The Best Question:  
Explaining the Projection Behavior of Factives  

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Abstract  
In this paper, we offer an account of the projection behavior of the complements of factive (and in some cases, non-factive) verbs within a QUD framework. We first motivate the approach by demonstrating that projection of factive complements is affected by focus marking – a conventional indicator of the QUD – and by explicit questions. We then propose and motivate two hypotheses: the first, that projection occurs when the best candidate for the QUD – what we call the Best Question – is one whose alternatives all entail the truth of the complement proposition; the second, that projection also occurs when the best explanation for the introduction of a particular contextual question requires attribution to the speaker of commitment to the truth of that proposition. In developing these ideas, we introduce a crucial distinction between two types of discourse question: the Congruent Question, which is determined primarily by surface features of the utterance; and the Question Under Discussion, which reflects the intentions and discourse goals of the interlocutors.  

1. Introduction  
This paper is about the phenomenon of projection: cases in which content of an embedded clause which is not entailed by a given sentence is nonetheless understood as a commitment of a person who utters that sentence in conversation. We will illustrate the phenomenon below. The focus of this paper will be projection of the contents of complement clauses of a set of attitude verbs, including know, discover and realize, verbs standardly characterized as factive.¹ We will also briefly discuss projection of the content of complements of purportedly non-factive verbs including believe and think.  

¹ The class of factive verbs is usually distinguished in terms of presuppositionality: an attitude verb is said to be factive if its complement is conventionally presupposed. As we deny that the complements of these verbs are conventionally presupposed, we cannot adopt that definition, and it is unclear that any other set of characteristics picks out all and only the verbs standardly characterized as factive. For current purposes we use the term as a convenient shorthand.
The main thesis of the paper is that projection of the complement of an attitude verb is determined by very general processes of making sense of an utterance in its discourse context. Fundamentally, projection occurs when the best way to make sense of the attitude claim is to make the assumption that the speaker believes (or commits to) the truth of the content of the complement. The main goal of the paper will be to demonstrate the role played by the construction and resolution of questions in an ongoing discourse. One central contribution will be to distinguish clearly between two different notions of conversational question: an utterance relative notion, closely tied to formal properties of an uttered sentence or clause, which we will call the Congruent Question (CQ) for the utterance; and a discourse-segment relative notion, which we will call simply the Question Under Discussion (QUD). As we will show, projection is sometimes a consequence of the structure of the CQ itself, and sometimes arises from the process of building relations of relevance between the CQ and the QUD.

The approach we develop here stands in contrast to the standard view, according to which the projectivity of a verbal complement is determined by the lexical content of the verb itself. On this view some verbs “mark” their complements as presupposed; presupposed content projects (by mechanisms we will not review here). Other verbs do not mark their complements as presupposed, and their complement does not project. On this account, the appearance of projection in utterances whose main verbs are not conventional triggers of projection must be given an alternate account, perhaps along the lines we will suggest as a general account. So, one advantage of the approach we propose here is that it allows for a unified treatment of the interpretation of attitude sentences.

We do not deny, however, that there are important lexical features which play a role. Particular verbs may have associated conventions of use which themselves can be explained in pragmatic terms, on the basis of the lexical content of the verbs. We will turn to this issue at the end of the paper.

We begin (Section 2) with a brief introduction to the phenomenon of projection. In section 3, we review the standard approach to the projection of the complements of factive verbs, and present three observations which motivate an alternative approach informed by the QUD model. Some aspects of this model are presented in section 4 and used in an account of some of the phenomena. Section 5 extends the presentation of the model, and shows how the additional features presented are used to explain additional cases. We conclude in section 6.

2. Projection

Projection is easier to illustrate than to define, so we begin with some examples:

(1) [Speaker has just run into me when I am out with a child, obviously my daughter]
    
    I didn’t know that you have a daughter.

(2) [To my daughter who has not yet got out of bed]
    
    Are you aware that you have school today?

(3) [To my husband, as we are wondering why our daughter is out of bed early on a Saturday]
    
    Perhaps she’s forgotten that her ballet class is canceled this week.
Each of the example sentences can be analyzed as an atomic sentence which either falls under the scope of an entailment canceling operator or which has undergone an entailment canceling transformation. The first sentence is the negation of I knew that you have a daughter; the second is the question form of You are aware that you have school today; and the third embeds the sentence She's forgotten that her ballet class is canceled this week under the modal adverb perhaps.

