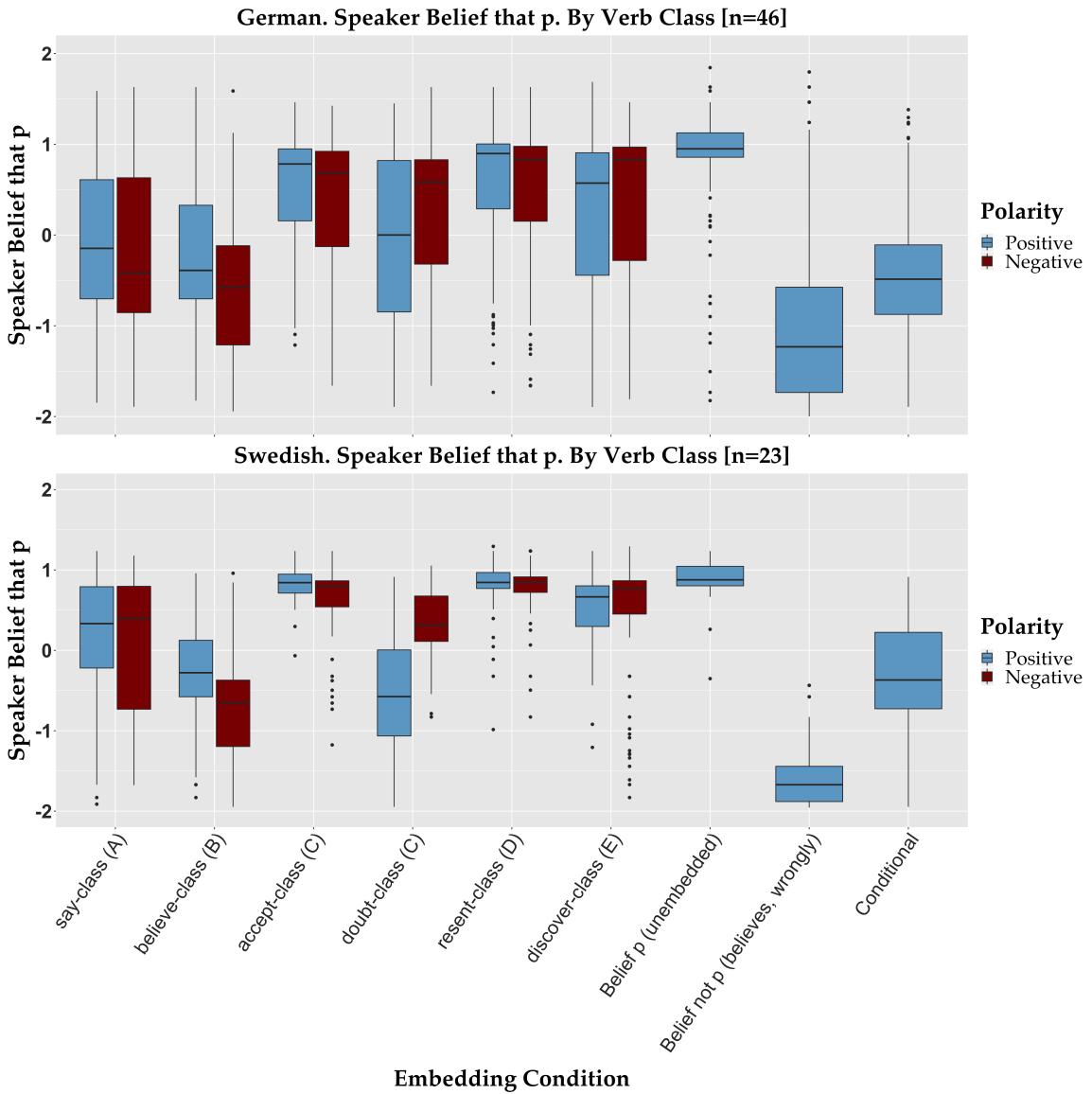


Figure 3.27: Speaker commitment to p [German, Swedish].

The consistently highest scores are found with the factive verbs, in both polarities, a result that is expected on the standard view whereby factive verbs presuppose speaker commitment to p. There is some variation across the different language/context conditions as to whether the factives differ significantly from the positive speech act verbs (the intercept), but in neither case do we find a large effect size. As we pointed out above, none of the other predicate types are typically taken to make reference to the speaker, so it is not surprising

to observe that there is quite a lot more variation among these verbs. It is worth noting that we find overall high scores with the positive response stance verbs in both polarities, a pattern reminiscent of projection (cf. Tonhauser et al. 2018); as with the factives, there is some variation with respect to whether these conditions differ significantly from the intercept. For the negative response verbs, the negated predicates are generally rated higher than the positive ones for speaker commitment to p. We also find a significant main effect of negation in the English and Swedish datasets, though the size of the effect varies, as shown in Tables A.1–A.4 in Appendix A.1.1. We also observe a significant interaction with negation with the doxastic non-factives in all datasets except the English MAXCONTRAST data, such that the difference between the two polarities is smaller here than with the speech act verbs. For reasons of space, the full regression models (from the Verb Class × Polarity analysis) can be found in the Appendix.³⁵

Again, we can compare the model based on verb class and negation with the other three models. These comparisons are summarized in Tables 3.16–3.19. In each case, we find that the current model predicts substantially more of the variation in the data (marginal $R^2 > 0.38$) than the models based on a priori verb classifications ($mR^2 < 0.2$). We also find, as with attitude holder commitment to p, that a lot of variation is captured by the type of predicate and polarity alone, in that not much more of the variation is predicted by considering the identity of the verb or the random effects. The lack of variation among the predicates of the different classes is illustrated in the by-verb plots, which can be found in the Appendix.

³⁵As mentioned above, the English MAXNEWNESS speaker belief experiment used the wrong items in the floor control condition (namely those from the discourse familiarity experiments. Because of this, the controls have been excluded from this analysis.

	Speaker commitment to p (English, n=60)	Marginal R ²	Conditional R ²
(1)	Verb Class × Polarity	0.394	0.451
(2)	Verb × Polarity	0.470	0.471
(3)	LEX-CP/DP	0.164	0.372
(4)	LEX-HT	0.089	0.374

Table 3.16: R squared values for the English MAXNEWNESS speaker commitment to p data.

	Speaker commitment to p (English, n=57)	Marginal R ²	Conditional R ²
(1)	Verb Class × Polarity	0.529	0.559
(2)	Verb × Polarity	0.567	0.567
(3)	LEX-CP/DP	0.117	0.306
(4)	LEX-HT	0.044	0.309

Table 3.17: R squared values for the English MAXCONTRAST speaker commitment to p data.

	Speaker commitment to p (German, n=46)	Marginal R ²	Conditional R ²
(1)	Verb Class × Polarity	0.383	0.394
(2)	Verb × Polarity	0.399	0.399
(3)	LEX-CP/DP	0.132	0.195
(4)	LEX-HT	0.075	0.197

Table 3.18: R squared values for the German speaker commitment to p data.

	Speaker commitment to p (Swedish, n=23)	Marginal R ²	Conditional R ²
(1)	Verb Class × Polarity	0.690	0.746
(2)	Verb × Polarity	0.760	0.761
(3)	LEX-CP/DP	0.206	0.425
(4)	LEX-HT	0.108	0.428

Table 3.19: R squared values for the Swedish speaker commitment to p data.

3.2.6.1.3 Discourse novelty

Turning to discourse novelty, we find again that, while there is some variation across the different datasets, the pattern that emerges is again remarkably stable across the three languages, and—perhaps unexpectedly—across the two discourse conditions in English. In fact, it is interesting that among the three pragmatic dimensions, discourse novelty appears to be the most robustly associated with particular verb classes.

As shown in Figures 3.28–3.29. there is a large and significant effect of negation across all language/context conditions, such that the negated speech act verbs get lower ratings than the non-negated ones. This contrast is also observed with the doxastic factives and the doxastic non-factives. For the response verbs and with the emotive factives, both polarities scores low on discourse novelty. We also find that all verb classes, except the doxastic factives, differ significantly from the speech act condition, in all four datasets. In the case of the doxastic non-factives, this effect, however, is relatively small. In the English MAXNEWNESS data and in the German data, also the doxastic factives differ significantly from the intercept, though in both cases, the effect size is small (p 's < 0.05). These experiments, then, replicate the results from Caplan and Djärv (2019), reported in Section 3.1.6, and further shows us that this is truly a robust property of these verb classes both across languages, and across different kinds of discourse contexts. As with the speaker commitment data, the full regression models are given in Appendix A.1.2.

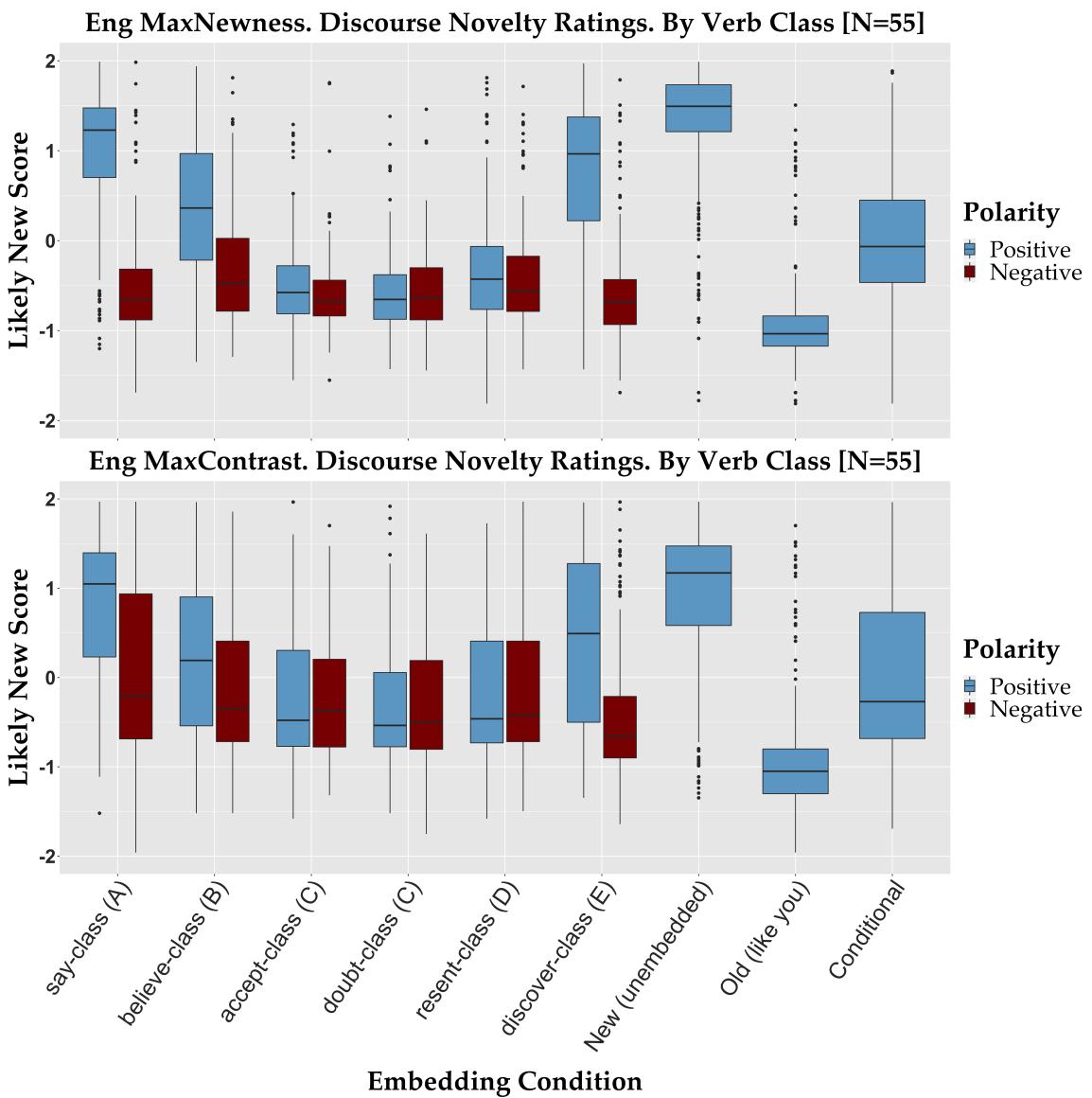


Figure 3.28: Likelihood that p is discourse new [EnglishMAXNEWNESS, English MAXCONTRAST, German, Swedish].

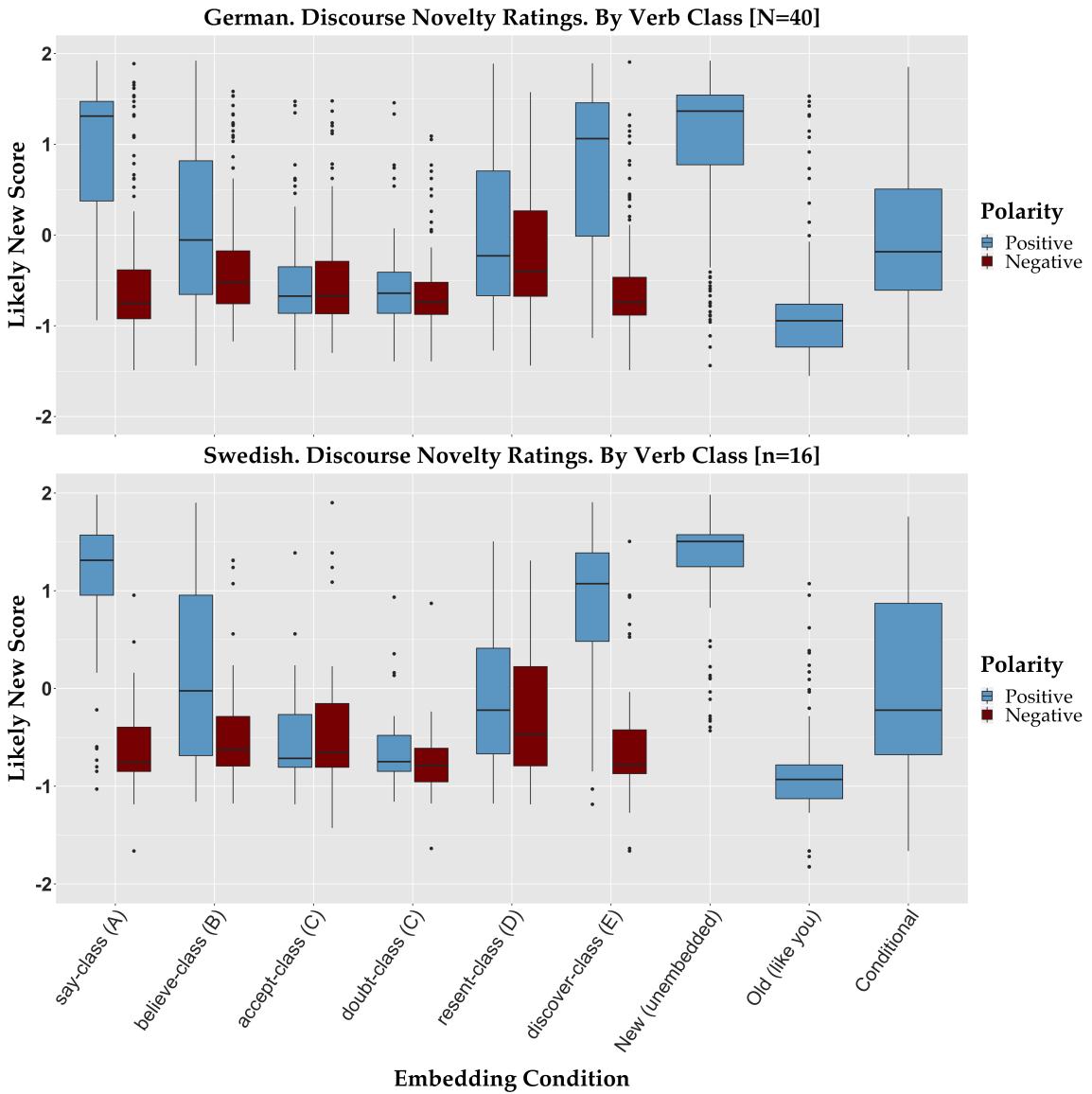


Figure 3.29: Likelihood that p is discourse new [EnglishMAXNEWNESS, English MAXCONTRAST, German, Swedish].

As shown in Tables 3.20–3.23, if we compare the model based on verb class and negation with the other three models, we find again that the current model predict a lot more of the variation in the data ($\text{marginal } R^2 > 0.72$) than the models based on a priori verb classifications ($\text{marginal } R^2 < 0.063$).³⁶ Again, a lot of the variation in the data is captured simply by the

³⁶Note that in this case we observe a fairly large difference in the two discourse conditions. While all the (non-)significant main effects and interactions are the same, the MAXNEWNESS data predicts much more of the variation in the data ($\text{marginal } R^2 > 0.72$) than the MAXCONTRAST data ($\text{marginal } R^2 > 0.35$). The

type of predicate and polarity, such that not much more variation is captured by considering the identity of the verb or the random effects. (This is confirmed by the by-verb plots in the Appendix.)

	p is discourse new (English, n=55)	Marginal R ²	Conditional R ²
(1)	Verb Class × Polarity	0.611	0.616
(2)	Verb × Polarity	0.616	0.622
(3)	LEX-CP/DP	0.053	0.133
(4)	LEX-HT	0.105	0.130

Table 3.20: R squared values for the English MAXNEWNESS p is discourse new data.

	p is discourse new (English, n=55)	Marginal R ²	Conditional R ²
(1)	Verb Class × Polarity	0.358	0.378
(2)	Verb × Polarity	0.375	0.390
(3)	LEX-CP/DP	0.043	0.100
(4)	LEX-HT	0.044	0.100

Table 3.21: R squared values for the English MAXCONTRAST p is discourse new data.

	p is discourse new (German, n=40)	Marginal R ²	Conditional R ²
(1)	Verb Class × Polarity	0.499	0.522
(2)	Verb × Polarity	0.525	0.535
(3)	LEX-CP/DP	0.017	0.117
(4)	LEX-HT	0.042	0.116

Table 3.22: R squared values for the German p is discourse new data.

German and Swedish data, which both used the MAXNEWNESS context, have intermediate R² values.

	p is discourse new (Swedish, n=16)	Marginal R ²	Conditional R ²
(1)	Verb Class × Polarity	0.577	0.599
(2)	Verb × Polarity	0.604	0.623
(3)	LEX-CP/DP	0.015	0.120
(4)	LEX-HT	0.049	0.118

Table 3.23: R squared values for the Swedish p is discourse new data.

3.2.6.2 Predictions for MCP

The results from the pragmatic judgement confirmed one important intuition behind a lot of theoretical work in this area, namely that certain pragmatic properties are systematically and fairly robustly associated with certain *classes* of predicates —as opposed to being associated with particular items on a purely lexical basis, or as arising solely as a property of an utterance in a given discourse context. Importantly, however, these dimensions are not a simple consequence of a given verb, but have been shown to depend heavily (and in different ways) on the presence or absence of negation.

In Chapter 5, we return in greater detail to the question of whether these properties are part of the lexical meaning of these verbs. For now, what matters is that we have been able to derive, for each lexical class in both polarities, an independently motivated measure of each pragmatic dimension. Before moving on to the findings of the MCP acceptability studies, let us look at what results we expect to find, given the accounts in (54)–(56).³⁷

To start, on the selection-based views in (54) and (53), repeated here, we predict no interaction with negation. That is, if a verb selects a type of complement that permits MCP, that should hold regardless of higher elements such as negation.³⁸

³⁷Of course, in some cases, the ratings are intermediate, thus making it hard to evaluate what the predictions should be on these pragmatic accounts: do the MCP judgements vary with the various pragmatic dimensions in a gradient fashion, or are MCP licensed in a binary fashion, given sufficiently high levels of the relevant pragmatic dimension? Rather than going into this, rather thorny, issue, we will focus here on those conditions where the predictions of the different accounts *clearly* come apart.

³⁸At least on a standard conception of selection. More recent work has pointed to various forms of ‘non-local’ selection, e.g. Roberts T. (2019). We leave this possibility for future work to consider.

Predictions of lexical accounts for the acceptability of MCP:

- | | | |
|------|--|-------------|
| (57) | Lexical Class à la Hooper and Thompson (1973) | [Lex-HT] |
| | ✓ {Speech act, Doxastic non-factives, Doxastic factives} | |
| | ✗ {Response verbs, Emotive factives} | |
| (58) | Lexical Class à la The CP/DP Interface Hypothesis | [Lex-CP/DP] |
| | ✓ {Speech act, Doxastic non-factives} | |
| | ✗ {Response verbs, Emotive factives, Doxastic factives} | |

As we pointed out above, the more complex (disjunctive or conjunctive) pragmatic accounts ended up reducing to the simpler accounts whereby MCP are licensed by either speaker belief that p, or p being discourse new information. This is illustrated in Table 3.24: a check mark (✓) indicates that, given the results in the previous section, the different pragmatic accounts predict MCP to be acceptable.

	Sp Act (say)		Dox –Fact (believe)		Response+ (accept)		Response- (doubt)		Emo Fact (resent)		Dox +Fact (discover)	
	+	-	+	-	+	-	+	-	+	-	+	-
PRAG-SP	✓	✗?	✓?	✗	✓	✓	✗	✓	✓	✓	✓	✓
PRAG-SPAHL	✓	✗?	✓	✗	✓	✓	✗	✓	✓	✓	✓	✓
PRAG-NEW	✓	✗	✓?	✗	✗	✗	✗	✗	✗	✗	✓	✗
PRAG-SP-NEW	✓	✗	✓?	✗	✗	✗	✗	✗	✗	✗	✓	✗
PRAG-SPAHL-NEW	✓	✗	✓?	✗	✗	✗	✗	✗	✗	✗	✓	✗

Table 3.24: Predictions from the different pragmatic accounts for the availability of MCP.

Hence, we can feel confident in our choice to focus on the hypotheses based on speaker commitment to p and discourse novelty. Table 3.25 shows a more concise summary of the predictions of these accounts.

	Sp Act (say)		Dox -Fact (believe)		Response+ (accept)		Response- (doubt)		Emo Fact (resent)		Dox +Fact (discover)	
	+	-	+	-	+	-	+	-	+	-	+	-
PRAG-SP	✓	✗?	✓?	✗	✓	✓	✗	✓	✓	✓	✓	✓
PRAG-NEW	✓	✗	✓?	✗	✗	✗	✗	✗	✗	✗	✓	✗

Table 3.25: Predictions from the different pragmatic accounts for the availability of MCP.

As we can see in Table 3.25, the two pragmatic accounts make essentially the same predictions for the speech act verbs and the doxastic non-factives in both polarities, and the negative response predicates and the doxastic factives in the positive polarity. The cases to focus on, then, to differentiate between these accounts, are the following:

Predictions of pragmatic accounts for the acceptability of MCP:

- (59) a. Positive response stance verbs: both polarities (e.g. *accept*, *not accept*)
 - b. Negative response stance verbs: negated (e.g. *not doubt*)
 - c. Emotive factives: both polarities (e.g. *resent*, *not resent*)
 - d. Doxastic factives: negated (e.g. *not discover*)
- (60) For each of these,
- a. PRAG-SP predicts: ✓MCP
 - b. PRAG-NEW predicts: ✗MCP

Let us now turn to the main results: the MCP acceptability judgements.

3.2.6.3 Main Clause Phenomena

3.2.6.3.1 German Embedded V2

Looking first at the results from German Embedded V2 (61), illustrated in Table 3.30, we find a very similar pattern to that reported for Swedish V2 in Caplan and Djärv (2019) (Section 3.1) and in Djärv, Heycock, and Rohde (2017) (Section 2.5.2). A similar pattern was also found for Danish V2 by Jensen and Christensen (2013) (Section 2.5.1).

- (61) Maria sagt, Peter geht nach Hause.
Maria says Peter going to home
'Maria says Peter is going home.'

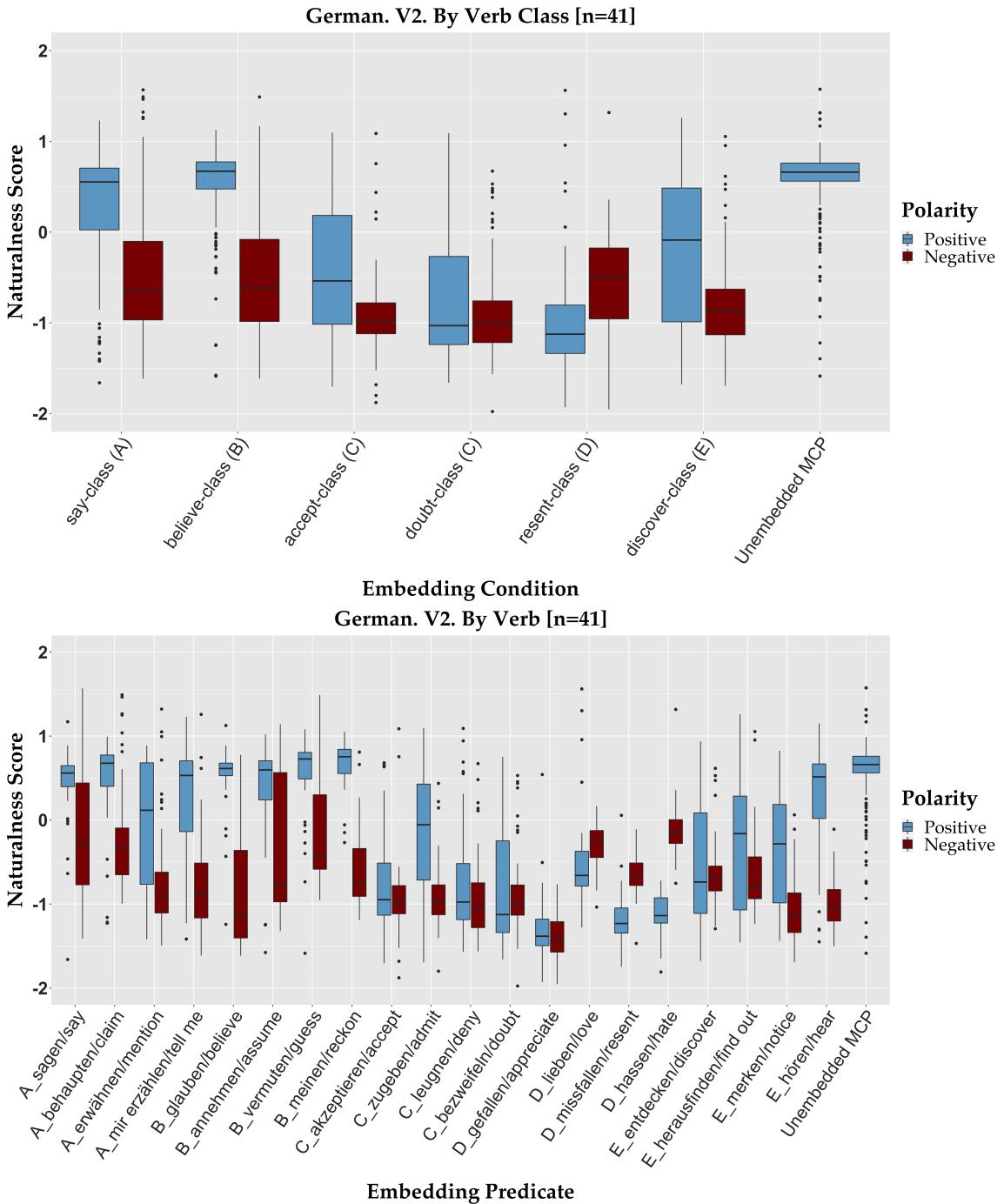


Figure 3.30: German embedded V2

We find that, regarding the effect of predicate type, all verb classes except the doxastic non-factives differ significantly from the speech act verbs ($p < 0.005$). In the case of the

doxastic factives, however, the effect size is small ($\beta = -0.51$) relative to the emotive factives ($\beta = -1.3$) and the negative response verbs ($\beta = -1.01$). The positive response verbs show an intermediate effect size ($\beta = -0.7$). We also observe a main effect of negation ($\beta = -0.71$, $p < 0.005$), as well as a significant interaction with negation in all cases except the doxastic factives (p 's < 0.05). For the doxastic non-factives, this interaction was driven by the fact that these are rated slightly higher in the positive condition ($\beta = 0.24$), an effect that was not significant. In the other cases, the interaction was driven by the low scores in the positive polarity. The output of the regression model is summarized in Table 3.26.

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	0.27505	0.09347	2.943	0.005034 **
VerbClass = Dox.NonFact	0.24370	0.12962	1.880	0.066755 .
VerbClass = Response.Pos	-0.70042	0.15875	-4.412	6.58e-05 ***
VerbClass = Response.Neg	-1.01332	0.15875	-6.383	9.40e-08 ***
VerbClass = Emo.Fact	-1.30212	0.12962	-10.046	6.13e-13 ***
VerbClass = Dox.Fact	-0.50703	0.12962	-3.912	0.000315 ***
Polarity = Neg	-0.71346	0.06324	-11.281	< 2e-16 ***
VerbClass = Dox.NF : Polarity = Neg	-0.28846	0.08944	-3.225	0.001285 **
VerbClass = Response.Pos : Polarity = Neg	0.24438	0.10954	2.231	0.025827 *
VerbClass = Response.Neg : Polarity = Neg	0.58801	0.10954	5.368	9.17e-08 ***
VerbClass = Emo.Fact : Polarity = Neg	1.12070	0.08944	12.530	< 2e-16 ***
VerbClass = Dox.Fact : Polarity = Neg	0.12574	0.08944	1.406	0.159969

Table 3.26: German V2 data. Output of regression model: predicting acceptability scores from the embedding predicate and polarity of the matrix clause. Number of observations = 1640, on 41 subjects and 40 items.

Looking first at the lexical accounts, it should be clear from considering the positive doxastic factives that the account based on the classification of the CP/DP Interface Hypothesis is too restrictive, since it predicts all factives to disallow MCP. The classification from Hooper and Thompson (1973) clearly do better in this regard. However, contrary to the view of Wiklund et al. (2009), this cannot be due to selection, given the interaction with

negation for each of the speech act verbs the doxastic non-factives, and the doxastic factives. This is confirmed by comparing the models based on these classifications with those based on verb (class) \times polarity. As shown in Table 3.27, the highest Marginal R squared value is found for Verb \times polarity ($mR^2=0.48$), followed by Verb Class \times Polarity with an mR^2 of 0.36. These are markedly higher than the values for the other models ($mR^2's=0.17, 0.13$). (As in the above data, we also find only a small gain in the amount variation accounted for if we also consider the individual verbs or the random effects).

	German V2 data (n=41)	Marginal R ²	Conditional R ²
(1)	Verb Class \times Polarity	0.362601	0.4680442
(2')	Verb \times Polarity	0.4811563	0.5097774
(3)	LEX-CP/DP	0.172379	0.2793046
(4)	LEX-HT	0.1324976	0.2807856

Table 3.27: R squared values for the German V2 data: lexical accounts.

Turning then to the pragmatic accounts, we can now compare their predictions with the observed results.

- (62) a. Positive response stance verbs: both polarities (e.g. *accept, not accept*)
 - b. Negative response stance verbs: negated (e.g. *not doubt*)
 - c. Emotive factives: both polarities (e.g. *resent, not resent*)
 - d. Doxastic factives: negated (e.g. *not discover*)
- (63) For each of these,
- a. PRAG-SP predicts: ✓MCP
 - b. PRAG-NEW predicts: ✗MCP
 - c. Observed result: ✗MCP

The distribution of embedded V2, then, is clearly as we would predict on the account based on discourse novelty, in line with Caplan and Djärv (2019).

Note that the models predicting the acceptability of V2 from speaker commitment to p or the status of p as discourse new content both account for very little of the variation in the data (Table 3.28). As we discussed in Section 3.2.4.2, however, this is likely a methodological problem relating to the implementation of these specific statistical predictors, rather than the predictive power of the various pragmatic dimensions per se. Here, we report this data for transparency and completeness, however, the focus in evaluating the various account will be on the specific patterns found in the data, rather than these variables.

	German V2 data (n=41)	Marginal R ²	Conditional R ²
(5)	PRAG-SP	0.1432901	0.6459056
(6)	PRAG-NEW	0.1097904	0.3694876

Table 3.28: R squared values for the German V2 data: pragmatic accounts.

3.2.6.3.2 Scene Setting Adverbs

Turning next to the scene setting adverbs (64), we find very little sensitivity to the various predictors, as illustrated in Figure 3.31.

- (64) John said that, last week, Mary read a great book.

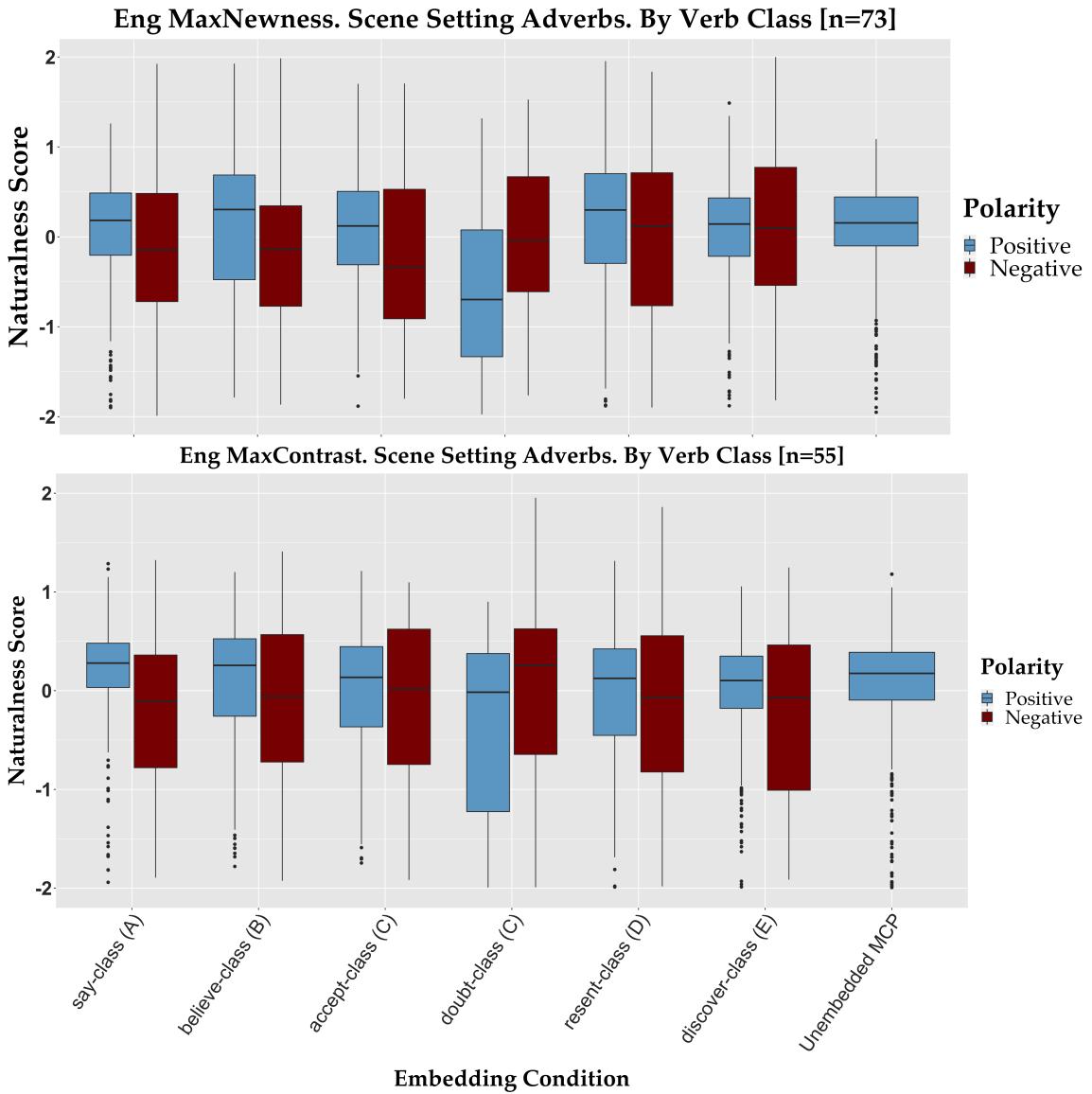


Figure 3.31: Scene Setting Adverbs [English MAXNEWNESS, MAXCONTRAST]

This lack of variation is corroborated by the statistical models, shown in Tables 3.29–3.30. While it is true that certain contrasts come out as significant in this model, the effect sizes are all relatively small. Note also that none of the statistically significant effects track any of the predictions made by the various theoretical accounts.

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	9.847e-03	8.339e-02	0.118	0.90650
VerbClass = Dox.NonFact	8.042e-02	1.176e-01	0.684	0.49727
VerbClass = Response.Pos	1.689e-02	1.440e-01	0.117	0.90714
VerbClass = Response.Neg	-7.372e-01	1.440e-01	-5.120	5.51e-06 ***
VerbClass = Emo.Fact	1.196e-01	1.176e-01	1.017	0.31431
VerbClass = Dox.Fact	2.346e-02	1.176e-01	0.200	0.84271
Polarity = Neg	-1.733e-01	6.506e-02	-2.664	0.00777 **
VerbClass = Dox.NF : Polarity = Neg	-1.052e-01	9.201e-02	-1.143	0.25308
VerbClass = Response.Pos : Polarity = Neg	-1.102e-01	1.127e-01	-0.978	0.32818
VerbClass = Response.Neg : Polarity = Neg	8.334e-01	1.127e-01	7.395	1.85e-13 ***
VerbClass = Emo.Fact : Polarity = Neg	3.350e-02	9.201e-02	0.364	0.71583
VerbClass = Dox.Fact : Polarity = Neg	2.091e-01	9.201e-02	2.272	0.02314 *

Table 3.29: English MAXNEWNESS Scene Setting Adverb data. Output of regression model: predicting acceptability scores from the embedding predicate and polarity of the matrix clause. Number of observations = 2920, on 73 subjects and 40 items.

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	0.12570	0.09499	1.323	0.191939
VerbClass = Dox.NonFact	-0.05204	0.13300	-0.391	0.697389
VerbClass = Response.Pos	-0.11074	0.16289	-0.680	0.499947
VerbClass = Response.Neg	-0.46130	0.16289	-2.832	0.006803 **
VerbClass = Emo.Fact	-0.28135	0.13300	-2.115	0.039747 *
VerbClass = Dox.Fact	-0.19913	0.13300	-1.497	0.141063
Polarity = Neg	-0.40647	0.07223	-5.628	2.07e-08 ***
VerbClass = Dox.NF : Polarity = Neg	0.18165	0.10215	1.778	0.075502 .
VerbClass = Response.Pos : Polarity = Neg	0.32231	0.12510	2.576	0.010054 *
VerbClass = Response.Neg : Polarity = Neg	0.72318	0.12510	5.781	8.56e-09 ***
VerbClass = Emo.Fact : Polarity = Neg	0.38427	0.10215	3.762	0.000173 ***
VerbClass = Dox.Fact : Polarity = Neg	0.22175	0.10215	2.171	0.030055 *

Table 3.30: English MAXCONTRAST Scene Setting Adverb data. Output of regression model: predicting acceptability scores from the embedding predicate and polarity of the matrix clause. Number of observations = 2200, on 55 subjects and 40 items.

More importantly, *none* of the regression models have a Marginal R squared value higher than 0.06 (compared with $R^2 > 0.4$ for the German V2 data, and $R^2 > 0.7$ for the pragmatic inference data), as shown in Tables 3.31–3.32.

	English MAXNEWNESS Scene Setting Adverb data (n=73)	Marginal R ²	Conditional R ²
(1)	Verb Class × Polarity	0.052	0.113
(2')	Verb × Polarity	0.087	0.154
(3)	LEX-CP/DP	7.243437e-05	0.078
(4)	LEX-HT	0.002	0.078
(5)	SP	0.053	0.133
(6)	NEW	0.005	0.079

Table 3.31: R squared values for the English MAXNEWNESS Scene Setting Adverb data.

	English MAXCONTRAST Scene Setting Adverb data (n=55)	Marginal R ²	Conditional R ²
(2)	Verb Class × Polarity	0.029	0.120
(2)	Verb × Polarity	0.077	0.161
(3)	DEF	0.003	0.088
(4)	HT	0.001	0.088
(5)	SP	0.022	0.127
(6)	NEW	0.028	0.128

Table 3.32: R squared values for the English MAXCONTRAST Scene Setting Adverb data.

While this lack of differentiation based on embedding condition is perhaps not surprising, given the claim from Haegeman that scene setting adverbs do not constitute a MCP in the relevant sense, it turns out that the same lack of sensitivity to the type of embedding condition is found in the English topicalization data.

3.2.6.3.3 Topicalization

As shown in Figure 3.32, English topicalization (65) shows the same lack of variation among the different embedding environments as we saw with the scene setting adverbs.

- (65) John said that, this book, Mary read.

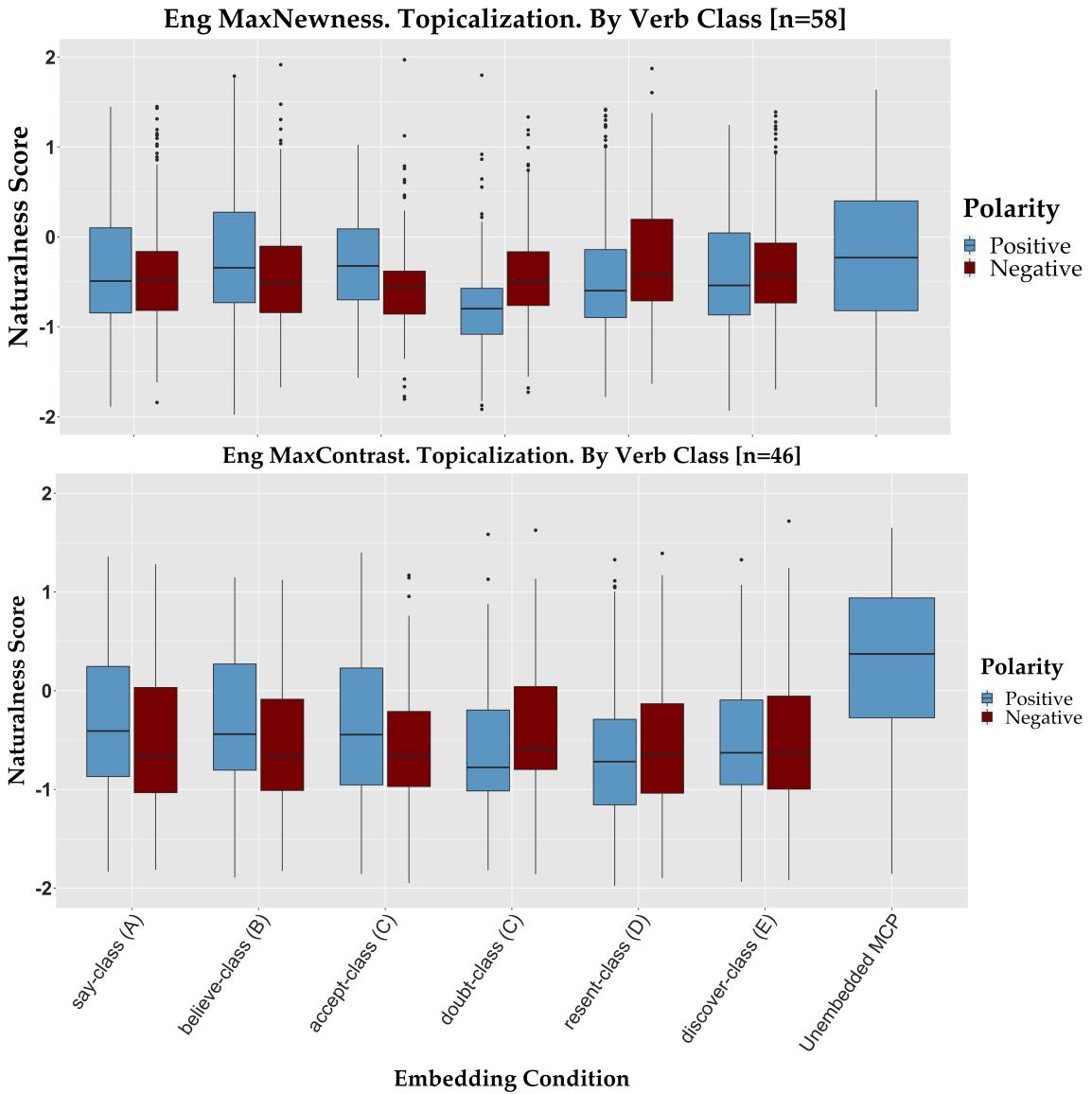


Figure 3.32: Topicalization [EnglishMAXNEWNESS, MAXCONTRAST]

Again, this lack of an effect is corroborated by the statistical analysis (Tables 3.33–3.34) as with the scene setting adverbs, we find that while some of the effects do come out as significant, the effect sizes are all very small, and not in line with the predictions of any theoretical view. And again, as shown in Tables 3.35–3.36, none of the regression models have a Marginal R squared value higher than 0.12.

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	-0.39337	0.08307	-4.735	2.18e-05 ***
VerbClass = Dox.NonFact	0.22559	0.11716	1.925	0.06053 .
VerbClass = Response.Pos	0.12469	0.14350	0.869	0.38951
VerbClass = Response.Neg	-0.37575	0.14350	-2.619	0.01200 *
VerbClass = Emo.Fact	-0.03660	0.11716	-0.312	0.75619
VerbClass = Dox.Fact	-0.01851	0.11716	-0.158	0.87515
Polarity = Neg	-0.02092	0.05986	-0.350	0.72672
VerbClass = Dox.NF : Polarity = Neg	-0.24932	0.08465	-2.945	0.00326 **
VerbClass = Response.Pos : Polarity = Neg	-0.24333	0.10368	-2.347	0.01901 *
VerbClass = Response.Neg : Polarity = Neg	0.35448	0.10368	3.419	0.00064 ***
VerbClass = Emo.Fact : Polarity = Neg	0.14907	0.08465	1.761	0.07839 .
VerbClass = Dox.Fact : Polarity = Neg	0.07869	0.08465	0.930	0.35271

Table 3.33: English MAXNEWNESS Topicalization data. Output of regression model: predicting acceptability scores from the embedding predicate and polarity of the matrix clause. Number of observations = 2320, on 58 subjects and 40 items.

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	-3.133e-01	7.293e-02	-4.296	5.55e-05 ***
VerbClass = Dox.NonFact	8.556e-03	9.917e-02	0.086	0.931530
VerbClass = Response.Pos	-3.930e-02	1.215e-01	-0.324	0.747356
VerbClass = Response.Neg	-2.628e-01	1.215e-01	-2.164	0.034417 *
VerbClass = Emo.Fact	-3.489e-01	9.917e-02	-3.518	0.000831 ***
VerbClass = Dox.Fact	-1.983e-01	9.917e-02	-2.000	0.050022 .
Polarity = Neg	-1.845e-01	7.044e-02	-2.620	0.008881 **
VerbClass = Dox.NF : Polarity = Neg	-8.013e-02	9.962e-02	-0.804	0.421288
VerbClass = Response.Pos : Polarity = Neg	-6.550e-02	1.220e-01	-0.537	0.591430
VerbClass = Response.Neg : Polarity = Neg	3.675e-01	1.220e-01	3.012	0.002632 **
VerbClass = Emo.Fact : Polarity = Neg	2.848e-01	9.962e-02	2.858	0.004308 **
VerbClass = Dox.Fact : Polarity = Neg	1.534e-01	9.962e-02	1.539	0.123899

Table 3.34: English MAXCONTRAST Topicalization data. Output of regression model: predicting acceptability scores from the embedding predicate and polarity of the matrix clause. Number of observations = 1840, on 46 subjects and 40 items.

	English MAXNEWNESS Topicalization data (n=58)	Marginal R ²	Conditional R ²
(1)	Verb Class × Polarity	0.033	0.125
(2)	Verb × Polarity	0.085	0.162
(3)	LEX-CP/DP	0.002	0.098
(4)	LEX-HT	0.003	0.098
(5)	SP	0.027	0.132
(6)	NEW	0.001	0.096

Table 3.35: R squared values for the English MAXNEWNESS Topicalization data.

	English MAXCONTRAST Topicalization data (n=46)	Marginal R ²	Conditional R ²
(1)	Verb Class × Polarity	0.027	0.102
(2)	Verb × Polarity	0.061	0.116
(3)	LEX-CP/DP	0.007	0.079
(4)	LEX-HT	0.004	0.079
(5)	SP	0.001	0.082
(6)	NEW	0.013	0.084

Table 3.36: R squared values for the English MAXCONTRAST Topicalization data.

While this may seem surprising, given the many accounts taking English Topicalization to be *the* example of MCP, it should perhaps not be *that* unexpected after all, given the vast disagreement about its distribution, shown in Chapter 2.