These embedded sentences all entail the content of their complement clauses. Once the sentences are modified as in (1)-(3), they no longer have these entailments. In the case of (2), this is obvious: questions do not have entailments. We can show this with (1) and (3) by showing that the sentences can be uttered in conjunction with another sentence which is inconsistent with the truth of the complement clause, as in:

(4) I didn't know that you have a daughter because you don't, in fact, have a daughter.

(5) Perhaps she's forgotten that her ballet class is canceled this week, but perhaps ballet class actually isn't canceled this week.2

But let’s now return to the utterances illustrated in (1) - (3). Despite the fact that the uttered sentences do not entail the truth of their complement clauses, the speaker in each case would be understood to be committed to the truth of that content. The speaker of (1) is acknowledging that the addressee has a daughter; the speaker of (2) is clearly reminding the addressee that she has school today; and the speaker of (3) is most naturally understood as assuming that the ballet lesson is canceled, and speculating that her daughter has forgotten that. So, in (1) - (3), although the content of the complement clause is not entailed by the example sentence itself, utterance of that sentence in the scenario given commits the speaker to the truth of that content. In each of these cases, then, we have an utterance U of a sentence S' which embeds an atomic sentence S, where S entails some content c. S' does not entail c, but U commits the speaker to the truth of c. In this situation, we say that c projects.3

2 The second conjunct, in this case, is not a denial of the truth of the complement of the first. However, if utterance of the first conjunct committed the speaker to it being the case that the ballet class is canceled, then it would be inconsistent to go on to assert the possibility that it isn't.

3 The definition of projection is surprisingly controversial. The description given here should not be taken as a definition, but as a description of the cases of projection under consideration in this paper. NOTE TO SELF: under this characterization "projection" in cases of "doesn't believe" doesn't count as projection, because the atomic sentence doesn't entail truth of complement; could be taken as projection under implication sharing definition, if atomic sentence sometimes implies truth of the complement.
3. Projection and Factive: the standard view, and some puzzles for that view

3.1 Approaches to projection in factive sentences

As noted above, the standard way of understanding what is special about factive verbs is that they presuppose the truth of their complements. It is standardly assumed that this is due to some conventional, lexical property of these verbs: factive verbs are assumed to conventionally mark the content of their complements as presupposed. Projection is then assumed to follow from presuppositionality. According to a large and widely accepted class of accounts, conventionally presupposed content is required to be entailed by (or to have an antecedent in) the context relative to which the presuppositional utterance is evaluated (see i.a. Heim 1983, 1992, van der Sandt 1992). Projection occurs when a contextual requirement of an embedded clause must be satisfied by the global context. Non-projection occurs when the contextual requirement of an embedded clause can be satisfied by a local context.

A range of alternative, pragmatic accounts have been proposed by authors including Abrusán 2011, Atlas 2005, Boër & Lycan 1976, Chierchia & McConnell-Ginet 200, Kadmon 1992, Kartunnen & Peters 1979, Kempson 1975, Levinson 1983, Simons 2001, 2004, Stalnaker 1974, Wilson 1975. All of these have argued that projection of content in factives arises due to general pragmatic considerations. These accounts typically take as their starting point the truth conditions, and in particular the entailment patterns, of atomic factive sentences. While our account is closer in spirit to these than to conventionalist accounts, we see accounts of this sort as similar to conventionalist accounts in one crucial respect. Both types of account assume that projectivity in factives should be explained at the sentence level, based on semantic features of the sentence. Our account is even closer in spirit to that of Abusch 2002, 2009, who takes the presuppositionality of factives to arise from the alternative set which these verbs trigger. However, Abusch takes the relevant alternative sets to be conventionally determined, so falls into the conventionalist camp with respect to the source of presupposition and hence of projection.

A consequence of this conventionalist assumption is that it is expected that what projects in utterances of factive sentences would be immune to contextual effects: factive sentences may sometimes give rise to projection and sometimes not, but where projection occurs, what projects will be a matter entirely of the sentence content. Moreover, it is assumed that there will be a robust distinction between factive and non-factive verbs with respect to projection behavior. In the remainder of this section, we make some observations showing that these predictions are not borne out. Our observations highlight the sensitivity of projection in factive sentences to features of the context, and in particular to contextually salient questions.

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4 This idea is challenged in Tonhauser et al. (2013), where it is argued that factive verbs are not subject to what is there called a Contextual Felicity Condition. It is demonstrated, at least, that factive verbs are subject to a much weaker requirement than clearly anaphoric expressions like too.
3.2. Puzzles for the standard view

3.2.1. Sensitivity to focus marking

On the standard conventionalist view, and also on pragmatic views that derive projection facts as a consequence of entailments, what projects from a factive sentence is determined by sentence content alone. However, it turns out that what projects is variable, and is heavily influenced by the focus structure of the complement clause itself, as the following (constructed) examples show. (The target sentences are underlined.)

(6) A: James just found out that Harry’s having a graduation party, and I just can’t understand why he’s so upset about it.
   B: He didn’t find out that HARRY’s having a graduation party, he found out that HARRIET is having a graduation party, and HARRIET is his best friend.

(7) A: Putin is a straightforward, trustworthy guy.
   B: Why do you say that?
   A: George Bush said so.
   B: Yes, but Bush didn’t KNOW he was a straightforward trustworthy guy. He just BELIEVED it, or maybe HOPED he was.

Consider first example (6), where capitals indicate intonational prominence marking narrow focus on the capitalized item. Speaker B in the example clearly remains uncommitted as to whether or not Harry is having a graduation party. Even without the continuation given, however, the speaker would be committed to the claim that James found out that someone is having a graduation party. This proposition, not the content of the complement, is what projects.

Similarly, in example (7), where the attitude verb itself is intonationally prominent (therefore, we assume, focused), the target utterance does not imply that the speaker believes that Putin is a straightforward, trustworthy guy. It does imply that the speaker believes that some relation holds between Bush and the proposition that Putin is a straightforward, trustworthy guy. This is the proposition that projects.

From the standard perspective on projection in factive sentences, two things seem to be happening in these examples: the “expected” projection of the content of the complement does not occur; while a different, focus-triggered implication projects instead. One way to approach this would be to propose an interaction between two distinct mechanisms, the projection mechanism and the interpretation of focus. Our approach is to posit that projection is a by-product of the construction of focal alternatives. On this approach, interaction with focus marking is predicted to be inevitable.

3.2.2 Sensitivity to implicit questions and overt interrogatives

It’s well known that factive predicates, when embedded, can quite easily be given a non-projective reading even they occur in positions from which projection is expected. There are many examples of this, both constructed and attested, in the literature. Here are a few:
(8) [Interlocutors are aware that their friend Bill is trying to discover the whereabouts of his grown daughter Sally]
If Bill discovers that Sally is in New York, he’ll be relieved.
(Variant on example due to Chierchia & McConnell-Ginet REF)
(9) …I haven’t tried this with wombats though, and if anyone discovers that the method is also wombat-proof, I’d really like to know. (Beaver Bellybutton, ex.(32))
(10) Mr. Wynn asked if PennDot’s review letters were a reaction to a submission Home Depot made with these changes on it, which generated these review comments. Mr. Furnacola believes that there is written verification from PennDot requesting the change. Mr. Wynn is not aware that PennDot has ever dictated access on a Township roadway, since it is not in their jurisdiction. (Beaver Bellybutton, ex.(42))

In all of these cases, there’s a general sense that the factive complement fails to project because context, in one way or another, leads us (as interpreters) to think that the speaker does not intend to commit to that complement being true. In example (8), we’re inclined to assume that the speaker knows no more about Sally’s whereabouts than Bill; the speaker is just speculating about what will happen if it turns out that Sally is in New York. In example (9), the writer makes clear that he doesn’t know whether the method works with wombats, not having tried it. Example (10) is a little more obscure, but what seems to guide judgments here is that the style of writing tells us that this is a formal report of a legalistic interaction. The target sentence containing the factive aware is understood as a report of a first person statement of the form I am not aware that..., and the writer has no more information about the case than the people on whom s/he is reporting.