3.2.6.3.4 Speech Act Adverbs

Turning finally to the speech act adverbs in English and German, we find that also in this case there is very little sensitivity to the various embedding conditions, as shown in Figures 3.33.

- (66) a. Anna said that Lisa honestly got fired.
- b. Anna hat gesagt, dass Lisa **offen gestanden** gefeuert wurde.
 Anna has said that Lisa frankly.said fired was
 ‘Anna said that Lisa, to be frank, got fired.’

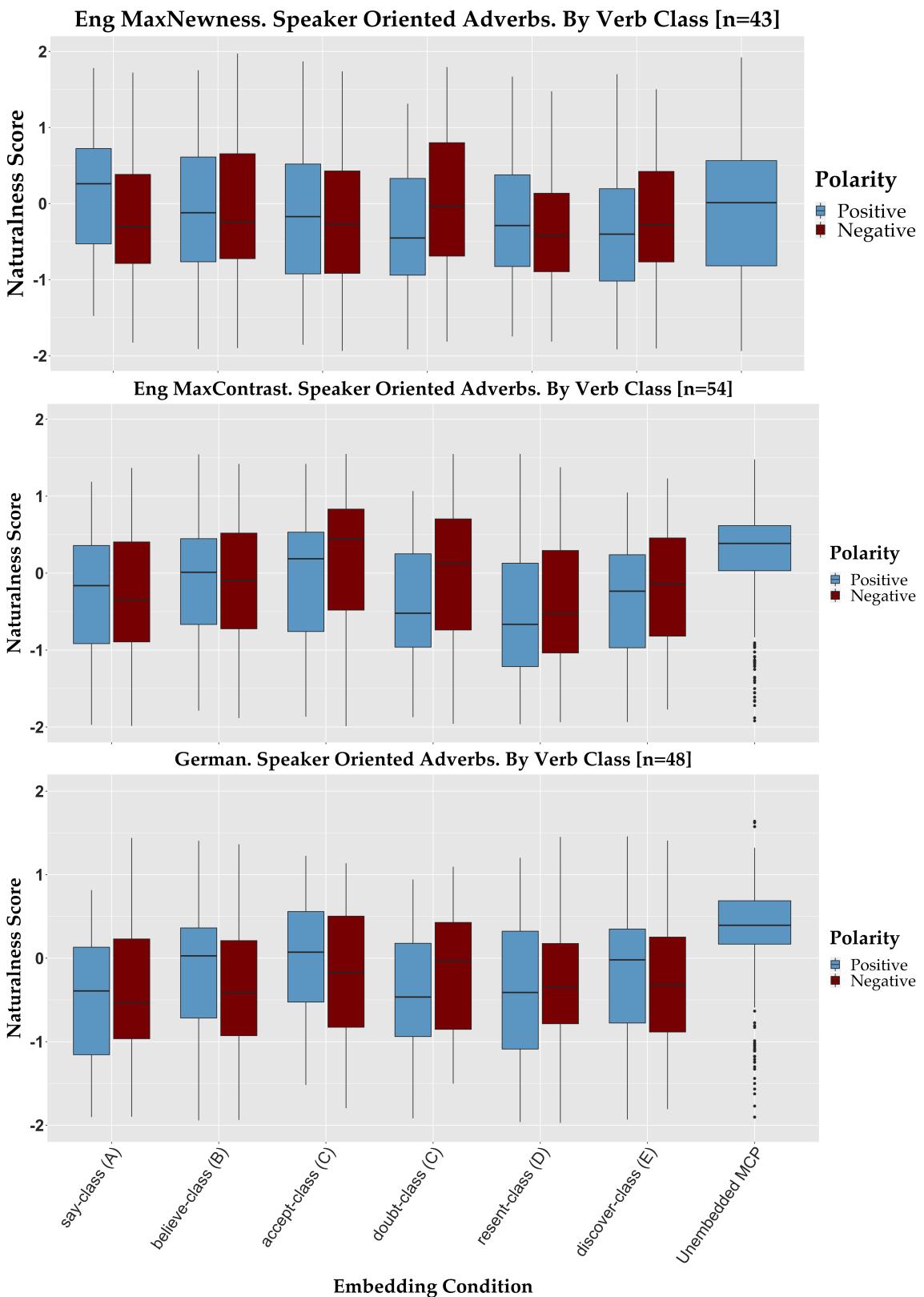


Figure 3.33: speech act adverbs[English MAXNEWNESS, MAXCONTRAST, German]

The lack of effect, as we saw with both the scene setting adverbs and with topicalization, is corroborated by the regressions in Tables 3.37–3.39, showing some small but significant effects — neither of which is in line with any theoretical account. And as in those cases, comparing the R-squared values (Tables 3.40–3.42), we find that none of the models have a Marginal R squared higher than 0.11.

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	0.10970	0.13149	0.834	0.408862
VerbClass = Dox.NonFact	-0.17849	0.18596	-0.960	0.342620
VerbClass = Response.Pos	-0.27993	0.22775	-1.229	0.225871
VerbClass = Response.Neg	-0.44722	0.22775	-1.964	0.056210 .
VerbClass = Emo.Fact	-0.38341	0.18596	-2.062	0.045445 *
VerbClass = Dox.Fact	-0.53087	0.18596	-2.855	0.006661 **
Polarity = Neg	-0.30460	0.08355	-3.646	0.000275 ***
VerbClass = Dox.NF : Polarity = Neg	0.27497	0.11816	2.327	0.020080 *
VerbClass = Response.Pos : Polarity = Neg	0.23824	0.14472	1.646	0.099901 .
VerbClass = Response.Neg : Polarity = Neg	0.65528	0.14472	4.528	6.38e-06 ***
VerbClass = Emo.Fact : Polarity = Neg	0.22650	0.11816	1.917	0.055429 .
VerbClass = Dox.Fact : Polarity = Neg	0.47744	0.11816	4.041	5.57e-05 ***

Table 3.37: English MAXNEWNESS speech act adverb data. Output of regression model: predicting acceptability scores from the embedding predicate and polarity of the matrix clause. Number of observations = 1720, on 43 subjects and 40 items.

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	-0.27040	0.11683	-2.315	0.0253 *
VerbClass = Dox.NonFact	0.13780	0.16277	0.847	0.4020
VerbClass = Response.Pos	0.22829	0.19936	1.145	0.2586
VerbClass = Response.Neg	-0.18418	0.19936	-0.924	0.3608
VerbClass = Emo.Fact	-0.35142	0.16277	-2.159	0.0366 *
VerbClass = Dox.Fact	-0.12385	0.16277	-0.761	0.4510
Polarity = Neg	-0.08200	0.07270	-1.128	0.2595
VerbClass = Dox.NF : Polarity = Neg	0.06061	0.10281	0.590	0.5555
VerbClass = Response.Pos : Polarity = Neg	0.20637	0.12591	1.639	0.1014
VerbClass = Response.Neg : Polarity = Neg	0.49559	0.12591	3.936	8.56e-05 ***
VerbClass = Emo.Fact : Polarity = Neg	0.26226	0.10281	2.551	0.0108 *
VerbClass = Dox.Fact : Polarity = Neg	0.23036	0.10281	2.241	0.0251 *

Table 3.38: English MAXCONTRAST speech act adverb data. Output of regression model.

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	-0.56149	0.09148	-6.138	7.04e-08 ***
VerbClass = Dox.NonFact	0.36612	0.12322	2.971	0.004521 **
VerbClass = Response.Pos	0.54001	0.15091	3.578	0.000771 ***
VerbClass = Response.Neg	0.16357	0.15091	1.084	0.283514
VerbClass = Emo.Fact	0.13927	0.12322	1.130	0.263668
VerbClass = Dox.Fact	0.33734	0.12322	2.738	0.008505 **
Polarity = Neg	0.16594	0.07441	2.230	0.025853 *
VerbClass = Dox.NF : Polarity = Neg	-0.34276	0.10523	-3.257	0.001145 **
VerbClass = Response.Pos : Polarity = Neg	-0.38309	0.12887	-2.973	0.002991 **
VerbClass = Response.Neg : Polarity = Neg	0.01201	0.12887	0.093	0.925768
VerbClass = Emo.Fact : Polarity = Neg	-0.01129	0.10523	-0.107	0.914596
VerbClass = Dox.Fact : Polarity = Neg	-0.31206	0.10523	-2.966	0.003060 **

Table 3.39: German speech act adverb data. Output of regression model: predicting acceptability scores from the embedding predicate and polarity of the matrix clause. Number of observations = 1840, on 48 subjects and 40 items.

	English MAXNEWNESS speech act adverb data (n=43)	Marginal R ²	Conditional R ²
(1)	Verb Class × Polarity	0.032	0.183
(2)	Verb × Polarity	0.076	0.248
(3)	LEX-CP/DP	0.015	0.155
(4)	LEX-HT	0.003	0.156
(5)	SP	0.006	0.170
(6)	NEW	0.001	0.152

Table 3.40: R squared values for the English MAXNEWNESS speech act adverb data.

	English MAXCONTRAST speech act adverb data (n=54)	Marginal R ²	Conditional R ²
(1)	Verb Class × Polarity	0.048	0.197
(2)	Verb × Polarity	0.096	0.243
(3)	LEX-CP/DP	0.003	0.176
(4)	LEX-HT	0.001	0.176
(5)	SP	0.005	0.192
(6)	NEW	8.506115e-06	0.173

Table 3.41: R squared values for the English MAXCONTRAST speech act adverb data.

	German speech act adverb data (n=48)	Marginal R ²	Conditional R ²
(1)	Verb Class × Polarity	0.026	0.148
(2)	Verb × Polarity	0.083	0.180
(3)	LEX-CP/DP	0.003	0.130
(4)	LEX-HT	0.002	0.130
(5)	SP	0.004	0.132
(6)	NEW	0.001	0.128

Table 3.42: R squared values for the German speech act adverb data.

3.2.7 Inter-speaker variation?

Before concluding this section, recall the concern raised above, that (at least some of) the variable and conflicting judgements reported in the literature might be due to variation across speakers. To test for this, we plotted the participants responses for each MCP variant, including the unmarked control conditions.³⁹ The x-axis represents the participants in the different studies, ordered by their average acceptability score for the particular condition.

Figure 3.34 show these responses plotted for the unmarked unembedded (main clause)

³⁹To do this, we took the participants mean responses by predicate type and polarity, thus giving us a dataset consisting of one data point per participant, for each predicate type and polarity combination. This was done using the `ddply` function in the `dplyr` package in R, with the options `summarise` and `mean()`.

control sentences in each language variant (in German, these are of course V2). Compare this to the topicalization and V2 data in Figures 3.35–3.36, across both unembedded and the various embedding conditions.⁴⁰ As we can see from these plots, while there is clear variation across speakers, there is no difference in the type of pattern observed in the unmarked unembedded control clauses (of the type *Mary likes Bill*) and in the various MCP-variations, regardless of the type of embedding condition. We also find no indication of any kind of bimodal distribution, as would be expected if we're looking at two different grammars.

⁴⁰The difference between the German data in Figure 3.34 and Figure 3.35 is in terms of the subjects; the stimuli for these are the same.

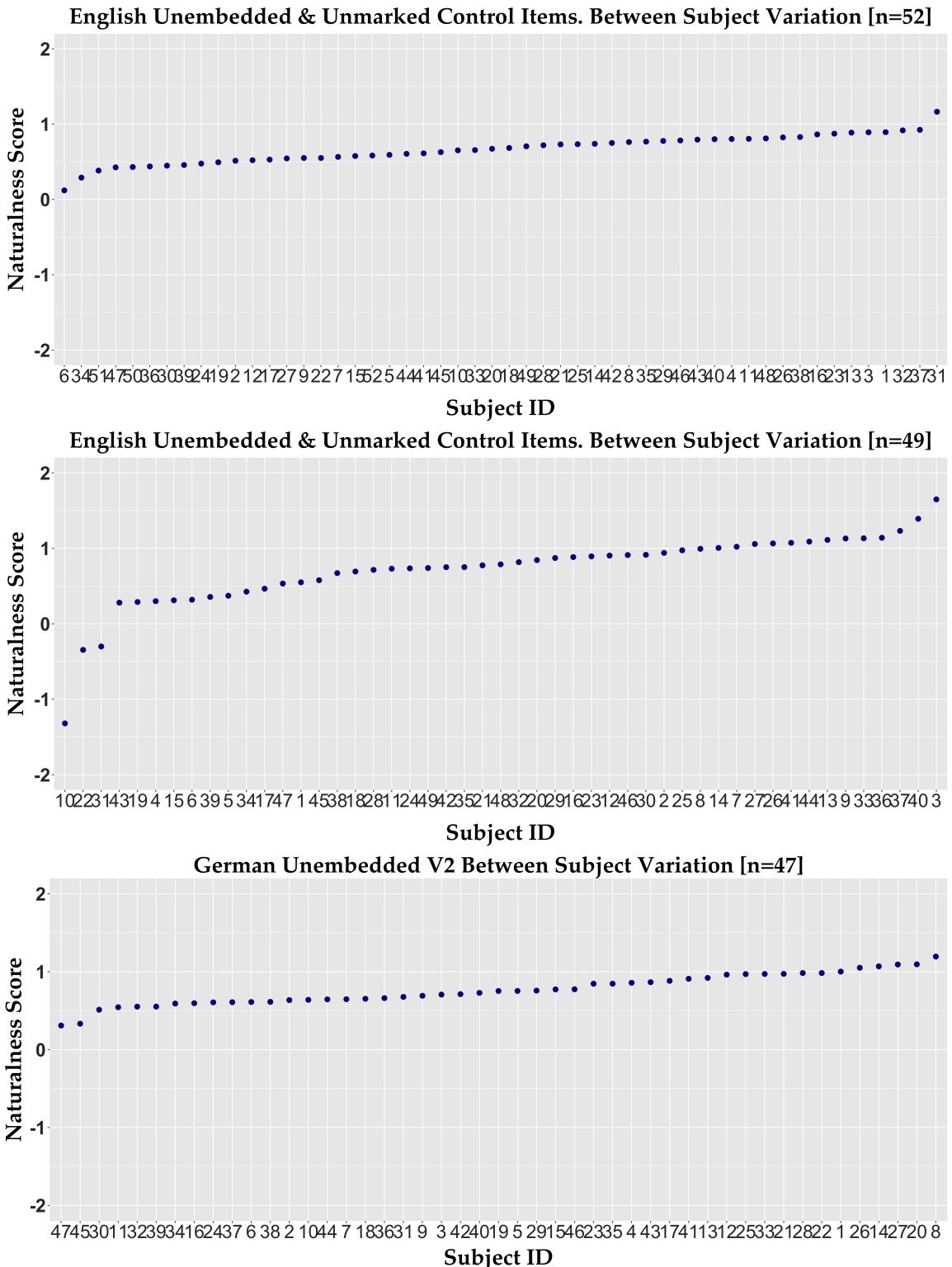


Figure 3.34: By participant acceptability ratings for unmarked main clauses in each of the language variants. From top to bottom: English MAXCONTRAST; English MAXNEWNESS; German.

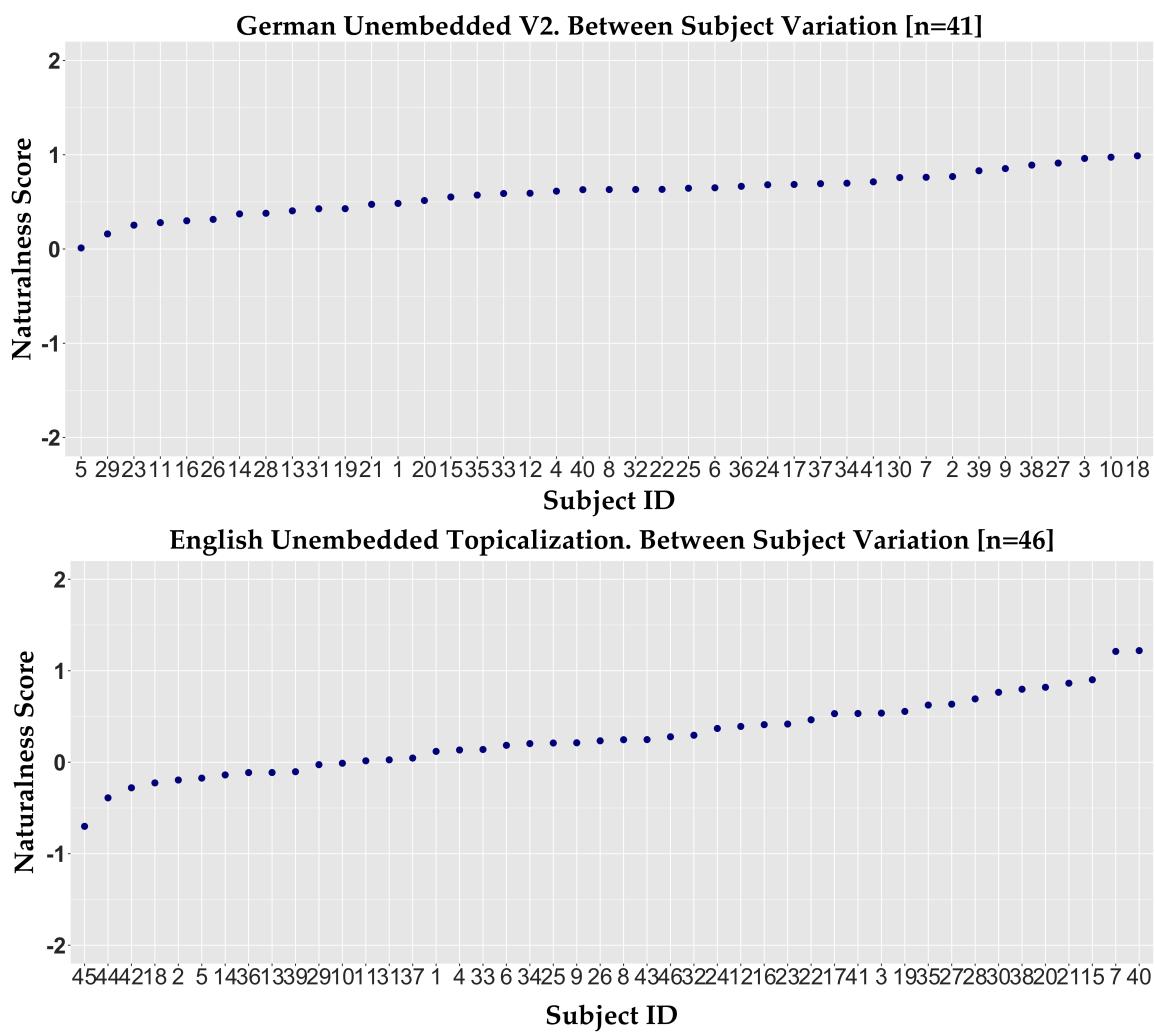


Figure 3.35: By participant acceptability ratings for German main clause V2 (top) and English main clause topicalization (MAXCONTRAST) (bottom).

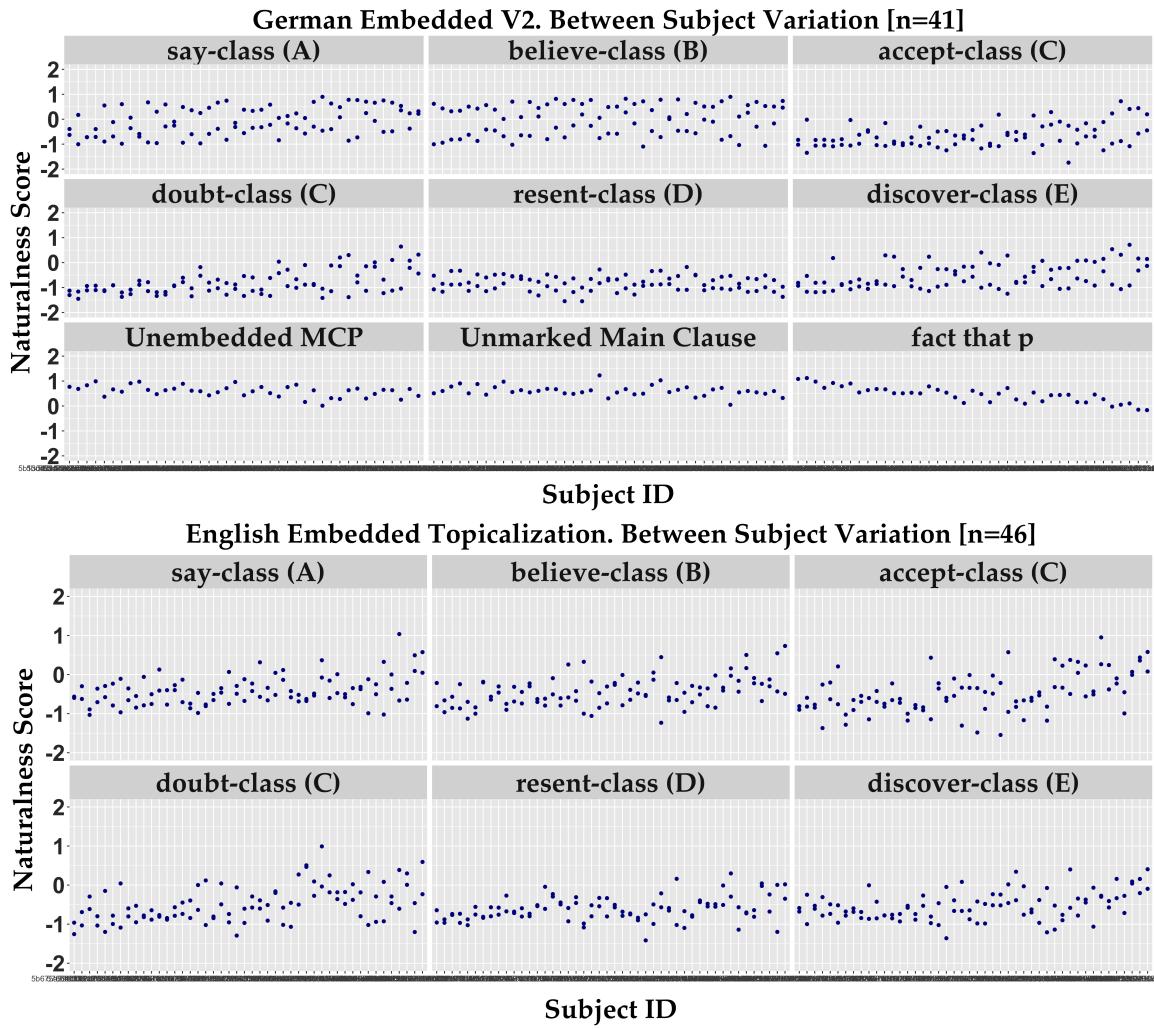


Figure 3.36: By participant acceptability ratings for German embedded V2 (top) and English embedded topicalization (MAXCONTRAST) (bottom).

3.2.8 Summary

From the pragmatic inference studies, we were able to derive an independent and empirically motivated measure of the various pragmatic dimensions claimed to be responsible for MCP licensing —for the very same items that were then tested for the acceptability of various MCP. By manipulating the polarity of the predicates, we were also able to disentangle pragmatic and selection based accounts of the availability of MCP.

Interestingly, and somewhat surprisingly, we saw that among the four constructions

investigated here, only German embedded V2 showed any sensitivity to the factors manipulated in the experiment. The pattern we found was very similar to that observed for Swedish V2 in Caplan and Djärv (2019) (Section 3.1) and Djärv, Heycock, and Rohde (2017) (Section 2.5.2), as well as for Danish V2 in Jensen and Christensen (2013) (Section 2.5.1): V2 was rated as acceptable, only under the speech act verbs, the doxastic non-factives, and the doxastic factives, and only in the positive polarity. The large effect of negation speaks strongly against a purely selection-based account. Rather, the distribution tracked very closely the cases that were found to allow for the introduction of discourse new content, in line with the pragmatic approach of Caplan and Djärv (2019), outlined in Section 3.1. We return in the next section to exactly what this statement amounts to.

The pragmatic accounts based on speaker (or attitude holder) commitment to p were found to over-generate the kinds of contexts that are predicted to allow embedded V2. The same was also true for attitude holder belief. To really get a sense for this, compare the results for each of the pragmatic dimensions with the acceptability ratings for embedded V2, repeated in Figure 3.37 below. Figures 3.38–3.39 below further illustrate how the predictions of the different pragmatic accounts come apart (focusing on the most striking cases where the predictions of the various accounts diverge: the interaction with polarity for negative response verbs, and the distribution across factivity). From these plots, it is clear that the distribution of German embedded V2 is best predicted by discourse novelty.

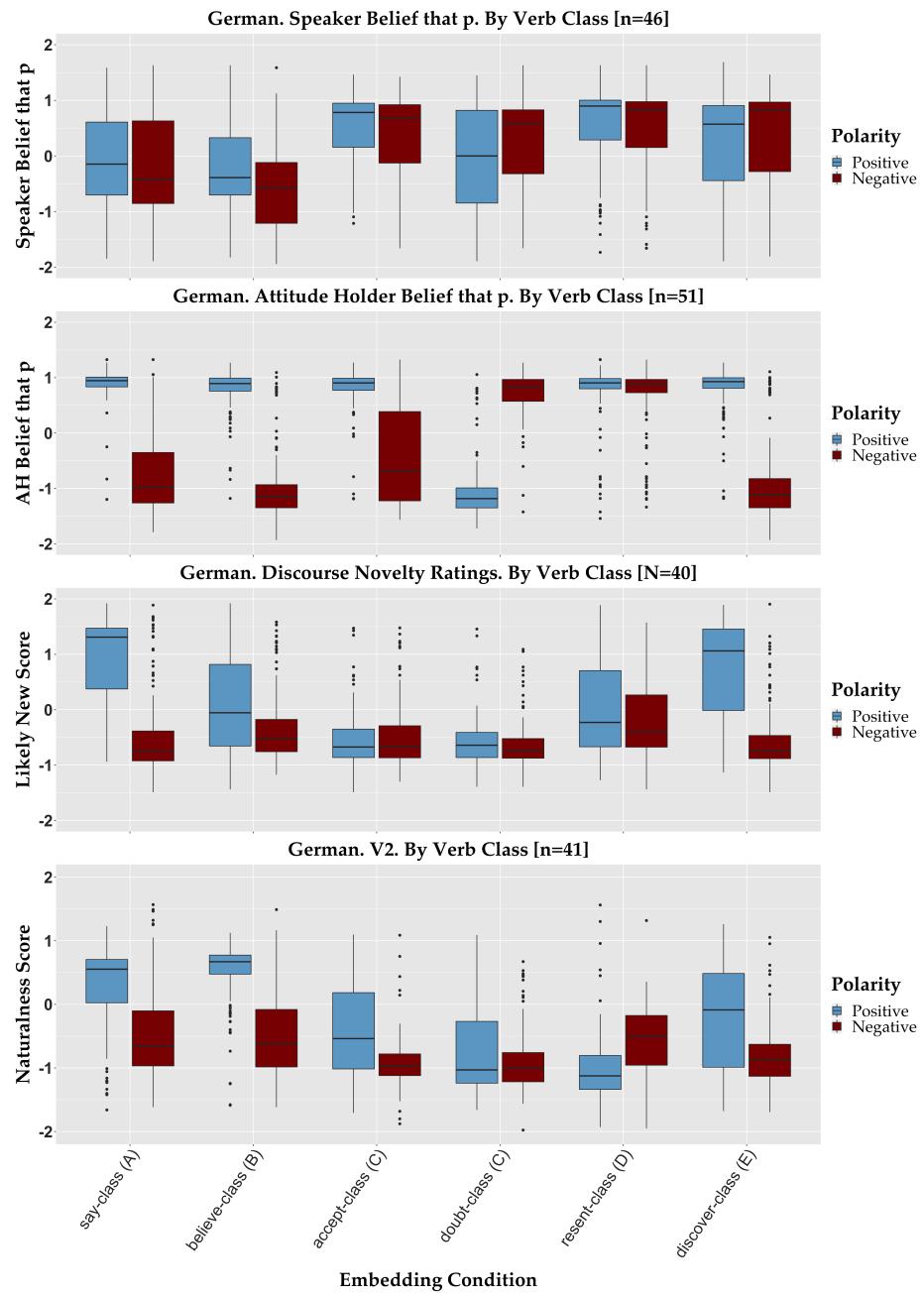


Figure 3.37: German: Speaker commitment to p; Attitude holder commitment to p, p as discourse new content; Embedded V2.

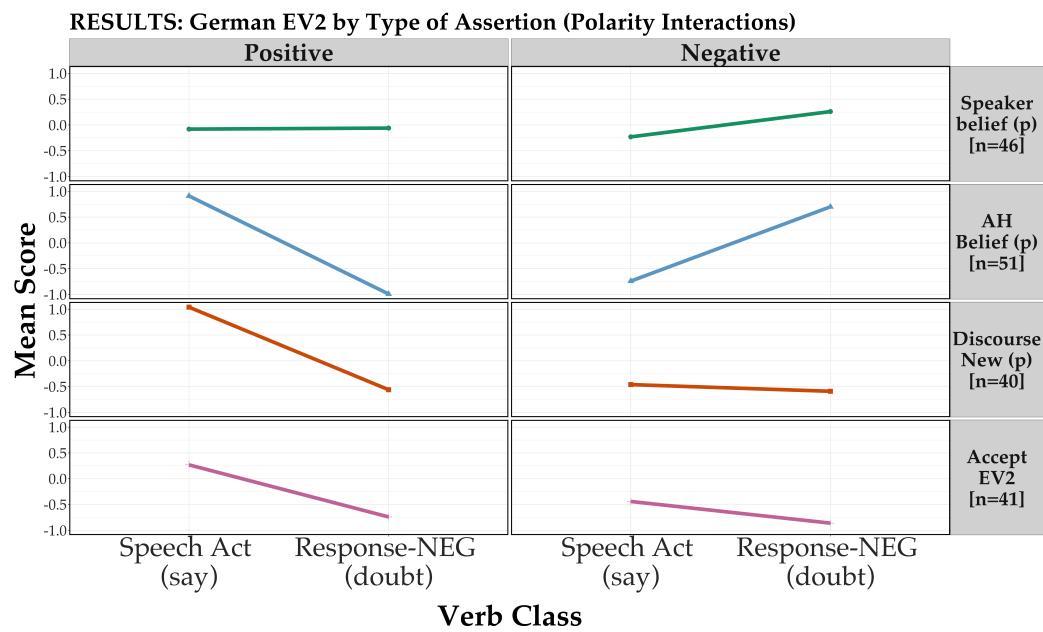


Figure 3.38: Acceptability of German EV2 as predicted by different measures of assertion: polarity interaction. The y-axis values represent the mean scores for each judgement type.

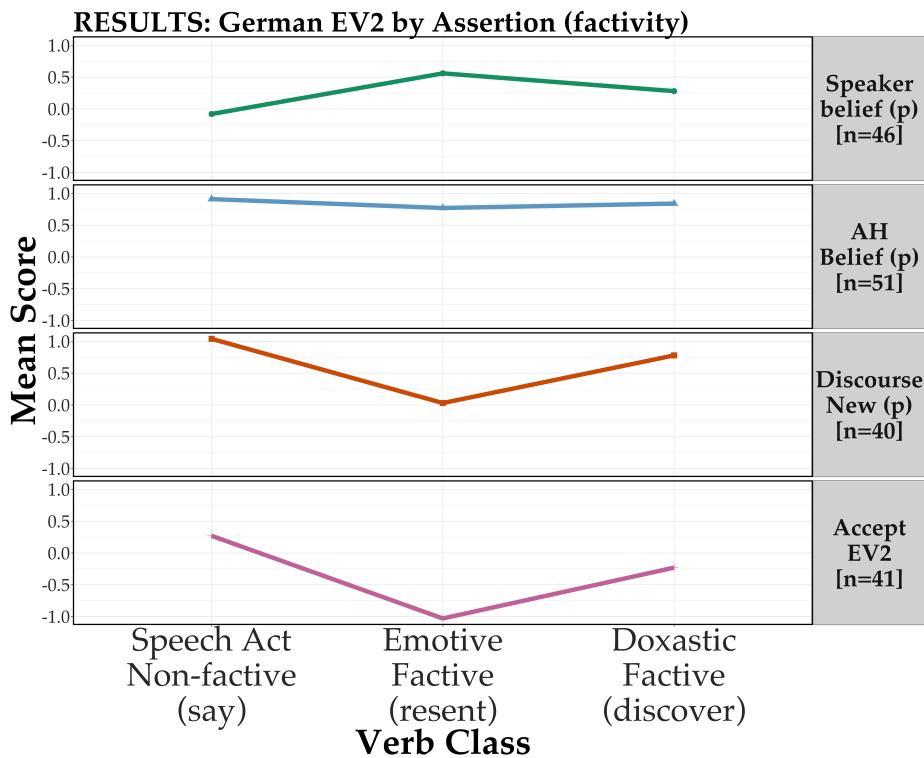


Figure 3.39: Acceptability of German EV2 as predicted by different measures of assertion: factivity. The y-axis values represent the mean scores for each judgement type.

It is of course possible, given these results, that some level of speaker commitment to p is still necessary. A possible follow-up to test whether this is the case would be to test the acceptability of embedded V2 in a context like the one used here (67), but to add a manipulation that explicitly varies the speaker's endorsement of the embedded proposition as in the (a) vs. (b) continuations:

- (67) Guess what! I just talked to John, and he said that Bill and Lisa broke up!

 - a. . . Poor Bill! He must be heartbroken. [+Speaker commitment]
 - b. . . but I know that can't be right, because I just saw them, and they seemed very much in love. [-Speaker commitment]

It is remarkable then, that only embedded V2 was found to show the distribution of MCP as characterized by Hooper and Thompson (1973), given that their original discussion was

based entirely on English. In another sense, however, it should perhaps not be too surprising, given the vast disagreements in the theoretical literature about the data. Regarding the issue of what a theory of MCP should look like, we are left with a swath of new questions. If anything, what is generally taken to be a relatively cohesive class of MCP is in fact a fairly heterogeneous set of constructions, in terms of their licensing conditions. Given the lack of sensitivity to both the type of embedding predicate and negation, we might ask whether what looked like a systematic prohibition on certain constructions in particular embedded contexts is in fact due to a conglomerate of conspiring factors. As shown in Section 3.2.4.2, even in the unmarked control conditions, there was a non-trivial penalty for (a) embedding under negation, and (b) embedding under certain verb classes. Recall also that topicalization in English must be contrastive. It is fairly plausible that the availability of contrast depends to some degree on the embedding predicate (Bianchi and Frascarelli 2009). However, as shown by the examples in (68), and corroborated by the current data, this can clearly be solved by sufficient contextual support.

- (68) Bianchi and Frascarelli (2009, p. 69)

- a. I am glad that [this unrewarding job], she has finally decided to give up.
- b. Mary didn't tell us that [Bill] she had fired, and [John] she had decided to promote.

It might just be then that the much-cited sentence in (69),⁴¹ often taken as evidence that factives (or presuppositional/referential predicates) disallow MCP, is simply lacking sufficient context to support a contrastive reading of the topicalized DP.

- (69) *John {regrets, resents, denies, remembers, realizes} that this book, Mary read.

It is plausible, then, that compounded with a general dis-preference for embedding under some of these predicates, the overall effect amounts to something that looks like a systematic

⁴¹E.g. in Hegarty (1992), Maki et al. (1999), Haegeman and Ürögdi (2010), De Cuba and Ürögdi (2010), Haegeman (2012), Kastner (2015), and De Cuba (2017a).

restriction on MCP in these contexts. To resolve these issues, this kind of quantitative comparative data has been very helpful. What is particularly informative in this regard, is the magnitude, and the robustness, of the effect of predicate type and polarity in the case of embedded V2. It is now an open empirical question exactly what –if anything– the unifying characteristic or property is, that allows us to talk about MCP as a theoretically meaningful construction. I will leave this question for future research to address, and focus the remainder of this chapter on the licensing of embedded V2 in German and Swedish.

Finally, regarding the pragmatic dimensions of interest, an important finding of this experiment was that it provided a solid empirical underpinning for the common assumption in theoretical syntax and semantics, that predicates cluster into *classes*, based on their pragmatic properties. In the pragmatic inference studies, we observed a robust association of each of the three pragmatic properties with specific verb class and polarity conditions; an association which we found to hold robustly across the three languages and the two discourse contexts investigated. As shown by the comparisons of R squared values, we also found that a lot of the variation in the data is really captured by the a priori classifications, thus motivating the use of these classes as theoretically meaningful constructions.

In the following chapter, the notion of factivity will be examined in some detail. As a primer for this discussion, it is worth pointing out that while the speaker commitment inferences were generally the most variable across the various conditions, and did also not distinguish between the different verb classes as clearly as discourse novelty and attitude holder commitment, we found that the factive verbs were reassuringly robust in their projection behaviour. Interestingly, we also found that the positive response stance predicates showed consistently high speaker commitment ratings, across all of the languages and discourse conditions (Figures 3.26–3.27). This raises the question of whether factivity might be a more fluid or gradient property than is generally thought. This view has been adopted for instance by Tonhauser et al. (2018), who (following Abrusán 2011b, 2016, Simons et al. 2010, 2017, Tonhauser 2016, a.o.) argue that content projects to the extent that it is not at-issue. In Chapter 5, we show that, despite some intuitive appeal, this view faces serious

problems in view of the data.

3.3 Assertion, Givenness, and the left-periphery

Before concluding this chapter, let us say a little bit more about what it means for a proposition to be discourse new.

As mentioned at several points above, the relevant notion cannot be that p is Common Ground, as shown most clearly by the negative response stance verbs, and matrix negation. It is intuitive that (70) would be infelicitous in a context where the question of $?p$ (*Will John and Bill get along?*) had not previously been discussed. However, there is no sense in which either the speaker or the hearer need to be committed to p .

- (70) a. I doubt that [P John and Bill will get along].
 b. I don't think that [P John and Bill will get along].

Rather, what seems to be important is simply that p has some kind of antecedent in the discourse. Importantly, while the response predicates and the emotive factives both share this general property, they differ in whether this antecedent has to be linguistic or not. As shown in (71)–(72), the emotives seem to require simply that the attitude holder's belief that p , and the source of this belief, can be plausibly inferred from the context.

- (71) [Context: Mary and Bill are walking through the Scottish highlands on a windy and rainy day. Not having previously discussed the weather, Mary says:]

#I'm so happy that it turned out to be such a nice day!

- (72) [Context: Mary and Bill are lying on the beach on a beautiful sunny day. Not having previously discussed the weather, Mary says:]

I'm so happy that it turned out to be such a nice day!

The response predicates (and negated verbs like *say* and *think*), on the other hand, requires an actual linguistic antecedent, such that p has either been proffered, or that the question

of ?p has bee raised (73).

- (73) [Context: Mary and Bill are lying on the beach on a beautiful sunny day. Not having previously discussed the weather, Mary says:]
#I {doubt, didn't say} that it's going to rain later.

The emotives are also odd in such contexts, as shown in (74). As this example shows us, neither type of predicate requires that the issue of p has been the topic of the present conversation.

- (74) [Context: Mary and Bill are on the subway. They overhear someone say:
“I read that Weinstein is going to prison.” Mary turns to Bill and says:]
a. I doubt that will ever happen.
b. I'm happy he's finally getting what he deserves.

The relevant pragmatic dimension, then, seems to be very similar to Schwarzschild's (1999) notion of Givenness. Schwarzschild (1999) uses the notion of ‘antecedent’ broadly, to encompass both overt linguistic antecedents, as well as accommodated or contextually entailed antecedents.

While this speaks in interesting ways to the often observed semantic parallels between clausal and nominal elements, it is worth noting that the claim that V2 is the syntactic expression of discourse novelty —as the complement of Givenness—, is actually quite contrary to Schwarzschild's (1999) conception of Givenness. Looking at prosodic prominence, Schwarzschild (1999) states, regarding (75):

... deictics and other words appear to be inherently given ... but one doesn't find words that are inherently novel. I submit therefore that the grammar makes reference to givenness and includes a statement like (75-a), but that no mention is made of novelty, hence there is nothing like (75-b). This cannot be the whole story, however. Even if it is too broadly stated, (75-b) does have some truth to

it, and this will be explained in terms of a constraint, AVOIDF. This constraint has the effect of requiring a speaker to refrain from accenting material that is given. (Schwarzschild 1999, p.142)

- (75) a. Lack of prominence indicates givenness.
 b. Prominence indicates novelty.

This raises the question of whether the syntax is somehow different, in that it explicitly encodes discourse novelty, or whether the idea that V2 is somehow the MARKED option, triggered by some feature in the syntax is actually misguided. Perhaps it makes more sense to think of V2 as the syntactic analogy to focus. We leave this intriguing possibility, and the question of how this idea might be implemented formally, for future research.

3.4 Conclusions: Chapters 2 & 3

Our investigation of embedded V2, topicalization, etc. started out with the observation, due to Hooper and Thompson (1973), that Main Clause Phenomena are licensed by assertion. Reviewing the literature on MCP and embedded assertion in Chapter 2, however, revealed that there is in fact very little agreement about what actually constitutes an embedded assertion; both pragmatically and for the purpose of the syntax. Quantitatively examining (in parallel) the syntax and the pragmatics of a variety of verb (classes) and MCP has allowed us to tease apart the different lexical and pragmatic factors proposed to predict the distribution of MCP. We found that the contexts that disallow V2 are such that the embedded proposition has an antecedent in the discourse; where p is Given, in the sense of Schwarzschild (1999).

At a first glance, this seems to be compatible with the intuitions of the CP/DP Interface Hypothesis, which takes ‘referential’ predicates to select for complements that are syntactically DPs, and semantically and pragmatically presupposed. However, this hypothesis cannot be right: first, as we saw from the *so*-anaphora and expletive associate tests in

Section 2.2, the response stance verbs do in fact allow CP-complement. Hence, the fact that they disallow embedded V2 cannot be explained by appealing to DP-selection. The same point is made even more sharply, when we consider the effect of matrix negation. Like the response verbs, these both disallow embedded V2 and require p to have an antecedent in the discourse. Nevertheless, they clearly allow for CP-complements, even in contexts where p has an obvious discourse antecedent:

- (76) I know you think that roller-coasters are a blast, but I certainly don't think so.

In fact, the tests in Chapter 2 showed us that, aside from the emotive factive verbs, all of the predicates considered here allow CP-complements. This, then, is much more in line with the view, common in theoretical work on V2, that the contexts which do vs. do not allow V-to-C movement are distinguished syntactically in terms of the size of the embedded CP.

Interestingly, as we saw in Section 2.3.1, the availability of *wh*-extraction in English tracks the distribution of embedded V2 and discourse novelty across predicate types, such that it is available under speech act verbs, doxastic non-factives, and doxastic factives, but degraded under the response verbs and the emotive factives. As we have seen, this cannot follow from the selection of a DP that blocks movement, as per Kastner's account. Nor can the island-effects follow straightforwardly from the semantics of factive predicates, as in Szabolcsi and Zwarts (1993), Fox and Hackl (2006), Oshima (2006), Abrusán (2011a, 2014), Chierchia (2013), Schwarz and Simonenko (2018), a.o. Rather, the weak island effects arise precisely in those contexts that disallow embedded assertions, in the sense of p constituting discourse new content.

This, then, is in line with the idea, going back to Weerman et al. (1986), Iatridou and Kroch (1992) and Vikner (1995) (see also more recent work by Featherston 2004), that V2 is licensed in the complements of so-called *bridge verbs*. However, as we have seen here, this is not a matter of selection. Rather, whether or not an embedded declarative can be asserted depends in part on the semantics of the matrix predicate, along with other aspects of the

linguistic and pragmatic context (for instance, matrix negation). Moreover, the clauses that allow V-to-C and *wh*-extraction vs. those that do not, must be differentiated by properties of the CP, not by whether the clause is a CP or a DP.

In line with research in the Rizzian tradition, we might say that the syntactic expression of assertion (i.e. discourse novelty) is an extended C-domain, which in turn is required for V-to-C movement and *wh*-extraction from the embedded clause.⁴² One might ask, then, why (English) topicalization should be excluded from this requirement, given that this, too, involves movement to the left-periphery. Pragmatically, however, it is clear that while topicalization involves a type of context-update, it does not require discourse novelty. In fact, because topicalization in English is contrastive, topicalization would be quite odd in a context where p represents an entirely discourse new issue.⁴³ Pragmatically, then, there is good reason to distinguish the type of context-update relevant to V2, and that involved in topicalization.⁴⁴ In terms of the syntax-pragmatics mapping, this seems to be in line with the Rizzian conception of the C-domain, whereby Topic is encoded in a projection below Force^o, along the lines of (77):⁴⁵

(77) Conclusions: Syntax-Pragmatics Interface

- a. [p is Discourse New [p is Contrastive [p]]]
- b. [_{CP+} V-to-C; *wh*-extraction [_{CP} Topicalization [_{TP} Clause]]]

This hypothesis, however, takes the position required for *wh*-extraction in English to be the same as that which is involved in V-to-C movement in Swedish and German (recalling the idea of bridge-verbs/complements); a position which we have shown is licensed by the pragmatic status of p as discourse new. Saying that this position is structurally *higher* than

⁴²Note also that this supports the claim that *wh*-movement has to be successively cyclic, at least in English. More work is needed to investigate the interaction of V2 and movement, as shown in Section 2.4.2.

⁴³One might worry that this would be a problem for the conclusions for the experiment. Recall, however, that we also found no differentiation among embedding contexts in the MAXCONTRAST condition.

⁴⁴For relevant discussion of different kinds of “Common Ground management”, see Bianchi and Frascarelli (2009).

⁴⁵We use the theoretically more neutral label CP+, given that the label ForceP is generally associated with commitment-based pragmatic accounts.

the position involved in topicalization —where p is Given, and may be contrastive— may not be the right characterization, however. Because of the V2-property, it is difficult to find good evidence both for the presence of a full Rizzian C-domain, and for the relative height of different projections, in languages like German and Swedish. From a comparative point of view, however, it is worth noting that much work in the Rizzian tradition have argued that Topic is structurally higher than *wh*-features (e.g. Obenauer and Poletto 2000, Rizzi 2001, 2004, Poletto 2006). To probe this issue and the relationship between V2 and movement (which we touched on in Section 2.4.2), further investigation of the discourse pragmatics associated with topicalization in Swedish and German, as well as a closer look at the interaction of V2 and *wh*-extraction in these languages, would be helpful.

In Section 3.2, we saw experimental evidence supporting the claim from Section 3.1, that contrary to traditional conception of factivity, it is not the case that factives in general require p to be Common Ground, or Given. In fact, the doxastic factives were found to promote a reading of p as discourse new. The question then is where this leaves our understanding of factivity. This issue will be the focus of Chapter 5.

In the final two chapters of the dissertation, we address two issues raised in this and the previous chapter. In Chapter 2, we saw that emotive factive verbs select for clauses that are underlyingly DPs. As we saw here, however, this is neither a consequence of their factivity nor the status of their complement as Given. The question then, is whether this reflects some other semantic or pragmatic property, and if so, which one? The other problem concerns the status of the doxastic factives as ‘assertive’, in the sense that their complements are readily interpreted as discourse new information (an observation already made by Simons 2007). The question is what this means for our theory of factivity, which defines factive verbs as verbs which require that their complement p is Common Ground (thus entailing that p is Given, in a strong sense).

The question about the doxastic factives, and the theory of factivity, will be the focus of Chapter 5, the final chapter of the dissertation. In Section 5.6.2, we will also offer an answer to the question of why emotive factives select for DPs. Next, in Chapter 4, we return

to the more basic issue, of the s-selectional properties of the different types of attitude verbs examined here. Recall from Section 1.1 that on the standard, Hintikkan approach to the semantics of propositional attitude reports, attitude verbs are taken to select for propositions (functions from worlds to truth values; type $\langle st \rangle$, the semantic type of *that*-clauses). In Section 2.3, we saw that all verbs investigated here⁴⁶ license DPs (typically understood to denote individuals, of type e), and as we just mentioned, that the clausal complements of emotive distribute like DPs. The central question of Chapter 4, is what this flexibility tells us about (i) the selectional properties of the various types of attitude verbs, and (ii) the semantic types of *that*-clauses more broadly. Based on the argument structure and entailment patterns of verbs like *know* and *believe*, we distinguish between two types of attitude predicates: verbs like *believe*, which extract propositional content from content individuals (in the sense of Kratzer 2006, Moulton 2009b), and verbs like *know*, which describe acquaintance-relations (broadly construed) to individuals of any kind. The insights of this chapter will provide a semantic foundation for the analysis of factivity developed in Sections 5.6.1–5.6.2

‘

⁴⁶With the apparent exception of *suppose*.