But there is another way to look at these examples. In each case, the utterance containing the factive occurs in a discourse in which the content of the complement is clearly up for discussion. The utterance in example (8) is understood to occur in a conversation where there is a salient implicit question: Where is Sally? The utterance is not itself an answer to this question, although it is relevant. (It addresses a potential subquestion.) But it is salient that there are “live” contextual alternatives in which Sally is in locations other than New York.

Similarly, the utterance in example (9) serves to raise the question: Does the method work with wombats? The writer wants to be informed if someone discovers that it does, not because s/he is interested in the discoverer’s epistemic state, but because s/he would thereby learn that it does. And in example (10), it is apparent that an effort is being made to establish certain facts: in particular, to establish whether or not PennDot has ever dictated access on a Township roadway. Mr. Wynn’s awareness, or lack of it, is of interest only as it provides evidence as to the answer to this question.5

These examples suggest an alternative type of account of non-projection in these cases, one that does not involve reasoning about what a speaker does or does not know, but simply takes into account which

5 This is an example of an evidential use of an attitude predicate, as discussed in Simons 2007.
questions are being treated as resolved in the current conversation, and which are being treated as unresolved.

3.2.3. **Projection of non-factive complements**

On the standard view, we should expect to find a sharp distinction between complements of factives and complements of non-factives: the former project, the latter do not. As we’ve already seen, projection of factive complements is less robust than one might expect on that view. Both intonation and contextual factors can easily give rise to non-projective readings. But the distinction is also undermined by the observation that projection occurs with non-factive predicates too. Here are a couple of examples:

(11) [Context: At a party. Abe, the host, sees Ben, a guest, without a drink. Ben is standing talking to Carl, his good friend]
    Abe: Hey, dude, let me get you a beer.
    Ben: Nah, I’m good. I actually don’t drink.
    Abe: (laughing) Oh yeah, that’s a good one. Very funny. I’m getting you a beer.
    (Abe walks away.)
    Ben (to Carl, shaking his head): The guy doesn’t believe I’m a teetotaler.

Suppose that you overhear this entire exchange. You’ll undoubtedly understand Ben’s last remark as conveying that Abe is mistaken in not believing Ben to be a teetotaler: we might paraphrase this utterance as:

(12) I’m a teetotaler, and the guy doesn’t believe that I am.

So, in this instance, the complement of believe projects.

(13) [Context: Alexis and Chloe are waiting for Alexis’s husband Lawrence, who went off to retrieve the car, parked earlier by Alexis.]
    Chloe: Why’s it taking Lawrence so long to get back here?
    Alexis: He didn’t believe that I’d parked it in the paying lot.

The most natural interpretation here is that Alexis parked the car in the paying lot and told Lawrence so, but that Lawrence did not believe her. Once again, the complement of the non-factive believe is given a projective reading.

On the standard view of projection, the interpretations of these non-factive sentences must be taken to involve some process other than canonical projection. Of course, the advocate of the standard account can help herself to some other explanation, perhaps even the account to be proposed below. But why propose separate accounts for the two cases of projection, if it is possible to give a single account that works for both?
3.3. Towards an integrated account

The observations we have made are these:

- Narrow focus within the complement of a factive or on the factive verb itself can over-ride the “usual” projection behavior of factives.
- Evidence that there is a salient question in the context which precludes the possibility that the speaker/writer is assuming the content of the factive complement over-rides the “usual” projection behavior of factives.
- Sentences with non-factive verbs can also be given projective readings.

The account we will propose takes as its starting point the idea that every sentence, when uttered, provides some clues as to the alternatives amongst which the utterance is intended to differentiate. For reasons we will clarify shortly, we call these alternatives the congruent question for the utterance. The first hypothesis we explore here can be articulated as follows:

**Projection Hypothesis 1:** Projection of the content of the complement of an attitude verb occurs when the best available Congruent Question for the utterance entails this content.

In the next section (section 4) we will lay out the notion of the Congruent Question and its relation to projection. In particular, we’ll explore the idea that one consideration involved in question selection is question simplicity, and we will provide a metric for simplicity of questions. However, we emphasize that simplicity is only one consideration. Of primary importance is the use by the speaker of any conventional indicator of the intended Congruent Question; these indicators, we claim, cannot be over-ridden by any pragmatic considerations. Similarly, contextual information about the speaker’s assumptions or goals may provide strong evidence as to the intended Congruent Question; these will carry more weight than the default preference for simplicity. What we here call The Best Question will be whatever question best conforms to the various constraints on the Congruent Question provided by the context, discourse structure, linguistic form, and general pragmatic considerations. Here, we are unable to explore all of these features in detail, and concentrate on the contribution of focus marking and of the simplicity criterion.

The Best Question (which is the Congruent Question for the utterance) will not, however, do all the work needed. We will see in section 5 that there is a second notion of conversational question which we must invoke, that of the Question Under Discussion (QUD). The QUD is the question which sets conversational goals and imposes relevance constraints on conversational contributions. In some cases, projection arises from the need to construct a relevance relation between the Congruent Question and the QUD. For these cases, we will explore the following hypothesis:

**Projection Hypothesis 2:** Projection of the content of the complement of an attitude verb occurs when the best explanation for relevance of the CQ to the QUD requires attribution of belief in that content to the speaker.
4. Congruent questions and projection

4.1. The basic framework

The elements of the framework we propose here will be familiar to readers acquainted with the linguistic literature on focus and questions, although we introduce here some new distinctions. For readers from other domains, we introduce the basic notions without too much technical detail to facilitate understanding of our proposal.

A central idea of our account is that focus plays a crucial role in relation to information structure in discourse. We construe focus as a syntactic/semantic feature of linguistic constituents. This feature is part of the structural description of a sentence, along with constituent structure and other structural features. Following Selkirk 1984, we assume that every sentence bears some focus, although (as we’ll discuss further below) it may be the entire sentence which is focused (so-called wide focus). (14) illustrates how we indicate focus on a constituent within a sentence.

(14) [fJohn] ate the cake.

Different languages mark focus on a constituent in different ways. English utilizes some syntactic forms to mark constituents as being in focus, _it_-clefts being a prime example. However, intonational prominence is the most commonplace way to mark focus in English. The details of the relation between intonational prominence on a given syllable and focus marking of a constituent containing that syllable are complicated, and not relevant for current purposes. Here, we will simply assume that the intended focus is retrievable from intonation (and in many of the simple examples used here for illustration, it will be). In examples, we will sometimes put the focused constituent(s) in capitals to give a sense of the intended intonation, as in (15):

(15) JOHN ate the cake.

We turn now to the semantic function of focus. On a very intuitive level, focused constituents are understood to correspond to the new information in the discourse. In the example just above, focus on _John_ indicates that the information about _who_ ate the cake is what is new in the utterance; the fact that the cake was eaten is unfocussed, so indicated to be old or familiar. If you imagine the sentence uttered with stress on the word _John_, you will have the impression that it answers the question _Who ate the cake?_ or serves as a correction to a previous claim like _Lily ate the cake._

A more formal model for understanding how focus indicates the structuring of information in a discourse is given by Roberts (1996/1998/2012), which itself builds on proposals due to Rooth (1985/1992). A variant of Roberts’ model is proposed and utilized in Beaver & Clark 2008. The model we utilize in the account below builds on this work. We sketch the basic ideas here.

Rooth proposes that focus in a sentence serves to make salient a set of alternative propositions: roughly, the alternatives that can be generated by replacing (the semantic value of) the focused constituent with any other type-appropriate object. We call each such proposition a focal alternative of the sentence; the
set of focal alternatives is the *focal alternatives set* or the *focus semantic value* of the utterance. For example (14), the focal alternatives set would be the set of propositions of the form \( x \) *ate the cake*, where \( x \) is any individual or set of individuals. Crucially, all of these propositions entail that someone ate the cake; they vary (hence are alternatives to one another) with respect to who ate the cake.

Focus, then, allows us to associate with each sentence a set of propositional alternatives. Sets of propositional alternatives have another role in semantics, too. On a very widely accepted view, *questions* are appropriately represented in just this way: as sets of propositional alternatives. The basic intuition here is that a question can be represented as the set of its answers (Hamblin 1973, Karttunen 1977, Groenendijk & Stokhof 1984; for an overview, see Groenendijk & Stokhof 1997). So, for example, the question *Who ate the cake?* denotes the set of propositions which answer the question – exactly the set of propositions which we identified above as the focal alternatives set of sentence (14). This parallel between focal alternatives sets and questions is at the heart of the account we develop.