Chapter 4

Why knowing me is different from believing me

*I know that you believe that you know the difference between ‘know’ and ‘believe’.*¹

In this chapter, we examine the basic semantic properties of declarative propositional attitude reports. We focus on the s-selectional properties of clause-taking attitude verbs like *know* and *believe*, the semantic types of their clausal and nominal complements, as in (1) and (2), and the mechanisms by which they compose.

- (1) (b) \models (a)
 - a. Sue believes [_{CP} that Anna is to blame].
 - b. Sue believes [_{DP} the rumour that Anna is to blame].

- (2) (b) \models (a)
 - a. Sue knows [_{CP} that Anna is to blame].
 - b. Sue knows [_{DP} the rumour that Anna is to blame].

As has been observed by a number of authors (e.g. Pietroski 2000, Uegaki 2015, Elliott 2016), attitudes differ in terms of whether a sentence with a content DP (the b-sentences) entail the corresponding CP-version (the a-sentences): while *believe*, along with *trust* and *doubt*, gives rise to such an entailment, *know*, along with *discover*, *fear*, *mention*, and *explain*, does not. Thus, this contrast is not due to an isolated lexical quirk of either *believe* or *know*, and

¹Lefteris Paparounas, p.c. (Philadelphia, 2019).

moreover, does not correspond to the contrast in factivity.

Here, we offer an observation that sheds new light on this contrast, namely that the availability of the DP-to-CP entailment for a given verb tracks the availability of another type of DP argument, which is structurally independent of the *that*-clause, and denotes the source of the content provided by the *that*-clause. This contrast is given in (3).

- (3) a. I believe John that it's going to rain.
 b. *I know John that it's going to rain.

This pattern is unexpected on the standard Hintikkan picture. Recall from Section 1.1 that on the Hintikkan approach to propositional attitude reports, attitude verbs are analyzed as quantifiers over worlds. On this approach, *know* and *believe* both quantify over the worlds w' that are compatible with the attitude holder's beliefs in w . They differ in that *know* additionally entails (or presupposes) that p is true in w :

- (4) a. $[\![\text{believe}]\!]^w = \lambda p_{\langle st \rangle} \cdot \lambda x_e \cdot \forall w' \in \text{Dox}_x(w) \rightarrow p(w') = 1$
 b. $[\![\text{know}]\!]^w = \lambda p_{\langle st \rangle} \cdot \lambda x_e : \underline{p(w)} = 1 \cdot \forall w' \in \text{Dox}_x(w) \rightarrow p(w') = 1$

On this view, why should there be (i) this difference in their argument structure (3), (ii) a contrast in whether the DP-case entails the CP-case (1)–(2), and (iii) why should these two properties pattern together? Here, we will offer a new approach, proposing a basic distinction between verbs like *believe*, which describe fundamentally epistemic or doxastic relations to content individuals (in line with Hintikka 1962, 1969, Kratzer 2006, Moulton 2009b, 2015), and verbs like *know*, which describe (broadly speaking) acquaintance-based relations to individuals of any kind (this analysis is further refined in Section 5.6, where we show that factive *know*-verbs are *evidentials*). A schematic picture of the two types of verbs is given in (5):²

- (5) *know* and *believe*-verbs [Schematic templates: see §5.6]

²Note that while we're using s_i for states, in the denotations given here, it is clear, especially with the verbs like *discover*, *realize*, and *explain* from the *know*-class, that these verbs include both states and events.

- a. *know*-verbs : $\lambda x_e. \lambda s_l. \text{VERB}_{AQ}(s)(x)$
- b. *believe*-verbs : $\lambda x_e. \lambda s_l. \text{VERB}_{DOX}(s)(\text{CONT}(x)(w_s))$

On the view proposed here, then, clausal complements of verbs are of type e (in line with Cresswell 1973, Chierchia 1984, 1985, Potts 2002, and Woods 2016a).³ We propose that the selection for a content individual is mediated by a verbal C-head of type $\langle st, e \rangle$ (6) (which also accounts for the distribution of *that*-clauses in equatives; see Section 4.3.2.1.1). In Section 4.3.2.1, we argue that content nouns, on the other hand, select propositions (mediated by a nominal C-head of type $\langle st, st \rangle$ (7)).

(6) Clausal complements of verbs

- a. $[[C_{V-cont}^o]]^w = \lambda p_{\langle st \rangle}. \iota x_c. \text{CONT}(x_c)(w) = p$
- b. $[[CP_{V-cont}^o]]^w = \iota x_c. \text{CONT}(x_c)(w) = p$

(7) Clausal complements of content nominals

- a. $[[C_N^o]] = \lambda p_{\langle st \rangle}. p$
- b. $[[CP_N^o]] = \lambda w. \text{John moved to Canada}(w)$

Section 4.1 introduces the core empirical observations of this chapter: the Source-construction and its link to the DP-to-CP entailment contrast. Before developing the analysis proposed here, in Section 4.4, Section 4.2 reviews some necessary theoretical background, and Section 4.3 considers two theoretical alternatives: a polysemy-based approach (Section 4.3.1), and a recent popular approach to the semantic composition of clauses with content nouns (like *the claim* or *the rumour*) and attitude verbs, from Kratzer (2006) and Moulton (2009b, 2015) (an approach which is essentially Hintikka, but takes a different approach to the semantic composition of clauses and predicates) (Section 4.3.2). While important aspects of this proposal will be adopted in the account proposed here for *believe*, the analysis developed here for *know* is quite different in nature, as shown in (5). Section 4.4 first spells

³At least the kind of attitude verb investigated here, which is able to combine with both DP and CP-complements.

out the argument for treating clauses as individuals (Section 4.4.1), and then discusses some consequences of—and provides further support for—treating *know*-verbs as fundamentally acquaintance-based, rather than epistemic or doxastic. Section 4.5 summarizes.

4.1 Individuals and propositions

In this section, we examine the syntactic and interpretative properties of sentences where clause-taking attitude verbs combine with nominal arguments. This leads us to the conclusion that *know* and *believe* differ fundamentally at the level of argument structure, and that this split generalizes across attitude verbs.

As noted by Prior (1971), Pietroski (2000), King (2002), Uegaki (2015) and Elliott (2016), attitude verbs differ in whether a sentence with a DP-complement entails the corresponding sentence with a CP-complement. As shown in (8), *know* and *believe* differ in this regard:

- (8) Uegaki (2015, p. 626)
- a. John believes the rumour that Mary left. \models John believes that Mary left.
 - b. John knows the rumour that Mary left. $\#$ John knows that Mary left.

As noted also by Pietroski (2000), Uegaki (2015), and Elliott (2016), the pattern displayed by *know* does in fact appear to be the majority pattern, and moreover, does not track the factive/non-factive distinction. While the factives all seem to pattern like *know* (e.g. *discover*, *notice*, *hear*, *remember*, *love*, *appreciate*, *resent*), there are also a number of non-factive verbs that behave like *know* (e.g. *fear*, *imagine*, *expect*, *report*, *predict*, *assume*, and *mention*).

- (9) Elliott (2016, p. 3)
- Jeff {fears, knows, imagined} the rumour that he is balding. $\#$
- Jeff {fears, knows, imagined} that he is balding.

- (10) Elliott (2016, p. 3)

Jeff expects the rumour that he will bald. \neq Jeff expects that he will bald.

- (11) Uegaki (2015, p. 626)

John {knows, discovered, reported, predicted} the rumor that Mary left. \neq

John {knows, discovered, reported, predicted} that Mary left.

While the interpretation of the various verb-complement combinations vary, broadly speaking, the verbs of the *know*-variety are all understood to denote some type of direct or acquaintance-based relation to a specific content individual, a rumour or a claim, etc. (whether of reference, familiarity, or some emotional relation, and so on). Importantly, in the cases where the verb+CP version implies some epistemic or doxastic meaning, as is the case for all of the factives as well as the doxastic non-factives, this entailment too is lost in the corresponding DP-case:

- (12) a. Sue {discovered, noticed, heard, remembered, loved, appreciated, resented, imagined, assumed} that [_P Mary was leaving]. \models believe(p)(Sue)
- b. Sue {discovered, noticed, heard, remembered, loved, appreciated, resented, imagined, assumed} the claim that [_P Mary was leaving]. \neq believe(p)(Sue)

As pointed out by Pietroski (2000), this is particularly surprising in cases like (13), involving the content noun *fact*, given the common assumptions that (i) *that*-clauses denote propositions, and (ii) facts are true propositions.⁴

- (13) Pietroski (2000, p. 655)

Nora explained the fact that Fido barked. \neq Nora explained that Fido barked.

On Pietroski's (2000) account, this contrast follows from *explain* assigning two different theta roles, depending on the type of the argument. Nominal arguments are assigned a

⁴The interpretive difference between the two is that in the DP-case, Nora (the explainer) is offering an explanations for *why* Fido barked. In the CP-case, on the other hand, that Fido barked is offered as the explanation for something else.

theme-role, whereas clausal arguments are assigned a content-role. However, this account fails to account for the pattern observed with *believe*, where the DP-case (8-a) *does* entail the CP-case (8-a).

A similar problem arises for Elliott (2016). According to Elliott, content DPs are always themes, and as such need to be thematically licensed by the verb. On his view, then, *all* verbs that permit content DPs assign a theme-role to their DP-complements. Regarding the entailment contrast, he states that “the entailment from the [DP-case] to the [CP-case] sometimes goes through, due to arbitrary facts about what it means to be the theme of, e.g., *believe*” (p. 4).⁵

The problem with this move, is that the entailment contrast is part of a more general split between verbs like *know* and verbs like *believe*. First, *believe*, unlike *know*, may occur in a particular kind of construction, in which an entity-denoting DP co-occurs with a finite CP. However, rather than describing a thing with propositional content, the DP denotes the source of the content provided by the CP. Moreover, as we saw in (8-a) (*... believe the claim/rumour that p*), (14-a) preserves the entailment that the attitude holder believes p.

(14) **Source Construction**

- a. I believe you [*P* that Anna is to blame].
- b. *I know you [*P* that Anna is to blame].

Crucially, the Source-construction is ungrammatical with all of the verbs which, like *know*, lack the DP-to-CP entailments.

(15) *I {discovered, noticed, heard, remembered, loved, appreciated, resented, feared, imagined, expected, reported, predicted, assumed, explained} you that Anna is to blame.

While the pattern exhibited by *believe* appears to be the minority pattern, the correlation

⁵See Appendix A.2 for discussion of the relation of Elliott's (2016) proposal to the complicated issue of Pesetsky's (1991) *wager*-class.

between the preservation of the DP-to-CP entailment, on the one hand, and the availability of the source-DP, on the other, is found with other clause-embedding attitude verbs, including *trust* and *doubt*:

- (16) a. Uegaki (2015, p. 626)

John trusted the rumor that Mary left. \models John trusted that Mary left.

- b. I trust him that he will do the best for me⁶

- (17) a. John doubted the rumor that Mary left. \models John doubted that Mary left.

- b. do you have any reason to doubt him that it was on that night that that conversation happened?⁷

That *doubt* should pattern with *believe* is not surprising, given that *doubt* is essentially synonymous with *not believe*.⁸

This contrast is reflected also in cases where the verbs take *only* a DP-complement. With *believe*-verbs (19-a), the DP is interpreted as the source of some contextually provided proposition p. And, as we saw in (8-a) and (14-a), the doxastic relation of the attitude holder to p is preserved. With *know*-verbs, on the other hand, no epistemic or source-relation is inferred. Here, the DP-complement is interpreted as a concrete specific individual (*a particular*, using the terminology of Kratzer 2002; see Section 4.2). In this case, the verb is now understood to denote some type of acquaintance-relation:

- (19) a. I believe John. \approx I believe that what J. said is true/that J. is right about p.
 b. I know John. \approx I am acquainted with J.

⁶Free Children's Ministry Resources; equipu.kids4truth.com

⁷Independent Counsel Solomon L. Wisenberg in a transcript of the Clinton Grand Jury Testimony, in Kuntz, Phil (ed). *The Evidence: The Starr Report*, p. 375.

⁸Interestingly, however, there appears to be a contrast between doubt in the positive and the negative polarity, as shown in (18). We leave the interesting issue of the effect of the polarity for future research.

- (18) a. ?I doubt him that Lisa was the culprit.
 b. I don't doubt him that Lisa was the culprit.

While the exact relation described by the other verbs of these two types varies, the general distinction should be clear; between on the one hand treating the DP as relating to some inferred proposition (the *believe*-class) (20-a), and on the other, simply describing a relation to an individual, with no inference of a proposition being generated (the *know*-class) (20-b):

- (20) a. I {believed, trusted, doubted} the large dinosaur.
- b. I {knew, discovered, noticed, heard, remembered, loved, appreciated, resented, feared, imagined, expected, reported, predicted, assumed} the large dinosaur.

With the *know*-class verbs in (20-b), the DP *the large dinosaur* is clearly interpreted as a particular, itself the object of the attitude. Here, there is no kind of epistemic or doxastic relation implied. In the case of *believe* and *trust*, however, the doxastic relation is preserved: here, the DP is interpreted as the *source* of some (contextually given) proposition. With the *believe*-verbs, the DP *the large dinosaur* receives an anthropomorphized, agentive, interpretation, which is not present with any of the verbs in (20-b).⁹

Overall, what we observe here is a distinction between verbs that denote acquaintance relations to individuals (of any type), and verbs that obligatorily extract propositional content from their DP-complements.¹⁰

This presents a problem for how to analyse the selectional requirements of the *know*-class verbs: Do they denote a relationship to a proposition, in which case they select for a *that*-clause? Or do they denote an acquaintance relation to an entity, and select for a DP?

In Section 4.4 below, we offer an answer to these questions (expanded in Sections 5.6.1–5.6.2 of Chapter 5). First, however, let us introduce properly the notions of *particular* and

⁹ *Trust* and *doubt* also have readings whereby the attitude holder trusts or doubts that the DP *the large dinosaur* is generally reliable; that it will do the right thing, etc. (Thanks Julie Anne Legate for highlighting this alternative.) However, there is also a reading of (20-a) where *the large dinosaur* is understood as a (non-)trustworthy source of some inferred proposition.

¹⁰ Though note that there are some predicates that seem to be more agnostic in this regard. We find while (21-b) commits the speaker to p being true, (21-a) has a reading where what is correct is not necessarily p itself, but rather, what is correct is something about the motivation or process behind the intuition:

- (21) a. The intuition that [_P sums of independent random variables are well-behaved] is correct.
- b. The claim that [_P sums of independent random variables are well-behaved] is correct.

content individual.

4.2 Particulars and content individuals

Recall from Section 1.3 that we recognized individuals as part of our inventory of semantic types, along with eventualities, and so on. Just like eventualities come in different flavours (i.e. states and events, à la Bach 1986), it is common also to recognize more specific subtypes of individuals. The ones most relevant for the study of clausal embedding are probably *particulars* and *content individuals* (following, among others, Kratzer 2002, 2006, Moulton 2009b).

The idea that some individuals (like rumours, claims, and ideas), but not others (like tables, tigers, and pianos), have propositional content associated with them, is probably intuitive. However, as Moulton (2009b, p. 36) points out, while content nouns allow for propositional content to be extracted from them, they are not themselves propositions. Rather, the things described by content nouns (unlike propositions) are entities associated with particular properties: “Proposals – and rumors, stories, theories, ideas, and others – come into existence at particular times (*the proposal that... was made last year*); they may be reported or spread and they may have qualities like being mean or nasty (*they spread a nasty rumor that...*), and they may cease to exist (*that proposal that... is dead*).” (p. 36).

On the analysis developed by Kratzer (2006) and Moulton (2009b), which we discuss in Section 4.3.2), the propositional content of a content individual is derived via a function, *CONT*, which returns the propositional content of individuals of the appropriate kind (22-a). According to Kratzer (2006), this is the meaning of *C^o* (22-b). Combined with a proposition (the meaning of *TP*), this will return the meaning of the CP given in (22-c); a predicate of propositional content.¹¹

(22) From Kratzer (2006, 2013b), Moulton (2009b); Moulton (2015, p. 312)

- a. $\text{CONT}(x_c)(w) = \{w' : w' \text{ is compatible with the intentional content determined}$

¹¹The exact formulation in (22-a) is from Kratzer (2013b, p. 195 (25)).

by x_c in $w\}$

- b. $[[C^o]] = \lambda p_{<st>}. \lambda x_c. \lambda w. [\text{CONT}(x_c)(w) = p]$
- c. $[[\text{that it's raining}]] = \lambda x_c. \lambda w. [\text{CONT}(x_c)(w) = \lambda w'. \text{raining}(w')]$

The notion of *particulars* is from situation semantics (e.g. Barwise 1981, 1989, Barwise and Perry 1983, Kratzer 1989, 2002). On this perspective, situations are parts of the world, and are made up of individuals and relations among them. In that sense, individuals and situations are both particulars, in that they are both part of the world.¹² The diagram in Figure 4.1, from Kratzer (2002, p. 661), shows a situation s consisting of three tea pots. We say that the situation in Figure 4.1 *exemplifies* the proposition in (23):

- (23) There are tea pots.

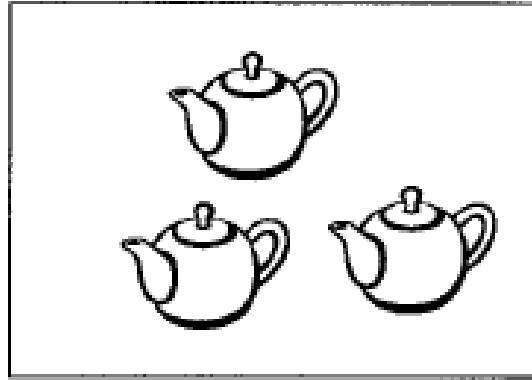


Figure 4.1: Teapot situation: diagram from Kratzer (2002, p. 661).

The exemplification relation is from Kratzer (2002):

- (24) **Exemplification** (Kratzer 2007, based on Kratzer 2002)

A situation s exemplifies a proposition p if whenever there is a part of s in which p is not true, then s is a minimal situation in which p is true. Any sum of situations

¹²As are eventualities, seeing as these too, are made up of individuals and relations among them; in discussing previous literature, we have talked about these as being of a different semantic type than individuals. However, on the perspective adopted here, it is more accurate to treat these as situations.

that exemplify a proposition p broadly exemplifies p . (Intuitively, a situation that exemplifies a proposition p is one that does not contain anything that does not contribute to the truth of p .)

From this, it should be clear that nouns like *rumour* and *claim* (unlike nouns like *tiger* and *tea pot*) lead a ‘double life’, as, on the one hand, particulars which exemplify properties (like being long, well-meant, tedious, etc.), and on the other hand, as what we have loosely referred to as vessels for propositional content. As we will argue in Section 4.4, the semantics of certain attitude verbs is sensitive to this distinction.¹³ Adopting elements of the Kratzer-Moulton approach, we propose that verbs like *believe* select for content individuals. Verbs like *know*, however, we show are compatible with both kinds of individuals, including content individuals and particular individuals like *John* or *the tea cup*. While these are both technically individuals of type e , when necessary, I will adopt the common convention of annotating these sub-types with the subscripts c (for content) and r (for particular).

4.3 Theoretical alternatives

4.3.1 Polysemy?

One way to account for the data in 4.1 would be to say that the verbs of the *know*-class are all polysemous, with one acquaintance-based item that selects for individuals (syntactically, DPs), and one, epistemic or doxastic item, selecting for propositions (CPs):

(25) *know_x*-class verbs, Type 1 [DP-complement]

- a. s-select for individuals (x_e)
- b. denote acquaintance-based relations to those individuals

(26) *know_p*-class verbs, Type 2 [CP-complement]

- a. s-select for propositions ($p_{<st>}$)

¹³Just like the grammar can be sensitive to distinctions among states and events (e.g. *Lisa was eating pizza for two days* vs. *#Lisa finished the pizza for two days*). Thanks Florian Schwarz, p.c. for this point.

- b. denote epistemic relations to propositions

While this might at a first glance seem motivated for the specific verb *know*, given the received wisdom that in languages like German or Swedish, there are two forms corresponding to these two meanings: *känna (till)/kennen* for (25), and *veta/wissen* for (26)', there are several points that speak against an analysis in terms of lexical ambiguity.

While this move might seem motivated for *know*, to capture the data discussed here, we would have to posit two lexical items for *discover*, *notice*, *hear*, *remember*, *love*, *appreciate*, *resent*, *fear*, *imagine*, *expect*, *report*, *predict*, *assume*, and *explain*, as well as any other verb which shows the *know*-pattern (virtually all attitude verbs that can combine with both DP and CP complements). To start, I am not aware of any language that systematically distinguishes between CP-selecting forms and DP-selecting forms of these attitude verbs. Moreover, a polysemy-based approach would not capture the strong intuition that the clause-taking and the DP-taking “versions” of *discover*, *fear*, *imagine*, *love*, *notice*, etc., all share a semantic core. On the approach which will be offered here (Section 4.4), the two cases involve the same verb, thus automatically capturing their shared semantic core.

It is also worth noting that the *känna/veta* contrast is in fact more complex than what we would expect on the type of analysis given in (25)–(26). While it is true that generally, the form *känna* is used with a bare DP to mean *be acquainted with*, there are contexts where it is possible to use *veta* with a bare DP to mean ‘know of’, as in (27-a). *Känna* is also possible here, as in (27-b). However, it would have a slightly different meaning. A true answer to (27-b) requires mutual acquaintance on the part of the addressee and Johan. In (27-a), it is sufficient that the addressee is familiar with or knows about the existence of Johan.¹⁴

- (27) Swedish (own judgement)

- a. Du vet Johan? Vi jobbar ihop.
You know.PROP Johan? We work together.

¹⁴It is worth noting that (27-b) appears to require the presence of the discourse particle *väl*, which translates roughly to English *right?*.

‘You know John? We work together.’

- b. Du känner väl Johan? Vi jobbar ihop.
You know.FAM PART Johan? We work together.
‘You know John, right? We work together.’

Moreover, both *känna* and *veta* can combine with a *that*-clause in the presence of a preposition, as shown in (28). In this case, the meaning of the predicate is more similar to that of *be aware of* (often treated as the adjectival counterpart of *know*).

(28) Swedish (own judgement)

- a. Jag känner till att Anna och Bill har gjort slut.
I know of that Anna and Bill have made end
‘I’m aware that Anna and Bill broke up.’
- b. Jag vet om att Anna och Bill har gjort slut.
I know of that Anna and Bill have made end
‘I’m aware that Anna and Bill broke up.’

Both forms can also occur with a bare *that*-clause, without a preposition. In this case, however, their meanings clearly diverge. In this case, *känna* means something like *sense* or *feel*, whereas *veta* would clearly translate to (propositional) *know*.

(29) Swedish (own judgement)

- a. Jag känner att Anna och Bill har gjort slut.
I sense that Anna and Bill have made end
‘I sense that Anna and Bill broke up.’
- b. Jag vet att Anna och Bill har gjort slut.
I know that Anna and Bill have made end
‘I know that Anna and Bill broke up.’

With a content noun, both *känna till* and *veta om* are again possible, and seem to mean roughly the same thing (approximately, *be aware (of)*). In both of these cases, the preposition is obligatory.

(30) Swedish (own judgement)

- a. Jag känner till ryktet att Anna och Bill har gjort slut.
I know of rumour.DEF that Anna and Bill have made end
'I'm aware of the rumour that Anna and Bill broke up.'
- b. Jag vet om ryktet att Anna och Bill har gjort slut.
I know of rumour.DEF that Anna and Bill have made end
'I'm aware of the rumour that Anna and Bill broke up.'

Thus, while *veta* appears to be more proposition-oriented, and *känna* more acquaintance-oriented, their semantic spaces do in fact overlap more than is generally recognized. And, contrary to what we would predict on the polysemy-based account described in (25)–(26), they can both be used—with a similar acquaintance-oriented meaning—with both a *that*-clauses and DPs.¹⁵ Taken together, these various considerations lead us to reject a polysemy-based account.

On the proposal which will be advanced in Section 4.4, the particular entailment-properties of *believe* is a fundamental consequence of its lexical semantics. Because content individuals are such that they allow us to extract propositional content (via the content function in (22-a)), believing the rumour that p guarantees the belief that p. Likewise, the lack of an entailment with *know*-verbs is a fundamental consequence of their semantics, which does not make reference to the content function, but (in addition to other aspects of meaning) denote acquaintance-based relations to individuals of any type. Since being acquainted with a claim or a rumour that p does not entail the belief that p, no entailment arises in this case.

Before moving on to this account, we look at the popular recent approach from Kratzer (2006) and Moulton (2009b), developed in particular as a way of accounting for the composition of *that*-clauses and content nouns.

¹⁵I leave an examination of the semantic vs. syntactic contributions of the propositional complements for future research.

4.3.2 Clauses as predicates?

The argument that clauses denote propositional content comes primarily from considering clausal complements of nouns, as in (31).

- (31) the claim that John moved to Canada

This will be the main focus of this section (Section 4.3.2.1), though in Section 4.3.2.2, we also consider briefly the extension of this account to the clausal complements of verbs.

4.3.2.1 Clausal complements of nouns

The basic theoretical claim advanced in Moulton (2009b, 2015), building on Stowell (1981) and Kratzer (2006),¹⁶ is that the CP in (31) is in fact a predicate of propositional content, of type $\langle e, st \rangle$ (43-a). The variable x_c ranges over individuals from which it is possible to recover propositional content, such as *claim*, *rumor*, *idea*, *notion*, or *fact*. The CP combines with content nouns like (32-b), via Predicate Modification. The compositional meaning of (31), on the Moulton-Kratzer view, is given in (32-c).

- (32) a. $[[\text{that John moved to Canada}]] = \lambda x_c. \lambda w. [\text{CONT}(x_c)(w) = \lambda w'. \text{John moved to Canada}(w')]$
- b. $[[\text{claim}]] = \lambda x_c. \lambda w. \text{claim}(x_c)(w)$
- c. $[[\text{the claim that John moved to Canada}]] = \lambda x_c. \lambda w. [\text{claim}(x_c)(w) \ \& \ [\text{CONT}(x_c)(w) = \lambda w'. \text{John moved to Canada}(w')]]$

On this view, de-verbal nouns like *claim* and *belief* are derived from their verbal counterpart via existential closure of the verb's eventuality-argument, as shown in (37) from Moulton (2015), where existential closure is associated with the nominalizing head *n*.¹⁷

¹⁶See also Kratzer (2013a, 2014)

¹⁷Importantly, as we will see below, Moulton intends this specifically for object nominalizations, such that the nominalized root in (37-c) ends up describing the thing that the verb's object denotes, as illustrated with the object nominals in (33)–(34) (see also Higgins 1973, Stowell 1981, Grimshaw 1990).

- (33) Moulton (2015, p. 314)

(37) Moulton (2015, p. 314)

- a. $[[\sqrt{\text{EXPLAIN}}]] = \lambda x_c. \lambda e. \lambda w. \text{explain}(x_c)(e)(w)$
- b. $[[n]] = \lambda P. \lambda x. \lambda w. \exists e [P(x)(e)(w)]$
- c. $[[\text{explanation}]] = \lambda x. \lambda w. \exists e [\text{explain}(x_c)(e)(w)]$

The claim that verbal roots select complements of type *e*, rather than propositions, is motivated by the observation that clause-taking verbs select content nouns as their internal arguments:

(38) Moulton (2015, p. 314)

- a. He believed the mean rumor.
- b. I understood your silly idea.
- c. Sue claimed something false.
- d. I accepted/admitted/confirmed/mentioned his position/idea/claim.

I return to the composition of attitude verbs and CPs shortly. First, let us consider the motivation for the theoretical claim that clauses are predicates of propositional content, which modify content nouns, rather than saturate their internal argument. Primary moti-

-
- a. Paul explained that he was temporarily insane.
 - b. Paul's explanation was that he was temporarily insane.

(34) Moulton (2015, p. 313)

- a. Sue loved Edna.
- b. Sue's great love was Edna.

This can be contrasted with event-nominalizations, which describe the eventuality of its counterpart verb:

(35) Moulton (2015, p. 315); from Grimshaw (1990, p. 58)

- a. The total destruction of the city in two days/*for days appalled everyone.
- b. Only observation of the patient for several weeks/*in several weeks can determine the most likely course of action.

(36) Moulton (2009b, p. 45)

- a. John loved Mary.
- b. John's love of Mary lasted forever.

We'll return to this contrast momentarily.

vation for this claim comes from two related observations: (i) the observation from Higgins (1973), Stowell (1981), and Potts (2002) that CPs and content nouns may occur together in copular sentences; and (ii) Grimshaw's (1990) observation that non-derived nouns like *idea* and *story* don't take (syntactic) arguments (independently of case). I review each of these observations, and consider their theoretical consequences, in turn.

4.3.2.1.1 Distribution in copular sentences

The first observation is that CPs and content nouns may co-occur in copular constructions:

- (39) Moulton (2009b, p. 38)

- a. The belief that Edna was stealing (is false).
- b. The belief is that Edna was stealing.

The crucial assumption here is that the sentence in (39-b) is *equative*. Equative copular constructions (unlike predicational ones) involve two XPs of the same semantic type.¹⁸ Support for the claim that sentences like (39-b) are equative, and not predicational, comes from Potts (2002), using the observation of Heycock and Kroch (1999) that only predication—where one argument is of type *e*, and the other of type <*et*>—is possible in small clauses:

- (41) Moulton (2009b, p. 31); from Heycock and Kroch (1999, ex. (29))

- a. Your attitude towards Jones is my attitude towards Davies.
- b. *I consider your attitude towards Jones my attitude towards Davies.

The argument from Potts/Moulton is that (39-b) cannot involve predication, in the canonical

¹⁸It is sometimes assumed that equation involves two XPs of the same *syntactic* type (e.g. Citko 2008). However, the following example from Heycock (2012, p. 225) shows that it is in fact possible to equate a DP and an adjective, as long as they are both interpreted as predicates (40-a)–(40-b). If the DP is interpreted predicationally, on the other hand, it cannot be equated with a referential DP (40-c).

- (40) Heycock (2012, p. 225)

- a. Honest is the one thing that I want a man to be.
- b. The one thing that I want a man to be is honest.
- c. *The one thing that I want a man to be – honest – is John.

sense, given the ungrammaticality of the corresponding small clause (on part with (41)).

(42) Moulton (2009b, p. 31); from Potts (2002, p. 68)

- a. *I consider the problem that she is bonkers.
- b. *I consider that she is bonkers the problem.
- c. *I consider it the problem that she is bonkers.

If (39-b) is indeed equative, then this would be a problem for analyzing the DP as being of type e and the CP of type $\langle st \rangle$: the two XPs would have to be of the same semantic type. As Moulton points out, we clearly do not want to analyze nouns like *rumor* as propositions: a rumor can have a range of properties that propositions do not have, such as being mean, boring, spread by people, etc. He proposes instead that such nouns denote individuals from which it is possible to extract propositional content, as shown in (32-b). If true, it then follows that the CP, too, must be of type $\langle e, st \rangle$, as in (43-a).

While I agree that the argument from small clauses shows us that (39-b) cannot involve predication, in the sense that the DP denotes an individual of type e , and the CP a predicate of type $\langle et \rangle$, it is less clear to me what it *does* show. Assume, for instance, that clauses in fact denote propositions (as per the Hintikkan view). If the ungrammaticality in small clauses is due to the requirement that the two XPs are of type e and $\langle et \rangle$, respectively, then this would also rule out the possibility of a proposition occurring in this construction.

Of course, this move raises the question of how to analyze (39-b). If it's not predication, then equation does indeed seem to be the most plausible alternative. But equation of what? Clearly not of two propositions. Moulton proposes to analyze both clauses and content nouns as predicates of type $\langle e, st \rangle$. But in the sentence in (39-b), we have one definite DP (*the belief*) and one CP (*that Edna was stealing*), so presumably one thing of type e and one thing of type $\langle e, st \rangle$. So that cannot be equation. Perhaps the DP saturates the internal argument slot of the clause (the copula being semantically vacuous). That would yield the meaning in (43-c).

(43) Alternative for composition with content nominals

- a. $[[\text{that } \text{John moved to Canada}]] = \lambda x_c. \lambda w. [\text{CONT}(x_c)(w) = \lambda w'. \text{John moved to Canada}(w')]$
- b. $[[\text{the claim}]] = \iota x_c. \lambda w. \text{claim}(x_c)(w)$
- c. $[[\text{the claim is that John moved to Canada}]] = [[\text{that John moved to Canada}]]([[\text{the claim}]])) =$
 $\lambda x_c. \lambda w. [\text{CONT}(x_c)(w) = \lambda w'. \text{John moved to Canada}(w')] (\iota x_c. \lambda w. \text{claim}(x_c)(w)) =$
 $\lambda w. [\text{CONT}(\iota x_c. \text{claim}(x_c)(w)) = \lambda w'. \text{John moved to Canada}(w')]$

Another option, which will be pursued here, and argued for in more detail in Section 4.4 below, is that both the DP *the claim* and the clause *that John moved to Canada* are of type *e*, and thus, truly do involve equation.

The crucial analytical piece, which will be required, is the assumption that nouns and verbs select for different complementizers. Specifically, we propose that nouns select for the complementizer in (105-a), whereas verbs select for a complementizer that shifts propositions into things of type *e*. On this view, then, it follows that the copula too will select a complementizer that shifts the clause, of type *<st>*, to a thing of type *e*, thus allowing us to analyse (39-b) as equation.

The composition with the noun also works out, if we assume that nouns do in fact select propositions, as shown in (44). The end result is the same as on the Kratzer-Moulton analysis, shown in (32-c) above.¹⁹

(44) Content nominals (current proposal)

- a. $[[C_N^o]] = \lambda p_{<st>}. p$
- b. $[[C_N^o]]([[John moved to Canada]]) = \lambda w. \text{John moved to Canada}(w)$
- c. $[[\text{claim}]] = \lambda p_{<st>}. \lambda x_c. \lambda w. [\text{claim}(x_c)(w) \ \& \ \text{CONT}(x_c)(w) = p]$
- d. $[[\text{claim}]]([[that John moved to Canada]]) =$
 $\lambda x_c. \lambda w. [\text{claim}(x_c)(w) \ \& \ [\text{CONT}(x_c)(w) = \lambda w'. \text{John moved to Canada}(w')]]$

¹⁹The meaning of the definite article remains standard.

- e. $[[\text{the claim that John moved to Canada}]] =$
 $\iota x_c. \lambda w. [\text{claim}(x_c)(w) \ \& \ [\text{CONT}(x_c)(w) = \lambda w'. \text{John moved to Canada}(w')]]$

The main difference between the two accounts is that here, the content function (22-a) is part of the meaning of content nominals (105-c), rather than being the meaning of C^o . This strikes me as a desirable consequence, given how central the propositional content is to the meaning of these nouns: while it is true that a rumor or claim or theory has properties beyond its propositional content, it wouldn't be anything without its information content. In this way, there is something unintuitive about the modification analysis; in the case of the relative clause modifier in (45-a), the fact that John read the books denoted by the head nouns is treated as 'extra' information about the books, which would presumably be whatever they are, independently of whether or not John had read them. In (45-b), on the other hand, it doesn't seem like the proposition 'John read every book' constitutes bonus information about the claim in the same way.

- (45) a. The books that John read.
b. The claim that John read every book.

Of course, this criticism might simply be dealt with by saying that the content of the nominal, on the modification approach, must be contextually provided (and given the meaning of C^o and how Predicate Modification works, must be identical to the content of the CP). On the current approach, after all, we must allow for the propositional content of the noun to be contextually given, without pronouncing a full CP.

4.3.2.1.2 (Non-)argument structure nominalizations

Let us turn now to the second observation that was used to motivate the analysis of clauses as predicates. This is the observation, due to Grimshaw (1990), that non-derived nouns like *idea* and *story* don't select for the kinds of DPs that otherwise can refer to propositional content, independently of case, as in (46).

(46) Moulton (2009b, p. 23)

*The {idea, story, theory, scoop, myth, notion} of that, I don't believe.

As shown in (47), this is not the general case for nouns. It is also not the case for all nouns that combine with CPs: de-verbal nouns like *proof* and *hope* may combine with DPs, as shown in (48).

(47) Moulton (2009b, p. 22)

- a. The niece of my brother's father (is nice).
- b. The capital of Wisconsin (is friendly).

(48) Moulton (2009b, p. 23)

- a. John proved that he was a citizen.
- b. Do you have any proof of/for that?
- c. John hoped that he would win.
- d. Do you have any hope for that?

Moulton (2009b) takes the observation that the verbs in (46) don't take DP arguments to further motivate the claim that these verbs are not relational, and that what would be the CP counterparts of these DP arguments must therefore not be arguments of the nouns either, but must combine with the noun via some other composition strategy; by hypothesis, that shown in (43).²⁰

Further elaboration of this argument in the realm of de-verbal content nouns like *belief* is found in Moulton (2015), using Aktionsart modifiers as a diagnostic for ‘non-argument-structure nominals’. The premise of the argument, from Grimshaw (1990), is that certain nominalizations, namely those that describe the eventuality of its verbal counterpart, retain

²⁰As Moulton (2009b) points out, it's important here to distinguish the propositional content of a belief or claim, from the so-called *res* argument: what the belief or claim is about (see Quine 1956, Stechow and Cresswell 1982, Charlow and Sharvit 2014, a.o.).

(49) a. Mary's belief **about John** was that he no longer lives in the US.
b. Mary believed **of/about John** that he no longer lives in the US.

the argument structural properties associated with the verb, as shown in (50)–(52).

- (50) Moulton (2015, p. 315), from Grimshaw (1990, p. 58)
- a. The Romans destroyed the city in/*for three hours. Telic
 - b. The doctor observed the patient for/*in three hours. Atelic
- (51) Moulton (2015, p. 315), from Grimshaw (1990, p. 58)
- a. The total destruction of the city in/*for two days appalled everyone. Telic
 - b. Only observation of the patient for/*in several weeks can determine the most likely course of action. Atelic

Moulton refers to such event nominals as ‘argument-structure nominals’. He further observes that the *Aktionsart* modifier requires the internal argument of the verb:

- (52) Moulton (2015, p. 315)
- a. *The total destruction in two days was widespread.
 - b. *Only observation for several weeks can determine the best course of action.

If both the CP and DP complements were internal arguments of the de-verbal noun, as well as of the verb, as we might expect from (53), then, Moulton (2015) argues, we should expect that both a DP and a CP complement should be able to fill the internal argument slot of *observation* in an event/argument-structure nominalization. However, as shown by (54), only the DP-argument can satisfy this requirement.

- (53) a. We observed the patient/that the patient was very ill.
b. The observation of the patient/that the patient was very ill.
- (54) Moulton (2015, p. 316)
- a. We observed the butler for several weeks.
 - b. Observation of the butler for several weeks is needed.
 - c. They observed that the butler was likely the killer for several weeks.

- d. *Their observation that the butler was likely the killer for several weeks was not supported by evidence.

This argument is essentially distributional: “non-derived nouns, what I call content nouns like *theory* don’t take arguments, so the CPs they appear in construction with cannot be arguments either. The conclusion is that they must stand in a modification relation to the noun.” (Moulton 2009b, p. 20) However, what I take this argument to show, is that these nominals don’t take type *e* arguments. It is not clear that this argument presents a problem for the view proposed here, that nouns select for propositions.

The question remains to be answered, however, why the *that*-clause cannot satisfy the internal argument requirement of event-nominals, as shown in (54). To some extent, the analysis offered here fits the approach to the two types of nominalizations outlined in Moulton (2009b, p. 43–45), in the sense that event nominalization requires saturation of the individual argument, and (on the present approach) feeding the nominal its propositional argument will return a predicate of individuals. However, I believe there is more to be said about the issue. A benefit of Moulton’s approach is that it presents a very clear compositional picture of the relationship between the verbal and nominal counterparts of these attitude/content roots. On the present approach, it is less clear how these are derivationally related. I leave this issue for future research.

Before moving on to the issue of how clauses combine with verbs on the present approach, let us consider a few more data points.

4.3.2.1.3 Clauses as modifiers vs. arguments

To support the claim that content nominals do not take arguments, but combine with clauses through modification, Moulton (2015) points to the distribution of the clausal anaphor *so*. The basic observation is that *so* is syntactically a CP (and not a DP). That is, it can serve as a complement to verbs like *seem*, which only allow CP arguments, as shown in (55) (recall the discussion in Section 2.3.2).

(55) Adapted from Moulton (2015, p. 306)

- a. It seems [*CP so*].
- b. It seems [*CP that John left*].
- c. *[*DP That/it*] seems.
- d. *It seems [*DP that/it*].
- e. *It seems [*DP the fact/idea/notion/claim/rumor that John left*].
- f. *It seems [*DP John's leaving*].

As pointed out by Moulton (2015), *so* can occur as the complement of attitude verbs, as shown in (56).²¹ As shown in (57), however, *so* cannot occur as the complement of a clause-taking content nominal.

(56) Bill said/believes that [*P John and Mary broke up*]_{*i*}, and I said/believe *so_i*, too.

(57) Moulton (2015, p. 308)

*the/her {admission, announcement, answer, assertion, assumption, claim, comment, complaint, conclusion, expectation, guess, hope, indication, inference, judgment, knowledge, objection, prediction, presumption, pretence, promise, prophecy, proposal, reasoning, report, ruling, sense, speculation, statement, stipulation, supposition, suspicion, teaching, theory, thought, threat, understanding, worry} so

For Moulton (2015), this follows from the way that clauses and proforms combine semantically with nouns and verbs respectively: clauses can combine with nouns through modification; proform *so*, on the other hand, is of type *e*, and may combine with verbs, but not nouns, as an argument. On the present approach, however, the contrast follows similarly from the selectional restrictions of nouns and verbs, respectively (assuming, with Moulton, that *so* is of type *e*). Whereas content nominals select propositional arguments, attitude verbs select arguments of type *e*.

Further, as Moulton (2009b) points out, CPs that specify the content of the noun do not

²¹I discussed the conditions on *so* as the complement of attitude verbs in Section 2.3.2.

stack, unlike relative clauses (58). On Moulton's approach, this is achieved through ensuring that the proposition specifies the *unique* content of the noun. On the current approach, again, this falls out as a consequence of selection: whereas relative clause modifiers can be stacked, complement/content clauses saturate the internal argument slot of the content nominal: hence, only one clause is possible.

- (58) Moulton (2009b, p. 29)

- a. *The rumor that Fred was happy, that he was in Paris, that he could see ghosts.
- b. The rumor that Fred made, that Jill believed, that Bill spread to his friends...

With regards to these two observations then, it seems like the two approaches are both able to account for the data. A more conclusive piece of evidence comes from *one-replacement*.²²

- (59) a. The rumor that Bill told Mary and the one that he told John.
b. *The rumor that Bill likes Mary and the one that he likes John.

As shown in (59), *one-replacement* is possible with relative clauses, but not with a complement/content clause. On the assumption that *one* cannot target a nominal without also targeting its internal argument (since Jackendoff 1977; see Harley 2005, 2014 for theoretical discussion and formal implementation of this in a Distributed Morphology/Bare Phrase Structure framework), this shows us that while the relative clause in (59-a) is a modifier on the noun *rumor*, the clause in (59-b) is an internal argument.

Before moving on, I should mention that Moulton (2009b) also looks at evidence from binding/connectivity to support the claim that the CP is an adjunct, rather than an argument. The prediction is that if the CP is an adjunct, we should see selective bleeding of condition C effects, because the CP can be Late Merged in the high position, and not in the base-position (Van Riemsdijk and Williams 1981, Freidin 1986, Lebeaux 2009, Safir 1999). On Lebeaux's (2009) account, Late Merge is available for adjuncts, but not arguments, be-

²²Thanks Luke Adamson, p.c., for this observation!

cause of the Projection Principle, which states that all of the predicate's arguments have to be present at all levels of representation. The contrast is shown in (60), and the theoretical implementation is given in (61).

- (60) Moulton (2009b, p. 51); from Safir (1999, fn. 1, p. 589)
- a. *Which investigation of Nixon₁ did he₁ resent? argument
 - b. Which investigation near Nixon's₁ house did he₁ resent? modifier
- (61) Moulton (2009b, p. 53)
- a. Modifier – late-merged to higher copy (no Condition C violation)
[Which investigation near Nixon's₁ house] did he₁ resent [which investigation]?
 - b. Argument – merged in base position (violates Condition C)
*[Which investigation of Nixon₁] did he₁ resent [which investigation of Nixon]?

Freidin (1986), Lebeaux (2009) observed such an asymmetry between relative clauses (62-a) and clausal complements of nouns (62-b), thus supporting the analysis of the latter as an argument and the former as a complement, in line with the *one*-replacement data in (59).

- (62) Moulton (2009b, p. 54); from Safir (1999, p. 589)
- a. *Which claim that Mary had offended John₁ did he₁ repeat? CP comp
 - b. Which claim that offended John₁ did he₁ repeat? RC

As Moulton points out, however, several linguists have argued that these facts are not robust, as shown in (63), where no Condition C violation appears to occur.

- (63) Moulton (2009b, p. 56); (b) from Safir (1999, fn. 1, p. 589)
- a. The fact that John₁ has been arrested he₁ generally fails to mention.
 - b. How many arguments that John's₁ theory was correct did he₁ publish?

He argues that once we control for a number of confounds (see discussion in Moulton 2009b,

Sec. 4.4), we do in fact observe a contrast between clausal complements of verbs (or verbal gerunds, in this example), and clausal complements of nouns, which now pattern with the relative clause modifier in (62-b).

(64) Moulton (2009b, p. 63)

- a. *Whose loudly claiming that Bob₁ is the murderer did he₁ not hear? V+CP
- b. Whose loudly claiming that he₁ is the murderer did Bob₁ not hear? V+CP
- c. Whose loud claim that Bob₁ is the murderer did he₁ not hear? N+CP
- d. Whose loud claim that he₁ is the murderer did Bob₁ not hear? N+CP

As Moulton points out, however, it is not clear how robust this contrast is. While this issue certainly matters for evaluating the two approaches, I will leave this issue for future work. Before moving on to the analysis (Section 4.4), let us consider the issue of how, on this approach, clauses would combine with attitude verbs.

4.3.2.2 Clausal complements of verbs

In the previous section, we considered the compositional strategies available for clauses to compose with (de-verbal) content nominals. I discussed in some detail the approach articulated in Moulton (2009b), where clauses are treated as predicates, modifying the nouns that they combine with. Here, I briefly review the compositional mechanism proposed for clausal complements of verbs, on this approach, as outlined in Moulton (2015).

The denotation of attitude verbs, on this approach, is given in (65-a). If clauses are of type $\langle e, st \rangle$, as in (65-b), it is clear that they will not be able to combine with verbs.

(65) Moulton (2015, p. 320)

- a. $[[\sqrt{\text{EXPLAIN}}]] = \lambda x_c. \lambda e. \lambda w. \text{explain}(x_c)(e)(w) = (37\text{-}a)$
- b. $[[\text{that } \textit{Fred} \text{ left}]] \lambda x_c. \lambda w. \text{CONT}(x_c)(w) = \text{that } \textit{Fred} \text{ left}$

Moulton's solution is to propose that clauses combine with verbs via two type driven move-

ments: (i) CP-movement to Spec,AspP (below Existential Closure (\exists)), which leaves a copy of type e to saturate the verb's selectional requirement, and triggers predicate abstraction (allowing the CP to combine with the VP via Predicate Modification); (ii): Asp^o-movement to a position above \exists , which leaves an event-type trace to saturate the verb's event-argument, and triggers predicate abstraction (allowing Asp^o to combine with the VP, a predicate of eventualities, and return a predicate of times).

Part of the motivation for this analysis is the observation discussed above, that *that*-clauses can combine with nouns that otherwise don't take type e arguments (Stowell 1981, Grimshaw 1990). The other empirical phenomenon that the movement-based account aims to explain, is that *that*-clauses don't move leftward (e.g. Alrenga 2005, see also Koster 1978, Takahashi 2010, Moulton 2013, Ott 2017; see discussion in Section 2.3.4). This claim is based on the observation that (apparently) fronted CPs are only possible if a DP is licensed in its base-position (we refer to this as the *DP-requirement*, following Moulton 2013):

(66) Adapted from Ott (2017, p. 5),

- a. Bill expected that John would be unqualified.
- b. That had been expected.
- c. That John would be unqualified had been expected.
- d. Bill expected it.
- e. Bill expected him to be unqualified.

(67) Adapted from Ott (2017, p. 5),

- a. Bill objected that John would be unqualified.
- b. *That had been objected.
- c. *That John would be unqualified had been objected.
- d. *Bill objected it.
- e. *Bill objected him to be unqualified.

Moulton (2015, p. 306) discusses the consequences of this observation: “One line [of address-

ing the DP-requirement, KD] is that a DP in the form of a null operator is recruited, and CPs are high, base-generated satellites (Koster 1978, Alrenga 2005). The other line is that CPs that move are in fact embedded in null DPs (Davies and Dubinsky 2010, Takahashi 2010). Both of these solutions have the following corollary. In order to capture the fact that CPs must rely on one of these DP strategies, the grammar must prevent CPs from themselves moving alone.”

As Moulton points out, this is not due to a general ban on things of category CP to move. As we saw in (55), proform *so* is syntactically a CP, yet appears to be able to move (recall from (55) that *seem* does not take DP-complements, thus allowing us to rule out the hypothesis that *so* moves using the same kind of DP-strategy that is involved in the movement of full *that*-clauses).

- (68) So it seems.

Regarding the movement-facts, the theoretical claim from Moulton (2015) is that the resulting configuration blocks further leftward movement, as this would either result in a type-clash or semantically vacuous movement (see discussion in Moulton 2015, Sec. 4.2.).²³ Recall from Sections 2.3.4–2.3.5 that, based on the availability of CP-fronting across different types of predicates, we suggested that movement requires not only that a DP is licensed in base-position, but also that the verb is able to combine with a CP. We leave further exploration of the movement facts for future research, and turn now to the task at hand, of accounting for the entailment and argument structural properties of *know* vs. *believe* discussed in Section 4.1.

²³The movement analysis is argued to have a number of other benefits, including capturing the right-peripheral position of CPs relative to arguments and the verbal complex in German, freezing effects in the VP, extraction from and binding into CPs, and similarities and difference among CP argument extraposition, heavy NP shift, relative clause extraposition. See Moulton (2015) for discussion.

4.4 Analysis

In Section 4.1, we looked at the interpretation of sentences involving nominal and clausal complements of attitude verbs. We saw that with verbs like *know*, *discover*, *fear*, *imagine*, and *mention*, etc., sentences with DP-complements are interpreted essentially as relations of acquaintance (in relation to other aspects of meaning) to an individual. Here, the epistemic or doxastic relation present in the corresponding CP-case disappears. With *believe* and *trust*, however, the verbs retain their epistemic or doxastic meaning with all kinds of DP-complements. In cases involving content nouns like *claim* or *rumour*, the DP is simply interpreted as a “vessel of propositional content” (as on the standard picture of content nominals, discussed in the previous section). With DPs that are not associated with propositional content, the DP gets interpreted as the source of the propositional content. In both of these cases, the entailment to the corresponding CP-case is preserved.

We noted that this pattern raises a question for how to analyse the selectional requirements of the *know*-class verbs: Do they denote a relationship to a proposition, in which case they select for a *that*-clause? Or do they denote an acquaintance relation to an entity, and select for a DP? And moreover, what does this mean for the Hintikkan picture, according to which *know* is simply the factive sibling of *believe*?

In Section 4.3.1, we considered a theoretical alternative based on polysemy, whereby the facts are explained by all verbs of the *know*-class are ambiguous between a verb which denotes an acquaintance-based relation and selects for individuals of type *e* (the DP-case) and a doxastic or epistemic verb, which selects for propositions of type *<st>*. This alternative was rejected on both conceptual and empirical grounds.

In Section 4.3.2, we examined a recent popular approach to the semantic composition of clausal complements, which treats clauses as predicates of propositional content, which combines with nouns as modifiers (via Predicate Modification), and with verbs via a set of type-driven movements. Looking at the distribution of clauses and individuals in equative sentences, we argued that clauses are in fact of type *e*. On this view, these attitude verbs

select a complementizer which shifts propositions into things of type e , a process mediated by selection for a complementizer of type $\langle st, e \rangle$.

To account for the composition of clauses and content nouns, which would not be able to compose semantically if they were both of type e , we proposed that content nouns do in fact select for propositions, and that the content function is part of the meaning of content nominals. Rather than selecting for a C-head which includes the content function as part of its meaning, we proposed that content nouns select for a ‘classic’ C-head, which is simply a function of type $\langle st, st \rangle$. In Section 4.3.2.1.3, we saw evidence for this claim —that clausal complements are arguments rather than modifiers— from the *one*-replacement test. In both the verbal and the nominal case, then, the embedding predicate composes with the clausal complement through Function Application.

With this background in mind, let us now turn to the claim that clauses are of type e . Before putting the various analytical pieces together, let us consider in some more detail the compositional possibilities for the Source-DP, which we find presents further motivation for treating the clausal complements of *believe*-verbs as individuals. In Section 4.5, we present arguments for treating the clausal complements of *know*-verbs as individuals.

4.4.1 Selecting for individuals: introducing Source-arguments

As we saw in 4.1, *believe*-verbs, but not *know*-verbs, allows for a Source-argument to co-occur with a finite *that*-clause:

(69) Source-construction

- a. I believe him [CP that he’s moving to Canada].
- b. *I know him [CP that he’s moving to Canada].

In what follows, we examine the syntactic and semantic properties of this construction, and discuss its implications for the compositional semantics of attitude verbs and *that*-clauses.

The same contrast is found in German. Interestingly, in German, which distinguishes morphologically between Accusative (ACC) and Dative (DAT) case, we observe a contrast

between Source and content DPs: the Source-DP must have Dative case, as shown in (70-a), whereas content DPs must have Accusative case, as shown in (70-b).²⁴

(70) German

- a. Ich glaube ihm/*ihn, dass Hans Maria das Buch gab.
I believe him.DAT/ACC, that Hans Maria the book gave.
'I believe him that Hans gave Mary the book.'
- b. Ich glaube die/#dem Behauptung, dass Hans Maria das Buch gab.
I believe the.ACC/DAT claim, that Hans Maria the book gave.
'I believe the claim that Hans gave Mary the book.'

German, as we saw in Section 4.3.1 above, has different forms corresponding approximately to acquaintance/familiarity *know* (*kennen*) and propositional *know* (*wissen*). As with the English verb *know*, neither *kennen* nor *wissen* may participate in the Source-construction.

(71) illustrates

(71) German

- *Ich weiß/kenne ihm, dass Hans Maria das Buch gab.
I know.PROP/know.FAM him.DAT, that Hans Maria the book gave.
'I know (from him) that Hans gave Mary the book.'

Importantly, German, unlike English, allows for the Source-DP (marked DAT), and a content-DP (marked ACC) to co-occur, as shown in (72)–(73).

(72) German

- Ich glaube ihm die Behauptung, dass Hans Maria das Buch gab.
I believe him.DAT the.ACC claim that Hans Maria the book gave.
'I believe the claim that he told me, that Hans gave Mary the book.'

(73) *I believe him the claim that Hans gave Mary the book.

²⁴Thanks Florian Schwarz for this observation.

To account for the case- and DP-licensing contrasts in (70) and (72), I propose that in German, the Source-DP is introduced in a Low Source Applicative (74) (recall that *e* is the type of individuals and *s* is the type of events and states²⁵). This is plausible, as this construction is generally available in German, but not in English, as shown in (75) (e.g. McIntyre 2006, Schäfer 2008)

(74) Pylkkänen (2008, p. 22)

$$[\text{[App}^o_{\text{Source}}]] = \lambda x_e. \lambda y_e. \lambda f_{<e,st>.} \lambda e_s. [f(e,x) \ \& \ \text{TH}(e,x) \ \& \ \text{source}(x,y)]$$

(75) Source Applicative (Schäfer 2008, p. 76)

- a. *John stole Mary a book.

(Intended: John stole a book from Mary) English

- b. Hans stahl Maria das Buch
Hans.NOM stole Maria.DAT the book.ACC
'Hans stole the book from Maria.'

German

English, like German, has Goal Applicatives (76), as shown with (77-a)–(77-b).

(76) Pylkkänen (2008, p. 22)

$$[\text{[App}^o_{\text{Goal}}]] = \lambda x_e. \lambda y_e. \lambda f_{<e,st>.} \lambda e_s. [f(e,x) \ \& \ \text{TH}(e,x) \ \& \ \text{recipient}(x,y)]$$

(77) Goal (Recipient) Applicative (Schäfer 2008, p. 76)

- a. John gave Mary a book.

English

- b. Hans gab Maria das Buch
Hans.NOM gave Maria.DAT the book.ACC
'Hans gave Maria the book.'

German

Recall the assumption spelled out in Section 1.3, that a minimal requirement on semantic composition is that their semantic types are compatible (assuming a set of compositional mechanisms, in particular Functional Application (25) for arguments and Predicate Modification (26) for modifiers). On the standard analysis, $\text{App}^o_{\text{Source}}$ takes two arguments of

²⁵Though as we pointed out in Section 4.2 above, in a situation semantic perspective, eventualities would be viewed as a type of situation.

type e and returns a function of type $\langle\langle e, st \rangle, \langle st \rangle \rangle$, as shown in (74). In order for *glauben* ('believe') to be able to combine with ApplP, then, *glauben* must itself be of type $\langle e, st \rangle$,^{26,27} i.e. selecting for individuals, rather than propositions.²⁸ We might of course imagine a different version of $\text{Appl}_{\text{Source}}^o$, which selects for propositions, rather than individuals, as its first argument. However, without further, independent, motivation for such a move, we assume a classic, independently motivated, semantics for $\text{Appl}_{\text{Source}}^o$. This move, then, raises the question of what kind of individual does *believe*-verbs select for.

The answer to this question, we argue, lies in the entailment contrast discussed in Section 4.1. While *believe*+DP preserves the epistemic entailments of the corresponding CP-case, *know*-verbs do not; they describe relations of acquaintance to their DP-complements. We also saw that this was not a function of the nature of the DP, but followed from the verbs themselves. This contrast, then, must be due to something about the lexical semantics of the verbs. We propose that *know* and *believe*-verbs (a) select for different types of individuals, and (b) denote different types of relations to these individuals. As shown in the templatic analysis given in (78), *know*-verbs return predicates of states or events involving "acquaintance" (very broadly speaking) with some individual x , as shown in (84-a): this individual can be a particular like *John* or *the tea cup* or content individual like *the rumour (that p)*. (In Section 5.6, we show that factive *know*-verbs involve an *evidential* acquaintance relation; see Tables 5.6–5.7 for the final analysis of these predicates.) *believe*-verbs, on the other hand, describe fundamentally doxastic or epistemic states, and select specifically for content individuals (x_c). As shown in (84-b), *believe*-verbs return predicates of states that are true if the intentional content p of x_c is true in all of the attitude holder's doxastic alternatives.

²⁶Where s is an eventuality, either a state or an event.

²⁷It is of course also conceivable, though not very plausible, that *glauben* took ApplP as its first argument, rather than the opposite. I will not consider that option here, as this would cause serious problems for the composition with clauses and DPs.

²⁸Note that it doesn't necessarily follow from the Applicative facts that this holds also for *believe* in English. However, in the interest of keeping our theory as restrictive as possible, and given that German otherwise appears to pattern with English (both in terms of the *know/believe*-contrast discussed here, and in their semantic-pragmatic properties, as we saw experimental evidence of in Section 3.2), I will assume that English *believe* is also of type $\langle e, st \rangle$.

- (78) *know* and *believe*-verbs [Schematic templates: see §5.6]

- a. *know*-verbs : $\lambda x_e. \lambda s_l. \text{VERB}_{AQ}(s)(x)$
- b. *believe*-verbs : $\lambda x_e. \lambda s_l. \text{VERB}_{DOX}(s)(\text{CONT}(x)(w_s))$

By including the content-function (repeated in (79)) in the lexical semantics of *believe*, it follows that *believe DP* entails the belief that p (as per the Hintikkan approach, and also in line with Kratzer 2006 and Moulton 2009b).

- (79) $\text{CONT}(x_c)(w) = \{w' : w' \text{ is compatible with the intentional content determined by } x_c \text{ in } w\}$

Given that *know*-verbs do not include the content function in their lexical semantics, but describe relations of acquaintance with particulars, the belief that p does not follow from *know DP* (contrary to the Hintikkan approach). This then captures the fact that the entailment contrasts are not due to the complements, but follow from the verbs themselves.²⁹

The applicative facts and the entailment contrast motivates analyzing the clausal complements of *believe* as content individuals.³⁰ As we mentioned in Section 4.3.2.1.1, we can derive a CP of type *e* from a proposition (the semantic type of TP) via a complementizer that shifts propositions into a content individual (x_c), as shown in (80) (where p can be any proposition):

- (80) Clausal complements of *believe*-verbs

- a. $[[C_{V-cont}^o]]^w = \lambda p_{st}. \iota x_c. \text{CONT}(x_c)(w) = p$
- b. $[[CP_{V-cont}]]^w = \iota x_c. \text{CONT}(x_c)(w) = p$

Let us turn now to the type of clausal complements of *know*-verbs. The entailment contrasts motivate the claim that *know*-verbs do not extract propositional content from content indi-

²⁹This move raises questions about the opacity of the complements of *know*-verbs. I address these in Section 4.4.2.

³⁰The argument against polysemy in Section 4.3.1 focused on *know*-verbs; however, the same considerations apply in the case of the *believe*-class.

viduals, but rather, describe an acquaintance relation to such individuals. The arguments against polysemy then spoke against positing a separate lexical item for CP-arguments. Taken together, this motivates analysing *know*-class verbs as in (84-a), regardless of whether they take a DP or a CP-complement, with the consequence that *know*-verbs do not denote doxastic relations to their clausal complements. In Section 4.4.2, we discuss the consequences, and note some advantages, of this analytical consequence.

The question is whether the clausal complements of these two types of verbs are *themselves* different. One possibility is that clausal complements of *know* and *believe* are the same: that they are both content individuals, as in (80). Another option is that the grammar makes available a different type of C-head, which specifically shifts propositions to particulars (x_r). Such an alternative is provided in (81):

(81) Possibility for clausal complements of *know*-verbs (to be rejected)

- a. $[[C_{V-part}^o]] = \lambda p_{st}. \iota x_r. \text{situation}(x_r) \ \& \ \text{exemplifies}(x_r)(p)$
- b. $[[CP_{V-part}]] = \iota x_r. \text{situation}(x_r) \ \& \ \text{exemplifies}(x_r)(p)$

A problem with the alternative in (81), however, is that, at least without further qualification, it wrongly predicts that all verbs of the *know*-variety should be factive, given the adoption of Kratzer's (2002) *exemplification*-relation (see discussion around (24) in Section 4.2). On Kratzer's (2002) account of what it means to know a fact, facts are particulars that exemplify propositions —in the same way that particulars such as tea cups, people, and rumours exemplify properties.

Moreover, it seems intuitive that, for instance, knowing the story of Robin Hood implies that you know the content of that story, not just that your are familiar with its existence.^{31,32}

³¹ As with *I know of the story of Robin Hood*, where *the story of Robin Hood* is the *res* argument (e.g. Quine 1956, Stechow and Cresswell 1982, Charlow and Sharvit 2014). In English, these arguments are typically introduced in PPs, as shown in (82):

- (82) a. Mary's belief (about John) was that he no longer lives in the US.
 b. Mary believed (of/about John) that he no longer lives in the US.

³² Thanks Florian Schwarz, p.c., for this point.

On the alternative in (81), there is nothing that captures this fact. On the alternative in (80), on the other hand, the attitude holder is acquainted with an individual, which is characterized by its content, as well as any other properties (like being kind, tedious, repetitive, and so on). We thus adopt the alternative in (80) for both types of verbs:

(83) Clausal complements of verbs (final analysis)

- a. $[[C_{V-cont}^o]]^w = \lambda p_{.} \iota x_c. \text{CONT}(x_c)(w) = p$
- b. $[[CP_{V-cont}]]^w = \iota x_c. \text{CONT}(x_c)(w) = p$

This move also has the nice consequence that it simplifies our typology of complementizers: we now have one verbal complementizer of type $<st,e>$ (involved with attitude verbs as well as with the copula), and one nominal complementizer of type $<st,st>$.

The full composition of the two types of verbs and the various (im)possible combinations of complement types is spelled out in (85)–(87) (based on the meanings of the two types of verbs given in (78); repeated in (84) for clarity), highlighting clearly the epistemic equivalence of *believe*+DP and *believe*+CP (the internal composition of content DPs is given in (44)). (Note that on this analysis, sentences like *I believe Lisa (that p)* involve either a contextually supplied value or existential closure of the content argument, unlike sentences like *I know Lisa*; in line with their respective interpretations.)

(84) *know* and *believe*-verbs [Schematic templates: see §5.6]

- a. *know*-verbs : $\lambda x_e. \lambda s_l. \text{VERB}_{AQ}(s)(x)$
- b. *believe*-verbs : $\lambda x_e. \lambda s_l. \text{VERB}_{DOX}(s)(\text{CONT}(x)(w_s))$

(85) Clausal complements of verbs vs. content DPs

- a. $[[it's raining]]^w = \iota x_c. \text{CONT}(x_c)(w) = \lambda w'. \text{rains}(w')$
- b. $[[the claim that it's raining]]^w = \iota x_c. \text{CONT}(x_c)(w) = \lambda w'. \text{rains}(w') \& \text{claim}(x_c)(w)$

Schematic templates of clausal and nominal complements of *know* and *believe*-verbs (see Section 5.6 for the full analysis of factive *know*-verbs; where we show that these encode an

evidential presupposition).

(86) *know*-verbs with CP/DP complements

- a. CP-complements (e.g. *it's raining*):

$$\lambda s_l. V_{AQ}(s)(\iota x_c. \text{CONT}(x_c)(w) = \lambda w'. \text{rains}(w'))$$

- b. Content DP (e.g. *the claim that it's raining*):

$$\lambda s_l. V_{AQ}(s)(\iota x_c. \text{CONT}(x_c)(w) = \lambda w'. \text{rains}(w') \ \& \ \text{claim}(x_c)(w))$$

- c. Regular entities (e.g. *Lisa*):

$$\lambda s_l. V_{AQ}(s)(\text{Lisa})$$

(87) *believe*-verbs with CP/DP complements

- a. CP-complements (e.g. *it's raining*):

$$\lambda s_l. V_{DOX}(s)(\text{CONT}(\iota x_c. \text{CONT}(x_c)(w) = \lambda w'. \text{rains}(w'))(w_s))$$

- b. Content DP (e.g. *the claim that it's raining*):

$$\lambda s_l. V_{DOX}(s)(\text{CONT}(\iota x_c. \text{CONT}(x_c)(w) = \lambda w'. \text{rains}(w') \ \& \ \text{claim}(x_c)(w))(w_s))$$

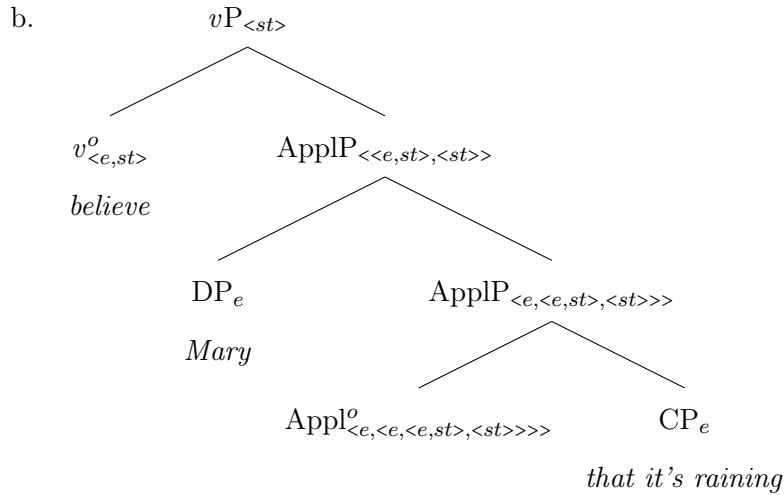
- c. Regular entities (e.g. *Lisa*):

$$\# \lambda s_l. V_{DOX}(s)(\text{CONT}(\text{Lisa})(w_s))$$

Before concluding this section, we should note that there is clearly more to be said about the Source-construction. One question, which we will not attempt to tackle here, is how the Source-DP is introduced in English, which, as we have seen, lacks Source Applicatives. In German, the composition works out without difficulty, as shown in (88).

(88) Composition of Source-construction in German

- a. $[[\text{believe } \text{Mary } \text{that } \text{it's raining}]] :$



- c. $\lambda e_s.[\text{VERB}_{DOX}(e)(\text{CONT}(\iota x_c.\text{CONT}(x_c)(w_s)=\lambda w'.\text{raining}(w'))(w_s)) \ \&$
 $\text{TH}(e,\iota x_c.\text{CONT}(x_c)(w_s)=\lambda w'.\text{raining}(w')) \ \&$
 $\text{source}(\iota x_c.\text{CONT}(x_c)(w_s)=\lambda w'.\text{raining}(w'),\text{Mary})]$

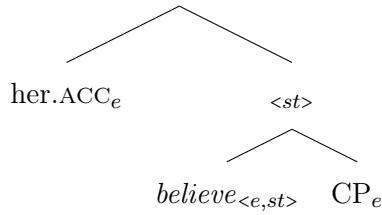
Roughly, this is a predicate of eventualities of believing the propositional content ‘it is raining’ (the meaning of the CP), where the source of that content is some Mary.

As we saw in (72) above, English does not allow two DPs: it is possible to have a Source-DP or a content DPs, but not both. This speaks to there being only one case-assigning head present in the syntax. The question for the semantics, then, is how the Source-DP is introduced in the first place? In the case of content DPs, we have argued that the clause is selected for by the noun (Section 4.3.2.1.3). However, there is no reason to think that entities like *Bill* select for clauses. Moreover, contrasts in the movement possibilities confirm that *that*-clauses form a constituent with content nouns, but not with Source-DPs:

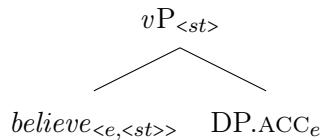
- (89) a. The rumour that Bill is moving to Canada surprised Mary/is unbelievable.
b. *Bill that he is moving to Canada surprised Mary/is unbelievable.

Another option would be to say that the Source-DP is lexically introduced by *believe*-verbs. This, however, would require us to say that *believe* in English, is of type $<e,<e,<st>>>$, given that on the current approach, the Source-DP cannot be an argument of *believe*:

- (90) *believe her that p* : vP: TYPE CLASH



- (91) *believe the claim that p* :



One reason to not take this route, is that we have no reason, besides this contrast, to think that English *believe* and German *glauben* differ in this respect. More importantly, however, while the bare DP-case clearly implies some contextually salient proposition, the inverse does not hold in the bare CP-case:

- (92) a. $I_y \text{ believe you}_x.$ $\rightsquigarrow \exists p \text{ s.t. } y \text{ believes } x \text{ that } p$
 b. $I_y \text{ believe } [P \text{ that it's raining}].$ $\rightsquigarrow \exists x \text{ s.t. } x \text{ is the source of } p$

Here, there is no inference that some (contextually salient) individual is the source of *p*. This speaks against *believe* selecting for the Source-DP.³³

Another question is why *know*-verbs should not be possible in the Source-construction. On the analysis given here (78), their semantic types are compatible with the selectional requirements of $\text{Appl}^0_{\text{Source}}$. One possibility for why *know*-verbs are not possible in this construction might then be that the meaning resulting from combining *know*-verbs and ApplP is anomalous. Whereas *believe*-verbs when combined with ApplP describe predicates of states of believing some propositional content *p* (of a content individual x_c), where the source of that content is some individual *y*, the resulting meaning in the case of *know* would be a predicate of states or events of acquaintance with an individual x_c , where *y* the source of x_c . While the former meaning strikes me as more transparent, it is not obvious to me, however, that the latter meaning is anomalous. And in fact, as we will see in Section 5.6.2

³³Thanks Florian Schwarz, pc. for this point.

where we discuss the DP status of emotive factives, there is reason to think that at least this subtype of the *know*-class does make reference to something like a source situation or individual. This suggests that the selectional requirements of *know*-verbs are likely more complex than suggested here.

Regardless of these complications, the main conclusions to take away from this chapter still hold: (i) that clausal complements of attitude verbs like *know* and *believe* denote content individuals, rather than propositions, and (ii) that these two types of predicates differ fundamentally in how they relate to those individuals. While *believe*-verbs describe epistemic or doxastic relations to propositions (à la Hintikka), *know*-verbs describe acquaintance-based relations to particulars. Connecting the conclusions of this section to the discussion on content nouns in Section 4.1, we arrive at a three-way split among predicates that select *that*-clauses (content nouns, *know*-verbs, and *believe*-verbs). This split is mediated by two general types of complementizers: a nominal type ($\langle st, st \rangle$), and a verbal type ($\langle st, e \rangle$).

This analysis proposed here for the lexical semantics of *know*-verbs, *believe*-verbs, and content nominals, has allowed us to explain the following empirical observations: the DP-to-CP entailment contrasts between *know* and *believe*-predicates and its correlation with the ability to occur in the Source-construction (Section 4.1), the ability of clauses to occur with content nominals in equative sentences (Section 4.3.2.1.1), and the argument-status of clausal complements of content nouns (Section 4.3.2.1.3). A more specific proposal for the semantics of factive verbs and *fact that* nominals is offered in Section 5.6, where we argue that factive *know*-verbs involve an *evidential* acquaintance relation (see summaries in Tables 5.5, 5.6–5.7).

Before concluding this chapter, Section 4.4.2 provides some discussion on the analysis of *know*-verbs as involving a primarily acquaintance-based relation, rather than as a primarily epistemic predicate, pointing to some potential issues, as well as some observations in favour of this approach.

4.4.2 Knowledge without belief?

In the previous section, we proposed a lexical semantics for attitude verbs like *know* which was primarily acquaintance-based, rather than epistemic. Primary motivation for this approach came from the observation that *know*-verbs and *believe*-verbs differ in whether a sentence with a DP-complement entails the corresponding sentence with a CP-complement:

- (93) Uegaki (2015, p. 626)

John {knows, discovered, reported, predicted} the rumor that Mary left. $\#$
John {knows, discovered, reported, predicted} that Mary left.

- (94) Adapted from Uegaki (2015, p. 626)

John {believed, doubted, trusted} the rumor that Mary left. \models
John {believed, trusted, doubted} that Mary left.

This move, however, is likely to raise a number of eyebrows. The idea that knowledge entails belief is fairly standard both in the linguistic and the philosophical literature, as we saw reflected in the Hintikkan approach discussed in Section 1.1. However, while it's clear that many (perhaps most) uses of *know that p* implies the belief that p, there are also uses that clearly do not imply such belief:³⁴

- (96) [About a friend, a former student at Cambridge, who's confusedly walking on the grass —something which all students know is not permitted:]

He definitely knows that walking on the grass is not allowed! I guess he's been away for a long time and must have forgotten...

Importantly, there are no such uses with *believe*: *belief*, by definition, must involve an epistemic state. Acquaintance with an actual situation, corresponding to the content of the

³⁴Similarly to *know WH*, e.g.

- (95) You definitely know {the answer, what to do here}! Just think about it for a minute.

belief, does not, however, seem to be necessary:

- (97) I don't know why I believe that I'm going to win the Nobel Prize. I just do.

know has also been observed to have uses corresponding to (97), as shown in (98). However, the use of *how*, as opposed to *why* in (97), is telling: this suggests that even in these cases, there exists a situation through which the speaker knows that p (though exactly what that situation is may not be known).

- (98) I don't know how I know that I'm going to win the Nobel Prize. I just do.

Another interesting contrast that speaks to this point concerns the (in)compatibility of *be right* (often taken to be the veridical counterpart of *know*; e.g. Anand and Hacquard 2014) with epistemics or doxastics like *believe* vs. acquaintance-based predicates like *know*. With verbs like *believe*, *be right to VERB* is possible, and means roughly that the epistemic intuition is correct (99). With verbs like *know*, however, *be right to VERB* is infelicitous (100):

- (99) a. You are right to believe that this distinction has important moral implications.³⁵
b. You are right to doubt that she was dead by that time.³⁶
c. You are right to trust that it is time to wear your heart on your sleeve.³⁷

- (100) a. #You are right to know that Bill and Anna broke up.
b. #You were right to hear/have heard that Bill and Anna broke up.
c. #You were right to discover/have discovered that Bill and Anna broke up.³⁸

There is also evidence supporting the claim that some of the predicates that are generally taken to be ‘weak’ (non-factive) doxastics, are in fact acquaintance verbs like *know*:

³⁵ From <https://samharris.org/the-marionettes-lament/>.

³⁶ From https://www.reddit.com/r/serialpodcast/comments/2m428a/how_do_we_know_for_sure_hae_was_dead_by_236/.

³⁷ From <http://kristinfontana.com/starcast/2015/07/08/>.

³⁸ With some of these predicates, there is an alternative reading of *be right*, as in *You were right to find out that they broke up..* What this means, however, is not the epistemic intuition that is right, as in (99), but rather that the act of finding out was justified.

- (101) It's a rainy Christmas Eve all over the UK and the question is who is number one on the Radio One chart show tonight? “Is it Blue or the unexpected Christmas sensation from Billy Mack?” **You might have guessed it although you may not believe it...** It’s Billy Mack!³⁹

In Sections 5.6.1–5.6.2 of Chapter 5, we present an analysis of factivity, which might be viewed as a ‘decompositional’ development of Kratzer’s (2002) account of what it means to know a fact, given in (102).

- (102) *S* knows *p* if and only if (Kratzer 2002, p. 664)
- a. There is a fact *f* that exemplifies *p*,
 - b. *S* believes *p de re* of *f*, and
 - c. *S* can rule out relevant possible alternatives of *f* that do not exemplify *p*.

We propose that the basis for factivity (in the sense of the projection-prone inference that the speaker is committed to *p*) is a presupposition of an evidential modal base, anchored to a *Judge*, which entails *p* (akin to the condition in (89-c)). Depending on the type of factive predicate, however, the judge can either be bound by the speaker (as we argue is the case for doxastic factives), or by the attitude holder (the case of the emotive factives), or it can be contextually provided (the case of *fact that* nominals). The belief-component in (89-b), however, plays no role in our account of factivity.

Nevertheless, this is obviously not the last word on this issue. Regarding the source of the doxastic component of *know*-verbs, one potential option is to treat it like an inference of some kind, stemming perhaps from the evidential relation. Another possibility is to go further down the decompositional route, proposing that belief is a possible, but not essential component of *knowledge*. An interesting direction for further work in this area is to combine the insights from the semantics with a derivational approach to the internal composition of words, such as that offered by Derivational Morphology (e.g. Halle and Marantz 1993,

³⁹From the movie *Love Actually*.

Harley and Noyer 1999, Embick and Marantz 2008, among others). This is clearly an issue beyond the scope of the current project, but I hope that the discussion here has provided some interesting new directions for future work on the topic.

4.5 Summary

This chapter has argued for a unified, acquaintance-based semantics for ‘propositional’ and ‘acquaintance’ *know* and other predicates where sentences with DP-complements fail to entail the corresponding CP-sentences. This is unlike *believe*-verbs, which we take to describe a fundamentally epistemic or doxastic relation to propositions (in line with the Hintikkan approach).

The central empirical observation of this chapter, was the contrast in the availability of the Source-arguments between the *know*-class and the *believe*-class, and the correlation of this split to the DP-to-CP entailment contrast (Section 4.1). Rather than placing the explanatory burden on the complement itself, the account offered here places it on the type of relation described by the verb. Verbs like *know*, *mention*, *discover*, and *explain* (in addition to other aspects of meaning) describe a primarily “acquaintance”-based relation to an individual. Verbs like *believe*, *trust*, and *doubt* (besides other components of meaning) describe primarily epistemic or doxastic relations to propositions (in the Hintikkan sense).

To further capture the argument-structural properties of these verbs, and of content nouns which take clausal arguments, we proposed in Section 4.4.1 that clausal complements of verbs are individuals (in line with Cresswell 1973, Chierchia 1984, 1985, Potts 2002, and Woods 2016a). The semantics of this individual, however, borrows elements of the account of Kratzer (2006) and Moulton (2009b); specifically, the feature that propositions (the semantic type of TPs) are selected by a C-head which embeds the content function. Rather than returning a predicate of propositional content, as on the Moulton-Kratzer view, we argue that it returns an individual of propositional content, as shown in (103):

- (103) Clausal complements of verbs

- a. $\|C_{V-cont}^o\|^w = \lambda p_{<st>.lx_c.CONT(x_c)}(w) = p$
 - b. $\|CP_{V-cont}\|^w = lx_c.CONT(x_c)(w) = p$

This proposal, then, also explains the availability of *that*-clauses in equatives.

The basic, schematic meanings for the two types of predicates are given in (104). The key difference is that *believe*-verbs select specifically for content individuals (x_c), and describe states that are fundamentally doxastic or epistemic, as on the standard Hintikkan view. Verbs like *know*, on the other hand, describe relations of “acquaintance”, broadly construed, to a theme, which may be regular, particular individuals like *Lisa* and *the tea cup*, or content individuals like *the rumour (that p)*.

- (104) *know* vs. *believe*-verbs [Schematic templates: see §5.6]

 - a. *know*-verbs : $\lambda x_e. \lambda s_l. \text{VERB}_{AQ}(s)(x)$
 - b. *believe*-verbs : $\lambda x_e. \lambda s_l. \text{VERB}_{DOX}(s)(\text{CONT}(x)(w_s))$

In Chapter 5 (Sections 5.6.1–5.6.2), we refine the analysis provided for the *know*-verbs, showing that factive predicates of this general type are *evidentials*, rather than doxastics.

Regarding the internal composition of content DPs, we argued that content nouns select for propositions, contrary to the Kratzer-Moulton approach (discussed in Section 4.3.2), where *that*-clauses, predicates of propositional content, combine with nouns via Predicate Modification. This motivated positing a separate nominal complementizer of type $\langle st, st \rangle$. The details of the proposal for content nominals are repeated in (105) (from (44) above):

- (105) Clausal complements of content nominals

 - a. $[[C_N^o]] = \lambda p_{\langle st \rangle}.p$
 - b. $[[C_N^o]]([[John\ moved\ to\ Canada]]) = \lambda w.John\ moved\ to\ Canada(w)$
 - c. $[[claim]] = \lambda p_{\langle st \rangle}.\lambda x_c.\lambda w.[claim(x_c)(w) \ \& \ CONT(x_c)(w) = p]$
 - d. $[[claim]]([[that\ John\ moved\ to\ Canada]]) =$
 $\lambda x_c.\lambda w.[claim(x_c)(w) \ \& \ [CONT(x_c)(w) = \lambda w'.John\ moved\ to\ Canada(w')]]$

- e. $[[\text{the claim that John moved to Canada}]] =$
 $\iota x_c. \lambda w. [\text{claim}(x_c)(w) \& [\text{CONT}(x_c)(w) = \lambda w'. \text{John moved to Canada}(w')]]$

The full semantic composition of the two types of verbs and the various (im)possible combinations of complement types are repeated here (from (85)–(87) above):

(106) Clausal complements of verbs vs. content DPs

- a. $[[\text{it's raining}]]^w = \iota x_c. \text{CONT}(x_c)(w) = \lambda w'. \text{rains}(w')$
- b. $[[\text{the claim that it's raining}]]^w = \iota x_c. \text{CONT}(x_c)(w) = \lambda w'. \text{rains}(w') \& \text{claim}(x_c)(w)$

(107) *know*-verbs with CP/DP complements

- a. CP-complements (e.g. *it's raining*):

$$\lambda s_l. V_{AQ}(s)(\iota x_c. \text{CONT}(x_c)(w) = \lambda w'. \text{rains}(w'))$$

- b. Content DP (e.g. *the claim that it's raining*):

$$\lambda s_l. V_{AQ}(s)(\iota x_c. \text{CONT}(x_c)(w) = \lambda w'. \text{rains}(w') \& \text{claim}(x_c)(w))$$

- c. Regular entities (e.g. *Lisa*):

$$\lambda s_l. V_{AQ}(s)(\text{Lisa})$$

(108) *believe*-verbs with CP/DP complements

- a. CP-complements (e.g. *it's raining*):

$$\lambda s_l. V_{DOX}(s)(\text{CONT}(\iota x_c. \text{CONT}(x_c)(w) = \lambda w'. \text{rains}(w'))(w_s))$$

- b. Content DP (e.g. *the claim that it's raining*):

$$\lambda s_l. V_{DOX}(s)(\text{CONT}(\iota x_c. \text{CONT}(x_c)(w) = \lambda w'. \text{rains}(w') \& \text{claim}(x_c)(w))(w_s))$$

- c. Regular entities (e.g. *Lisa*):

$$\# \lambda s_l. V_{DOX}(s)(\text{CONT}(\text{Lisa})(w_s))$$

As is clear from (107)–(108), incorporating the content function in the meaning of *believe*-verbs, but not *know*-verbs, allows us to account for the DP-to-CP entailment contrasts discussed in Section 4.1. In Section 4.4.2, we discussed potential objections to this unorthodox approach to the semantics of *know*, where belief is not taken to be a fundamental

component of its meaning. In the following chapter, we finally turn to the question which we have haunted this dissertation: *What is factivity?* If it's not a presupposition that p is Common Ground (as we showed in Chapters 2 and 3), and it doesn't necessarily entail belief, then what is it?

Chapter 5

Factivity

In Chapters 2 and 3, we observed that factive predicates vary with respect to the discourse status of their complement, such that *doxastic* allow for the embedded proposition to be asserted, in the sense of providing discourse new content, while *emotive* factives require *p* to be Given, in the sense of Schwarzschild (1999). On the syntactic side, we found (i) that the potential for embedding discourse new information correlates with the availability of embedded V2 in Swedish and German, and *wh*-extraction in English, and (ii) that the complements of the emotive factives are (overtly or underlyingly) DP. In Chapter 4, we examined the entailment patterns and argument structure of verbs like *know* and *believe*, finding (i) that such verbs embed content individuals, rather than propositions, and (ii) that the two types of verbs differ in terms of how they relate to their argument. While verbs like *believe* describe a fundamentally epistemic or doxastic relation to the embedded content (1-b), verbs like *know* (a set which includes all of the factive verbs as well as a number of non-factive verb) describe primarily acquaintance-based relations, in addition to other aspects of meaning (1-a):

- (1) *know* vs. *believe*-verbs [Schematic templates]

 - a. *know*-verbs : $\lambda x_e. \lambda s_l. \text{VERB}_{AQ}(s)(x)$
 - b. *believe*-verbs : $\lambda x_e. \lambda s_l. \text{VERB}_{DOX}(s)(\text{CONT}(x)(w_s))$

These findings raise a number of questions for the theory of factivity and the semantics of factive verbs. On the standard conception of factivity (and presuppositions in general),

factive verbs require p to be Common Ground; a view which is clearly at odds with the observation that doxastic factives generally allow p to be discourse new information. Moreover, the observation that emotive factives obligatorily select for DPs raises the issue of what, if any, semantic dimension this reflects (we saw in Chapters 2 and 3 that it cannot simply be Givenness, given that response stance verbs like *accept* also require p to be Given, but allow CP-complements). In this chapter, we look in more detail at the semantics of doxastic and emotive factives, observing that the doxastic-emotive split tracks a separate semantic distinction in terms of the types of (linguistic and pragmatic) contexts that allow for cancellation or suspension of the inference of speaker commitment to p.

This chapter is structured as follows: Section 5.2 introduces previous approaches to factivity. We focus in particular on a set of recent proposals which have attempted to account for the (non-)projection of the factive presupposition through various pragmatic means (we refer to these proposals broadly as ‘pragmatic approaches’), as contrasted with traditional approaches, which take presuppositions to be lexically encoded properties (‘lexical approaches’). In Sections 5.3 and 5.4, we present new experimental results from two co-authored studies (with Hezekiah Akiva Bacovcin (Bacovcin and Djärv 2017, Djärv and Bacovcin 2018), and Jérémie Zehr and Florian Schwarz (Djärv, Zehr, and Schwarz 2018), respectively). These two studies test, and falsify, core predictions of the pragmatic approaches to factivity. The main findings of Sections 5.3–5.4 are summarized in Section 5.5.

The key analytical claims of this chapter (and to a certain extent, this dissertation) are provided in Section 5.6. In Section 5.6.1, we examine the complex interplay of evidence, belief, and justification, which ultimately seems to determine the contexts in which the global inference that the speaker is committed to p arises. Our main conclusions are: (i) that while only the behaviour of the emotive factives is incompatible with pragmatic approaches to factivity (Section 5.2.0.2), the kinds of contexts that lead to presupposition suspension (for both types of factives), are problematic also for traditional lexical accounts (Section 5.2.0.1); and (ii) that the types of contexts that allow for suspension or cancellation of the

speaker commitment inference with *unembedded* emotive factives, closely parallel the types of contexts often observed to allow for suspension or cancellation of the speaker commitment inference with *embedded* doxastic factives. Overall, a central insight emerging from this chapter is that factivity is less of a uniform phenomenon than has previously been proposed, both in terms of the semantic and pragmatic properties associated with factive verbs, and in the realization of these properties in emotive vs. doxastic factives.

Building on the observations made in Sections 5.3 and 5.4, Section 5.6.1 outlines a novel account of factivity in terms of (for doxastics) lexical or (for emotives) contextual entailments about evidential support for p. Specifically, the account offered here ties the speaker commitment inference to a presupposition that the evidential modal base of a *Judge* entails p. The ability of the judge to be bound by different individuals (the speaker, in the case of doxastic factives, the attitude holder, in the case of emotive factives, and via an index, in the case of *fact that* nominals) accounts for the variable projection and cancellation behaviour of the factive inference across predicates and (linguistic and pragmatic) contexts. While this approach identifies a common source for the triggering and (non-)projection of the speaker commitment inference for the emotive and doxastic factives, it is also able to capture a number of observed differences regarding their entailment properties, their interaction with operators, and sensitivity to contextual effects.

In Section 5.6.2, we return to the discourse status of the embedded proposition, examining the link between (a) the semantics of emotive factives, the syntactic status of their clausal complements as DPs or CPs, and the pragmatic status of their complements as Given or discourse new information. We argue that the emotive factives, unlike both the doxastic factives and the response predicates, in addition to the presupposition of the attitude holder's evidential support for p, additionally impose a requirement that a situation or individual, providing the source of the attitude holder's evidential basis for p, is familiar or has an anaphor in the context. With all the empirical and theoretical pieces in place, we present our analysis of the semantics of the different types of factives predicates. By dissociating the (projection-prone) inference of speaker commitment to p, from the discourse status of

p as new vs. Given content, we are able to give a semantically explanatory account that does not present a conflict for the pragmatics, and which moreover, is able to capture the distribution of DP-complements with emotive factives vis-à-vis other attitude predicates.

Finally, in Section 5.7, we look at some outstanding issues regarding variation in the effects of prosodic focus: Section 5.7.1 presents a probabilistic model (from Djärv and Baćovcin 2018) accounting for weak QUD-effects with both factive and non-factive predicates, observed in Section 5.3. Section 5.7.2 points to potential cross-linguistic variation regarding factivity and focus. Section 5.8 concludes.

First, we introduce the in more detail the notion of factivity, and the basic semantic properties of doxastic and emotive factives, respectively.¹

5.1 Two types of factives

As we have seen above, factive predicates constitute a sub-type of propositional attitude predicates; i.e. predicates which denote attitudes towards propositional objects, as illustrated with the verbs *claim*, *believe*, *deny*, *regret*, and *know* in (2). Each of the sentences in (2) expresses a different attitude on the part of the attitude holder, (*Anna*) towards the proposition denoted by the embedded finite *that*-clause (*Lisa got the job*).

- (2) a. Anna claimed that [*P* Lisa got the job].
b. Anna believed that [*P* Lisa got the job].
c. Anna denied that [*P* Lisa got the job].
d. Anna regretted that [*P* Lisa got the job].
e. Anna knew that [*P* Lisa got the job].

Factive predicates are also a classic type of presupposition trigger. While there is substantial

¹In the previous chapter, we argued that belief is not a *necessary* part of the semantics of verbs like *know*. Note that in this chapter, however, we will continue to use the notions of belief or commitment to *p* loosely in our discussion of the data (introducing more specific distinctions when necessary), given that factive sentences in the general case clearly imply belief either on the part of the speaker or the attitude holder, and this is mostly in line with previous work. For convenience, we will also stick with the labels used throughout this dissertation, referring to the two types of factives and *doxastic* and *emotive* factives.

variation among different kinds of presupposition triggers, they all give rise to inferences which (a) tend to be *not-at issue* in the discourse, and (b) typically survive when embedded under operators that otherwise target entailments, such as modals and negation. The second of these properties is referred to as presupposition PROJECTION, and is illustrated with the factive predicate *be sad* in (3), and with the trigger *stop* in (4).

- | | | |
|-----|---|--|
| (3) | a. Anna is sad that [_P Lisa got the job].

b. Anna isn't sad that [_P Lisa got the job]. | \rightsquigarrow Anna \odot p
\rightsquigarrow p
\rightsquigarrow Anna \odot p
\rightsquigarrow p |
| (4) | a. Anna stopped smoking.

b. Anna didn't stop smoking. | \rightsquigarrow Anna no longer smokes
\rightsquigarrow Anna used to smoke
\rightsquigarrow Anna no longer smokes
\rightsquigarrow Anna used to smoke |

Regarding the first property, it is probably intuitive that the sentences in (3) are statements about Anna and her emotive attitude towards Lisa getting the job, and not primarily claims about Lisa getting the job. Similarly, it should be intuitive that the sentences in (4) are not claims that Anna used to smoke, but statements about whether she gave it up or not. This point can be made more clearly using explicit Question-Answer pairs, such as (5) and (6) (this diagnostic draws on the notion of a Question Under Discussion [QUD], from Roberts 1996, 2012, Büring 2003; which we discussed in Section 2.5.1 above).

- | | |
|-----|--|
| (5) | Q. Why is Anna looking so mopey?

A. She's sad that Lisa got the job. |
| (6) | Q. Why is Lisa looking so giddy?

[Answer: Lisa is happy because she got the job.]

A. She got the job.

A'. #Anna is sad that Lisa got the job. |

Following Simons (2007), Simons, Tonhauser, Beaver, and Roberts (2010), among others, we might say that in sentences involving factive verbs, the main clause typically constitutes the Main Point or the *at-issue* content of the sentence. As we saw in Chapters 3 and 4, however, the doxastic factives present a challenge for this idea.

Another necessary distinction to introduce at this point is that between presupposition PROJECTION (which is illustrated in (3) and (4)) and TRIGGERING. The projection problem concerns the question of when and why presuppositions —typically, but not always—, survive in embedded context. The triggering problem, on the other hand, concerns the question of how presuppositions arise to begin with, and why it is that only certain content gets to be presupposed. In Section 5.2.0.2, we will see that while the projection question itself presents a fairly straightforward problem, the way that people have understood the triggering problem is more complicated, and appears to depend on what they take to be the explanandum; in particular, whether it is the purported Common Ground status of *p*, or the inference that *p* is true.

In terms of the type of relation or attitude expressed, factive predicates come in a range of flavors.² However, a major distinction can be made between predicates like *know*, *discover*, and *be aware*, which express cognitive relations between the attitude holder and the embedded proposition, and *regret*, *appreciate*, and *be sad*, which denote emotive attitudes.

(7) Two types of factives

- a. Doxastic Factives: e.g. *know*, *discover*, *find out*, *realize*, *be aware*
- b. Emotive Factives: e.g. *regret*, *resent*, *appreciate*, *be happy*, *be surprised*

This distinction has been present since early work on this topic. In seminal work on factivity, Karttunen (1971) distinguished between ‘full factives’ like *regret* and ‘semifactives’

²Regarding the question of what type of relations or attitudes have the potential to give rise to a factive presupposition, Anand and Hacquard (2013) argue that this follows directly from the lexical semantics of the attitude predicates themselves: factive verbs foreground the doxastic component, because they are *about* the doxastic states of a sentient experiencer, whereas veridicals are about the public discourse commitments of an agent with respect to some projected Common Ground, thus backgrounding the doxastic component. See also Anand and Hacquard (2009, 2014), Anand, Grimshaw, and Hacquard (2019) for discussion.

like *discover*.³ Karttunen noted that while projection is the typical case for all factive verbs, as shown in (8), some factive verbs, like *discover* and *realize*, sometimes lose their presuppositional status in embedded contexts. For example, they do not necessarily project from the antecedents of conditionals, in contrast to other factives such as *regret*, as illustrated in (9).

- (8) a. John found out that [*P* the proposal offended them]. $\rightsquigarrow p$
 b. John didn't find out that [*P* the proposal offended them]. $\rightsquigarrow p$

- (9) Adapted from Djärv, Zehr, and Schwarz (2018, p. 368)

- a. If I discover later that [*P* the proposal offended them], I will apologize. $\rightsquigarrow p$
 b. If I regret later that [*P* the proposal offended them], I will apologize. $\rightsquigarrow p$

(9-a), unlike (9-b), does not convey a commitment to the embedded proposition, *p*, on the part of the speaker, despite the fact that both *discover* and *regret* generally give rise to the global inference that the speaker is committed to *p*.