Accounts of questions as sets of alternatives differ in their details, varying as to whether the alternatives represent possible answers, true answers, or complete (exhaustive) answers. We here follow Beaver & Clark 2008 in adopting a fully unified treatment of questions and focal alternatives sets, so that any structure which counts as the representation of a question could also serve as a focal alternatives set, and vice versa. This means that we can technically refer to focal alternatives sets as questions. It’s important to bear in mind, though, that in using this terminology, we mean no more than that focal alternatives sets have a particular formal structure. The term *question* is used here in a technical sense; saying that a focus-marked sentence gives rise to a question is not to say that we should have the intuition that the use of that sentence in a context is the same as *asking* the associated question, or uttering an interrogative. It will be helpful to keep this in mind as we proceed.

The role that focal alternative sets / questions will play in our account is to help us to characterize the alternatives amongst which the speaker intends to distinguish in making her utterance. But for this purpose, we need to introduce *domain restrictions* on the alternative set. Consider again our simple example (14), and consider now an actual utterance of this sentence by a speaker in the course of a conversation. By placing the subject in focus, the speaker indicates an intention to distinguish among alternatives of the sort which make up the focal alternatives of her utterance; but crucially, only some subset of those alternatives will be under consideration: those that mention (include) some individual who might actually have eaten the cake. The sentence could, for example, be uttered by a mother, Lilly, to her daughter, Jane, speaking about Jane’s brother John. Perhaps the cake in question was the last slice of John’s birthday cake, which Jane was hoping to finish off. The only people who have had access to the

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6 Focal alternatives can be generated at any syntactic level, but for simplicity, we discuss only focal alternatives of complete sentences.

7 Elsewhere, we are going to be talking about propositions as sets of worlds, not as structured entities, so strictly speaking we cannot really help ourselves to this terminology. To be consistent, we might say that the focal alternatives consist of the set of propositions expressed by sentences of the form \( x \) *ate the cake*, where \( x \) is any generalized quantifier. The terminology used in the main text is rather standard, if slightly sloppy.
cake were Lilly, Jane, John, and the children’s father Larry. In this case, the alternatives amongst which 
the speaker intends her utterance to distinguish are just those which mention (include) Lilly, John and 
Larry. (Presumably, Jane is not under consideration as a person who might have eaten the cake, as it is 
common knowledge between Jane and her mother that she didn’t.) This set of alternatives corresponds 
formally to the question expressible as Who ate the cake?, where the domain of that question is restricted 
to just those three individuals.

When a speaker asks an explicit question in discourse, the domain of that question is almost always 
restricted in some way. Suppose my daughter has been out on a bird-watching trip, and at the end of the 
day I ask her: What did you see today? My intention is to ask about birds that she saw; a response that 
lists random objects she saw in the course of the day does not really answer my question. Similarly, the 
focal alternatives sets invoked by utterance of focus-marked sentences are typically understood to be 
restricted to some domain relevant to the discourse. We call these domain-restricted alternatives sets the 
congruent question for an utterance.

**Congruent Question (CQ) for an utterance:** The CQ for an utterance is a privileged subset of the focal 
alternatives set of the uttered sentence (given a structural analysis of that sentence, including 
focus marking).

As this definition makes clear, while sentences (under a given structural analysis including focus 
marking) are associated with a focal alternatives set, utterances (productions of linguistic forms in a 
context) are associated with Congruent Questions. Of course, a given focal alternatives set can be 
restricted in indefinitely many ways. The CQ for an utterance is a particular restriction, privileged in that 
it represents the alternatives which the speaker (in some sense) intends to distinguish among with her 
utterance.8

We have so far mostly emphasized the fact that the alternatives within a focal alternatives set or 
Congruent Question differ from one another in some respect. Let’s now return to an observation made 
briefly above: in many cases, the alternatives all have some content in common. Let’s return to our 
familiar example (14)(15), as uttered in the context described above. All of the alternatives in the CQ for 
this utterance entail that someone ate the cake. Following Abusch 2002, 2009 and Beaver & Clark 2008 , 
we assume that where a question is made salient by virtue of being the CQ for an utterance, those 
propositions which are entailed by the disjunction of the alternatives within the question – those 
propositions on which the alternatives “agree” – will be intuitively backgrounded, understood to be 
presupposed by the speaker. These are the propositions which the speaker does not take to be part of what 
is currently under discussion. As we’ll make frequent reference to these propositions, let’s introduce some 
shorthand to refer to them: where all the alternatives within a question or set of alternatives entail some 
proposition p, will we just say that the question (or set of alternatives) entails p.