In more recent work on presuppositions, Karttunen's contrast has been subsumed under a more general distinction between 'soft' and 'hard' triggers (following Abusch 2002, 2010).⁴ The difference is that the presupposition of soft, but not hard triggers, are easily suspendable. This contrast is illustrated in (10) with the soft trigger *win* and the hard trigger *too*.⁵

- (10) Jayez, Mongelli, Reboul, and Van Der Henst (2015, p. 174)
- a. I don't know whether Paul participated in the race, but if he **won**, he must be very proud.
 b. ?? I don't know whether Paul participated in the race, but if Mary participated

³As we saw in Chapters 2 and 3, this terminology is still widely used in the syntactic literature (in the study of Main Clause Phenomena, factive islands, etc.), where it's generally used to distinguish between 'more presuppositional' factives (the 'full', or emotive factives), and less presuppositional—or more 'assertive'—factives (the 'semifactives' or doxastic factives).

⁴While Abusch doesn't use the terms *doxastic* and *emotive*, she mentions Karttunen's discussion of *discover* as a case of soft trigger.

⁵Note that Jayez, Mongelli, Reboul, and Van Der Henst 2015 offer a somewhat different distinction, cast in terms of a split between 'strong' and 'weak' triggers.

too, they probably had a drink together just after.

In both (10-a) and (10-b), the context makes it clear that the speaker does not know whether Paul participated in the race. In (10-b), we find that this appears to conflict with the presupposition of *too*, that someone else other than Mary participated (with Paul being the only contextually available individual). In (10-a), however, there is no such conflict, despite the fact that *win* also typically projects a presupposition of participation. We observe a similar contrast also in the first person conditionals in (9) above, where in (9-a), the presence of the first person conditional simply leads to the suspension of the inference that *p* is true. In (9-b), on the other hand, this inference is not affected by its environment. (11)–(12) further illustrate the relative ‘softness’ of the presupposition of the doxastic factives.

- (11) Beaver (2010, p. 14)

...I haven't tried this with wombats, though, & if anyone discovers that [_P the method is also wombat-proof], I'd really like to know! ↗ p

- (12) Abrusán (2016, p. 167)

I have no idea if Mary is cheating on John. But if he discovers that [_P she is], he will be sad. ↗ p

In these examples, the factive sentences behave no differently from equivalent sentences with non-factive verbs, as shown in (13)–(14).

- (13) ...I haven't tried this with wombats, though, but if anyone thinks that [_P the method is also wombat-proof], I'd really like to know! ↗ p

- (14) I have no idea if Mary is cheating on John. But if he is under the impression that [_P she is], he's probably sad. ↗ p

Intuitively then, it seems that the ‘soft-hard’ distinction tracks the contrast between Hooper and Thompson’s (1973) ‘assertive’ and ‘non-assertive’ factives; whereby doxastic factive be-

have in one sense more like the non-factive predicates *say* and *think* than like the emotive factives. However, the empirical picture will turn out to be much more complex. In particular, as we will show in Section 5.4, there is also a clear sense in which the emotive factives are actually the ‘weaker’ ones. Drawing on a separate distinction proposed by Sudo (2012), between ‘entailed’ and ‘non-entailed’ triggers, we observe in Section 5.4 that—in *unembedded* contexts—the doxastic factives behave as though their presupposition is actually part of the entailed content of the sentence, while the presupposition of the emotive factives does not behave like a regular entailment.

5.2 Previous approaches to factivity

The hallmark property of factive predicates like *discover*, *know* and *regret* is that, unlike their non-factive cousins like *say*, *believe* and *deny*, they imply the truth of their complement (15-a) vs. (15-c). However, unlike purely veridical predicates like *be right* and *be true*, which also imply that p is true in *unembedded* contexts (15-b), factive predicates retain this inference, also when they are embedded under entailment cancelling operators: (16-b) vs. (16-c). As we mentioned above, this property is known as projection.

(15) Unembedded

- a. Anna believed that [_P Lisa got the job]. $\rightsquigarrow p$ Non-factive
- b. Anna was right that [_P Lisa got the job]. $\rightsquigarrow p$ Veridical
- c. Anna discovered that [_P Lisa got the job]. $\rightsquigarrow p$ Factive

(16) Embedded

- a. Anna didn’t believe that [_P Lisa got the job]. $\rightsquigarrow p$ Non-factive
- b. Anna wasn’t right that [_P Lisa got the job]. $\rightsquigarrow p$ Veridical
- c. Anna didn’t discover that [_P Lisa got the job]. $\rightsquigarrow p$ Factive

In the tradition going back to Stalnaker (1974, 1978), the presupposition of factive predicates that p=1 is standardly analyzed as a requirement that the embedded proposition

p is entailed by the context; modelled in terms of the Common Ground [CG], which is made up by the propositions mutually taken to be true by the discourse participants. The *Context Set* is the intersection of the propositions in the CG: the worlds in which all of the propositions in the CG are true. The idea is that in order for the sentences in (15-c) and (16-c) to be felicitous, the proposition that Lisa got the job has to be entailed by the context set. Previous work on presuppositions can be grouped broadly into two types of approaches, which we will refer to here broadly as the *lexical* and the *pragmatic* approach, respectively. We review these in subsections 5.2.0.1 and 5.2.0.2, focusing on accounts addressing factivity.

5.2.0.1 Lexical approaches

In the dynamic semantics framework of Heim (1982, 1983), Kamp (1981) (see also Heim 1992, Van der Sandt 1992, Groenendijk and Stokhof 1990, Kamp and Reyle 1993, Chierchia 1995 and subsequent work), the meaning of a sentence is viewed as ‘instructions’ to change or update the discourse context with new information: “meaning is context change potential” (building on Stalnaker’s 1978 notion of context). On this framework, presuppositions are taken to be lexically encoded on their hosts as ‘admittance’, ‘domain’, or ‘definedness’ conditions on the context, which must be satisfied in order for a context update to be defined (in different terms, for the truth-conditional computation to proceed, or be licensed). This then, is how these approaches answer the triggering question. In particular, presuppositions must be satisfied in (entailed by or have an antecedent in) the context, in order for the utterance to be felicitous, or for a context update to be defined. Presupposition projection simply amounts to this context being the global context, as in (17).

- (17) Adapted from Djärv and Bacovcin (2018, p. 2)
- [Context: John and Mary are discussing the season finale of The Great British Bake Off, which they watch together every week.]
- a. Mary: How did you like the season finale? Were you pleased with the outcome?
 - b. John: *OMG, I'm SO happy that [PS Nadiya won!] She was always my favourite.*

Suppose, however, that the presupposition is not obviously met in the context, but that the context is nevertheless consistent with the presupposed content (PS). In this case, the hearer is understood to be able to enrich the context with PS, or silently add PS to the context, for the presupposition to be satisfied, and the context update to proceed. This is what is typically referred to as GLOBAL ACCOMMODATION (see also Stalnaker 1974, Lewis 1979):

- (18) [Context: Mary doesn't ever watch The Great British Bake Off, but her best friend John is obsessed with it, and she usually asks him about it after each episode.]
- Mary: How did you like the season finale? Were you pleased with the outcome?
 - John: *OMG, I'm SO happy that [PS Nadiya won! She was always my favourite.*

Here, given that there is no reason for Mary to doubt John's statement about who the winner was, Mary can simply add the proposition 'Nadiya won' to the context. Suppose, however, that we're in the context in (19).

- (19) [Context: Mary doesn't really watch a lot of TV, but her best friend John is obsessed with The Great British Bake Off, and so she decided to give it a go and watch the season finale, so she could discuss the outcome with him. Mixing up the various versions available on Netflix, however, she accidentally ended up watching the final episode of The Great Kiwi Bake Off, instead, the winner of which was Annabel.]
- Mary: How did you like the season finale? Were you pleased with the outcome?
 - John: *OMG, I'm SO happy that [PS Nadiya won! She was always my favourite.*

In this case, the PS 'Nadiya won' conflicts with Mary's beliefs. Adding the PS to the context would therefore result in a contradictory context, i.e. one that entails both 'Nadiya won' and 'Annabel won'.⁶ Hence, because Mary cannot add 'Nadiya won' to the context, she now is also unable to update her context with the proposition 'John is happy that Nadiya won'. The typical reaction in such cases of 'presupposition failure' would be along the lines

⁶Assuming that there's only one winner.

of the ‘hey, wait a minute’ response.⁷

- (20) Hey, wait a minute! I thought Annabel won the Bake Off...

On this approach, embedded sentences work the same as unembedded sentences, in the case where there is no conflict with the context, such as those in (17) and (18):

- (21) a. Mary: How did you like the season finale? Were you pleased with the outcome?
b. John: *No way – I’m not happy that [PS Nadiya won]! Remember her Black Forest Gâteau?!*

Here, given that the presupposition ‘Nadiya won’ is satisfied in the context (or easily accommodated), what gets added to the context is that John is not happy about this state of affairs. Broadly speaking, then, we might say that on lexical approaches, projection is accounted for by saying that embedding operators target only truth-conditional or asserted content, but not other types of meaning, including presuppositions.⁸

However, suppose that globally accommodating the presupposition would lead to a contradictory context, i.e. one that both entails that p and not p, as in (19). In such contexts, as we saw above, it has been observed since Karttunen (1971, 1974), that in embedded cases, the inference that p may simply fail to project at a global level (and as a consequence, no inconsistency arises, unlike in the unembedded case). The relevant examples from Section 5.1 are repeated here (recall that emotive factives tend not to allow this kind of presupposition suspension):

- (22) a. If I discover later that [PS the proposal offended them], I will apologize.
b. ... I haven’t tried this with wombats, though, & if anyone discovers that

⁷Following (Shanon 1976, Von Fintel 2004), the ‘hey, wait a minute’ response is often used as a diagnostic for presupposed content.

⁸Though as we will see in Section 5.2.0.2, this idea is central also to more recent, pragmatic approaches to presuppositions, such as Simons, Tonhauser, Beaver, and Roberts (2010) *et seq.* While these authors take issue with the idea that presuppositions are lexically encoded domain conditions on the context (as opposed to regular entailments), they argue that (non-)projection follows directly from the (*non-*)*at issue* status of the presupposed content, relative to a Question Under Discussion à la Roberts (1996); in a sense then, clearly echoing the notion that operators target only asserted content.

- [PS the method is also wombat-proof], I'd really like to know!
- c. I have no idea if Mary is cheating on John. But if he discovers that [PS she is], he will be sad.
 - d. If I realize later that [PS I have not told the truth], I will confess it to everyone.

On these approaches, non-projection is accounted for by invoking a special operation, LOCAL ACCOMMODATION (Heim 1982, 1983), which effectively adds the presupposed content to the level of asserted or truth-conditional content, where it can be targeted by operators like modals and negation. In the dynamic framework, the sentence's instructions to update the context will now include $\neg PS$. For a sentence like (16-c), *Anna didn't discover that Lisa got the job*, the updated context will now include NOT(Lisa got the job & Anna comes to believe that Lisa got the job). On this approach then, local accommodation is typically seen as a 'last resort' strategy, licensed only in embedded contexts, when adding p to the CG would lead to a contradiction, un informativity or problems with presupposition binding.

5.2.0.2 Pragmatic approaches

Recent work on presuppositions, however, has challenged the approach outlined in the previous section (see, among others, Simons 2001, 2004, 2007, Beaver 2010, Abusch 2002, 2010, Simons, Tonhauser, Beaver, and Roberts 2010, Simons, Beaver, Roberts, and Tonhauser 2017, Abrusán 2011b, 2016, Anand and Hacquard 2013, Romoli 2012, Tonhauser, Beaver, Roberts, and Simons 2013, Tonhauser 2015, 2016, Tonhauser, Beaver, and Degen 2018; building on insights by Stalnaker 1974); pointing to the observation that presuppositions are not arbitrary properties of lexical items, but seem to be systematically associated with their respective 'hosts', or triggers. For instance, what guarantees that p, specifically, is a presupposition of *know*, or why it is that factives systematically give rise to that inference.

While there is substantial variation among these proposals, they all share the assumption that p is simply a regular lexical entailment of factive verbs (i.e. that factive verbs are just a special case of veridical predicates, like *be true* or *be right*). The presuppositional status of p is then taken to be pragmatically derived, as a consequence of the discourse status of p

with respect to a particular Question Under Discussion (Roberts 1996, 2012, Büring 2003). A common feature of several of these proposals is the appeal to the information structure of the utterance, and in particular prosodic focus, in order to account for the triggering (Abrusán 2011b, 2016) or projection (Simons et al. 2017, Tonhauser 2016) of presuppositions of factive predicates. Based on examples such as (23), these proposals challenge the idea that presupposition suspension only happens in a restricted set of environments (see discussion of local accommodation in Section 5.2.0.1). For instance, Beaver (2010) provides examples like (23), supporting the empirical claim that prosodically marked focus determines factive presupposition projection.

- (23) A professor to a student: (Beaver 2010, p. 93)
- a. If the TA discovers that your work is [plagiarized]_F, I will be forced to notify the Dean.
 - b. If the TA [discovers]_F that your work is plagiarized, I will be [forced to notify the Dean]_F.

The specific empirical claim made based on examples like that in (23), is that with focus in the matrix clause (23-b), the inference that $p=1$ projects as usual; however, when focus is on content in the embedded clause (23-a), no truth-inference projects. Taking this as their explanandum, work in this tradition has argued that the lexical approach fails to account for the impact of discourse structure on projection, proposing alternative mechanisms for determining the distribution of presuppositions. The following section reviews three such approaches from the recent literature: the projection accounts of Simons et al. (2010) and of Simons et al. (2017) (the latter adopted also in Tonhauser 2016), and the triggering account of Abrusán (2011b, 2016).

For our purposes, two key aspects of these ‘pragmatic accounts’ will be questioned. The first is the empirical assumption of several (though not all) pragmatic accounts (see Section 5.2.0.2.2), that the triggering or projection of presuppositions is fundamentally tied to the status of the presupposed content as *non-at issue*, with respect to some Question Under

Discussion. Experimental results presented in Section 5.3 will show that, in the case of factivity, this assumption is in fact not empirically well-supported.

Secondly, we will question the theoretical assumption, shared (to my knowledge) by all pragmatic accounts, that the content which ends up presupposed or projecting, is in fact part of the conventional lexical entailments of the trigger. (We might think of this as the inverse of the process of local accommodation: rather than ‘adding’ the presupposed content to the level of entailed content for it to take scope under operators, pragmatic accounts argue that when entailments are assigned backgrounded or *not-at issue* status, they end up escaping, or projecting from, the scope of entailment-targeting operators.) This assumption will be called into question by the experimental results in Section 5.4 and further observations in Section 5.6.1. These results show that while the assumption that p is entailed by factive predicates might be supported in the case of the doxastic factives, in the case of the emotive factives, p does not behave like conventionally entailed content.

Before moving on to our discussion of these proposals, however, an important point regarding these proposals is in order.

5.2.0.2.1 Factivity: $p=1$ vs. p is Common Ground

Within the broad heading of QUD-based approaches to factivity and presupposition, there are two dominant ways of accounting for the presence of presupposition (projection). Either in terms of QUDs where the (entailment) p provides the *at-issue* or pragmatic Main Point of the Utterance (a term due to Simons 2007), or in terms of QUDs where p fails to be entailed. The first approach is found in Simons (2001, 2004, 2007), Abrusán (2011b, 2016), and Anand and Hacquard (2014). The second one is found in for instance Simons et al. (2010, 2017), and Tonhauser (2016).

Importantly however, among the proposals appealing to the Main Point or *at-issue* status of p to account for presuppositionality, there is a deep (and generally unacknowledged) divide. The proposals discussed in Section 5.2.0.2.2 all use the notion of Main Point or *at-issue* status to account for the presence of the global inference that $p=1$. Of course, if

we are truly in a world such as that assumed by traditional lexical accounts, where the projective inference that $p=1$ and the Common Ground status of p are simply two sides of the same coin, then we would expect the two properties to co-vary. In particular, we would expect that if a predicate has the property that its complement, p , typically projects in embedded contexts, then this predicate should also impose the ‘domain’ condition on the context, that p must be Common Ground — independently of any embedding operators.

However, the very point made by Simons (2007) was that, at least for certain factive predicates, these two properties come apart, and therefore must not be two sides of the same coin. That is, given the QUD raised by (24-a), it is clear that in (24-b), the embedded proposition p is what provides the *at-issue* or Main Point content of the utterance; and moreover, that p must not be Common Ground.

(24) Simons (2007, p. 1045)

- a. Where did Louise go last week?
- b. Henry discovered that [P she had a job interview at Princeton].

However, as Simons observed, (24-b) still gives rise to the inference that the speaker takes p to be true. Hence, what Simons’s (2007) work effectively showed us, is that the two properties traditionally taken to define factivity: the inference that $p=1$, and p being Common Ground, need to be disassociated. The same point was made very clearly by the experimental results in Section 3.2.6.1: the doxastic factives were interpreted as among the most likely to introduce p as discourse new information. Nevertheless, they showed consistently ceiling-level ratings for speaker-commitment in the negative polarity. These observations effectively demonstrate that the two properties traditionally taken to define factivity: the projective inference that $p=1$, and p being Common Ground, need to be disassociated.⁹

⁹While Simons doesn’t distinguish explicitly between doxastic and emotive factives, she does tie the availability of so-called ‘embedded MPU’ readings to the ability of the matrix predicate to function parenthetically (Urmson 1952), e.g. serving an evidential function. Importantly, however, the ability of a given predicate to function parenthetically is not absolute, but varies with the (linguistic and pragmatic) context (a conclusion supported also by the experimental results by Djärv, Heycock, and Rohde 2017 discussed in Section 2.5.2). Contrast the examples in (25) and (26).

In terms of the kind of pragmatic approach that appeals to the Main Point or *at-issue* status of p (Simons 2001, 2004, 2007, Simons et al. 2010, Abrusán 2011b, 2016, Anand and Hacquard 2014), we find that manipulating the QUD is able to successfully account for *one* aspect of factivity as traditionally understood, namely whether or not p is understood to be Common Ground. Thus, this approach deals effectively with one dimension of the triggering problem (the CG status of p). Accounts appealing to QUDs where p fails to be entailed, on the other hand, are primarily concerned with the projection problem. Regarding the other dimension of the triggering problem, regarding the inference that p=1, both kinds of pragmatic accounts take p to be a regular lexical entailment of factive predicates (similarly to veridical predicates like *be right*¹⁰). The question for these accounts then, then, is whether manipulating the context in embedded contexts, to the effect that p either fails to be entailed or gets assigned Main Point/*at-issue* status, is able to account for the presence of the global inference that the speaker takes p to be true.

5.2.0.2.2 QUD-based approaches to projection¹¹

In the following three sub-sections, we look in more detail at how QUD-based approaches attempt to deal with cases where p does not project.

Simons, Tonhauser, Beaver, and Roberts (2010)

On the view advanced by Simons, Tonhauser, Beaver, and Roberts (2010), the relevant factor for determining whether or not certain content projects is the (non-) *at-issue* status of that

-
- (25) Where did Louise go yesterday? (Simons 2007, p. 1050)
- a. #Henry forgot that [_P she had a job interview at Princeton].
 - b. #Henry remembered that [_P she had a job interview at Princeton].
- (26) Sorry, we're going to have to change our plans for dinner tonight... (Simons 2007, p. 1050)
- a. Henry forgot that [_P he had an evening appointment].
 - b. Henry just {realized, remembered} that [_P he had an evening appointment].

¹⁰See for instance Anand and Hacquard (2014) for discussion.

¹¹The discussion in this section is adapted from joint work with Hezekiah Akiva Bacovcin (Djärv and Bacovcin (2018): Section 2.1; primarily prepared by the first author).

content.¹² Specifically, they argue that projection is restricted to only those implications of embedded sentences which are not-at-issue relative to the Question Under Discussion in the context. They formulate this as an ‘iff’ statement:

- (27) Simons et al. (2010, p. 309)

[W]e propose an alternative explanation based on the following claim, which is intended to apply to all content which occurs in embedded contexts: Meanings project IFF they are not at-issue, where at-issueness is defined in terms of the Roberts' (1996) discourse theory.

- (28) Hypotheses about what projects and why (Simons et al. 2010, p. 315)

- a. All and only those implications of (embedded) sentences which are not-at-issue relative to the Question Under Discussion in the context have the potential to project.
- b. Operators (modals, negation, etc.) target at-issue content.

To define *at-issueness*, they adopt the notion of the QUD from Roberts (1996, 2012). As we saw in our discussion of Jensen and Christensen's (2013) account of V2-licensing in Section 2.5.1, the QUD, roughly speaking, is the topic of discussion in the present discourse. It may, but need not, correspond to an actual question asked. Theoretically, the QUD is formulated as a set of alternative propositions. For instance (allowing for domain restriction), a question like that in (29-a) corresponds to the set of propositions, the QUD, in (29-b):

- (29) a. Where is Anna?

- b. {p: Anna is at home, Anna is at work, Anna is at the gym, ... }

For a conversational move to be felicitous, it must attempt to contribute to resolving the

¹²Note that this proposal is intended to target a much wider range of non-projective meanings than what is classically recognized by presupposition theory, including non-restrictive relative clauses, epithets, honorifics, and appositives. For discussion of the differences and similarities between different kinds of non-projective meanings, see Simons et al. (2010) and references cited therein, as well as more recently, Kennedy, Bill, Schwarz, Crain, Folli, and Romoli (2015), Schwarz (2016), and Bill, Romoli, Schwarz, and Crain (2016).

current QUD. This can be done either by completely resolving it, thereby eliminating all the alternatives but one, as in (30-a), or partially resolving it, thereby eliminating at least one alternative, as in (30-b).

- (30) a. She's at work.
b. I'm not sure, though I know she's not at home...

Additionally, a speaker may give an answer that addresses the current QUD by giving an answer that *contextually entails* an answer to it. The example in (31) is from Simons et al. (2010, 316). Here, given that it is Common Ground that the legal drinking age is 21 (or younger), the answer in (31-b) contextually entails an answer to the QUD raised by the question in (31-a). (For more discussion, see Simons et al. 2010, and Roberts 1996, 2012.)

- (31) a. Is Avi old enough to drink?
b. He's twenty-two.

At-issueness then, is defined in terms of relevance to the QUD ((32) is repeated from (103) in Chapter 2):

- (32) Relevance to the QUD (Simons et al. 2010, p. 316)
a. An assertion is relevant to a QUD iff it contextually entails a partial or complete answer to the QUD.
b. A question is relevant to a QUD iff it has an answer which contextually entails a partial or complete answer to the QUD.

Although they don't discuss the effect of focus in embedded sentences, as in (23) above (repeated in (33)), Simons et al. (2010) point out that, given the assumption that focus is a signal of the QUD, their proposal predicts that operators should associate with focused material, whereas intonationally backgrounded content should project. They give (34) to show that this prediction is borne out.

- (33) A professor to a student:
- a. If the TA discovers that your work is [plagiarized]_F, I will be [forced to notify the Dean]_F.
 - b. If the TA [discovers]_F that your work is plagiarized, I will be [forced to notify the Dean]_F.
- (34) Simons et al. (2010, p. 318); originally from Kratzer (1989)
- a. Paula isn't registered in [Paris]_F
(\approx Paula is registered somewhere, not in Paris.)
 - b. [Paula]_F isn't registered in Paris
(\approx Someone is registered in Paris, not Paula.)

That is, in the b-sentence (with focus in the matrix clause), what is at issue is something about the TA (whether they discovered that the student's work is plagiarized). The embedded proposition (the student's work is plagiarized) is *not-at-issue*, and should therefore be able to project. However, in the a-sentence (focus in the embedded clause), what is at issue is something about the student's work (whether it is plagiarized). Hence, the prediction is that the proposition 'the student's work is plagiarized' should not project.

In some sense, then, the idea that operators only target *at-issue*, or asserted content (28-b), does in many ways echo the idea behind lexical approaches to projection (Section 5.2.0.1). Where these approaches differ crucially, is in their treatment of non-projection, which they take to be licensed in a much wider set of contexts than those which are taken to license local accommodation on lexical approaches.

The following section reviews a recent update of this work. Here, the authors focus specifically on the projection behaviour of focus in factive sentences.

Simons, Beaver, Roberts, and Tonhauser (2017); Tonhauser (2016)

Building on Beaver (2010), Simons, Beaver, Roberts, and Tonhauser (2017) develops an account, adopted in Tonhauser (2016), whereby the focus-sensitivity of factive presuppositions

is accounted for in terms of focus leading the hearer to construe a particular QUD, defined as the Current or Congruent Question [CQ]. The claim is that the content of the embedded clause will project if it is entailed by the CQ.¹³ Tonhauser (2016) provides the following definition of the CQ, adapted from Simons et al. (2017).

- (35) Tonhauser (2016, p. 952)

The Current Question of an utterance is a privileged subset of the focus alternatives set of the uttered sentence (given a structural analysis of that sentence, including focus marking) which meets the following conditions:

- a. The proposition expressed is a member of the Current Question and
- b. The Current Question has at least one additional member.

For instance, a sentence such as that in (36-a), with narrow focus in the embedded clause, will give rise to the set of focus alternatives in (36-b).

- (36) a. Perhaps John discovered that [Jane]_F left town.

- b. {p: for some entity *a*, John discovered that *a* left town}

In this case, the CQ for the utterance does not entail the proposition that Jane left town. Therefore, ‘Jane left town’ should not project. The existential claim that ‘someone left town’, however, *is* entailed by the CQ and projects. In contrast, a sentence such as (37-a), with narrow focus on the factive predicate, will give rise to the focus alternatives in (37-b).

- (37) a. Sarah: Perhaps John [discovered]_F that Jane left town.

- b. {p: for some relation R, John R that Jane left town}

To the extent that the relations R in the focus alternatives set are all veridical (compare

¹³ Although note that Simons et al. (2017, p. 192) end up invoking a more complex notion of QUD, involving also a Discourse Question, which “provides the topic of a segment of discourse and imposes relevance constraints on conversational contributions.” They thus hypothesize that in some instances “Projection of the content of the complement of an attitude verb occurs if the best explanation for relevance of the CQ to the DQ requires attribution of acceptance of that content to the speaker.” As pointed out by Abrusán (2016), for sentences taken out of context, this still requires the stipulation that the implicit CQ is veridical.

(38-a) and (38-b)), the CQ will entail p, and p will project. Tonhauser (2016) points out that although focus sets are contextually determined, it is still an open question what the most common focus sets are for different predicates in different contexts. The assumption on this account is that for projection to take place, the relevant CQs for these types of sentences contain only veridical relations, as in (38-a). If the CQ involves also non-veridical relations, as in (38-b), the embedded content is not predicted to project.

- (38) Tonhauser (2016, p. 953-4)

Perhaps he [discovered]_F that she's a widow.

- a. Example projective CQ:

{he discovered that she's a widow, he knew that she's a widow, he was happy
that she's a widow}

- b. Example non-projective CQ:

{he discovered that she's a widow, he thought that she's a widow, he speculated
that she's a widow}

Hence, this account predicts that with focus in the embedded clause, there should be *no* CQ that entails p, and p should therefore not be able to project.¹⁴ With focus on the matrix predicate however, there exists at least one possible CQ that entails p, and thus, we expect projection to be more likely, if not obligatory, in this context.

Next, we review a proposal by Abrusán (2011b, 2016), which appeals to the Main Point status of p (along the lines of Simons et al. 2010), rather than whether or not p is entailed (as in the proposal reviewed here), as a way addressing the triggering problem.

¹⁴ Although Simons et al. (2017, 192) then add that “Projection of the content of the complement of an attitude verb occurs if the Current Question for the utterance entails this content.”—with the caveat that “this hypothesis presents one circumstance in which projection occurs: this is intentionally formulated with if and not iff.” However, the authors do not formulate a clear hypothesis for what those circumstances should be, and whether they would take projection from such alternative mechanisms to be possible in a context where the CQ does not entail p—i.e. where there is focus in the embedded clause.

Abrusán (2011b, 2016)

Abrusán (2011b) develops an account, adopted in Abrusán (2016), to address the triggering problem for factive predicates and additive particles. In a nutshell, she argues that entailments of a sentence become presupposed if they do not have Main Point status. Drawing on work in cognitive psychology and computational vision, the idea is that whatever content we don't pay attention to ends up being presupposed. Abrusán presents a focus-sensitive triggering mechanism for presuppositions that generates two types of main points; a default (grammatically defined) main point, and a secondary (pragmatically defined) main point.¹⁵

- (39) a. Default Main Point: these are the semantic entailments of the sentence that are “by nature about the event time of the matrix predicate” (p. 502)
b. Secondary Main Point: this is the content that (at the event time of the sentence) most directly addresses a grammatically signaled QUD.

The secondary main point may (but need not) be different from the default main point. If they are different, the sentence ends up with two main points, neither of which is presupposed. The following example illustrates the derivation of the default main point:

- (40) *John knows (at t₁) that it is raining (at t₁)*. (Abrusán 2011b, p. 508)
a. $\phi = \text{John believes (at } t_1\text{) that it is raining (at } t_1\text{)}$.
b. $\psi = \text{It is raining (at } t_1\text{)}$.

The sentence in (40) is taken to have (at least) two entailments, that in ϕ and that in ψ . The entailment in ϕ (John's belief that p) is necessarily about the event time of the matrix predicate (John's knowledge that p) — it follows from the lexical meaning of *know* that the attitude holder's belief spans the same temporal interval as their knowledge.¹⁶ However, for the entailment in ψ (that it is raining), this is not so. Although in (40) the event time of ϕ is the same as the event time of ψ , this is not the case across all temporal alternatives, a

¹⁵Here, we only sketch a brief overview of Abrusán's proposal, see discussion in the paper for more detail.

¹⁶Though see discussion around example (96) in Section 4.5.

notion Abrusán invokes to distinguish ‘accidental’ from ‘non-accidental co-temporaneity’:

- (41) Abrusán (2011b, p. 508)

- a. John knows (at t_1) that it was raining (at t_1).

T-alternative: John knows (at time t_1) that it was raining (at time t_2)

- b. John managed (at time t_1) to solve the exercise (at t_1)

T-alternative: *John managed (at time t_1) to solve the exercise (at t_2)

Thus, Abrusán’s mechanism predicts that, as the default main point is about the ‘matrix event’ (John’s attitude towards p), we interpret the sentence in (40) as presupposing that it is raining (at t_1), *by default*. The output of the default triggering mechanism is then subject to further modulation by contextual factors. That is, contextual factors such as focus can ‘point our attention’ to content which otherwise would’ve been presupposed by default, thus eliminating the presupposition before it ever gets triggered (at a global level).

Thus, the ‘suspension’ facts that we observed above [those in (33)] with focus do not in fact show a *removal* of a presupposition by focus; instead, focus has interacted with the presupposition triggering mechanism and has prevented the relevant presupposition from being triggered to begin with. In other words, content that would otherwise be presupposed stays part of the main point (at-issue content) of the sentence. (Abrusán 2016, p. 171)

Note that Abrusán (2011b) claims that, unlike on the account of Simons et al. (2010), such pragmatic modulation is only possible if there are sentence *internal* factors signalling a shift in the discourse structure. Hence, simply introducing a particular question into the discourse should not be enough to remove a presupposition. Abrusán (2011b, 2016) discusses three such grammatical factors; prosodic focus, clefts, and evidentials (submitting that there are likely other such factors).

Regarding focus, Abrusán (2011b, p. 522-6) looks primarily at the example in (33). What is important for Abrusán, is that focus in the embedded clause (*If the TA discovers that your work is PLAGIARIZED,...*) makes salient the question *What will the TA discover?*. Since the most direct answer to that question is the proposition in the embedded clause (the

default presupposition), this content is now predicted to not be presupposed. Hence, given that focus is (at least in English) prosodically marked, whether or not the complement of a factive predicate will project depends crucially on the prosodic contour of the utterance.

...when the content of what would become the presupposition is focused, no presupposition is predicted to be generated. (Abrusán 2016, p. 168)

The second case that Abrusán (2011b) deals with involves what she refers to as evidentials; sentences in which a factive attitude verb like *discover*, *realize*, and *figure out* is used parenthetically, as in (42), and (24) from Simons (2007), repeated below:¹⁷

(42) Abrusán (2011b, p. 527); adapted from Simons (2007)

- a. Why isn't Louise coming to our meetings these days?
- b. Henry {discovered, realized, figured out, learned} that [_P she's left town].

(43) Simons (2007, p. 1045)

- a. Where did Louise go last week?
- b. Henry discovered that [_P she had a job interview at Princeton].

Abrusán claims that, because the embedded proposition constitutes a (secondary) main point, "it is not predicted to be presupposed" (p. 528). However, (42), and (24) are unembedded sentences. As we saw in Section 5.2.0.2.1, manipulating the Main Point status of p for unembedded sentences successfully accounts for whether or not p is taken to be Common Ground. However, it has no effect on the inference that p is true (the sentence remains veridical). It is clear, then, that the 'evidential' case addresses one dimension of triggering (the CG status of p), as we already saw in Simons (2007). It is not clear, however, how this fits with the focus-case in (33): first of all, those sentences are all embedded. Second, what those sentences seem to show is that the inference that p=1 varies with prosody. That, then, looks like a case of projection, not triggering. While Abrusán is explicit that what she

¹⁷It is not clear to me that these cases are consistent with Abrusán's claim that the factors signalling a shift in the QUD have to be sentence-internal. We leave this issue to the side for the purpose of this discussion.

intends to address is the triggering problem, and not projection, it is clear that this cannot be the case. While it seems intuitive that what is *at-issue* in (44-a) is different from that in (44-b), there is no sense in which the inference that p=1 is weaker in (44-a) than in (44-b).

- (44) a. The TA discovered that your work is [plagiarized]_F.
b. The TA [discovered]_F that your work is plagiarized.

It seems, then, that the effect of focus must only be operative in embedded contexts.¹⁸ The proposals reviewed here all take the observation—that focus affects presuppositions in a way that is better explained by a QUD-based pragmatic account than by a local accommodation-based lexical account—to motivate a move away from both a lexical account of presupposition triggering, and away from using local accommodation as a theoretical tool to explain instances of non-projection in embedded environments.

However, this move does not seem to be warranted. I agree with the advocates of the ‘pragmatic approach’ that the effect of focus should not be analysed as a trigger for local accommodation. However, this claim will be based on different considerations, specifically the results of the experimental investigation in Section 5.3, showing that the effect of focus is in fact much weaker than has generally been assumed in this literature. What these results demonstrate, is that focus in the embedded clause (45-a)–(46-a) only slightly weakens the inference that p is true. This can be compared with the sentences (47), where the presence of a first person conditional or an explicit ignorance context really seems to entirely remove any inference that the speaker is committed to p.

- (45) A professor to a student:
- a. If the TA discovers that your work is [plagiarized]_F, I will be [forced to notify the Dean]_F.
b. If the TA [discovers]_F that your work is plagiarized, I will be [forced to notify the Dean]_F.

¹⁸Though note that Özyıldız (2016, 2017a) observes a similar effect of focus in Turkish, in *unembedded* sentences. We return to the question of variation in this respect in Section 5.7.2.

- (46) a. Paula isn't registered in [Paris]_F
 (≈ Paula is registered somewhere, not in Paris.)
- b. [Paula]_F isn't registered in Paris
 (≈ Someone is registered in Paris, not Paula.)
- (47) a. If I discover later that [_{PS} the proposal offended them], I will apologize.
 b. . . I haven't tried this with wombats, though, & if anyone discovers that [_{PS} the method is also wombat-proof], I'd really like to know!
 c. I have no idea if Mary is cheating on John. But if he discovers that [_{PS} she is], he will be sad.
 d. If I realize later that [_{PS} I have not told the truth], I will confess it to everyone.

Thus, provided that we can find an independent explanation for the weak effect of focus observed, it seems premature to entirely give up the idea of lexically triggered factivity and local accommodation as a way of eliminating embedded presuppositions in certain contexts. We turn now to these experimental studies.

5.3 Factivity and the QUD: new experimental results¹⁹

5.3.1 Experimental background: (Tonhauser 2016)

Tonhauser (2016) conducted an experiment designed to test the predictions of the approach of Simons et al. (2017) outlined in Section 5.2.0.2.2 for factive presupposition projection. In order to test the effect of discourse structure on projection, the experiment manipulated prosody by placing narrow focus on the factive matrix predicate or within the embedded clause, using items such as (48).

- (48) Dana (about Scott and Valeria)
 [Context: overhearing a conversation at a party]

¹⁹The content in this section is adapted from joint work with Hezekiah Akiva Bacovcin (Djärv and Bacovcin 2018: Sections 2.2–3.

- | | |
|--|-----------------|
| a. Perhaps he [noticed] _F that she is a widow. | H* on predicate |
| b. Perhaps he noticed that [she] _F is a widow. | L+H* on pronoun |
| c. Perhaps he noticed that she is a [widow] _F . | L+H* on content |

The target sentences, which included a factive verb and the modal particle *perhaps* (*Perhaps he noticed that she is a widow.*) were presented aurally, as illustrated in Figure 5.1.

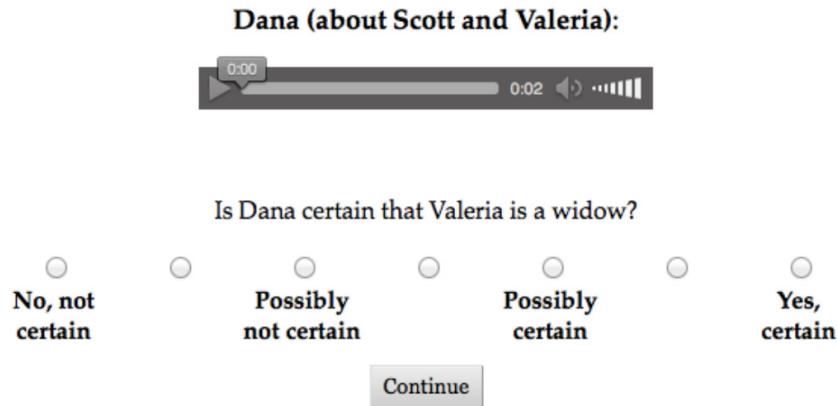


Figure 5.1: Tonhauser's experimental set-up (Tonhauser 2016, 944).

The predicates used were *discover*, *realize*, *know*, *be aware*, and *notice*. Two unembedded control sentences (*I am tired.* and *I was invited to the party.*) were also included to make sure that participants were paying attention.

The prediction was that narrow focus in the embedded clause would reduce projection. Projection was measured as the speaker's commitment or certainty of the truth of the embedded proposition. Hence, after hearing the target sentence, the participants were presented with a question such as (49). The dependent variable was the participants' rating of the speaker's certainty on a 7-point likert scale (1=not certain—7=certain).

- (49) Is Dana certain that Valeria is a widow?

Tonhauser found a significant difference between the main clause focus condition and both conditions with focus in the embedded clause, in the direction predicted by the QUD-based

approach (focus on pronoun received lower ratings than predicate focus; $\beta = -0.68$, $p < .05$, and focus on the content noun (e.g., *widow*) received lower ratings than predicate focus; $\beta = -0.49$, $p < .05$). The results are illustrated in Figure 5.2 from (Tonhauser 2016, 945).

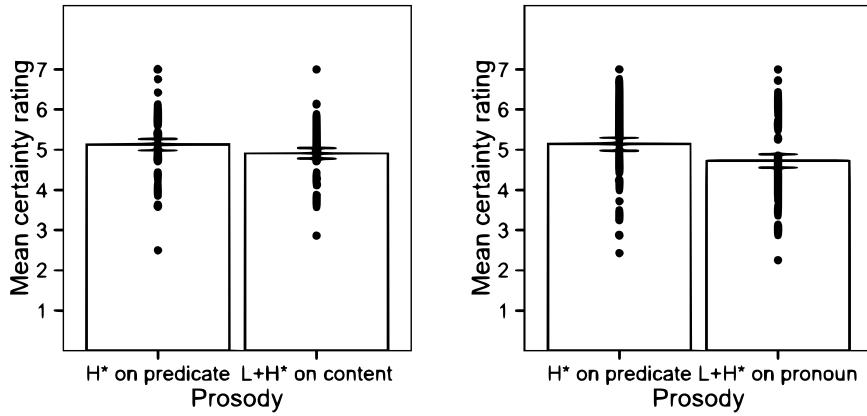


Figure 5.2: Graph of results from Tonhauser (2016, 945).

Tonhauser not only concludes from this that prosody *influences* projection for utterances with factive predicates embedded under an entailment canceling operator, but that the results provide evidence for the QUD-based analysis from Simons et al. (2017) outlined in Section 5.2—whereby information structure (here mediated by focus) *drives* projection. That is, the condition with narrow focus in the matrix clause will give rise to the CQ in (50-a), which (given a domain of veridical relations R) entails p (predicting projection), and the conditions with narrow focus in the embedded clause will give rise to the CQs in (50-b) and (50-c), neither of which entails p (predicting non-projection). On the assumption that presuppositions are derived when a proposition is entailed by the CQ, only (50-a) will generate a factive presupposition, and thereby project.

- (50) a. {p: for some relation R, John R that she is a widow} (48-a)
 b. {p: for some entity *a*, John discovered that *a* is a widow} (48-b)
 c. {p: for some property π , John discovered that she is a π } (48-c)

She further argues that the classical analyses of projection (Heim 1983, *et seq.*), where

presuppositions are lexically encoded on the factive predicate, are unable to predict the observed results.

Although Tonhauser's (2016) study shows that information structure (mediated by prosody) indeed has an influence on presupposition projection, it is less clear that the results provide strong support for the claim that projection is in fact *driven* by the QUD. To begin with, the contrast observed between the embedded clause and matrix clause focus conditions was small. Secondly, and more critically, the experiment did not include any baseline conditions for projection and non-projection (i.e., unembedded sentences,²⁰ and sentences with non-factive clause embedding predicates, respectively). That is, if the construal of a particular CQ is what gives rise to projection (by either entailing or not entailing p), then we would expect to see a distribution of responses like that in the left-hand graph in Figure 5.3. (main clause focus may lead to less projection than unembedded controls to the extent that non-veridical alternatives are considered for R.) On the other hand, if presuppositions are lexically encoded on certain (factive) verbs, then we would expect to see a distribution similar to that in the right-hand graph in Figure 5.3, where focus-placement inside vs. outside of the embedded clause has no effect on projection.²¹

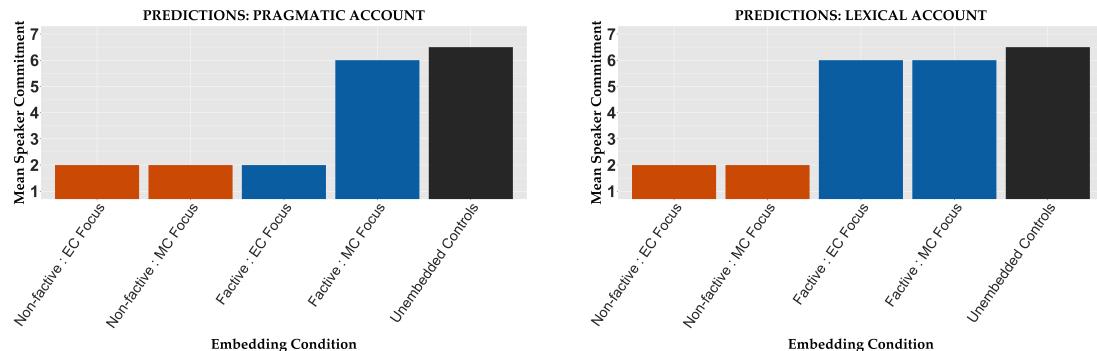


Figure 5.3: Predictions for (the strong versions of) pragmatic QUD-based (left) and lexically based (right) approaches to presupposition projection.

Without a baseline of comparison between cases where (the equivalents of) projection

²⁰The two unembedded control sentences in Tonhauser's experiment were not included in the analysis.

²¹Note that the bars for the factive verbs are lower than that for unembedded sentences; this is to take into account potential instances of local accommodation.

and non-projection respectively are uncontroversially expected, as reflected in straightforward judgements about the presence or absence of the relevant inference (that the speaker is committed to p), it is difficult to assess the claim that Tonhauser's results specifically provide evidence in favor of the QUD-based approach of Simons et al. (2017). Hence, our experiment, reported in Section 5.3.2 below, crucially includes baseline conditions for projection and non-projection to assess more directly how the effects of prosody and potentially independent lexical factivity compare.

To foreshadow, while we replicate the findings reported in Tonhauser (2016), that prosody does have an impact on factive presupposition projection (focus on material in the embedded clause decreases the strength of the projected inference that p is true), we find that the focus-based difference was an order of magnitude smaller than the difference between lexically factive and non-factive predicates, independently of focus placement. This finding is important, as it undermines the central empirical underpinning of these accounts; that focusing embedded content is able to either entirely eliminate the factive presupposition, or prevent it from projecting.

5.3.2 Experiment: factivity and the QUD

5.3.2.1 Design

This experiment closely follows Tonhauser's (2016) design in order to maximize comparability, with some modifications (see Section 5.3.2.3). We used the same general set-up where the participants were told to imagine that they happened to overhear a conversation at a party, involving sentences similar to those used by Tonhauser. The stimuli were presented aurally, and varied focus in the matrix clause (on the factive predicate) and the embedded clause (on the subject). Unlike Tonhauser (2016), we did not include a third condition with focus on the embedded predicate (Tonhauser's L+H* on content condition; (48-c)), given that Tonhauser only observed a very small difference between the two conditions with focus in the embedded clause, and that the proposals considered here make the same predictions for the two embedded focus conditions. The dependent variable was the participants' rating

of the speaker’s certainty about whether the embedded proposition holds, measured on a 7-point Likert scale. The participants were told that there is no right or wrong answer, but to simply choose the answer they preferred.

5.3.2.2 Participants

57 undergraduate students, recruited through the University of Pennsylvania’s Psychology department’s subject pool, participated in the study for course credit. They all reported being native speakers of English and having normal hearing. The participants were given a link to the experiment to take the experiment on their own over the internet. The experiment was implemented in Ibex.²² It took approximately 10 minutes to complete. Data from all participants were included in analysis.

5.3.2.3 Materials

In addition to the prosodic variation (factive main clause focus vs. embedded clause focus), the current experiment included three embedding conditions (factive matrix predicate vs. non-factive matrix predicate vs. unembedded), as in (51).

- | | | |
|------|--|-------------|
| (51) | a. John might’ve discovered that Anna left town. | Factive |
| | b. John might’ve believed that Anna left town. | Non-factive |
| | c. Anna left town. | Unembedded |

The auditory stimuli were recorded on a Blue Snowball microphone in the Phonetics Lab in the Linguistics department at the University of Pennsylvania. The target sentences were produced by splicing together the recordings of the different matrix and embedded sentences to avoid any unintended prosodic variation. As shown in (51), we also changed the embedding operator from *perhaps* to *might’ve*. This was done to avoid a potential metalinguistic interpretation of *perhaps*, along the lines of ‘I don’t know whether this answers your question,

²²See <http://spellout.net/ibexexps/SchwarzLabArchive/THProsPs/experiment.html> for an archived version of the experiment.

Verbal	
Unembedded	
Doxastic Factive	<i>discover, realize, notice</i>
Emotive Factive	<i>regret, love, resent</i>
Non-factive	<i>believe, hope, say</i>

Adjectival	
Unembedded	
Doxastic Factive	<i>be informed, be conscious, be aware</i>
Emotive Factive	<i>be happy, be disappointed, be upset</i>
Non-factive	<i>be hopeful, be worried, be concerned</i>

Table 5.1: Factive and non-factive predicates used in the experiment (verbal and adjectival).

but perhaps the fact that he discovered that p is relevant'.²³

As has been observed in the presupposition literature going back to Karttunen (1971), doxastic and emotive factives differ in several regards with respect to the status of the factive presupposition concerning the embedded content (e.g. Simons 2001, Abusch 2002, 2010, Chemla 2009, Romoli 2015, Abrusán 2016, and Djärv et al. 2018). Hence, the present study included both doxastic and emotive factive predicates. We also considered the possibility that a difference between verbal (e.g., *discover*) and adjectival forms (e.g., *be aware*) could affect projection. Therefore, we balanced the number of verbal and adjectival predicates across the different embedding conditions. The full list of predicates is given in Table 5.1.

The 48 test items involved a speaker (Sarah), uttering a sentence about some other people (John and Anna). Each item had variations in all 8 conditions; [factive main clause focus vs. embedded clause focus] × [doxastic factive matrix predicate vs. emotive factive matrix predicate vs. non-factive matrix predicate vs. unembedded], as illustrated in (52). Each subject saw all conditions across items, but the different lexical content in the embedded clause associated with an item was only shown in one condition, counter-balanced across subjects using a latin-square design.

- (52) a. Doxastic, embedded clause focus:

²³Thanks to Satoshi Tomioka, p.c., for this point.

- Sarah: John might've discovered that [Anna]_F left town.
- b. Doxastic, main clause focus:
Sarah: John might've [discovered]_F that Anna left town.
 - c. Emotive, embedded clause focus:
Sarah: John might've regretted that [Anna]_F left town.
 - d. Emotive, main clause focus:
Sarah: John might've [regretted]_F that Anna left town.
 - e. Non-Factive, embedded clause focus:
Sarah: John might've believed that [Anna]_F left town.
 - f. Non-Factive, main clause focus:
Sarah: John might've [believed]_F that Anna left town.
 - g. Unembedded, ‘embedded clause focus’:
Sarah: [Anna]_F left town.
 - h. Unembedded, ‘main clause focus’²⁴:
Sarah: Anna left town.

As in Tonhauser’s study, the target sentence was followed by a question such as (53), asking about the speaker’s commitment to p.

- (53) Is Sarah certain that Anna left town?

The set up of the experiment is illustrated in Figure 5.4:

5.3.2.4 Statistical methods

To test our predictions, we used two different statistical methods: Conditional Inference Trees and Bayesian Mixed Effects Models. The Conditional Inference Trees were used to test whether there was significant clustering of focus conditions and embedding predicates on the basis of certainty ratings. The model was given only the lexical identity of the pred-

²⁴No marked focus pattern.

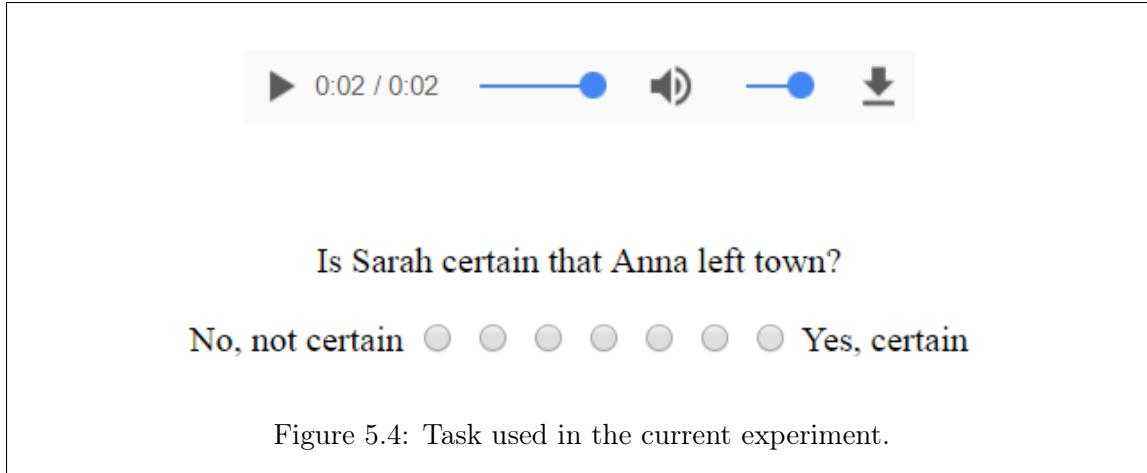


Figure 5.4: Task used in the current experiment.

icate in each trial, not the a priori assigned category. Conditional Inference Trees cluster data by finding clusters within predictors that have a significant effect on the dependent variable. We used them to validate the a priori identification of types of embedding predicates (i.e., factive/non-factive, emotive/doxastic). They were fit using the *partykit* package in R (Hothorn and Zeileis 2015 and Hothorn et al. 2006).

Bayesian Linear Mixed Effects models were used to test whether there was a substantial effect of focus on subjects' perception of the speaker's certainty in the embedded proposition. Bayesian models estimate the probability distribution over parameter values in a model rather than try to find a single point estimate. Their output provides a quantification of uncertainty after accounting for data. This uncertainty can be displayed with a credible interval. We report a 90% credible interval, which provides the range of parameter values such that there is a 95% chance that the value is above the bottom of the range and a 95% chance that the value is below the top of the range. If zero is within the credible interval, then the data was insufficient to determine whether any effect is positive or negative and that a null effect is still a plausible hypothesis. The Median (Table 5.2) gives the best estimate of the effect size, i.e., the number of points changed on the scale in that condition. The model was fit with the *rstanarm* package in R (Stan Development Team 2016).

For the Mixed Effects model, predicate type was coded using two variables Non-factive Diff. (1 for non-factive; 0 for Factives and Unembedded) and Unembedded Diff. (1 for

unembedded; 0 for Factives and Non-factives). Focus was included by a variable Fact. main clause focus (1 if the factive predicate was focused; 0 if the embedded subject was focused). We also included the interactions between the focus variable and the two predicate type variables. The intercept, thus, modelled certainty ratings for focused factive predicates. Only random intercepts for subject and item were included, since more complex models failed to converge.

5.3.2.5 Results

The Conditional Inference Tree (illustrated in Figure 5.5²⁵) clustered (most) factives together as a single group. The only exception was *be informed*, which patterned with some of the adjectival non-factives.²⁶ Adjectival non-factives were gradually ranked higher than the verbal non-factives, but lower than the factives. Factives and verbal and adjectival non-factives were rated below the unembedded conditions, although the factives (even with embedded clause focus) were much closer to the unembedded conditions than to the verbal non-factives.

²⁵See Appendix A.3 for a graphic of the clusters of the analysis

²⁶See Anand and Hacquard (2014) for an argument that its verbal counterpart *inform* is non-factive, contra Schlenker (2008).

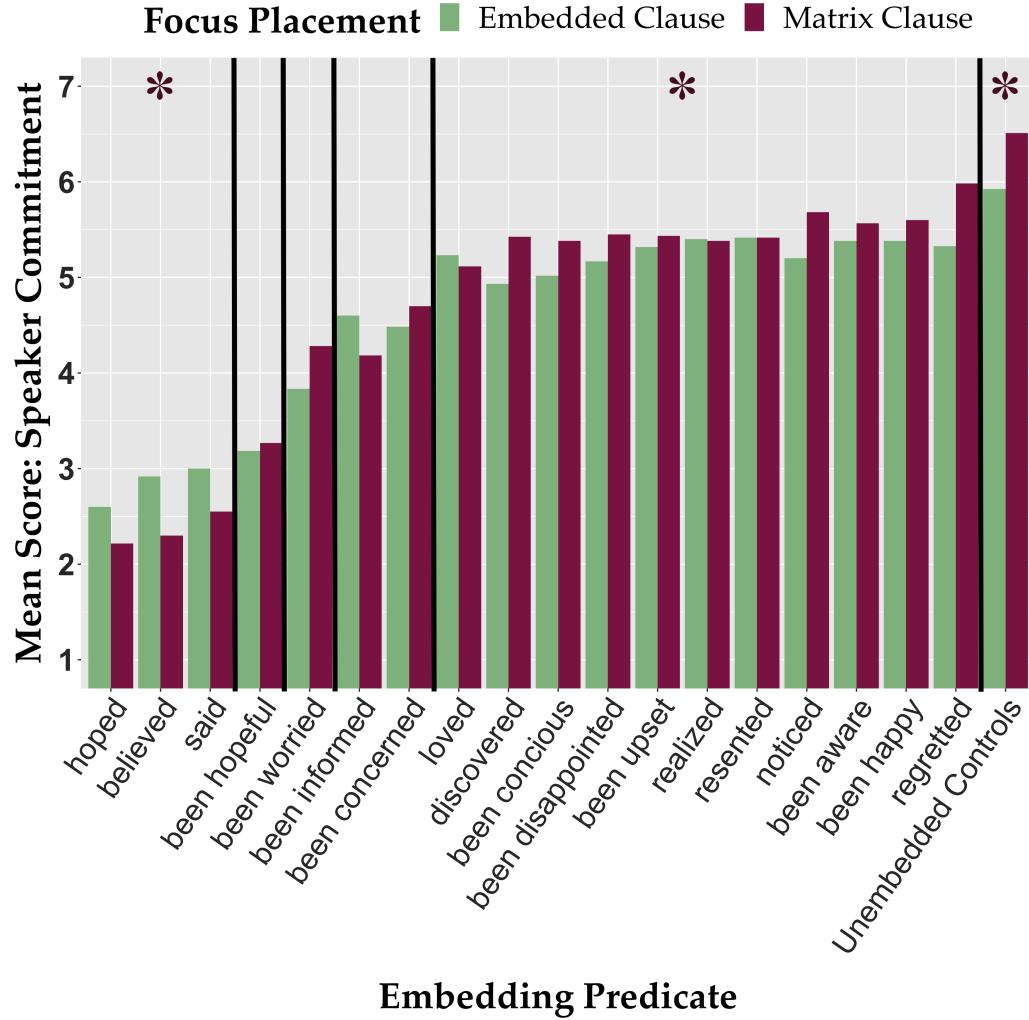


Figure 5.5: Mean speaker certainty ratings by embedding predicate and focus condition: black lines indicate clusters from Conditional Inference Tree cluster with stars indicating that a cluster contained focus based sub-clusters according to the Conditional Inference Tree model).

The results of the Bayesian Mixed Effects Model are summarized in Table 5.2. A surprising result was that adjectival non-factives did not neatly behave like either verbal non-factives or factives, nor did they behave like a coherent class. Instead there was a gradient difference between *be hopeful* which was fairly non-factive-like, *be concerned* which was more factive-like (similar to *be informed*) and *be worried* which was somewhere in the middle. Focus was shown to have a significant effect within the factive category, which was supported

	5% LB	Median	90% UB
Factives (Intercept)	5.0	5.2	5.4
Non-Factive Diff.	-2.0	-1.9	-1.7
Unemb. Diff.	0.6	0.7	0.9
Fact. Pred. Focus	0.03	0.2	0.3
N.F. Focus. Interact.	-0.5	-0.3	-0.04
Unemb. Focus Interact.	0.2	0.4	0.6

Table 5.2: Parameter estimates from the Bayesian Mixed Effects Model.

by the mixed effect analysis, for which all credible values according to the Bayesian model were positive (meaning that being in the main clause focus condition reliably led to higher certainty ratings). However, the magnitude of the difference between the factive and non-factive categories (model estimate of 1.9 points) was an order of magnitude larger than the difference between predicate and embedded clause focus for factives (model estimate of 0.2 as seen in the Fact. Pred. Focus row). In addition to the expected effect of focus in the factive category, there was also a reliable effect of focus with both the verbal non-factives and in the unembedded condition. In the unembedded condition, the effect of focus was stronger than with factives, and in the same direction (focus on the subject led to decreased ratings). However, for verbal non-factives, the effect of focus was in the **opposite** direction: embedded clause focus led to increased ratings.

For illustrative purposes, Figure 5.7 shows the mean scores by condition²⁷ (Non-factives: 3.28, Factive EC-focus: 5.2, Factive MC-focus: 5.38, Unembedded: 6.22). Comparing this graph to the prediction plots in Figure 5.6 (repeated from 5.3) clearly illustrates the main finding of this experiment, that prosodically mediated focus does not determine (though it does weakly influence) factive presupposition projection. Figure 5.8 shows a breakdown of the results by focus-type.

5.3.2.6 Discussion

This experiment successfully replicated the results from Tonhauser (2016): focus on the embedded subject leads to decreased certainty ratings for the factive inferences introduced

²⁷Collapsing over the embedded and main clause focus in the non-factive condition.

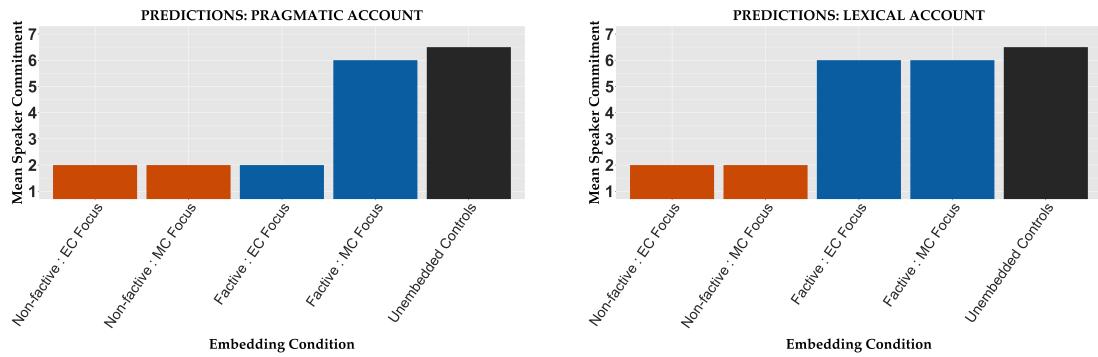


Figure 5.6: Predictions for (the strong versions of) pragmatic QUD-based (left) and lexically based (right) approaches to presupposition projection.

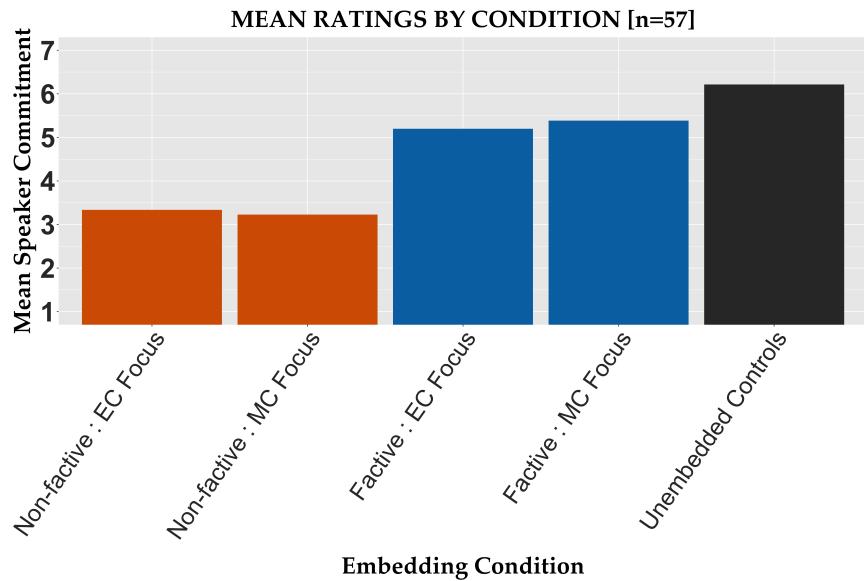


Figure 5.7: Mean speaker certainty ratings by embedding condition and focus condition.

by the presupposition triggers under investigation. However, we crucially find that this effect is substantially smaller than the difference associated with the traditional lexical distinction between factive and non-factive predicates, with the latter patterning overall very closely to unembedded content.

Thus, the inclusion of baseline comparisons for projection and non-projection in our first study puts the overall results in a very different perspective. The relatively small size of the effect of prosodic focus on factives, in combination with the finding that we still find

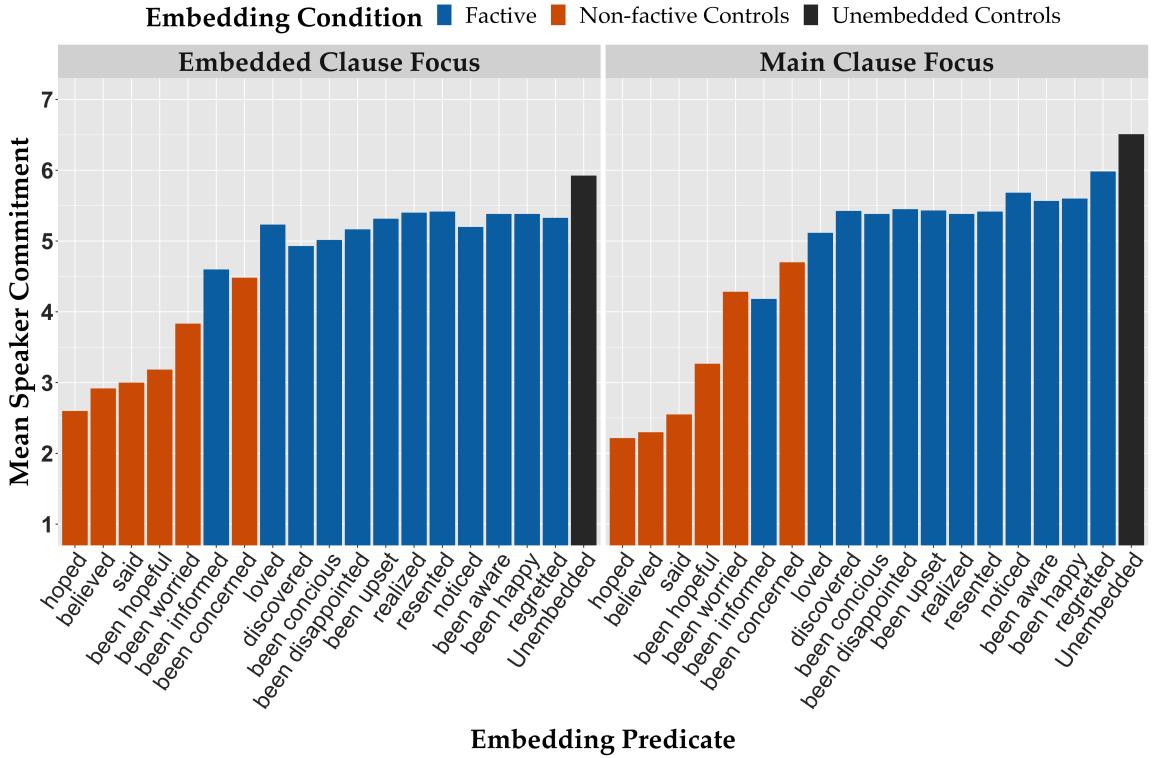


Figure 5.8: Mean speaker certainty ratings by embedding predicate and focus condition.

substantially higher certainty ratings for factives in the embedded clause focus condition, compared to non-factive predicates, argues against the accounts reviewed in Section 5.2.0.2, whereby prosodically mediated focus, as a signal of the QUD, is able to either completely eliminate the factive inference or prevent it from projecting. Nevertheless, the existence of a robust (if small) effect of prosody on judgements of certainty about whether the speaker is committed to the embedded content still requires an explanation, even if a lexical approach to presupposition triggering and projection were adopted.

When looking at the impact of focus, we provide novel evidence that the prosodic manipulation actually had an effect for *all* predicate types. One surprising lexical contrast with regards to the prosodic effects was a gradient difference between verbal and adjectival non-factives. Adjectival non-factives (to varying extents) showed more projection-like behaviour than verbal non-factives. Surprisingly, we also observe that focus placement impacted projection judgements for clauses embedded under *non-factive* predicates, in the *opposite direction*

from factives. For non-factives, focus in the embedded clause gave rise to a weak ‘projection-like’ inference, something that is unexpected on both lexical and pragmatic accounts. While these focus effects were significant, they were all an order of magnitude smaller than the lexical differences mentioned above. Based on these results, Bacovcin and Djärv (2017) and Djärv and Bacovcin (2018) argued that factive presuppositions are lexically triggered. They argued however, that focus may give rise to inferences about the Common Ground, via the QUD, that are completely independent of factivity, thus giving rise to a weak effect of prosody *across* predicate types. To capture this effect, they proposed a general, probabilistic, mechanism for integrating multiple (potentially conflicting) inferences about the Common Ground, and discussed how that mechanism interacts with the projection of factive presuppositions. While we will not end up following Bacovcin and Djärv (2017), Djärv and Bacovcin (2018) in adopting the lexical account (see discussion in Section 5.6.1), I believe that the probabilistic model of the weak QUD-effects provided by these authors, nevertheless provides an interesting perspective on the nature of these effects (and one which is compatible also with the account ultimately proposed here; see Sections 5.6.1–5.6.2). Section 5.7.1 presents this model.

Importantly, our account (like the pragmatic accounts) relies on the assumption that changes in prosodic focus evoke different QUDs and associated focus alternative sets. Though we do not report on this here, in the paper, we ran a second experiment designed to explicitly test the availability of various QUDs with different focus placement. In particular, we contrasted focus on the matrix predicate with focus on the embedded subject. The objective was to determine whether a QUD like ‘Who left town: was it Anna or someone else?’ is a more viable QUD with embedded clause focus than with focus in the matrix clause, as our model assumes (see Section 5.7.1). The results of this experiment corroborate our prediction that a QUD on only the embedded clause is licensed by a complex sentence with narrow focus in the embedded clause. See Djärv and Bacovcin (2018, Sec. 5) for details.

It is also worth noting that we found no difference between doxastic and emotive factives. This is interesting in light of the observation that the two types of factives differ in terms

of their sensitivity to the kinds of contexts that are standardly thought to trigger local accommodation on lexical accounts. This lack of an interaction indicates that besides from being quantitatively different from those cases (in terms of the size of the effect), the impact of focus is also qualitatively different (in that it affects doxastic and emotive factives equally).

To conclude this section, the current results are clearly incompatible with the assumptions that provide the empirical basis for the accounts reviewed in Section 5.2.0.2.2: that the (global) inference that the speaker is committed to *p* (in embedded contexts) depends on the (*not*) *at-issue* status of *p* with respect to the QUD, signaled by prosodic focus. Above, we presented data questioning the empirical basis for the way in which these approaches deal with projection in embedded contexts. Next, we turn to the question of the status of *p* in unembedded contexts. As we saw above, the Common Ground status of *p* depends on properties of the discourse (namely the QUD), at least for the doxastic factives. However, in unembedded contexts, pragmatic accounts predict that the inference that *p* is true should be essentially invariant, given that they take *p* to be part of the lexically entailed content of factive verbs. The next section tests this assumption, in the context of doxastic and emotive factives.

5.4 Factivity and entailment: new experimental results²⁸

5.4.1 Soft, hard, and entailed, presuppositions

Before moving on to the experiment, this section gives a brief (non-comprehensive) overview of recent work aiming to experimentally substantiate between sub-classes of triggers (for a recent review of experimental work on presuppositions more generally, see Schwarz 2016, and also Schwarz 2015).

Regarding the ‘soft-hard’ distinction introduced in Section 5.1, Tiemann, Schmid, Bade, Rolke, Hertrich, Ackermann, Knapp, and Beck (2011) find variation in acceptability judgments, in contexts that do not explicitly support the trigger’s presupposition, but are never-

²⁸The results reported in this section are adapted from joint work with Jérémie Zehr and Florian Schwarz (Djärv, Zehr, and Schwarz 2018: Sections 1.2–2.)

theless consistent with it. Likewise, Domaneschi, Carrea, Penco, and Greco (2014) find that while some presupposition triggers leave a lasting impact – suggesting that their presupposition is accommodated –, others essentially seem to be ignored: after reading short texts containing various triggers followed by a distractor task, subjects are more likely to answer questions based on the contribution of triggers like *stop*, compared to a greater likelihood of failing to consider the presupposition such as that of the prefix *re-* (as in *reintroduce*). Tiemann (2014) and Tiemann, Kirsten, Beck, Hertrich, and Rolke (2015) report a similar lack of consideration of the presupposition of *again* when answering questions, even without a delay in the task. These findings then, provide experimental support for a theoretical soft-hard distinction.

On the other hand, Schwarz (2014) reports results from a visual world eye tracking study that do not pattern as predicted by a theoretical view that assimilates soft triggers to implicatures (see Chemla and Bott 2013, Romoli 2012, 2015, Kennedy, Bill, Schwarz, Crain, Folli, and Romoli 2015, a.o.). Importantly for our discussion in Section 5.6.1, Jayez, Mongelli, Reboul, and Van Der Henst (2015) conducted an acceptability judgement study looking at the hard triggers *too* and *regret*. Their results suggest that these, too, can fail to project from antecedents of conditionals in contexts that globally establish ignorance with respect to the truth of the presupposition, at least with sufficient contextual support.

In the remainder of this section, we review a set of experiments by Cummins, Amaral, and Katsos (2013) and Amaral and Cummins (2015), which provided the conceptual and methodological basis for the experiments reported in Section 5.4.2. These authors investigated various triggers in English and Spanish, testing the acceptability of *Yes, although...* and *No, because...* continuations, as illustrated for *again* and *stop* below:²⁹

- (54) Did Brian lose his wallet again?

- a. Yes, although he never lost it before.
- b. No, because he never lost it before.

²⁹Similar tasks involving the selection of the best answer from a set of options had previously been used to investigate clefts and focus (Onea and Beaver 2011, Velleman, Beaver, Destruel, Bumford, Onea, and Coppock 2012, Destruel, Velleman, Onea, Bumford, Xue, and Beaver 2015).

(55) Did John stop smoking?

- a. Yes, although he never smoked before.³⁰
- b. No, because he never smoked before.

Importantly, they found that, across all of the triggers that they looked at, both *yes* and *no* responses of this sort were degraded relative to controls, suggesting that contradicting the presupposition is never entirely free. Interestingly, however, the triggers in their results fell into two classes regarding the extent to which *yes...* and *no...* responses differed from one another: for expressions such as *stop* and *still*, there was a fairly substantial, statistically significant difference in acceptability between the response options, with higher ratings for *no* than for *yes*. In contrast, expressions such as *again* and *too* yield comparable acceptability ratings for both continuations. Importantly for our purposes, they also found *regret* to pattern with the first set of triggers, exhibiting a significant difference between continuations. This is directly relevant to our findings below, and at first sight may seem incompatible with them; we discuss this in footnote 36.

The findings of Cummins et al. (2013) align broadly with the soft-hard distinction.³¹ And in line with common claims about this distinction, the interpretation offered by these authors is indeed that the first set of triggers more easily allows for ‘local accommodation’, leading to the relatively greater acceptability of the *no*-responses for these triggers. However, there is a potential additional dimension to the variation as well, which can be related to Zeevat’s notion of lexical triggers, which constitute cases where the presupposition is a requirement that comes with the asserted component of the trigger. As Amaral and Cummins (2015, p. 169) put it, in these cases “the responses in condition [yes-continuation] appear self-contradictory, if we assume that the presupposition is a logical prerequisite for the at-issue content of the trigger.” That is, the content introduced in the question cannot be affirmed independently of the presupposition. Our experiments presented in Section 5.4.2 below build on essentially this notion, which we couch in terms of the distinction, introduced in Section

³⁰Note that Cummins et al. (2013) do not explicitly provide the continuations they used for *stop*, so this is our best guess at what they looked like for this question, which is listed in the materials in their appendix.

³¹They relate their results to Zeevat’s (1992) distinction between ‘lexical’ and ‘resolution’ triggers.

5.1, between entailed and non-entailed presuppositions.

The experiments in Section 5.4.2 test the theoretical claim of pragmatic accounts, that—in unembedded contexts—the presupposed content is part of the conventionally entailed content of the trigger. The results from these experiments will show that view is problematic for the emotive factives, suggesting that at least for these predicates, the basic assumption of the pragmatic accounts is not met. The results are, however, consistent with the claim that p is an entailment of the doxastic factives.

5.4.2 Experiment: factivity and entailment

This study was designed to test the hypothesis that doxastic, but not emotive, factives encode the embedded proposition p as part of their conventional entailments (Table 5.3).

Factive Type	COGNITIVE ATTITUDE that P	EMOTIVE ATTITUDE that P
Entailed content	$P \ \& \text{ATTITUDE}$	ATTITUDE

Table 5.3: Hypothesis: doxastic, but not emotive, factives conventionally encode their embedded proposition p as part of their entailment.

To test this hypothesis, we employed a yes/no-continuation task, similar to that used by Cummins et al. (2013) (previous section). The task paired a factive question with a response of the form *yes, although...* or *no, because...*, followed by a denial of the content of p :

- (56) Is Anna {aware, happy} that [P Ryan is coming to the wedding]? /
 Does Anna {realize, appreciate} that [P Ryan is coming to the wedding]?
 a. Yes, although he isn't.
 b. No, because he isn't.

The starting point for our investigation was the hypothesis that we find different relationships between different subcomponents of meaning for emotive and doxastic factives. Generally speaking, both types of factives contribute (at least) two meaning components, that of the attitude involved (which relates the matrix subject's mental state to the embed-

ded proposition), and that of the embedded proposition p (conveying that p is true). We propose that these two components stand in a different relationship to each other for the two types of factives, such that for emotive factives, p can be disentangled from the subject's attitude in a way that it cannot for doxastic factives. The basic intuition is that it is quite easy to imagine that one is *happy* about a certain state of affairs, but is simultaneously wrong about it. It is harder to see how one can *discover* something which is not true. In this vein, (57-a) is a coherent statement, whereas (57-b) gives rise to contradiction:³²

- (57) a. John was happy that his parents are coming to town, although it turned out that he was in fact mistaken/although it turned out that they had to cancel.
- b. #John discovered that his parents are coming to town, although it turned out that he was in fact mistaken/although it turned out that they had to cancel.

As mentioned above, we build on the proposal by Sudo (2012), that certain triggers (e.g., change of state verbs like *stop*) have their presupposition represented as part of the entailment at the lexical level, whereas others (such as gender features on pronouns or the additive presupposition of *also*) do not. We hypothesized that doxastic and emotive factives differ in terms of their entailment properties — specifically, that p , while generally surfacing as projective content for both types of factives, is also part of the conventionally entailed content of doxastic factives, whereas it is not for emotive factives, as shown in Table 5.3.

While the overall approach taken here is quite similar to that of Cummins et al., our hypothesis provides a slightly different angle on the expected outcomes by focusing on whether or not an affirmative answer is possible when the presupposition is explicitly denied at the same time. Our basic assumption was that a *yes*-response necessarily commits the speaker to the entailed content introduced by the question. However, it may in principle be possible to deny a presupposition, to the extent that it is introduced entirely at a separate level and not part of the conventionally entailed content. This leads to diverging predictions based on our hypothesis: if the content of the embedded proposition is entailed, as we propose is

³²On this point, Egré (2008, p. 103) also observes that the emotive *regret* behaves differently from doxastic *know* in false-belief environments.

the case for the doxastic factives, saying *yes* and then denying the content of the embedded proposition should be contradictory, and thus only *no* will be a viable response. But for the emotive factives, where we hypothesize that the content of the embedded proposition is not part of what is entailed, it should in principle be possible to just endorse the (emotive) attitude by responding *yes*, even if qualifying immediately by noting that the embedded proposition is false.

We still take it that selectively addressing only certain aspects of the meaning of a complex statement in an answer may come at a cost, i.e., it is indeed plausible that the default impact of an affirmation involves endorsing both entailed and presupposed content, wholesale, as it were. What's crucial for our approach is that in principle it may be possible that non-entailed presuppositions can be denied along with a *yes*-response, while entailed ones cannot. If so, that leads to a prediction for our hypothesized difference between doxastic and emotive factives, namely that the latter should yield a greater acceptance of *yes*-responses than the former.

Note that the hypothesis makes no specific prediction for the relative acceptability of denials of presupposed content with *no*-answers, which require targeting the presupposed content with negation (commonly taken to involve local accommodation). It's possible that the different relationship between presuppositions and entailments has a reflex here, too, but this does not necessarily follow from our hypothesis. Next, we report on two experiments to test these predictions: Experiment 1, where the participants were asked to chose which of the *yes* vs. *no* answer-options they preferred, and Experiment 2, which uses acceptability ratings to target the acceptability of *yes*-responses more directly.

5.4.2.1 Experiment 1

5.4.2.1.1 Design

In Experiment 1, participants were presented with questions containing a doxastic or an emotive factives and had to indicate their preference with respect to *yes* and *no*-answer options. There were additional response options to express that 'Both options are equally

good.' or 'Both options are equally bad.'

- (58) {Did Mark **find out**/Was Mark **surprised**} that [_P his parents are visiting]?

- a. Yes, although they had to cancel because of the weather.
- b. No, because they had to cancel because of the weather.
- c. Both options are equally good.
- d. Both options are equally bad.

If, as hypothesized, doxastics but not emotives entail the content of the embedded proposition, we expect that the *yes*-responses should be more readily available for the questions with an emotive factive, compared to those with a doxastic one. That is, for the emotive factives, we expect both the *yes* and the *no*-responses to be in principle available. Assuming more or less comparable availability of the *yes* and *no*-responses, the *both good* and *both bad* responses should be chosen more frequently for emotive factives (depending on how the potential cost of local accommodation (for *no*) or targeting only one aspect of meaning (for *yes*) affects acceptability judgments). For the doxastic factives on the other hand, we expect these to allow only the *no*-responses, as these should be clearly better than *yes*-responses (even if involving some cost for local accommodation). Hence, *both good* should be impossible with the doxastic factives, given the unacceptability of the *yes*-response. The *both bad* option might get chosen for the doxastic factives, if subjects dislike both local accommodation and cancellation/suspension. However, this is likely to be the dispreferred choice, assuming that local accommodation does make *no*-responses available.

5.4.2.1.2 Participants

Thirty-six native speakers of English participated in the study. The participants were recruited on **Prolific.ac**, a crowd-sourcing tool for recruiting participants to participate in scientific studies online. Participants were paid at rate of 5.20 GBP per hour for their participation. The task took approximately 10 minutes to complete. No participant was excluded from the analyses.

5.4.2.1.3 Materials

All items presented short written dialogues between two speakers. There were two variations of twenty-four experimental items, corresponding to the two predicate types: doxastic (*realize, find out*) and emotive (*be disappointed, be surprised*) factives, as illustrated in (58) above. Each subject only saw a given item in one version, with item-condition pairings counterbalanced across subjects. In addition, there were twenty-four filler items where factives were paired with different continuations. Given the prediction for the critical part of the experiment, that the *yes*-responses should be endorsed to a greater extent in the emotive condition than in the doxastic condition, the fillers were designed to yield the opposite preference. Hence, among the fillers, the emotive factives favoured a *no*-response, and the doxastic factive favoured a *yes*-response, as illustrated in (59) and (60), in order to counteract the potential risk of introducing an overall bias against the *yes*-responses. The *both good* and *both bad* options in (58) were available for the fillers, too.

(59) Was Mike disappointed that John decided to quit football? [Emotive filler]

- a. Yes, although he didn't think John was a very good player.
- b. No, because he didn't think John was a very good player.

(60) Was Mary surprised that Bill got the grant? [Doxastic filler]

- a. Yes, although she was on the grant committee.
- b. No, because she was on the grant committee.

The participants were given the following instructions: “In this experiment you will read short questions. You will then be asked to choose which answer you prefer, given a choice of two answers. You also have the opportunity to say that you think that both answers are equally good or equally bad. There is not a right or a wrong answer. Simply choose the answer that you prefer, given the preceding question.” In order to control for variability stemming from the two predicate types influencing the answers across conditions, we used a block design. Thus, half of the participants saw the emotive factives in a randomized

order first, and the doxastic factives in a randomized order last, and vice versa for the other half of the participants. Each block contained both fillers and critical items. Additionally, the items were divided into two groups, in order for each specific predicate to be evenly distributed across participants, thus creating a two-by-two Latin square design.³³

5.4.2.1.4 Analysis

The results were analyzed as logistic mixed effects regression models in R (version 3.1.2) using the `glmer` function of the `lme4` package (version 1.1-11) and its `bobyqa` optimizer. Results from maximally complex converging models are reported here (Barr et al. 2013). We ran four types of models regarding the predicted outcomes: models predicting the observation of a *yes*-response (to the exclusion of all the others), of a *no*-response (to the exclusion of all the others), of a *both good*-response (to the exclusion of all the others) and of a *both bad*-response (to the exclusion of all the others). These models tested for a fixed effect of predicate type (emotive, doxastic). For each of these simple-effect models, we also ran a version testing for an effect of block order (emotive-doxastic, doxastic-emotive) and its interaction with predicate type. Participants and items were added as random effects, with a random slope for predicate type per participant, and a random slope for predicate type and block order (in the relevant models) per item. Our different baselines exhausted the logical space of effects and interactions. The models did not include data-points for the filler items, and no other data-point was excluded.

5.4.2.1.5 Results

The results are summarized in Figure 5.9. The response patterns for the first block showed a clear contrast between the doxastic and the emotive factives. There was a main effect of predicate type on the observation of *no*- and *both bad*-responses in the first block (resp. $p = 0.00247$, $\beta = 1.2433$, $SE = 0.4107$ and $p = 0.024687$, $\beta = 1.6566$, $SE = 0.7375$), with *no*-responses being more frequent for the doxastic factives and *both bad*-responses being

³³An archived version of the experiment is available at:
<http://spellout.net/ibexexps/SchwarzLabArchive/YesNoFact/experiment.html>

more frequent for the emotive factives. There was also a significant interaction with block order for the *no*-responses ($p = 0.02423$, $\beta = 1.3729$, $SE = 0.6092$) but not for the *both bad*-responses; the significant main effects between the two types of factives disappeared in the second block (predicate type for *no* $p = 0.7260$, $\beta = 0.12959$, $SE = 0.36983$; predicate type for *both bad* $p = 0.678$, $\beta = 0.3225$, $SE = 0.7768$), suggesting that exposure to one type of factive predicate had a strong effect on the participants' responses, potentially through priming one type of interpretation, or through adjusting the participants' standards for evaluation. There was no such significant main effect on the observation of *yes*- and *both good*-responses (all $p > 0.17$, $\beta \leq 0.5$). We observed the same results in simple models, excluding block order as a predictor: *no*- and *both bad*-responses were more frequent with doxastics than with emotives (*no*: $p = 0.0222$, $\beta = 0.5266$, $SE = 0.2303$; *both bad*: $p = 0.0223$, $\beta = 0.7232$, $SE = 0.3165$) but there was no significant effect of predicate type for *yes*- and *both good*-responses (*yes*: $p = 0.737$, $\beta = 0.08468$, $SE = 0.25253$; *both good*: $p = 0.809$, $\beta = 0.07354$, $SE = 0.30382$).

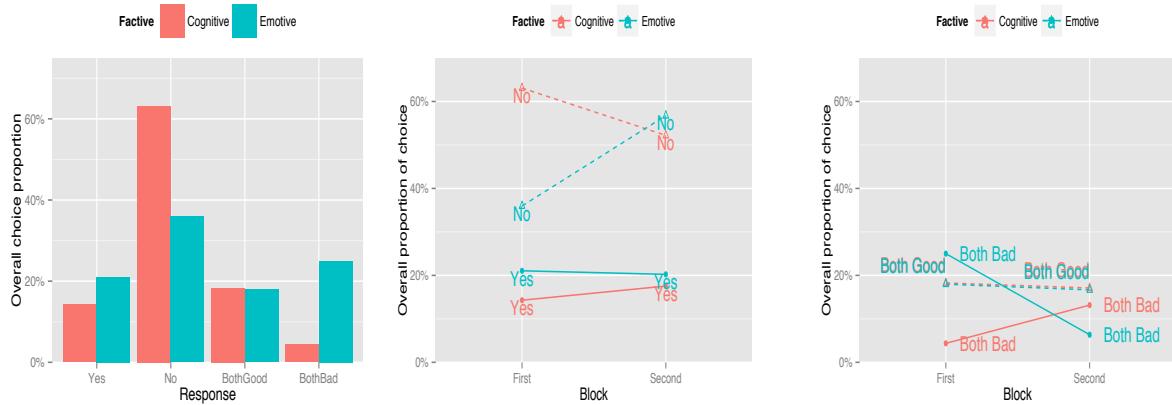


Figure 5.9: **Left:** proportion of responses for the two types of factives in block 1, where the contrast between the doxastic (“cognitive”) and the emotive factives is significant for the *no* and the *both bad*-responses. **Center and right:** responses for the four response types (*yes*, *no*, *both good*, *both bad*), by block. The contrast between the two types of factives is neutralized in Block 2.

To summarize, even though the contrasts between the two verbs are subtle, and subject

to influencing each other across blocks, there is nonetheless a clear contrast between the two types of factives with respect to the availability of *no*-responses. Even though there was no direct, visible contrast in the availability of *yes*-responses and *both good*-responses, the contrast in *both bad*-responses is in line with our hypothesis, according to which the two aspects of meaning identified as part of the semantics of the two types of factives (the attitude and the p components) contribute to the overall semantic properties in different ways for the emotive and the doxastic factives — specifically in terms of the truth of the embedded clause being part of the conventional entailment in the case of doxastic factives, but not for the emotive factives. Under this view, participants were not sufficiently inclined to consider an interpretation where either negation targeted p directly or where an affirmative response selectively endorsed the conventionally entailed content (for emotive factives). At the same time, participants did display a sensitivity to the contrast in entailment in that they were more amenable to accepting a *no*-response for doxastic factives, because it should be easier to target the embedded proposition p with negation when it is conventionally entailed.

However, there is at least one alternative interpretation of the results which basically attributes the contrast in *no*-responses to varying availability of local accommodation, and does not posit a difference between factives in terms of whether or not p is part of the conventionally entailed content. To spell out a specific version of this alternative, it might be that only emotives are lexically associated with a conventional presupposition that p (which at the same time is part of the entailed content as well). In contrast, the presuppositional status of p would result from a pragmatic derivation in the case of doxastic factives, in line with the proposals by Simons, Romoli and others. Based on these assumptions, *no*-responses for doxastics are expected to be easily acceptable, to the extent that the pragmatic derivation does not (or at least not necessarily) take place under negation.³⁴ For emotives on the other hand, both a *yes* and a *no*-response would require cancellation of a hard-coded, conventional presupposition, which would lead participants to generally prefer the *both bad*

³⁴For Romoli in particular, the justification after *no* would block or cancel this derivation, in the same way that the *sometimes* implicature normally associated with *not always* does not arise in *I don't always curse because I never curse*.

response to indicate a presupposition failure.

In order to disambiguate between these two interpretations of the results, Experiment 2 used an acceptability rating task where subjects were only presented with one answer option at a time. This allowed us to test for a contrast in the acceptability of *yes*-responses between the two types of factives more directly. As discussed above, our hypothesis predicts that *yes*-responses paired with denials of p will be more readily available for emotive factives than for doxastic factives. In contrast, the alternative interpretation we just considered does *not* predict such a contrast in the *yes*-responses, as both types of factives should yield low ratings for *yes*-responses, based on the crucial assumption that factives uniformly include a conventional entailment that p .

5.4.2.2 Experiment 2

5.4.2.2.1 Design

Experiment 2 used an acceptability rating task to provide an independent assessment of the acceptability of *yes* and *no* continuations. Participants saw only one response at a time (*Yes, although...* or *No, because...*), as shown in (61) and (62).

(61) a. Is Maria {aware, happy} that [P Mike is moving back to Chicago]?

b. Yes, although he isn't.

(62) a. Is Maria {aware, happy} that [P Mike is moving back to Chicago]?

b. No, because he isn't.

Specifically, the participants were asked to rate to what extent the answer sounds natural to them, in light of the question, by choosing a value between 1 ('completely unnatural') to 7 ('completely natural') by clicking the number or pressing the corresponding key. They were instructed that there was no right or wrong answer. If doxastic, but not emotive factives conventionally entail p , then we expect to see a contrast between the doxastic and the emotive factives in the *yes*-responses, such that *yes* is rated significantly lower for the dox-

astics than for the emotives. Again, no specific predictions were made for the *no*-responses. In addition to the slight change in the nature of the task, the stimuli were refined from Experiment 1 to be more uniform, in particular by consistently using future-oriented progressive forms (e.g., *is moving to Chicago*) in the embedded clause and expressing denial in the response-continuation via VP-ellipsis. This was done to avoid potential other pragmatic strategies of reconciling the denial with the initial affirmative or negative response, which may have given rise to additional variation in response patterns for the original materials.

5.4.2.2.2 Participants

Sixty-two undergraduate students at the University of Pennsylvania, all native speakers of English, participated in the study for course credit through the Psychology department's subject pool. The experiment took approximately 15 minutes, and was carried out on computers in the Experimental Study of Meaning lab.

5.4.2.2.3 Materials

As illustrated above, the items consisted of short dialogues between two speakers, as in (61)–(62). Versions of the twenty-four critical items were created in four conditions, corresponding to the two predicate types—doxastic and emotive, and the two answer types—*yes*, *although* and *no*, *because*. We also included a between item adjective-verb manipulation, such that half of the items contained verbal factives (*appreciate*, *realize*), and half of them, adjectival factives (*happy*, *aware*). Forty-eight filler items were also included. These were designed with two purposes in mind: first, to provide a floor and a ceiling baseline for the *yes*- and *no*-responses; and second, to counterbalance the number of good and bad *yes*- and *no*-responses. Half of the fillers therefore used a non-factive matrix predicate (*think*), where the *no*-answers would be infelicitous, and the *yes*-answers would be fully acceptable, as in (63). The other half involved a question with two conjuncts, as in (64). Here, it would be the *yes*-answers that were infelicitous, while *no* would be an acceptable response.

- (63) Does Sue think that Bill's parents are going to the wedding?

- | | |
|--------------------------------|----------------|
| a. #No, because they are. | [Bad Control] |
| b. ✓Yes, although they aren't. | [Good Control] |
- (64) Is John going to Paris and Rome this summer?
- | | |
|---|----------------|
| a. ✓No, he's not. | [Good Control] |
| b. #Yes, although he isn't going to Rome. | [Bad Control] |

The participants were given the following instructions: "In this experiment you will read short dialogues between two people in the form of a question and an answer. You will then be asked to rate to what extent the answer sounds natural to you in light of the question, by choosing a value between 'completely unnatural' (1) to 'completely natural' (7). There is not a right or a wrong answer. Simply make the choice based on how well you feel the answer works for the preceding question." In contrast to Experiment 1, the factive and emotive items were randomly mixed, but answer type (*yes* vs. *no*) was separated by blocks, with order counter-balanced across groups.³⁵

5.4.2.2.4 Analysis

The ratings were analyzed using linear mixed effects regression models in R (version 3.1.2), using the `lmer` function of the *lme4* package (version 1.1-11). All models included predicate type (emotive, doxastic) and answer type (yes, no) as fixed effects. Given that we made no predictions about category (adjective, verb) nor about block order (yes-no, no-yes), we fitted models excluding them both (simple models) and models including either one as predictors (models including both would not converge). We tested for the maximally complex models, including all possible interactions of predictors and all random slopes for participants and items as random effects, and our baselines exhausted the logical space of effects and interactions. The models included only the data points of the experimental items.

³⁵The experiment is available at:
<http://spellout.net/ibexexps/SchwarzLabArchive/YesNoRating/experiment.html?Home=true>

5.4.2.2.5 Results

The results are presented in Figure 5.10. Responses were similar in the first and second block (main effects $t \leq 1.35$, $\beta \leq 0.45$; two-way interactions $t \leq 0.3$, $\beta \leq 0.15$; three-way interaction $t = 0.302$, $\beta = 0.13988$, $SE = 0.43359$) and for adjectives and verbs (main effects $t \leq 1.5$, $\beta \leq 0.35$; two-way interactions $t \leq 1.63$, $\beta \leq 0.44$; three-way interaction $t = 1.216$, $\beta = 0.37898$, $SE = 0.31167$). As predicted, the response patterns showed the *yes*-ratings to be significantly higher for the emotive than for the doxastic factives (simple model: $t = 4.954$, $\beta = 0.76$, $SE = 0.1534$; $t \geq 3.1$ and $\beta \geq 0.59$ otherwise), with no difference in the *no*-ratings (simple model: $t = 0.625$, $\beta = 0.1005$, $SE = 0.1607$; $t \leq 0.785$ and $\beta \leq 0.1683$ otherwise). There was also an interaction between predicate type and answer type (simple model: $t = 4.083$, $\beta = 0.8605$, $SE = 0.2108$; $t \geq 2.61$ and $\beta \geq 0.67$ otherwise).

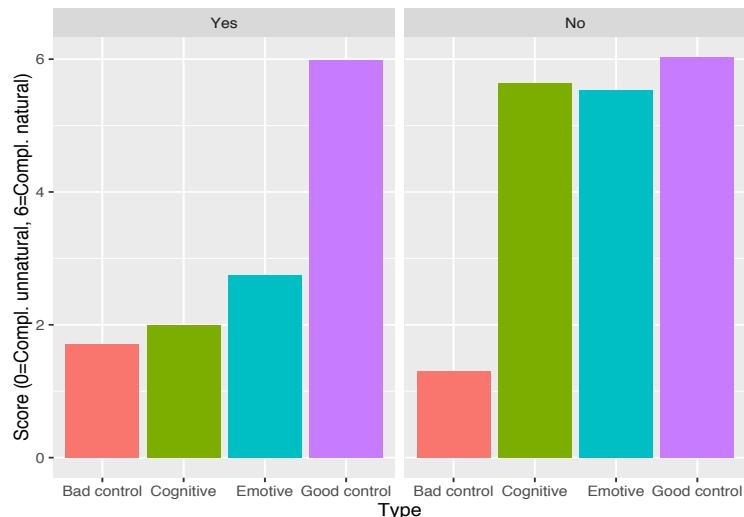


Figure 5.10: Mean ratings by answer type and predicate type: emotive \times doxastic (“cognitive”) factive type (merged blocks).

With Experiment 2, we replicated the main conceptual result from Experiment 1, in that we elicited a contrast between emotive and doxastic factives. The contrast no longer consists in participants endorsing *no*-answers more readily as responses to questions with doxastics than with emotives; rather, we now see that participants rate *yes*-answers as more

natural as responses to emotives than to doxastics.³⁶

Importantly, the results from Experiment 1 were not only compatible with our hypothesis, but also with an alternative hypothesis based on potential differences in the availability of local accommodation. However, the results from Experiment 2 are not in line with the predictions of such an alternative view: that view assumes that *p* is conventionally entailed both by doxastic and emotive factives, therefore *yes*-answers should be rated as low for emotive as for doxastic factive questions (under the assumption that *yes* commits the speaker to all the entailed content). On the other hand, our hypothesis naturally fits these results: participants were able to understand the affirmative reply as singling out the entailed content to the exclusion of the embedded proposition *p* to some extent for emotives. This led to an increase in acceptability of *yes*-continuations, in contrast to doxastics, which were visibly as low as the baseline controls in this regard. This is consistent with the idea that emotives do not, but doxastics do, conventionally entail *p*, given the assumption that it is in principle possible to selectively affirm the conventionally entailed content with a *yes*-response.

5.4.2.3 Discussion (Experiments 1 and 2)

We argued that the results from Experiments 1 and 2 supported our hypothesis, that doxastic and emotive factives differ in terms of whether *p* is entailed (in addition to being presupposed). While the first experiment did not support that notion directly, the results were consistent with this idea; however, they could also be explained by an alternative hypothesis that locates the difference entirely in terms of the interaction of negation (and more generally, *no*-answers) with the triggers. Experiment 2 sought to get a more direct comparison of the acceptability of *yes*-responses paired with a denial of the presupposition, and found a significant difference (and corresponding interactions) between the two types of factives. This showed that an explanation of the contrast has to extend beyond negation.

³⁶Cummins et al. (2013) report results for *regret*, which look similar to other triggers that we would see as candidates for entailing their presupposition. However, there is no direct point of comparison to other types of factives, and furthermore, their materials seem pragmatically skewed by using embedded clauses that the matrix subject is virtually guaranteed to be an informed authority on, such as *Did Fiona regret buying the house?*

We might note, in this context, that in a later experiment (available in Schwarz, Djärv, and Zehr 2018; not reported here), we replicated these findings in Italian. This, then, provides evidence that this contrast found here between doxastic and emotive factives is fundamentally tied to their respective lexical meanings, and not a simple lexical quirk of these items in English (in line with the findings of the cross-linguistic study in Section 3.2).

We interpreted these results in terms of a more general distinction between presupposition triggers, where some – like doxastics – entail their presupposition, whereas others – like emotives – do not. This shows us that the pragmatic accounts discussed in Section 5.2.0.2 cannot account for the presupposition behaviour of emotive factives. We also saw in the previous section that the predictions of these accounts, regarding the effects of prosodic focus, were not borne out for either type of factive. Before moving on, let us take stock of the theoretical and empirical landscape at this point.

5.5 Taking stock

Section 5.1 pointed to a key observation regarding the two types of factives, originally due to Karttunen (1971), that factive verbs tend to lose the inference that *p* is true in certain embedded environments. In particular, where the context is inconsistent with the speaker being committed to the truth of *p*. This includes first person conditionals and so-called *explicit ignorance contexts*, illustrated in (65). Going back to Heim (1983), presupposition ‘suspension’ in such contexts is typically accounted for by invoking a special operation, *local accommodation*, which allows the presupposition to take scope under the embedding operator (see Section 5.2.0.1).

- (65) a. If I discover later that [P_S the proposal offended them], I will apologize.
b. . . I haven’t tried this with wombats, though, & if anyone discovers that
[P_S the method is also wombat-proof], I’d really like to know!
c. I have no idea if Mary is cheating on John. But if he discovers that [P_S she is],
he will be sad.

Without the speaker's ignorance having been made clear by the context, or in a non-first person context, the sentences project a global inference that the speaker is committed to p:

- (66) [Context: at the office, about two co-workers who are dating:]

If John discovers that [P Mary is cheating on him], he will be sad. $\rightsquigarrow p$

As noted originally by Karttunen (1971), doxastic and emotive factives differ in this regard, as shown in (67). In recent work on presuppositions, this contrast has been subsumed under a more general split between 'soft' and 'hard' presupposition triggers (Abusch 2002, 2010) (Section 5.1).

- (67) Karttunen (1971, p. 64)

a. Soft trigger: doxastic factive *realize* $\rightsquigarrow p$

If I realize later that [P I haven't told the truth], I'll confess it to everyone.

b. Hard trigger: emotive factive *regret* $\rightsquigarrow p?$

If I regret later that [P I haven't told the truth], I'll confess it to everyone.

This distinction, then, aligns nicely with the findings from Section 3.2.6.1, showing that doxastic, but not emotive factives, allow for embedded assertions, in the sense that the embedded proposition p may be discourse new information. Emotive factives, on the other hand, require p to be Given (in the sense of Schwarzschild 1999). As illustrated in (68), doxastic factives pattern with speech act verbs and doxastic non-factives (traditionally considered to be 'assertive'), whereas emotive factives pattern with response stance verbs:

- (68) [Uttered out of the blue:] *Guess what* — (Caplan and Djärv 2019)

a. John {told me, thinks, discovered} that [P Bill and Anna broke up].

b. #John {appreciates, doubts} that [P Bill and Anna broke up].

The exact relationship between these two dimensions is not straightforward, however. To start, while the doxastic factives only lose the 'factive inference' in *embedded contexts* (23),

their ability to introduce discourse new content (68) is only present in *unembedded* sentences, as we saw in Chapter 3.

The experimental findings from the experimental and corpus studies of Chapter 3 showed that there is some syntactic reality behind this pragmatic intuition, in that doxastic factives, just like the speech act verbs and the doxastic non-factives, but unlike the emotive factives and the response verbs, allow for embedded V2 in Swedish and German (Section 3.2.6.3). We also saw, in Section 2.3.1, that these contexts also allow for *wh*-extraction from the embedded clause (in English). These findings support the popular idea (e.g. Speas and Tenny 2003, Tenny and Speas 2004, Rizzi 1997) that an extended C-domain is the syntactic realization of *assertion*. Importantly, this was not due to *selection*, contra Wiklund et al. (2009) and Kastner (2015), as shown by the large effect of matrix negation on both discourse novelty ratings and the acceptability of embedded V2. Nor did speaker or attitude holder commitment to p play any role in defining the contexts that allow embedded V2, contra Truckenbrodt (2006), Wiklund (2010), Julien (2015) and Woods (2016a).

This distinction between the two types of factives, was also observed, in Section 2.5.1, to be in line with a separate distinction, due to Simons (2007), whereby the doxastic factives (like *say*, *think* and *believe*), but generally not the emotive factives (nor the response verbs), allow their complement to provide the pragmatic Main Point of the Utterance.

- (69) Where did Louise go last week? (Adapted from Simons 2007, p. 1045)
- Henry {told me, thinks, discovered} that [_P she had an interview at Princeton].
 - #Henry {appreciates, doubts} that [_P she had an interview at Princeton].

As shown by experimental evidence from Djärv, Heycock, and Rohde (2017), however (Section 2.5.2), the restriction on emotive factives against embedding Main Point content is not a hard one, but can be overridden by appropriate pragmatic context, as shown by the felicity of the following Question-Answer pair:

- (70) Djärv, Heycock, and Rohde (2017)

- a. I hear that you went to Paris last summer. What was the city like?
- b. I was surprised that the city was really great.

Djärv et al. (2017) also found that, contrary to Jensen and Christensen (2013), having pragmatic Main Point or *at-issue* status, relative to the QUD, did not have any effect on the availability of embedded V2, thus showing us that this pragmatic notion is not what is relevant for licensing an extended C-domain.

Regarding factivity (and presuppositions in general), the status of p as Common Ground and the projective inference that the speaker is committed to p, are generally taken to be two sides of the same coin. As we saw in Section 5.2.0.2.1 (building on Simons 2007), however, these two dimensions come apart. In each (felicitous) case in (68)–(70) involving a factive verb, the speaker is understood to be committed to p. There is no sense, however, that p is CG. On an account whereby these two properties are inextricably linked, such as the classic lexical account (Section 5.2.0.1), this is unexpected.

However, this assumption has been adopted also by a number of pragmatic accounts, who argue that the Main Point or *at-issue* status of p is what determines whether p projects (Simons et al. 2010) or whether a presupposition that p gets triggered (Abrusán 2011b, 2016). As evidence, they cite the following kinds of examples:

- (71) A professor to a student: (Beaver 2010, p. 93)
- a. If the TA discovers that your work is [plagiarized]_F, I will be [forced to notify the Dean]_F. [Claim: $\rightsquigarrow p$]
 - b. If the TA [discovers]_F that your work is plagiarized, I will be [forced to notify the Dean]_F. [Claim: $\rightsquigarrow p$]
- (72) Simons et al. (2010, p. 318); originally from Kratzer (1989)
- a. Paula isn't registered in [Paris]_F
(\approx Paula is registered somewhere, not in Paris.)
 - b. [Paula]_F isn't registered in Paris

(\approx Someone is registered in Paris, not Paula.)

Regarding the claim about the triggering of the inference that the speaker is committed to p , we argued in Section 5.2.0.2, that this cannot be right. In the unembedded sentences in (69)–(70), as well as in (73-a), the embedded proposition is understood as being pragmatically *at-issue*. Regardless, the sentences retain their $p=1$ inference.

- (73) a. The TA discovered that your work is [plagiarized] $_F$.
b. The TA [discovered] $_F$ that your work is plagiarized.

Hence, we concluded that manipulating the QUD was indeed able to account for one dimension of factivity, as traditionally understood, namely whether or not p is understood to be Common Ground.

In Section 5.3, we asked whether manipulating the QUD would affect the projection of the $p=1$ inference, as predicted by Simons et al. (2010), as well as by the entailment-based accounts of Simons et al. (2017) and Tonhauser (2016). Our experimental results showed that, while participants used the prosodic manipulation as a guide to the QUD, prosodic focus had only a very small effect on their estimates of speaker commitment to p (relative to the effect of predicate type: factive vs. non-factive). The sentences with factive predicates all showed more-or-less ceiling-level projection scores. Moreover, unlike in the classic local accommodation cases, e.g. (67), there was no difference between the doxastic and the emotive factives. Surprisingly, we also observe that focus placement impacted projection judgements also for clauses embedded under *non-factive* predicates, in the *opposite direction* from factives. From these results, we conclude that, contrary to these pragmatic accounts, projection does not depend on the status of p relative to the QUD.³⁷

At this point, everything seems to point to a picture whereby the doxastic factives are

³⁷We return to the weak effect of focus in Section 5.7. Following Bacovcin and Djärv (2017), Djärv and Bacovcin (2018), we take the effect of focus, and the interaction with predicate type, to be an orthogonal effect to the $p=1$ inference triggered by factive verbs; Section 3.1.5 outlines a probabilistic model, from Djärv and Bacovcin (2018), to account for the effect focus, and the reverse effect found with the non-factives. Section 5.7.2 notes, however, that languages may differ with respect to the effect of focus.

‘less factive’ and ‘more assertive’ than the emotive factives – as reflected in their pragmatics, as well as their syntax. However, the empirical (and therefore theoretical) picture turns out to be slightly less straightforward than that.

As we mentioned above, without embedding, presuppositions are generally not suspensable in this way, as shown with the existence presupposition of the definite article in (74).

- (74) Abrusán (2016, p. 166)

- a. The King of France did not eat the cake: there is no King of France.
- b. #The King of France ate the cake, but there is no King of France.

It was therefore somewhat surprising to see that the ‘hard’ emotive factives, unlike the ‘soft’ doxastic factives, allow for suspension of the p=1 inference in *unembedded* contexts. This contrast was experimentally established by Djärv, Zehr, and Schwarz (2018), reported in Section 5.4 (see also Schwarz, Djärv, and Zehr 2018 for a replication of this experiment in Italian). (75)–(77) from Djärv, Zehr, and Schwarz (2018) illustrate their main finding:

- | | | |
|------|--|-------------------|
| (75) | a. Is Eve aware that [_P Ben is coming to the bar mitzvah]? | |
| | b. #Yes, although he isn’t. | Doxastic Factuals |
| (76) | a. Is Eve happy that [_P Ben is coming to the bar mitzvah]? | |
| | b. (#)Yes, although he isn’t. | Emotive Factuals |
| (77) | a. Does Eve think that [_P Ben is coming to the bar mitzvah]? | |
| | b. Yes, although he isn’t. | Non-factuals |

Based on the premise that answering *yes* to a question commits the speaker to all entailments of the question (but not other aspects of meaning³⁸), Djärv et al. (2018) argued that their results reflect a contrast in entailment (along the lines of Sudo’s (2012) distinction be-

³⁸ Consider for instance scalar implicatures:

- (78) a. Did some of the students pass the test? [*some* implies that *not all* students passed the test]
- b. Yes, in fact all of them did.

tween entailed and non-entailed presuppositions), such that only the doxastic, but not the emotive factives entail their presupposition that p . (As pointed out by Djärv et al. (2018), these results are problematic for the premise of pragmatic accounts, that p is part of the conventionally entailed content of factive predicates.)

While this might seem unintuitive, given that the doxastics are otherwise the ‘softer’ of the two, we show in Section 5.6.1 that these results are in fact two sides of the same coin. This discussion will also undermine the idea that doxastic factives entail their presupposition. Rather, as we will see shortly, the relevant contrast has to do with whether or not there is a lexically encoded presupposition of (the speaker’s) evidential modal base entailing p . We show that this is the case for doxastic, but not emotive factives. The critical evidence for this claim comes from an examination of the role of ‘non-commitment contexts’, and how it plays out with the two types of factives across embedding contexts. In Section 5.6.1, we spell out core of the current approach to (emotive and doxastic) factives, and extend this account to *fact that* nominals. In Section 5.6.2 we offer a solution to the issue of (i) the link between the semantics of emotive factives, (ii) the syntactic status of their clausal complements as DPs, and (iii) the pragmatic information-status of their complements as a specific type of Given information.

5.6 Analysis: doxastic and emotive factives

5.6.1 Evidence, belief, and justification

In the previous section, we claimed that the results of Djärv, Zehr, and Schwarz (2018) (that emotive, unlike doxastic factives, allow for cancellation of the $p=1$ inference in unembedded sentences) are in fact not indicative of a contrast in the entailment of p per se, but reflect a contrast in whether or not the speaker’s evidential support for p is a *lexically encoded* condition on the context —i.e. whether this is a presupposition (in the traditional sense).

Recall the examples in (75)–(76): as we saw in Section 5.4, the contrast in the acceptability of *yes*-answers observed between the doxastic and emotive was relatively small, though

significant (Section 5.4.2.2.5), and both much more degraded than responses to questions with non-factive verbs (77). Consider, however, the examples in (79). Here, contradicting the ‘presupposition’ is quite natural —and of course, no global inference that the speaker is committed to p arises.

- (79) a. John is happy that [P his parents are coming to visit him], though they actually had to cancel their trip because of the weather. (Poor John will be sad when he finds out!) $\not\rightarrow p$
- b. I'm really not sure what Mary's deluded reasons are for believing that her boss likes her, but she's sure happy that [P he does]. $\not\rightarrow p$
- c. Crazy John believes everything he reads! Now he read that the sun is going to be swallowed by an intergalactic T-Rex, and he's quite sad that [P the world is about to end]. But of course it's not! $\not\rightarrow p$

The feature shared by each of these examples, is that the speaker makes it clear that she does not endorse the attitude holder as a reliable source of p being true, or has evidence showing that the attitude holder is misinformed. This idea was in fact present also in Djärv et al.'s (2018) discussion of the contrast (though they argued for a theoretical distinction in terms of entailed presuppositions):

The basic intuition is that it is quite easy to imagine that one is *happy* about a certain state of affairs, but is simultaneously wrong about it. It is harder to see how one can *discover* something which is not true. (Djärv et al. 2018, p. 372).

Note also that, as shown by (80)–(81), it is not necessary for the speaker to explicitly contradict p in order for the inference that the speaker is committed to p to disappear:

- (80) Reliable Attitude Holder:

John, my boss, is extremely measured and rational. He's meticulous and always knows what's going on in the office—in particular in the accounting department... Now, I don't know anything about this myself, but *John's upset that our accounting offi-*

cer, Mary, has been embezzling and is threatening to take her to court. $\rightsquigarrow p$

- (81) Unreliable Attitude Holder:

John, my boss, is a paranoid hothead who tends to jump to conclusions and makes assumptions based on loose evidence and hearsay. Also, he really does not understand the details of accounting... Now, I don't know anything about this myself, but *John's upset that our accounting officer, Mary, has been embezzling* and is threatening to take her to court. $\rightsquigarrow p$

The same is true of emotive factives in embedded contexts:

- (82) a. John is not at all happy that [P his parents are coming to visit him]. However, that all doesn't really matter now, since apparently they ended up having to cancel their trip because of the weather. $\rightsquigarrow p$
- b. Crazy John believes everything he reads! Now he read that the sun is going to be swallowed by an intergalactic T-Rex, and he's not happy that [P the world is about to end]. But of course it's not! $\rightsquigarrow p$

These examples, then, clearly corroborate the experimental findings of Djärv et al. (2018), that it is possible for the speaker to not be committed to p , and still felicitously use emotive factives.

However, they also reveal another important fact: namely that the contexts that license the suspension of the inference that $p=1$ with (embedded or unembedded) emotive factives, closely mirrors the contexts in which p fails to project with embedded doxastic factives. That is, where the speaker does not know whether or not p holds (first person conditionals, explicit ignorance contexts), as we saw in (65), repeated here:

- (83) a. If I discover later that [PS the proposal offended them], I will apologize.
- b. ...I haven't tried this with wombats, though, & if anyone discovers that [PS the method is also wombat-proof], I'd really like to know!

- c. I have no idea if Mary is cheating on John. But if he discovers that [P_S she is], he will be sad.

Of course, as we have seen above, with unembedded doxastic factives, it is never possible for the speaker to contradict the presupposition, regardless of the context:

- (84) a. #John is aware that [P his parents are coming to visit him], though they actually had to cancel their trip because of the weather.
- b. #I'm really not sure what Mary's deluded reasons are for believing that her boss likes her but she's sure aware that [P he does].
- c. #Crazy John believes everything he reads! Now he read that the sun is going to be swallowed by an intergalactic T-Rex, and he's now aware that [P the world is about to end]. But of course it's not! $\not\rightarrow p$

On the classical, lexical view, whereby both kinds of factives presuppose p , and contexts inconsistent with p being Common Ground trigger local accommodation, the contrast illustrated in (85) is unexpected: why should doxastic and emotive factives differ in terms of the kinds of embedded contexts that allow suspension of the $p=1$ inference?

- (85) Karttunen (1971, p. 64)

- a. If I realize later that I haven't told the truth, I'll confess it to everyone. $\not\rightarrow p$
- b. If I regret later that I haven't told the truth, I'll confess it to everyone. $\not\rightarrow p?$

The examples in (79)–(82) and the results of Djärv et al. (2018), now allow us to answer both this, and some related questions.

First, however, recall from Section 5.2.0.1 that on the dynamic framework of Heim (1983), the presuppositions of a sentence must be Common Ground, in order for a context update to be defined. If factives uniformly presupposed p , then we'd indeed be hard pressed to account for the contrast in (85). However, the data from Simons (2007), Djärv, Zehr, and Schwarz (2018), Caplan and Djärv (2019) and Section 3.2 has already shown us that

factuals *do not* require p to be Common Ground (neither emotives, nor doxastics). The relevant examples are repeated in (86):

- (86) a. Guess what! John discovered that [_P Bill and Anna broke up].
b. Where did Louise go last week?
I heard that [_P she had a job interview at Princeton].
c. I hear that you went to Paris last summer. What was the city like?
I was surprised that [_P the city was really great].

So if factuals don't presuppose p, then *what do they presuppose?* And if they don't presuppose p, then where does the inference that the speaker takes p to be true come from? And what explains its variable occurrence and projection behaviour across the two types of factuals? Our proposal is that the answer to all of these questions lies in the parallel between the contexts that allow suspension of the speaker commitment inference with the (embedded and unembedded) emotives, and the contexts that trigger local accommodation with the doxastics. The key observations are summarized in (87).

- (87) a. Doxastic, but not emotive factuals, allow "suspension" of the inference that p is true in embedded, but not unembedded contexts, when the context entails that the speaker's beliefs are inconsistent with believing p.
b. Emotive, but not doxastic factuals, allow "suspension" of the inference that p is true in embedded *and* unembedded contexts, when the context entails that the speaker does not take the attitude holder to be justified in believing p.

To this, we might add another important observation, namely that emotive factuals presuppose that the attitude holder believes that p. For doxastic factuals, on the other hand, attitude holder commitment is part of the asserted or conventionally entailed content of the sentence. We saw evidence of this in the experimental study in Section 3.2.6.1 (Figures 3.22–3.23), where *attitude holder belief that p* received high ratings for the negated emotive factuals, but low scores for the negated doxastic factuals. The example in (88) also illustrates

this point: as a default, the attitude holder's belief that p projects from under embedded emotives, but not from under embedded doxastics.

- (88) a. Mary doesn't know that [P Bill moved to Canada].
 ~> Speaker believes p
 ~> Attitude holder believes p
- b. Mary doesn't appreciate that [P Bill moved to Canada].
 ~> Speaker believes p
 ~> Attitude holder believes p
 ~> Attitude holder appreciates p

What all of the facts speak to, then, broadly speaking, is that doxastic factives presuppose speaker holder commitment to p, and assert attitude holder commitment to p. Emotive factives, on the other hand, presuppose attitude holder commitment, and assert speaker commitment to p. It is not the case, then, that the apparent “resistance to local accommodation” of emotive factives is because of some quirk about how they interact with embedded operators, or because they are ‘hard triggers’. It’s just that the contexts that are inconsistent with the presupposition of doxastic factives —and therefore trigger local accommodation in embedded contexts—, are not the same as the kinds of contexts that are inconsistent with the presupposition of emotive factives. Hence, these contexts do not trigger local accommodation with emotive factives in embedded contexts.

The question, then, is why emotive factives generally give rise to the projecting inference that the speaker is committed to p. Do we perhaps want to treat that, too, as a presupposition of emotives, alongside the presupposition of attitude holder commitment? The answer is no. Suppose that we went down this route. If so, we’d have to explain why it is that in the case of the emotives, this inference is contextually defeasible in unembedded contexts, whereas with doxastics, it is not — and relatedly, why it is that speaker commitment to p appears to be a real domain condition of doxastics, whereas for emotives, this is not a requirement. So clearly, speaker commitment to p is not a presupposition of emotive factives.

Our preliminary analytical claims are summarized in Table 5.4:³⁹

Preliminary Analysis: Doxastic & Emotive Factives			
	Attitude	Commitment(p)(AH)	Commitment(p)(Speaker)
Doxastics	Asserted	Asserted	Presupposed
Emotives	Asserted	Presupposed	Pragmatic default inference

Table 5.4: Preliminary analysis of doxastic and emotives factives.

Nevertheless, in the default case, speaker commitment to *p* does project with both types of factives. We saw that in the experimental results in Section 3.2.6.1 (Figures 3.26–3.27), and this is clearly the general intuition. It is worth noting here, there seems to be a general tendency to assume that the speaker is committed to the embedded proposition, (more or less) regardless of the embedding predicate (we see this in the generally high speaker commitment scores assigned to the non-factives in the experiment reported in Section 3.2.6.1 (Figures 3.26–3.27). The central contrast, then, seems to be the fact that the emotives are much more degraded with the *yes, but not p* responses than the non-factives (Figure 5.10). This shows us that the emotives are not like non-factives either: they come with a very strong (though contextually defeasible) default assumption that the speaker endorses the attitude holder’s perspective, along the lines of: if the attitude holder is committed to *p*, then probably they are right about *p*.

But why should there be such a default assumption? Clearly, there is no such inference attached to beliefs in general. Recall also our discussion in Section 4.4. Here, we argued that verbs like *know* (a set which includes both the doxastic and the emotive factives) do not in fact encode belief as a necessary or core part of their meaning. Rather, we argued that these verbs are fundamentally “acquaintance”-based predicates. Just like the *know*-class encompasses a wide range of predicates, including both factive and non-factive verbs,⁴⁰

³⁹This table represents a preliminary meaning schema for the two types of factives, and not the final analysis. We use the label ‘Attitude’ very broadly, as a shorthand for the primary asserted meaning associated with different factives: for instance, *discover* asserts that there was some, external event, leading to the attitude holder coming to believe *p*; with *realize*, this event is internal. With *forget*, there was a time at which the attitude holder ceased to believe that *p*, etc. For the emotives, the Attitude is some emotional relation.

⁴⁰See Section 4.1 for a discussion of the relevant predicates.

the notion of acquaintance that we have in mind encompasses a wide range of relations from communicative relations like mentioning or reporting, to emotive relations like fearing, appreciating, or loving, to familiarity-based or cognitive relations like discovering, noticing, remembering, or assuming. Our theoretical proposal is that what the factive verbs among this class (as well as *fact that* nominals) have in common, is that they carry a presupposition of evidential support for *p*. This idea was present also in Kratzer's (2002) account of what it means for a subject (*S*) to know a fact, which we discussed in Chapter 4 ((89) is repeated from (102) above), though Kratzer argued that *de re* belief, too, is a necessary condition on knowledge:

(89) *S* knows *p* if and only if (Kratzer 2002, p. 664)

- a. There is a fact *f* that exemplifies *p*,
- b. *S* believes *p de re* of *f*, and
- c. *S* can rule out relevant possible alternatives of *f* that do not exemplify *p*.

Leaving the belief-component to the side, we will offer a ‘decompositional’ version of (89). First, to capture the contrast between emotive and doxastic factives, it will be useful to invoke a more general notion of a *Judge* (*J*), in place of Kratzer’s *S*. We propose that the judge can be bound by the attitude holder [AH], the speaker [SP], or might be contextually bound [X]. To formalize the condition that “*S* can rule out relevant possible alternatives of *f* that do not exemplify *p*” (89-c), we invoke the notion of an evidential modal base, which is anchored to the judge [$MB_{EVID}(J)$]. Our hypothesis is that what makes a verb factive is that the evidential modal base is part of its presupposed content (it specifically *has* to be part of the presupposed content, in order for it to (a) project in the default case, and (b) fail to project in the kinds of embedded contexts that will trigger local accommodation). To account for the data discussed above, we propose that in the case of the emotive factives, the judge is bound by the attitude holder, whereas with the doxastic factives, the judge is bound by the speaker. As we saw in Section 4.4.1, there is also good evidence for extending this analysis to *fact that* nominals. As shown in (90), the content nominal *the fact* does

not actually require speaker commitment to *p*, nor a factive predicate; there just has to be some, contextually available judge. As shown in Table 5.5, we implement this as an index (1) on the noun *fact*: this index may be bound by the attitude holder, or it may receive its value through the assignment function *g*.⁴¹

- (90) a. On the Satellite Hypothesis, this is explained by the fact that the object DP is not licensed.
- b. I don't believe the fact that teachers have extra eyes behind their heads.⁴²
- c. I don't agree with fact that it would be harder to live in Montreal than in Toronto.⁴³
- d. Nearly 37% of the Americans believe that the concept of the impact of climate change on health and global warming is a hoax, out of which 64% don't believe the fact that this is really going to change the way they live.⁴⁴
- e. George Osborne has said he doesn't regret the fact that his government did not plan for Brexit.⁴⁵

Table 5.5 summarizes the current proposal:⁴⁶

⁴¹We assume that the interpretation of free variables follows the Traces and Pronouns rule of Heim and Kratzer (1998).

⁴²From <https://www.facebook.com/>.

⁴³Overheard at dinner (Vancouver, Canada, July 1, 2019).

⁴⁴<https://www.tourmyindia.com/blog/shocking-facts-climate-change-global-warming/>.

⁴⁵<https://www.mirror.co.uk/news/politics/george-osborne-said-doesnt-regret-12197801>.

⁴⁶Note that an interesting issue arises here with regards to the analysis of *know*-verbs in Section 4.4.1 (thanks Florian Schwarz, p.c. for this comment):

- | | |
|--|-----------------------|
| (91) <i>know</i> vs. <i>believe</i> -verbs | [Schematic templates] |
|--|-----------------------|
- a. *know*-verbs : $\lambda x_e. \lambda s_l. \text{VERB}_{AQ}(s)(x)$
 - b. *believe*-verbs : $\lambda x_e. \lambda s_l. \text{VERB}_{DOX}(s)(\text{CONT}(x)(w_s))$

As we saw, this analysis, whereby *believe*-verbs describe fundamentally doxastic relations to content individuals (whose propositional content is extracted using the content-function of Kratzer 2006, Moulton 2009b), and *know*-verbs describe fundamentally acquaintance-based relations to any type of individual, gave us the asymmetries discussed in Section 4.1 regarding DP-to-CP entailments and Source-DPs. The key move was to propose a single lexical entry for both *know*-DP and *know*-CP (and other verbs that pattern like *know*; including both the emotive and doxastic factives).

The problem that arises at this point is that the analysis proposed here (Table 5.5) requires that *know* and other factive verbs encode an evidential presupposition that the modal base of the Judge entails *p*. But of course we do not want such an presupposition in the case of *I know John*, for instance.

An intriguing alternative, which we leave for future work on this topic to explore, is that the presence

Analysis: Presuppositions of factives		
Type of factive	Judge	Presupposition
Doxastic factives	Speaker [Sp]	$\text{MB}_{EVID}(\text{Sp}) \vDash p$
Emotive factives	Attitude Holder [AH]	$\text{MB}_{EVID}(\text{AH}) \vDash p$
<i>fact that</i> nominal	Contextually bound [X]	$\text{MB}_{EVID}(1) \vDash p$

Table 5.5: Presuppositions of different types of factives, including *fact that* nominals.

Allowing for the evidential modal base to be tied to different *Judges* allows us to account for the variable distribution of the ‘factive inference’ (i.e. that the *speaker* is committed to p) across embedding environments for different predicates. Given that doxastic factives presuppose that the evidential modal base of the speaker entails p , the inference that the speaker is committed to p can only be canceled in those embedded contexts that are inconsistent with this presupposition (i.e. the classic ‘local accommodation contexts’: explicit ignorance contexts, first person conditionals, etc.).

For the emotive factives, however, what is presupposed is that the evidential modal base of the attitude holder entails p . Hence, with sufficient cognitive distance from the attitude holder, it is possible for the speaker to endorse the attitude holder’s evidential support for p (yes, the attitude holder has evidence to support p), while distancing themselves from either the evidence itself (the attitude holder might be trusting unreliable sources, be misinformed, or hallucinating...), or from the conclusion that p (that what counts as evidence for the attitude holder need not qualify as evidence for the speaker). Given that no reference to the speaker is made at a lexical level, this kind of ‘endorsement-cancellation’ is possible in both embedded and unembedded environments. As we saw in (88), attitude holder commitment to p behaves like a presupposition of emotives. Importantly, the current analysis also predicts that attitude holder’s commitment to p should only be cancellable in *embedded* contexts that are inconsistent with this presupposition. This seems to be borne out:

or absence of this evidential presupposition is what marks the difference between the forms *kennen/känna* and *wissen/veta* in German and Swedish (discussed in Section 4.3.1). This possibility raises a number of interesting questions for the lexical semantics, and the interface between the semantics and the morphology.

- (92) Is Mary sad that [_P Bill is moving to Canada]?
- a. Well, Mary is off hiking in Siberia and hasn't been in touch with anyone for weeks, so she's probably neither happy nor sad that he's moving.
 - b. #Well, Mary is off hiking in Siberia and hasn't been in touch with anyone for weeks, so she's probably very upset that he's moving.

As apparent from (90), the same is true of the *fact that* nominals: with sufficient cognitive distance, it is possible for the speaker to distance themselves from the content of the embedded proposition.

Finally, by appealing to an *evidential*, rather than a doxastic modal base, we can explain the strong pragmatic default inference of speaker commitment to p, found with both the emotive factives and with *fact that* nominals: given that the speaker is committed to there being some evidence for p (even if this is not the speaker's own evidence), the speaker is also likely to endorse the conclusion that p. The doxastic modal base, on the other hand, provides a much weaker basis for endorsing the attitude holder's perspective; hence, we don't get this strong pragmatic default inference in the case of purely doxastic predicates.

In the following section, we turn to the other pragmatic dimension typically associated with factive verbs, but shown here to differ between the doxastic and emotive factives, namely the discourse status of p. In particular, we attempt to pin down the link between (a) the semantics of emotive factives, discussed in this and the previous chapter; (b) the syntactic status of their clausal complements as DPs, and (c) the pragmatic information-status of their complements as a specific type of Given information, both discussed in Chapters 2 and 3.

5.6.2 Definiteness, Givenness, and discourse novelty

Recall that in the tradition going back to Kiparsky and Kiparsky (1970), the syntactic status of the complements of emotive factives as DPs is a consequence of their factivity; the idea being that factive predicates select a clause with a potentially null DP corresponding to *the fact*, as illustrated in (93), repeated from (22) in Section 2.2

- (93) [vP v [DP D [NP FACT [CP that p]]]]

In a more recent implementation of this idea, Haegeman and Ürögdi (2010), Haegeman (2014), and Kastner (2015), among others, argued that the status of complements of emotive factives as DPs follow not from their status as factives, but from the discourse status of p as discourse old, or Given, information: a notion which is intended to capture the response stance predicates, along with the factives.⁴⁷

As we saw in Chapter 2 (in particular, §2.3), however, neither of these proposals are right. First, both the doxastic factives and the response stance verbs can take CP-complements. In fact, what the tests in this section showed us, was that among the approximately 20 verbs from the five predicate classes examined, the emotive factives were unique in that their clausal complements must be underlyingly DPs: all other verbs were found to take both CP and DP-complements.⁴⁸ Regarding the discourse status of p as Given, we saw in Section 3.2.6 that both the emotive factives and the response verbs —unlike the doxastic factives and the other non-factives— require p to be Given. Hence, it cannot be that DP-selection simply tracks the status of p as Given.⁴⁹

The question, then, is whether the syntactic selection of emotives for DP-complements is tied in some principled way to their semantic and/or pragmatic properties, or whether this is simply a syntactic quirk of these predicates. To answer this question, let us take stock of what properties we have seen so far, in terms of the semantic and pragmatic properties of the emotive factives, vis-à-vis the other predicate types examined here.

First, as we argued in Chapter 4, the emotive factives, like other verbs of the so-called *know*-class, describe acquaintance-relations to individuals, as shown in (94), repeated from Section 4.4.1.

⁴⁷Haegeman and Ürögdi (2010), Haegeman (2014) and Kastner (2015) use the terms ‘referential’ and ‘presuppositional’, respectively, but it’s clear from their discussions that they both have a similar notion of Givenness in mind.

⁴⁸With the exception of *suppose*, which apparently only allows CP-complements.

⁴⁹We did argue, however, that the status of p as discourse new vs. Given tracks the availability of an extended CP. However, this is in contrast with either smaller CP or a DP, not in contrast with a DP *per se*.

In the previous section, we then proposed that what distinguishes the factive verbs among this class is that they presuppose that there is an evidential modal base [$\text{MB}_{EVID}(J)$], anchored to a *Judge* (J), which entails p . For the doxastic factives, J is bound by the speaker, for the emotive, J is bound by the attitude holder, and in the case of *fact that* nominals, J is contextually bound (see Table 5.5 for a summary).

The second piece of the puzzle, comes from Chapter 3 (§3.3), where we discussed what, precisely, is meant when we say that the emotive factives and response stance verbs require p to be ‘discourse old’. As we’ve mentioned at various points in this dissertation (most explicitly discussed in §5.2.0.2.1), the relevant notion cannot be that p is Common Ground. Neither the response stance verbs nor the emotive factives impose such a requirement on the context. (This point is also illustrated by negated verbs like *think* and *say*, which pattern with the response verbs for this purpose.) Rather, the relevant pragmatic dimension, we argued, is Schwarzschild’s (1999) notion of *Givenness*, which implies that p has some antecedent in the discourse. Importantly, while the response predicates and the emotive factives both share this general property, they differ in whether this antecedent has to be linguistic or not, as shown in (95)–(96), repeated from Section 3.3:

- (95) [Context: Mary and Bill are lying on the beach on a beautiful sunny day. Not having previously discussed the weather, Mary says:]

- a. I’m so happy that it turned out to be such a nice day!
- b. #I {doubt, didn’t say} that it’s going to rain later.

- (96) [Context: Mary and Bill are on the subway. They overhear someone say: “I read that [P] Weinstein is going to prison].” Mary turns to Bill and says:]

- a. I doubt that $_P$ will ever happen.
- b. I’m happy he’s finally getting what he deserves. (implied by going to prison)

These examples showed us that the response predicates (along with negated verbs like *say*

and *think*) require an actual linguistic antecedent (such that p has either been proffered, or that the question of $?p$ has been raised). They then make an assertion about the attitude holder's stance towards p (accept or reject). For the emotives, what matters is that the source of the attitude holder's evidential support for p is contextually provided, though this need not necessarily be via a linguistic antecedent. It is this source of the attitude holder's evidence for p , we propose, that triggers the selection of a DP. In (95), the source is the situation of lying on the beach on a sunny day. In (96), it is the claim uttered by someone in the context. Note also that this is not the case for the doxastic factives: as we saw above, p can be introduced as entirely discourse new information, with no situation supporting p present in the context.

Recall the analysis offered in Section 4.4.1 for clausal complements of verbs:

$$(97) \quad [[CP_{V-cont}]]^w = \iota x_c. \text{CONT}(x_c)(w) = p$$

While the discussion in Chapter 4 emphasized the need to analyze clausal complements of verbs as individuals, we were intentionally vague about the role of the *iota*-operator. This question becomes important now, in light of the proposal that the obligatory DP-selection of emotive factives is linked to their requirement that the source of the attitude holder's belief is contextually provided. While a comprehensive discussion of the different varieties of definiteness found in natural language is well beyond the scope of the current discussion, a distinction which is relevant here is that between *uniqueness* and *anaphoricity* (see for instance Heim 1982, Schwarz 2009, 2013, and references therein). In the tradition of Frege (1892), Russell (1905) and Strawson (1950), we define the *iota*-operator as follows:

$$(98) \quad \iota x. f(x) \text{ is defined iff there exists a unique } x \text{ such that } f(x)$$

In the context of (97), what this ends up saying is simply that there has to be a unique individual x_c which has the intentional content p . This, we propose, is present with all clausal complements of attitude verbs.

The emotive factives, however, additionally impose a stronger form of definiteness,

namely a requirement that a situation or individual, providing the attitude holder's evidential basis for p , is familiar or has an anaphor in the context. While the uniqueness-requirement of the *iota*-operator in (97)/(98) doesn't provide this, natural language also makes available a definite article that encodes this kind of anaphoricity. Schwarz (2009) (building on Stalnaker 1978, Kamp 1981, Heim 1982, Roberts 2003, Neale 2004, and Elbourne 2005) distinguishes between the two types of definite articles in (99):

(99) Schwarz (2009, p. 182-183)

- a. Weak article: $\lambda s_r. \lambda P. \iota x. P(x)(s_r)$ $[_{DP} D [NP]]$
- b. Strong article: $\lambda s_r. \lambda P. \lambda y. \iota x. P(x)(s_r) \ \& \ x = y$ $[_{DP} 1 [D [NP]]]$

The strong article is essentially a semantically more complex version of the weak article (≈(98)), in that it in addition to the uniqueness requirement introduces an anaphoric index (1), which gets assigned a value by the assignment function g . (100) from Schwarz (2009) illustrates:

(100) Schwarz (2009, p. 181)

- a. $[[[the_{strong} s_r] book] 1]$
- b. $[(100-a)]^g = \iota x. book(x)(s_r) \ \& \ x = g(1)$

We propose, then, that it is this presupposition of the emotive factives, of an such a discourse antecedent, that triggers selection of the strong definite article, realized in an optionally null DP.⁵⁰ Evidence for the claim that the emotive factives—and non-factives—are semantically more complex than the doxastics, making particular reference to the source of the attitude holder's evidential basis for p , comes from pairs such as (101); no such

⁵⁰This of course raises the question of how the semantic composition works out. On the view of Moulton (2009b) (discussed in Section 4.3.2) where clauses are predicates (of type $\langle e, st \rangle$), the composition with the determiner would work out straightforwardly. On the current view, the answer is unfortunately less straightforward. We argued in Chapter 4 that if the CP is selected by a verb, it will be of type e , whereas if it is selected by a noun, it will be of type $\langle st \rangle$. To properly explore this issue, we should ideally look at languages with a richer system of overt clausal determiner. As this would presently take us too far afield, we leave this issue for future work.

alternations are available with the doxastic predicates.

- (101) a. The rumour that Bill is moving to Canada {surprised, angered, worries} me.
 b. I'm {surprised, angry, worried} that Bill is moving to Canada.
 c. I'm {surprised, angry, worried} about the rumour/fact that Bill is moving to Canada.

Our final complete of the two types of factives is summarized in Tables 5.6–5.7 (leaving to the side the issue of the doxastic component of these predicates):

Analysis: Doxastic factives	
Select for	Individuals of type e
Asserted content	(1) The attitude holder's acquaintance relation to x (discovery, realization, forgetting, remembering, noticing, hearing, etc.)
Presupposed content	The speaker's evidential modal base entails p

Table 5.6: Semantic analysis of doxastic factives, final version.

Analysis: Emotive factives	
Select for	Individuals of type e
Asserted content	The attitude holder's emotive relation to x (happiness, sadness, surprise, anger, etc.)
Presupposed content	(1) The attitude holder's evidential modal base entails p (2) The source of the attitude holder's evidential modal base has an antecedent in the discourse

Table 5.7: Semantic analysis of emotive factives, final version.

Fact that nominals, we argued, additionally carried a presupposition, similar to that of the factive verbs: $\text{MB}_{EVID}(J) \vDash p$. Unlike in the case of the verbal factives, however, the *Judge* is not intrinsically tied to either speaker or attitude holder, but is realized as an index on the noun, which might either be bound or receive its value through the assignment function.

To summarize, in this and the previous section, we spelled out a novel analysis of the

meaning of factive verbs in terms of (for doxastics) lexical or (for emotives) contextual entailments about evidential support for p . While this approach identified a common source for the triggering and (non-)projection/occurrence of the inference that the speaker endorses p , for the two types of factives, it was also able to capture a number of observed asymmetries regarding their apparent entailment properties, their interaction with operators and sensitivity to contextual effects. Importantly, this analysis does not tie factivity (i.e. speaker commitment to p) to the discourse status of p .

We also spelled out the link between the semantics, syntax, and pragmatics of emotive factives, vis-à-vis other predicate types. In previous work, the presence of a D-layer in the complements of emotive factives has been tied either to their status as factive, or to the status of their complements as Given information. In the previous two chapters, however, we saw that neither of those claims are correct. The account developed here, instead links the presence of this D-layer to the presupposition of the emotives that the situation (or content individual) which provides the attitude holder's evidential basis for p , must have an antecedent in the context.

Before concluding this chapter, and the dissertation, we return briefly to the issue of focus, and how it may interact with both factivity and the type of embedded clause in different languages.

5.7 Towards accounting for variation in prosodic effects

5.7.1 Focus and projection-like inferences⁵¹

In Section 5.3, we saw experimental data from Bacovcin and Djärv (2017), Djärv and Bacovcin (2018) showing that prosodic focus does not impact projection (or triggering) in the way predicted by the pragmatic accounts of Abrusán (2011b, 2016), Simons et al. (2010, 2017), and Tonhauser (2016) (building on observations by Beaver 2010). We did, however, observe a weak effect of focus on speaker commitment ratings, for both factive and

⁵¹The content in this section is adapted from joint work with Hezekiah Akiva Bacovcin (Djärv and Bacovcin 2018; Section 4.)

non-factive predicates. Importantly, however, the effect went in different ways for the factive and the non-factive predicates: for the factives, focus-placement in the embedded clause slightly weakened the inference that the speaker is committed to p, whereas for non-factives, focus in the embedded clause slightly strengthened this inference.

In Bacovcin and Djärv (2017), Djärv and Bacovcin (2018) (more explicitly in the latter paper), we proposed a novel account of how focus interacts with factive presupposition triggering/projection. On this account, the QUD-inferences generated by focus-placement in the embedded clause will either strengthen (for non-factives) or weaken (for factives) the inference that the speaker is committed to the embedded proposition, by giving the hearer cues as to the current state of the Common Ground. We argued that these independent inferences had to be combined with the inferences of the presupposed and asserted contents of the utterance, thus explaining the observed interaction between Focus Type and Predicate Type. In the case of focus on material in clauses embedded under *non-factive* predicates, the QUD inferences have the effect of supplementing the lack of a factive inference from non-factive predicates by giving rise to an existence inference: focus on the embedded subject generates a QUD that entails that for *some individual*, the embedded predicate holds in the Common Ground. Here, the existence inference generated by focus is stronger than any inferences from the non-factive predicate (i.e., no inference at all). Thus, prosody is expected to give rise to effects resembling a weak factive presupposition. In the case of focus on material in clauses embedded under *factive* predicates however, this type of QUD inference conflicts with the inference that the speaker is committed to p. Here, the existence inference generated by focus in the embedded clause is weaker than the truth inference generated by the factive predicate (that for a *specific* individual, the embedded predicate holds in the Common Ground). This conflicting QUD inference can then weaken the inference drawn from the lexically factive predicate. However, it does not eliminate the factive inference entirely.⁵²

⁵²Note that we also found that prosody had an effect on main clauses, e.g. *Anna left town* vs. *ANNA left town*. While this effect may appear surprising, given that the speaker is directly asserting the proposition in these cases, we interpreted the effect in the unembedded condition as being due to at least some participants interpreting focus on the subject as a question (an interpretation that was promoted by a tendency for the

To account for the data in embedded cases, we proposed that the standard lexical account of presupposition triggering and projection, as discussed in Section 5.2.0.1, should be adopted (and then supplemented with an independent account of the semantics/pragmatics of prosody). The lexical theory would account for the attested large difference found between non-factive and factive predicates (the former come with lexically encoded presuppositions, while the latter do not). Though we do not adopt this approach here, the current approach still predicts a large difference between factive and non-factive verbs, in terms of the inference that the speaker is committed to p , and should therefore be compatible with the approach of Bacovcin and Djärv (2017), Djärv and Bacovcin (2018).

The effect of prosody, we proposed, is completely independent from lexical factivity, thus giving rise to the weak effect of prosody *across* predicate types. In particular, we claimed that the final interpretation of an utterance is a synthesis of multiple inferences based on lexically encoded content, presupposition triggering and projection, and pragmatic reasoning about QUDs (as well as other inferences not discussed here, e.g., implicatures), which may conflict with one another.

From the pragmatic account, we adopted the assumption that focus reflects the presence of particular QUDs. Our proposal assumed that these QUDs themselves give rise to particular inferences about the current state of the Common Ground (hence similar to presuppositional inferences about the presence of a proposition in the Common Ground). Depending on the nature of these inferences, they can provide support for or against the probability that the embedded proposition is held to be true. Thus, we assumed that the certainty measure that we collected (i.e., to what extent participants assume that the speaker is committed to the truth of p) reflect the participants' estimation of the speaker's estimate of the probability that the embedded proposition is true. Such probabilities will be affected

recordings to include a slight rising intonation at the end of the utterances with Embedded Clause focus). This interpretation is corroborated by comments left by two participants at the end of the experiment. We therefore leave this to the side for the remainder of the discussion. (An anonymous reviewer of the paper also raised the concern that this final rise might have been a confound in the sentences involving factive attitude verbs. While this is possible, we noted that such an effect should in fact result in even *lower* certainty ratings than would follow from the effect of focus alone; thus making the estimated effect of focus a generous one—and hence not a problem for the current account.)

by the total sets of inferences and assertions generated by the speaker’s utterance. This conjecture (that prosodic differences can give rise to differential preferences for particular QUDs) was supported by the results of a second experiment reported in Djärv and Bacovcin (2018); not included here for reasons of space.

Our proposal assumed that three different types of inferences that can arise from any of our utterances: (1) the asserted content of the utterance, which for the embedded conditions *never* entail p (the assertions are only about the attitude holder’s relation to p); (2) the projected presuppositional content of the utterance, which only make claims about the status of the current Common Ground; and (3) the inferences from the QUD, which also only make claims about the current Common Ground. Table 5.8 shows the inferences for the four relevant embedded conditions. These three types of inferences need to be reconciled in order for the final meaning of the utterance to be determined. Given that these inferences can be contradictory (see the bolded elements from Table 5.8), there must be a mechanism for resolving the contradictions in determining the ultimate meaning of the utterance.⁵³

Our model assumed (following the current literature on the effects of focus) that focus on the matrix predicate naturally gives rise to the QUD “What doxastic (or emotive) relationship does John have with the proposition Anna left town?”. We assume that Embedded Clause focus can give rise to at least three possible QUDs: “Who left town?”, “Who did John discover that they left town?” and “Who might John discover that they left town?”. Of these three possible QUDs, only one has implications that are relevant for the Common Ground status of the proposition “Anna left town”, namely “Who left town?”. This question implies that it is Common Ground that someone has left town (while the questions that include John’s doxastic states have no direct implications about town leavers in the actual world). Crucial for our analysis of the effect of focus is only that the question “Who left town?”

⁵³Note that this would only be a contradiction if we assumed that “Anna left town” is assumed to mean “Only Anna left town”. While the exclusivity of statements is a natural pragmatic consequence of the Maxim of Quantity, we assumed a non-exhaustive interpretation, and show that while it does not directly contradict the presupposition, its inference of uncertainty with respect to the Common Ground is still in tension with the inference from the presupposition. If an exhaustive interpretation was adopted, the effects of focus would be slightly larger (since the QUD would rule out both the possibility that no one left town and that more than one person left town). Crucially, however, the direction of the effect would be the same.

Predicate	Focus	Assertion	Presupposition	QUD Inference
Factive	EC	It is possible that John discovered that Anna left town	It is CG that Anna left town	It is CG that someone left town, but not CG who that person is.
Factive	MC	It is possible that John discovered that Anna left town	It is CG that Anna left town	It is CG that John has some relationship with the proposition Anna left town.
Non-factive	EC	It is possible that John believed that Anna left town	N/A	It is CG that someone left town, but not CG who that person is.
Non-factive	MC	It is possible that John believed that Anna left town	N/A	It is CG that John has some relationship with the proposition Anna left town.

Table 5.8: Complete set of inferences in each condition; CG=Common Ground (bolded inferences in a row are contradictory. MC=Main Clause; EC=Embedded Clause.)

be *more accessible* in Embedded Clause focus conditions than in the Main Clause focus condition (a hypothesis that is explicitly tested, and supported, in a second experiment: see Djärv and Bacovcin 2018, Sec. 5).⁵⁴

To capture gradient responses in certainty, we adopted the formal device of modeling current conversational states as probability distributions over possible worlds rather than sets of possible worlds, e.g., that there is a probability of 0.1 that the real world is W_a , rather than that W_a is a member of the set of candidates for the real word. This move to probability distributions over worlds is similar to the move take by Rational Speech Act models; e.g., Goodman and Frank 2016 and citations therein. Given that this is a probabilistic model, the laws of probability must be observed, in particular that the probability over all possible worlds must sum to 1. The goal of conversation under such a model is to concentrate the probability distribution (i.e., move the probability of any given world close to either 1 or 0

⁵⁴It is worth noting that the QUD “Who left town?” does not even need to be the current QUD, it merely needs to be assumed to be on the QUD stack (i.e., it is possible that some participants reconstruct “Who did John discover that they left town?” as the current QUD, but that this is a sub-topic of the broader QUD of “Who left town?”). As long as the question is present on the QUD stack, it has implications for the structure of the Common Ground.

	W_a	W_{ab}	W_b	W_n
Baseline (B)	0.25	0.25	0.25	0.25
Presupposition (P): Anna left town	0.5	0.5	0	0
QUD (Q): Who left town?	0.33	0.33	0.33	0

Table 5.9: Various inferences and their formal representation as probability distributions over possible worlds.

and away from $1/\#\text{ of possible worlds}$).

For the purpose of exposition, we used a simple model of the set of possible worlds relevant for the discussion at hand. For ease of discussion, we assume that the relevant proposition is “Anna left town” and that there are only two possible candidates for town leavers: Anna and Bob. This creates four possible worlds: W_a in which Anna left town, W_b in which Bob left town, W_{ab} in which both Anna and Bob left town, and W_n in which no one left town. Table 5.9 shows the baseline probability over the worlds and the meaning of the two main inferences (the presupposition and the QUD "Who left town?"). Crucially, the question “Who left town?” rules out the world in which no one left town (since the question gives rise to the inference that someone left town). The presupposition “Anna left town” puts all of the probability mass on the worlds in which Anna in fact left town. For simplicity we assume that the probability mass is equally distributed over the remaining worlds in each case.

Given that neither the presupposition nor the QUD are actually asserted in any of the embedded utterances means that the reconstructed model of the Common Ground is only being indirectly inferred by the eavesdropper (or participant in the conversation). Thus, the baseline model (B from Table 5.9) in which all worlds are possible is always a live possibility. The eavesdropper must then combine this default baseline with any other inferences derived from the utterance to reconstruct a plausible model of the Common Ground. For mathematical ease, we assume that the assigned probability in the reconstructed model is the average of the probabilities contributed to that world by each of the inferences at play.

We assumed that the certainty scores given in Experiment 1 are a reflection of the prob-

	P(A)	W_a	W_{ab}	W_b	W_n
MC, NonFact (B)	0.5	0.25 (1/4)	0.25 (1/4)	0.25 (1/4)	0.25 (1/4)
EC, NonFact (B+Q)	0.58	0.29 (7/24)	0.29 (7/24)	0.29 (7/24)	0.13 (3/24)
MC, Fact (B+P)	0.76	0.38 (3/8)	0.38 (3/8)	0.13 (1/8)	0.13 (1/8)
EC, Fact (B+P+Q)	0.72	0.36 (13/36)	0.36 (13/36)	0.19 (7/36)	0.08 (3/36)

Table 5.10: Probability over worlds for each condition via averaging of inferences; probability estimated to two decimal points (exact fraction in parentheses); Probability of Anna leaving town is the sum of W_a and W_{ab} . MC=Main Clause; EC=Embedded Clause).

ability given in the first column of Table 5.10 (for P(A) the probability that Anna left town with or without Bob).⁵⁵ Namely, for Non-Factive verbs, the existence of the QUD inference in the Embedded Clause Focus condition causes a small rise in the estimated certainty that Anna left town with respect to the Main Clause Focus condition, since the probability that no one left town (W_n) has decreased relative to the baseline. For Factive verbs, Embedded Clause Focus decreases the probability (and thus the certainty rating) that Anna left town relative to the presupposition, since it increases the probability that only Bob left town. Notice also that this explains why the factive conditions show slightly lower certainty than the unembedded condition. That is, the baseline is still on the table in the factive condition, since the proposition “Anna left town” is only being inferred about the Common Ground instead of explicitly asserted, as in the unembedded case (where presumably the P(A) that Anna left town is 1 after the assertion).

Before concluding this section, it is worth noticing that previous lexical and pragmatic accounts, in their current form, are not able to capture this observation that focus has an effect on both factive and non-factive predicates (in opposite directions) without invoking additional theoretical machinery. The effect on non-factive predicates is not predicted by either the pragmatic or standard lexical theories. The pragmatic accounts argue that focus causes presuppositions (and their certainty judgements) to be lost, not gained. The lexical

⁵⁵The true linking hypothesis between this model and actual experimental results are likely to be more complex. In particular, it is unlikely that each type of inference is actually given equal weight in determining overall meaning. Nevertheless, the *pattern* of probability distributions mirrors the pattern of certainty ratings seen in the experiment.

accounts are silent on the consequences of prosodic effects altogether. On the current model, this effect falls out as a welcome consequence of the theory itself.

Of course, this model shares certain assumptions of the proposals in Abrusán (2011b, 2016), Simons et al. (2010, 2017), and Tonhauser (2016), as they all predict that prosodically mediated focus gives rise to QUD-inferences which may weaken the inference from the factive verb that p is true. However, the present approach differs crucially from these authors on two points. First, in terms of the type of effect that focus has; we showed in our second experiment that focus in the embedded clause merely makes available a QUD that weakens the factive inference (Djärv and Bacovcin 2018, Sec. 5). Secondly, in terms of the size of the focus-based effect on the speaker-commitment inference; we show that this is an order of magnitude smaller than the effect of the type of predicate (factive vs. non-factive) (Section 5.3). Because our proposal separates QUD inferences from lexically triggered inferences, focus does not uniquely determine a QUD that prevents the triggering or projection of the $p=1$ inference, but merely makes available a ‘non-factive’ inference, alongside other components of meaning, thus leading to the small effect of prosody.

The current experiment was carried out in English, as a way of testing the predictions of pragmatic approaches to factivity for sentences embedded under operators like modals and negation. As mentioned in Section 5.2.0.2, none of the accounts examined here claims that prosodic focus (or other manipulations of the QUD) should eliminate the inference that the speaker is committed to p in *unembedded* sentences (at least not for doxastic factives; the account proposed here argue that certain contexts may have this effect for emotive factives; importantly though, these are not manipulations of the Main Point or *at-issue* content of the utterance). Interesting questions arise however, when we look at data from other languages. The last section of this chapter provides a brief survey of some recent cross-linguistic findings.

5.7.2 Focus and factivity cross-linguistically

Looking at factivity in Turkish, Özyıldız (2016, 2017a,b) presents data suggesting that when unembedded factive predicates take a nominalized complement clause, the inference that p

is true varies with prosody, similarly to what was observed (albeit as a very weak effect) for English (the translations are from Özyildiz 2017a).

(102) Turkish (Özyildiz 2017a, p. 6)

- a. Tunç [Hillary'nin kazan-dıg-i-nı] [biliyor]_F.
Tunç Hillary-GEN win-NMZ-3S-ACC knows
'Tunç knows that Hillary won.' ↗ p
- b. Tunç [Hillary'nin [kazan-dıg-i-nı]_F] biliyor.
Tunç Hillary-GEN win-NMZ-3S-ACC knows
'Tunc believes that Hillary won.' ↗ p

The empirical picture from Turkish turns out to be fairly complex. As Özyildiz demonstrates, the availability of the $p=1$ inference depends on an interaction of focus placement and the type of embedded clause. If a factive verb takes a nominalized complement (the default, or unmarked option), the $p=1$ inference depends on focus-placement. If *know* takes a finite clause, headed by the discourse particle *diye*,⁵⁶ no inference that p is true arises, regardless of focus – showing us that focus does not *add* presuppositions. (See also Moulton 2009b, Bogal-Allbritten and Moulton 2016, Hanink and Bochnak 2016, Bondarenko 2019, among others.)

(103) Turkish (Özyildiz 2017b, p. 3)

- a. Tunç [Hillary'nin kazan-dıg-i-nı] biliyor.
Tunç Hillary-GEN win-NMZ-3S-ACC knows
'Tunç knows that Hillary won.' ↗ p
- b. Tunç [Hillary kazan-di **diye**] biliyor.
Tunç Hillary win-PST.3S DIYE knows
'Tunç believes that Hillary won.' ↗ p

Preliminary judgement data from Cypriot Greek also reveals an effect of focus similar to that in English and Turkish.⁵⁷ Here, it is possible to have a definite article (*to*) on top

⁵⁶ Grammaticalized from the verb *say*. See Berrebi and Bassel (2017) on complementizers grammaticalized from *say*-verbs cross-linguistically.

⁵⁷ Thanks to Christos Christopoulos for these judgements.

of the embedded clause, as well as a resumptive pronoun (*to*) preceding the matrix clause. In the regular case, with neither a definite article nor a resumptive pronoun, we observe that, again, the inference that $p=1$ varies with focus in the same direction as in English and Turkish, as shown in (104). However, both the definite and the resumptive pronoun force focus placement to be on the matrix verb, thus blocking the non-factive reading, as shown in (105)–(107).

(104) Cypriot Greek

- a. O John kseri [oti [epies]_F kriti]. Parolo pu en
the John know.3SG [that went.PFV.PST.2SG Crete]. Even.though that NEG
epies.
went.2SG.
‘John knows that you went to Crete. Even though you didn’t go.’
- b. #O John [kseri]_F [oti epies kriti]. Parolo pu en
the John know.3SG [that went.PFV.PST.2SG Crete]. Even.though that NEG
epies.
went.2SG.
‘John knows that you went to Crete. Even though you didn’t go.’

- (105) a. *O John kseri [to oti [epies]_F kriti]. (Parolo pu
the John knows [DEF.NEUT.NOM that went.2SG Crete]. Even.though that
en epies.)
NEG went.2SG.

‘John knows that you went to Crete. Even though you didn’t go.’

- b. #O John [kseri]_F [to oti epies kriti]. Parolo pu
the John knows [DEF.NEUT.NOM that went.2SG Crete]. Even.though that
en epies.
NEG went.2SG.

‘John knows that you went to Crete. Even though you didn’t go.’

- (106) a. *O John kseri to [oti [epies]_F kriti]. (Parolo pu en
the John knows it.NEUT.ACC [that went.2SG Crete]. Even.though that NEG
epies.)
went.2SG.

‘John knows that you went to Crete. Even though you didn’t go.’

- b. O John [kseri]_F to [oti epies kriti]. #Parolo pu
the John knows it.NEUT.ACC [that went.2SG Crete]. Even.though that

en epies.

NEG went.2SG.

‘John knows that you went to Crete. Even though you didn’t go.’

- (107) a. *O John kseri to [to oti [epies]_F kriti]. (Parolo pu en the John knows it [DEF that went.2SG Crete]. Even.though that NEG epies.)
went.2SG.

‘John knows that you went to Crete. Even though you didn’t go.’

- b. O John [kseri]_F to [to oti epies kriti]. #Parolo pu en the John knows it [DEF that went.2SG Crete]. Even.though that NEG epies.
went.2SG.

‘John knows that you went to Crete. Even though you didn’t go.’

The observation then appears to be that in Cypriot Greek, the inference of speaker commitment to *p* varies with focus in the same direction as in English and Turkish. Here, however, the interaction with clausal definiteness goes in the opposite direction from Turkish: only in *non-nominalized* clauses, is there an interaction with focus. Another surprising contrast is that—unlike what has been reported for English, Greek and Turkish both appear to show this contrast in *unembedded* sentences. While this observation is highly unexpected on previous theoretical accounts of focus, it appears to be in line with the model from Djärv and Bacovcin (2018), discussed in the previous section, given that it does not relate the focus effects in any way to the presence or absence of operators.

A natural question arising in the context of the experimental results from English, reported in Section 5.3, is to what extent the magnitude of the effect observed for Turkish is different from the magnitude of the effect observed in English. To address this question, comparative experimental data would be useful, given the empirical claim, examined in Section 5.3, that focus categorically eliminates the *speaker commitment to p* inference also in English. Regardless of the magnitude of the effect of focus, however, the interaction with the type of embedded clause is intriguing, and calls for further investigation. In particular, to address this issue, further investigation of variation in both the lexical meaning of factive

predicates and in clausal nominalizations across languages, is needed.⁵⁸

Before concluding this chapter, a final open issue ought to be flagged: as we saw in Figure 5.8 in Section 5.3, the *adjectival* non-factives (*be hopeful*, *be worried*, *be concerned*) fell somewhere in between the verbal non-factives and the factives, both in terms of their overall *speaker commitment* scores, and in terms of the direction of the effect of prosody. Here, we have focus on verbs; we leave the question of adjectival factive and non-factive predicates for future investigation.

5.8 Summary

By the end of Chapter 3, we had seen a lot of data calling into question two received views in the semantics literature: (i) the idea that factive predicates require p to be Common Ground, and (ii) the analysis of *know* as the factive version of *believe*. Investigating in some detail the syntax and pragmatics of embedded assertions, we found that a more fine-grained notion of Givenness vs. discourse novelty —distinct from and independent of factivity— is what matters for the projection of an extended C-domain. Previous work has tied the presence of a D-layer in the complements of emotive factives either to their status as factive, or to the status of their complements as Given information. In the previous two chapters, however, we saw that neither Givenness, nor factivity, determines the status of the embedded clause as a DP. We were thus left with the questions of (a) what it means for an embedded clause to be factive, and how (if at all) this relates to the notions of assertion and Givenness, and (b) what (if anything) about the semantics or pragmatics of the emotive factives accounts for the observation that they select DPs.

In this chapter, we looked at previous lexical and pragmatic accounts of factivity. In Sections 5.3 and 5.4, we saw new experimental results from two studies undermining two of the key empirical underpinnings of pragmatic approach to factivity: we find that neither does the presence of the *speaker commitment* inference depend on the Main Point or *at-issue*

⁵⁸It is interesting, for instance, in light of the Greek and Turkish data, that the experiment in Section 5.3 found no difference between doxastic and emotive factives.

status of p with respect to the Question Under Discussion, nor do emotive factives treat the embedded proposition as conventionally entailed content.

Section 5.6.1 examined in more detail the kinds of (non-)embedded contexts that allow for the suspension of the speaker commitment to p inference with emotive and doxastic factives. Based on the observations in this section, we spelled out a novel analysis of the meaning of factive verbs in terms of evidential support for p (building on work by Kratzer 2002). In particular, we argued that what factive predicates have in common, is a presupposition that the *evidential* modal base of a *Judge* entails p ($\text{MB}_{EVID}(J) \vDash p$): for doxastic factives, this is the speaker; for emotives, it is the attitude holder. We also looked briefly at *fact* nominals, suggesting that they encode the *Judge* as an index on the noun, which may either be bound or receive its value via the assignment function. While this approach identified a common source for the triggering and (non-)projection (or with the emotives, the non-occurrence) of the inference that the speaker endorses p , for the two types of factives, it was also able to capture a number of observed asymmetries regarding their apparent entailment properties, their interaction with operators and sensitivity to contextual effects.

In Section 5.6.2, we returned to the link between the syntax, semantics, and pragmatics, of the different predicates investigated here, focusing on the contrast between the doxastic and the emotive factives. Rather than pointing to factivity, or Givenness *per se*, the account developed here links the presence of this D-layer under the emotive factives to their presupposition that the situation or individual providing the attitude holder's evidential basis for p , must have an antecedent in the context.

A point worth making regarding the current proposal, is that the doxastic factives have been noted to being able to *function* as evidentials (e.g. Simons 2007, Abrusán 2011b, 2016); an observation which has been linked to their ability to embed *at-issue* content, or introduce discourse new information. On the analysis presented here, this is because they are in fact evidentials. The emotive factives are evidentials too, but not 'speaker-evidentials' like the doxastic factives; rather, they are 'attitude holder-evidentials'. Moreover, the emotive factives, unlike many of the doxastic factives, make assertions that are generally not relevant

to the status of p. This, then, goes a long way towards accounting for the contrast in terms of introducing (*non-*)*at issue* content, though, as we saw in Section 2.5), this is not a hard and fast restriction: in contexts where the attitude plays a relevant role with respect to the QUD, emotive factives may function as evidentials too.

Finally, Section 5.7 presented a probabilistic model, from Bacovcin and Djärv (2017), Djärv and Bacovcin (2018), aiming to capture the weak QUD-based effects observed in Section 5.3. This section also looked at some apparent cross-linguistic variation in the effects of focus, regarding the presence or absence of embedding operators, the type of embedded clause (nominalized vs. non-nominalized), as well as the type of nominalization, pointing to interesting questions and directions for future research. This section also pointed to recent work on so-called *factivity alternations*, i.e. verbs whose factivity depends on the type of embedded clause. A core insight emerging from this chapter is that factivity is less of a uniform phenomenon than has previously been proposed, both in terms of the semantic and pragmatic properties associated with factive verbs, and in the realization of these properties in emotive vs. doxastic factives. The decompositional analysis developed here was able to capture this variability. An interesting question for future work, then, is whether this perspective is able to capture also the kind of variation observed with these factivity alternations across different languages.

Chapter 6

Conclusions

6.1 Main findings of the dissertation

A central question of this dissertation was how and to what extent the lexical semantics of attitude predicates constrain the interpretation of their complements as asserted or presupposed. To answer this question satisfactorily, however, we needed a theory of the semantics of attitude verbs and clausal complementation, a theory of assertion, a theory of factivity, and a theory of the syntax-meaning interface — and we needed it all to add up.

A starting point for the journey that lead to this dissertation, was the realization that the different theoretical and empirical pieces that were needed to solve the puzzle, did in fact often not add up. For instance, we found that the notion of *factivity* had been stretched too thin: Semantically and pragmatically, it was intended to encompass simultaneously the (*non-*)*at issue* status of the embedded proposition *p*, the inference that the speaker is committed to *p*, and the tendency of this inference to survive in embedded contexts. In terms of the broader theoretical picture, factive verbs are typically analysed as a classic instance of a *presupposition trigger*, where presuppositions are viewed as the flip-side of *assertions*. Meanwhile, in work on the syntax-pragmatics interface, factivity has been invoked as a way of accounting for a wide variety of complementation patterns, including the availability of *wh*-extraction, V-to-C movement, topicalization, speech act adverbs, and different types of clausal anaphora.

As we saw in Chapter 3, however, factive verbs are not uniformly ‘non-assertive’, neither in terms of the syntax nor the pragmatics of their complements. In fact, this tension was

present right from the start, in Karttunen 1971 and Hooper and Thompson 1973. Recognizing this tension, a lot of work on the syntax-pragmatics interface has tried to appeal to different notions of assertion, such as speaker (or attitude holder) commitment to p, or the status of p as the Main Point or *at-issue* content with respect to the QUD; thus trying to circumvent the issue of factivity altogether.

As I hope to have shown, the key to the puzzle lay in the factive predicates themselves. Looking at the different types of context sensitivity displayed by the emotive and doxastic factives respectively (Chapter 5), we found that factivity is in fact less a uniform notion than is generally assumed. Dissociating the (projection-prone) inference of speaker commitment to p, from the discourse status of p as new vs. Given content, enabled us to give a semantically explanatory theory that does not present a conflict for the pragmatics, and which moreover, nicely captures the distribution of DP-complements with emotive factives vis-à-vis other attitude predicates.

By approaching factivity, presupposition, and assertion from the point of view of the interfaces of the syntax, semantics, and pragmatics, we have shown that we can maintain the view that some aspects of assertion and presupposition are lexically and syntactically encoded: in Chapter 3, we saw that V2 and *wh*-extraction are licensed by assertion; where assertion is the flip-side of Givenness (in the sense of Schwarzschild 1999). Other purported Main Clause Phenomena, on the other hand, we found not to be sensitive to this dimension. In the case of presupposition, we tied the obligatory presence of a D-layer in the complement of emotive factives to their presupposition that a situation or individual providing the attitude holder's evidential basis for p, must have an antecedent in the context (Chapters 2 and 5). Givenness itself, however, does not imply the presence of a D-layer: response stance verbs (including negated verbs like *say*, *believe*, and *discover*) do not select for DPs (Chapter 2). Yet, there is a sense in which they require p to be Given (Chapter 3). However, the notion of Givenness is different in this case. Similarly to Schwarz's (2009) 'strong' definite article, the response stance verbs, unlike the emotive factives, require that p itself has an linguistic antecedent in the discourse (Chapter 5). It seems, then, that 'clausal definiteness' is not

about questions or propositions in the Common Ground, but about particular situations or individuals being contextually accessible.

This observation, that the grammar isn't sensitive to questions, is mirrored in two of the empirical findings reported in this dissertation. In Chapter 2, we saw experimental results from Djärv, Heycock, and Rohde (2017), showing that being *at-issue* or the pragmatic Main Point with respect to the Question Under Discussion, is not relevant to the licensing of embedded V2; though it does matter for the interpretation of a complex utterance. In Chapter 5, we presented experimental results from Bacovcin and Djärv (2017), Djärv and Bacovcin (2018) showing that the inference that the speaker is committed to p does not depend on the status of p with respect to the QUD. However, manipulating the QUD does alter the status of p as backgrounded or not: by separating the discourse status of p from the speaker commitment inference, we can nicely capture this asymmetry.

In Chapter 4, we examined the interpretation of DP and CP-complements of attitude verbs and content nouns. We observed that the availability of what we referred to as a Source-DP, in addition to the clausal complement (1), tracks whether or not a sentence with a DP-complement will entail the corresponding CP-case (2):

- (1) a. I believe John that it's going to rain.
 b. *I know John that it's going to rain.

- (2) a. John believes the rumour that Mary left. \models John believes that Mary left.
 b. John knows the rumour that Mary left. \neq John knows that Mary left.

These and related data lead us to propose a basic distinction between *know*-verbs, which describe (broadly speaking) acquaintance-relations to individuals (a set which includes both factives like *discover*, *hear*, and *appreciate*, and non-factives like *fear*, *mention*, and *expect*), and *believe*-verbs, which describe epistemic or doxastic relations to propositional content (we identified *believe*, *trust*, and *doubt* as predicates of this type). We also argued that while content nouns select propositions (mediated by a nominal C-head of type $\langle st, st \rangle$) (3), attitude verbs that are able to combine with both clauses and DPs select for individuals

(mediated by a verbal C-head of type $\langle st, e \rangle$) (4).

(3) Clausal complements of nouns

- a. $[[C_N^o]] = \lambda p_{\langle st \rangle} \cdot p$
- b. $[[CP_N^o]] = \lambda w. \text{John moved to Canada}(w)$

(4) Clausal complements of verbs

- a. $[[C_{V-cont}^o]]^w = \lambda p_{st}. \iota x_c. \text{CONT}_w(x_c)(w) = p$
- b. $[[CP_{V-cont}^o]]^w = \iota x_c. \text{CONT}(x_c)(w) = p$

We offered the schematic analysis of the two types of verbs given in (5):

- | | |
|--|-----------------------|
| (5) <i>know</i> and <i>believe</i> -verbs | [Schematic templates] |
| a. <i>know</i> -verbs : $\lambda x_e. \lambda s_l. \text{VERB}_{AQ}(s)(x)$ | |
| b. <i>believe</i> -verbs : $\lambda x_e. \lambda s_l. \text{VERB}_{DOX}(s)(\text{CONT}(x)(w_s))$ | |

In Chapter 5, we expanded on our analysis of the factive members of the *know*-class, arguing that the source of the (generally projective) inference of speaker commitment to p comes from a presupposition of certain *know*-verbs, of an evidential modal base which entails p . To account for a number of observed asymmetries in the types of linguistic and pragmatic contexts that allow for cancellation or suspension of the speaker commitment inference across factive predicates, we argued that this evidential modal base is always anchored to a *Judge*, which, depending on the type of factive predicate, is bound by different individuals. In the case of the doxastic factives, the judge is bound by the speaker, whereas in the case of the emotive factives, the judge is bound by the attitude holder. This accounts for the observation that doxastic factives only allow suspension of the speaker commitment inference in *embedded* contexts that are inconsistent with the speaker having evidence for p (e.g. explicit ignorance contexts and first person conditionals); consistent with the view that such contexts trigger local accommodation of the relevant presuppositions (Heim 1982, 1983). Emotive factives, on the other hand, allow suspension or cancellation of the speaker

commitment inference also in unembedded contexts, provided that there is sufficient ‘cognitive distance’ between the evidential base of the speaker and the attitude holder (in line with the experimental findings of Djärv et al. 2018, reported in Section 5.4).

The analysis of the two types of factives proposed in this dissertation (Chapter 5) is repeated in Tables 6.1 and 6.2:

<i>Analysis: Doxastic factives</i>	
Select for	Individuals of type e
Asserted content	(1) The attitude holder’s acquaintance relation to x (discovery, realization, forgetting, remembering, noticing, hearing, etc.)
Presupposed content	The speaker’s evidential modal base entails p

Table 6.1: Semantic analysis of doxastic factives, final version.

<i>Analysis: Emotive factives</i>	
Select for	Individuals of type e
Asserted content	The attitude holder’s emotive relation to x (happiness, sadness, surprise, anger, etc.)
Presupposed content	(1) The attitude holder’s evidential modal base entails p (2) The source of the attitude holder’s evidential modal base has an antecedent in the discourse

Table 6.2: Semantic analysis of emotive factives, final version.

We further extended our analysis of factivity to *fact that* nominals, arguing that these carry the same presupposition, though unlike in the case of the verbal factives, the judge is not intrinsically tied to either speaker or attitude holder, but realized as an index on the noun, which might either be bound or receive its value through the assignment function. Thus, *fact that* nominals, like the emotive factives, allow the speaker to distance themselves from the content of the embedded proposition in unembedded contexts, given sufficient cognitive distance. While this account identifies a common source for the triggering and (non-)projection or occurrence of the speaker commitment inference for the different types of factives, it is also able to capture a number of observed asymmetries regarding their apparent

entailment properties, their interaction with operators and sensitivity to contextual effects. Importantly, it also does not tie the speaker commitment inference to the discourse status of p , thus allowing us to capture the ability of doxastic to embed asserted content.

Finally, a point I hope to have demonstrated, is that phenomena emerging at the interface of structure, meaning, and context are best understood through an integrated empirical approach, which considers carefully each component individually, as well as their interaction. Here, we have brought together and connected three separate strands of research on propositional attitude reports, investigating the relevant empirical phenomena from a combination of cross-linguistic experimental work, statistical analysis of large-scale corpus data, and careful consideration of fine-grained semantic and syntactic judgements.

6.2 Directions for future work

With this dissertation, I hope to have contributed to the larger enterprise of theoretical research into attitude reports and clausal embedding, as well as research about the nature of selection and the relationship between the syntax, the semantics, and the pragmatics. Here, I point to some of the many outstanding questions and promising directions for future research.

In Chapter 5, we touched on the issue of ‘factivity alternations’ found in certain languages; where the interpretation of attitude verb varies depending on the type of clausal complement. A key insight of this dissertation is that factivity is less of a uniform phenomenon than has previously been proposed, an observation which the decompositional analysis developed here was able to capture. An interesting question for future research, is whether this perspective is able to capture also the kind of variation observed with these factivity alternations across different languages. In this context, we also observed some potentially interesting variation in terms of the effects of focus, regarding the presence or absence of embedding operators, the type of embedded clause (nominalized vs. non-nominalized), as well as the type of nominalization (definite article vs. morphological nominalization). To probe these interactions further, comparative experimental work would be helpful.

Relatedly, a promising direction for future research would be to explore in greater detail the derivational relationship between different predicates involving the same root (e.g. the attitude verb *claim* and the content noun *claim*, as discussed in Chapter 4). Similar issues arose in the context of the (optional) doxastic component of *know*, and the unavailability of the Source-DP with this class of verbs. The identification of the ‘null DP-source’ with the emotive factives in Chapter 5 offers a starting point for investigating this issue. The perspective offered by Distributed Morphology, combined with careful semantic analysis, seems to offer an intriguing possibility for exploring selection and semantic composition down to the level of the root.

Here, we focused on the clausal complements of verbs. As we saw in Chapters 2 and 5, however, intriguing variations in projection and complementation patterns arose in the context of verbal and adjectival factive and non-factive predicates (see for instance footnote 30 in Section 2.3.3 on contrasts in DP-licensing, and the results from Section 5.3.2 on varying projection rates across predicate types). Differences between different kinds of predicates remain to be further investigated. Similarly, the present discussion focused on finite *that*-clauses. Chapter 4 also raised the question of how the current proposal for *know that...* relates to *know whether....* We have also touched briefly on the *wager*-pattern found with non-finite clauses (Pesetsky 1991, *et seq*), and its relation to the issues discussed here. Indeed, many questions remain to be addressed regarding the extent to which the perspective offered here relates and can be extended to different types of predicates and complementation patterns.

Appendix A

Appendix

A.1 Regressions from Section 3.2.6.1

A.1.1 Speaker belief

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	1.059e-01	9.567e-02	1.107	0.274474
VerbClass = Dox.NonFact	-6.611e-01	1.353e-01	-4.887	1.41e-05 ***
VerbClass = Response.Pos	5.926e-01	1.657e-01	3.577	0.000862 ***
VerbClass = Response.Neg	-1.121e+00	1.657e-01	-6.768	2.52e-08 ***
VerbClass = Emo.Fact	6.960e-01	1.353e-01	5.144	6.00e-06 ***
VerbClass = Dox.Fact	2.466e-01	1.353e-01	1.823	0.075180 .
Polarity = Neg	-7.252e-01	6.640e-02	-10.922	< 2e-16 ***
VerbClass = Dox.NonFact : Polarity = Neg	2.469e-01	9.391e-02	2.630	0.008606 **
VerbClass = Response.Pos : Polarity = Neg	-7.101e-03	1.150e-01	-0.062	0.950773
VerbClass = Response.Neg : Polarity = Neg	1.644e+00	1.150e-01	14.292	< 2e-16 ***
VerbClass = Emo.Fact : Polarity = Neg	6.293e-01	9.391e-02	6.702	2.59e-11 ***
VerbClass = Emo.Fact : Polarity = Neg	4.485e-01	9.391e-02	4.776	1.90e-06 ***

Table A.1: English MAXNEWNESS data. Output of regression model: predicting speaker commitment to p from the embedding predicate and polarity of the matrix clause. 2400 observations, from 60 subjects and 40 items.

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	0.13504	0.07334	1.841	0.069846 .
VerbClass = Dox.NonFact	-0.28724	0.10371	-2.770	0.007198 **
VerbClass = Response.Pos	0.23507	0.12702	1.851	0.068490 .
VerbClass = Response.Neg	-0.54279	0.12702	-4.273	6.03e-05 ***
VerbClass = Emo.Fact	0.65138	0.10371	6.281	2.58e-08 ***
VerbClass = Dox.Fact	0.33663	0.10371	3.246	0.001806 **
VerbClass = Control.unembedded	0.78591	0.09927	7.917	8.32e-11 ***
VerbClass = Control.believes.wrongly	-1.43397	0.09927	-14.445	< 2e-16 ***
Polarity = Neg	-0.22142	0.06005	-3.687	0.000231 ***
VerbClass = Dox.NF : Polarity = Neg	0.11903	0.08493	1.402	0.161155
VerbClass = Response.Pos : Polarity = Neg	-0.02520	0.10401	-0.242	0.808615
VerbClass = Response.Neg : Polarity = Neg	0.82018	0.10401	7.885	4.29e-15 ***
VerbClass = Emo.Fact : Polarity = Neg	0.23020	0.08493	2.711	0.006753 **
Class = Dox.Fact : Polarity = Neg	0.24177	0.08493	2.847	0.004445 **

Table A.2: English MAXCONTRAST data. Output of regression model: predicting speaker commitment to p from the embedding predicate and polarity of the matrix clause. 3192 observations, from 57 subjects and 56 items.

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	-0.08495	0.06947	-1.223	0.223863
VerbClass = Dox.NonFact	-0.15468	0.09824	-1.575	0.118124
VerbClass = Response.Pos	0.57426	0.12032	4.773	5.42e-06 ***
VerbClass = Response.Neg	0.02576	0.12032	0.214	0.830861
VerbClass = Emo.Fact	0.64959	0.09824	6.612	1.27e-09 ***
VerbClass = Dox.Fact	0.36913	0.09824	3.757	0.000272 ***
VerbClass = Control.unembedded	1.05895	0.08913	11.881	< 2e-16 ***
VerbClass = Control.believes.wrongly	-0.98780	0.08913	-11.083	< 2e-16 ***
Polarity = Neg	-0.14958	0.08263	-1.810	0.070391 .
VerbClass = Dox.NF : Polarity = Neg	-0.15374	0.11686	-1.316	0.188424
VerbClass = Response.Pos : Polarity = Neg	0.08401	0.14313	0.587	0.557302
VerbClass = Response.Neg : Polarity = Neg	0.46963	0.14313	3.281	0.001048 **
VerbClass = Emo.Fact : Polarity = Neg	0.09746	0.11686	0.834	0.404395
Class = Dox.Fact : Polarity = Neg	0.18814	0.11686	1.610	0.107538

Table A.3: German data. Output of regression model: predicting speaker commitment to p from the embedding predicate and polarity of the matrix clause. 2576 observations, from 46 subjects and 56 items.

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	1.05517	0.09657	10.926	< 2e-16 ***
VerbClass = Dox.NonFact	-0.89211	0.13657	-6.532	2.08e-09 ***
VerbClass = Response.Pos	-1.57720	0.16726	-9.429	7.92e-16 ***
VerbClass = Response.Neg	-1.64715	0.16726	-9.848	< 2e-16 ***
VerbClass = Emo.Fact	-1.09188	0.13657	-7.995	1.40e-12 ***
VerbClass = Dox.Fact	-0.23251	0.13657	-1.703	0.0915 .
EmbConditionNew (unembedded)	0.25849	0.12408	2.083	0.0406 *
EmbConditionOld (like you)	-1.90503	0.12408	-15.353	< 2e-16 ***
Polarity = Neg	-1.68320	0.11412	-14.750	< 2e-16 ***
VerbClass = Dox.NonFact : Polarity = Neg	1.08182	0.16138	6.703	3.72e-11 ***
VerbClass = Response.Pos: Polarity = Neg	1.85280	0.19765	9.374	< 2e-16 ***
VerbClass = Response.Neg: Polarity = Neg	1.53198	0.19765	7.751	2.61e-14 ***
VerbClass = Emo.Fact: Polarity = Neg	1.50170	0.16138	9.305	< 2e-16 ***
VerbClass = Dox.Fact: Polarity = Neg	0.27643	0.16138	1.713	0.0871 .

Table A.4: Swedish data. Output of regression model: predicting speaker commitment to p from the embedding predicate and polarity of the matrix clause. 1288 observations, from 23 subjects and 56 items.

A.1.2 Discourse novelty

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	1.01136	0.05031	20.103	< 2e-16 ***
VerbClass = Dox.NonFact	-0.62042	0.07115	-8.720	2.23e-14 ***
VerbClass = Response.Pos	-1.45007	0.08714	-16.641	< 2e-16 ***
VerbClass = Response.Neg	-1.56712	0.08714	-17.984	< 2e-16 ***
VerbClass = Emo.Fact	-1.30070	0.07115	-18.281	< 2e-16 ***
VerbClass = Dox.Fact	-0.23831	0.07115	-3.349	0.00109 **
VerbClass = Control.unembedded	0.38107	0.06432	5.924	7.84e-08 ***
VerbClass = Control.like.you	-1.97904	0.06432	-30.767	< 2e-16 ***
Polarity = Neg	-1.51244	0.06082	-24.869	< 2e-16 ***
VerbClass = Dox.NF : Polarity = Neg	0.81195	0.08601	9.441	< 2e-16 ***
VerbClass = Response.Pos : Polarity = Neg	1.39197	0.10534	13.215	< 2e-16 ***
VerbClass = Response.Neg : Polarity = Neg	1.50719	0.10534	14.308	< 2e-16 ***
VerbClass = Emo.Fact : Polarity = Neg	1.39518	0.08601	16.222	< 2e-16 ***
Class = Dox.Fact : Polarity = Neg	0.16663	0.08601	1.937	0.05278

Table A.5: English MAXNEWNESS data. Output of regression model: predicting discourse novelty of p from the embedding predicate and polarity of the matrix clause. 3080 observations, from 55 subjects and 56 items.

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	0.80150	0.07470	10.730	< 2e-16 ***
VerbClass = Dox.NonFact	-0.60821	0.10564	-5.757	1.24e-07 ***
VerbClass = Response.Pos	-1.05211	0.12938	-8.132	2.56e-12 ***
VerbClass = Response.Neg	-1.11643	0.12938	-8.629	2.46e-13 ***
VerbClass = Emo.Fact	-1.00787	0.10564	-9.541	3.30e-15 ***
VerbClass = Dox.Fact	-0.41439	0.10564	-3.923	0.000174 ***
VerbClass = Control.unembedded	0.17343	0.09852	1.760	0.082954 .
VerbClass = Control.like.you	-1.80063	0.09852	-18.277	< 2e-16 ***
Polarity = Neg	-0.70834	0.07624	-9.290	< 2e-16 ***
VerbClass = Dox.NF : Polarity = Neg	0.34512	0.10783	3.201	0.001385 **
VerbClass = Response.Pos : Polarity = Neg	0.77025	0.13206	5.833	6.03e-09 ***
VerbClass = Response.Neg : Polarity = Neg	0.71146	0.13206	5.387	7.70e-08 ***
VerbClass = Emo.Fact : Polarity = Neg	0.73765	0.10783	6.841	9.47e-12 ***
Class = Dox.Fact : Polarity = Neg	-0.08238	0.10783	-0.764	0.444913

Table A.6: English MAXCONTRAST data. Output of regression model: predicting discourse novelty of p from the embedding predicate and polarity of the matrix clause. 3080 observations, from 55 subjects and 56 items.

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	1.03555	0.07834	13.218	< 2e-16 ***
VerbClass = Dox.NonFact	-0.93754	0.11079	-8.462	6.13e-13 ***
VerbClass = Response.Pos	-1.53063	0.13569	-11.280	< 2e-16 ***
VerbClass = Response.Neg	-1.59373	0.13569	-11.745	< 2e-16 ***
VerbClass = Emo.Fact	-1.00820	0.11079	-9.100	3.09e-14 ***
VerbClass = Dox.Fact	-0.25137	0.11079	-2.269	0.0258 *
VerbClass = Control.unembedded	0.13558	0.10353	1.310	0.1949
VerbClass = Control.like.you	-1.94811	0.10353	-18.818	< 2e-16 ***
Polarity = Neg	-1.49252	0.07892	-18.911	< 2e-16 ***
VerbClass = Dox.NF : Polarity = Neg	1.08663	0.11161	9.736	< 2e-16 ***
VerbClass = Response.Pos : Polarity = Neg	1.56006	0.13670	11.413	< 2e-16 ***
VerbClass = Response.Neg : Polarity = Neg	1.45883	0.13670	10.672	< 2e-16 ***
VerbClass = Emo.Fact : Polarity = Neg	1.33680	0.11161	11.977	< 2e-16 ***
Class = Dox.Fact : Polarity = Neg	0.14378	0.11161	1.288	0.1978

Table A.7: German data. Output of regression model: predicting discourse novelty of p from the embedding predicate and polarity of the matrix clause. 2240 observations, from 40 subjects and 56 items.

Coefficient	Estimate	Std. Error	t-Statistic	Pr(> t)
VerbClass = SpeechAct (Intercept)	1.05517	0.09657	10.926	< 2e-16 ***
VerbClass = Dox.NonFact	-0.89211	0.13657	-6.532	2.08e-09 ***
VerbClass = Response.Pos	-1.57720	0.16726	-9.429	7.92e-16 ***
VerbClass = Response.Neg	-1.64715	0.16726	-9.848	< 2e-16 ***
VerbClass = Emo.Fact	-1.09188	0.13657	-7.995	1.40e-12 ***
VerbClass = Dox.Fact	-0.23251	0.13657	-1.703	0.0915 .
EmbConditionNew (unembedded)	0.25849	0.12408	2.083	0.0406 *
EmbConditionOld (like you)	-1.90503	0.12408	-15.353	< 2e-16 ***
Polarityneg	-1.68320	0.11412	-14.750	< 2e-16 ***
VerbClass = Dox.NonFact : Polarity = Neg	1.08182	0.16138	6.703	3.72e-11 ***
VerbClass = Response.Pos: Polarity = Neg	1.85280	0.19765	9.374	< 2e-16 ***
VerbClass = Response.Neg: Polarity = Neg	1.53198	0.19765	7.751	2.61e-14 ***
VerbClass = Emo.Fact: Polarity = Neg	1.50170	0.16138	9.305	< 2e-16 ***
VerbClass = Dox.Fact: Polarity = Neg	0.27643	0.16138	1.713	0.0871 .

Table A.8: Swedish data. Output of regression model: predicting discourse novelty of p from the embedding predicate and polarity of the matrix clause. 896 observations, from 16 subjects and 56 items.

A.2 The *wager*-class

This appendix offers some further insights to the issue of the licensing and interpretation of content nominals discussed in Section 4.1. According to Elliott (2016), the crucial difference between attitude verbs is that between (transitive) verbs that assign a theta-role (e.g. *believe*) and (intransitive) verbs that do not (e.g. *say*). He gives (1) to support this move:

- (1) Elliott (2016, p. 4)
- a. Jeff believes [_{DP} the {rumour, story, claim} that Britta will be late].
 - b. *Jeff {thinks, said} [_{DP} the {rumour, story, claim} that Britta will be late].

This claim is also present in Moulton (2009a) and Anand and Hacquard (2014), who tie this to a contrast between doxastic and speech act predicates, such that the former, but not the latter is able to license content nominals (see also Moltmann 2003).

- (2) Anand and Hacquard (2014, p. 79)
- a. John {believed, considered, judged, imagined} the rumor.
 - b. *John {admitted, affirmed, declared, said} the rumor.
- (3) Moulton (2009a, ex. (5))
- a. *Fred said the rumor that Horner is impotent.
 - b. *We never thought the idea that vitamin supplements in pregnancy lead to healthy babies.
 - c. *I didn't wager the claim that the argument has nothing to do with probability.
 - d. *He alleged the rumour that Homer was happy.
 - e. *Fred claimed the story that Steph was dating Phil.
 - f. *?He yelled his belief that Jesus will return again.

They further claim that the assertives are identical to Pesetsky's (1991) *wager*-class: a set of verbs which do not permit ECM/raising-to-object or a full DP, but can license an A/A-bar trace (or a weak pronoun) in the subject position of the infinitive:

- (4) Rezac (2013, p. 313)
- We alleged them/*THEM/*the propositions to be inconsistent.
- (5) Runner and Moulton (2017, p. 13)
- a. *He alleged Melvin to be a pimp.
 - b. Melvin, he alleged to be a pimp. Top
 - c. Who did they allege to be a pimp? WH
 - d. They alleged to be pimps – all of the Parisians who the CIA had hired in Nice. HNPS
 - e. Melvin was alleged to be a pimp. Pass
- a. John {assumed, believed, considered, imagined, judged, supposed} Mary to be the murderer.

- b. *John {admitted, affirmed, announced, asserted, claimed, observed, said, wagered} Mary to be the murderer.
- (6) The *wager*-class, based on Anand and Hacquard (2014, p. 79)
admit, affirm, announce, mumble, mutter, scream, wager, whisper, shout, sight, yell; assert, avow, claim, conjecture, declare, decree, disclose, grant, guarantee, intimate, maintain, note, observe, posit, recollect, say, state, stipulate, verify

However, looking at a wider range of verbs, it appears as though the *wager*-pattern extends to a much wider range of predicates, including several doxastic verbs, as shown in (7)–(8):

- (7) a. ??I {said, mentioned, claimed} him to be a good guy. Speech Act
 b. %/?I {assumed, suppose, guessed, reckoned} him to be a good guy. Doxastic Non-factive
 c. ??I {accepted, admitted, doubted} him to be a good guy. Response Stance
 d. ??/*I {noticed, discovered, heard} him to be a cheater. Doxastic Factive
- (8) a. He has often been {said, mentioned, claimed} to be a good person.
 b. He has often been {believed, assumed, supposed, guessed, reckoned} to be a good person.
 c. He has often been {accepted/admitted/doubted} to be a good person.
 d. He has often been {discovered, noticed, heard} to be a good person.

The odd ones out, among the verbs investigated here, are *know* and *believe* (9), which are grammatical in both the active and the passive, and the emotive factives (10), which are ungrammatical in both cases:

- (9) a. I {believe, know} him to be a good guy. Active
 b. He is {believed, known} to be a good guy. Passive
- (10) a. */??I {appreciated, resented, loved, hated} him to always do such crazy things.
 b. *He has often been {appreciated, resented, loved, hated} to have the craziest

ideas.

Moreover, we find variation among speakers as to whether the speech act verbs allow content nominals:

- (11) Canadian English (attested)

In the following paragraph, he argues the claim that all plainer graphs are K5-free.

For these authors, this points to a contrast in the discourse function of doxastic predicates like *believe* and ‘assertive’ predicates like *say* and *argue*. The claim is that *doxastic* attitude predicates are fundamentally reports of private mental states, whereas *assertive* attitude predicates report discourse moves of adding propositions to a projected common ground. Anand and Hacquard (2014) take this to be reflected in the argument structure of these predicates, and, further, tie this explicitly to factivity: they argue that no assertive predicate is factive.

We leave the interesting issue of the *wager*-class, and possible semantic correlates of case and DP-licensing for future research.

A.3 Conditional Inference Trees clustering analysis

Figure A.1 shows the clustering from of Conditional Inference Trees clustering analysis (from Bacovcin and Djärv 2017, Djärv and Bacovcin 2018; Section 5.3.2.5).

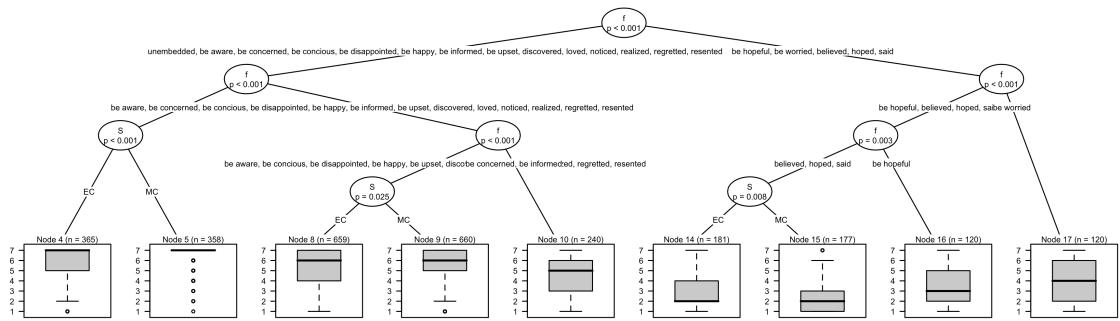


Figure A.1: Significant clusters from Conditional Inference Tree analysis Bacovcin and Djärv (2017), Djärv and Bacovcin (2018).

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