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8 Various questions arise here. It is undoubtedly an idealization to assume that speakers always have specific 
intentions with respect to the alternatives under consideration. And even where there is such a specific intention, 
how exactly do interpreters identify the intended domain in complex cases? These are issues we will be exploring in 
future work.
Beaver & Clark use this idea to provide an account of focus-induced projection. Let’s illustrate this with the negated version of the example we’ve used so far:

(16) [f JOHN] didn’t eat the cake.

The CQ for an utterance of (16) may be a domain restricted version of either (17) or (18):

(17) Who ate the cake?
(18) Who didn’t eat the cake?

As discussed at length by Beaver & Clark (pp.45-49), details of the intonation may serve to choose between these possibilities. Let’s restrict our attention to the possibility that (17) is the CQ. As we’ve already noted, all alternatives in this question entail that someone ate the cake. So, although (16) is the negation of (14), utterances of both will indicate the same background assumption of the speaker: that someone ate the cake.

4.2. Solution to the first puzzle: Interaction of focus marking and projection

In section 3.2.1. above, we observed that when narrow focus occurs within the complement clause of a factive verb or on the factive verb itself, the content of the complement does not project (i.e. is not understood as an commitment of the speaker); but (what we can now identify as) the focus-triggered presupposition does project. This is easily explained if we make the following assumptions:

(i) The content of the complement is not conventionally marked as projective

(ii) Focus-triggered projection occurs, as in the Beaver & Clark proposal

This pair of assumptions will not explain all of the data we have introduced, by any means. But let’s start by seeing that at least in this set of cases, the pair of assumptions (i)-(ii) will suffice.

Consider again example (6) above, repeated here, this time with some additional indication of the intended intonation:

(6) A: James just found out that Harry’s having a graduation party, and I just can’t understand why he’s so upset about it.

B: He didn’t find out that HARRY’s having a graduation party, he found out that HARRIET is having a graduation party, and HARRIET is his best friend.

9 In fact, Beaver & Clark are interested in accounting for Association with Focus. But projection turns out to be just the other side of the same coin in the account that they propose.

10 The notation used is based on the ToBI annotation system (Silverman et al. 1992). L+H* indicates a pitch accent (strongly accented syllable) beginning at a low pitch and rising to a relatively high pitch. L-H% indicates the sort of sentence final prosody that indicates that a continuation is coming.
Let’s concentrate on the target utterance, the underlined factive sentence. The stress pattern indicated is consistent with narrow focus on the NP Harry; and without further argument, I will assume this focus assignment. As in the example discussed above, there are thus two options with respect to the forms of the focal alternatives, depending on whether or not the negation is taken to be included in the focus domain. (For details, see Rooth 1992 and Beaver & Clark 2008.) The two options for the focal alternatives sets are as below:

(19) \{ p: \text{for some } a, p = \text{James found out that } a \text{ is having a graduation party} \} = \\
For which person \(a\) is it the case that James found out that \(a\) is having a graduation party?

(20) \{ p: \text{for some } a, p = \text{James didn’t find out that } a \text{ is having a graduation party} \} = \\
For which person \(a\) is it the case that James didn’t find out that \(a\) is having a graduation party?

Still following Beaver & Clark (and simplifying somewhat), I assume that the intonation pattern shown is not consistent with the question in (20). So, I assume that the focal alternatives set associated with the target utterance is (19).

The Congruent Question for the utterance must be some domain-restricted subset of this set of alternatives. In this case, a completely constructed example, there is no way to identify the restriction on the domain; but in the current case, the restriction, if any, plays no role in the account. What is important for us is that the alternatives set itself entails that James found out that some person is having a graduation party; hence, any domain restricted subset of this set (i.e. any potential CQ) will have this entailment. On the other hand, the alternatives set does not entail that any particular person is in fact having a graduation party; in particular, it does not entail that Harry is having a graduation party. Hence, the Beaver & Clark account predicts the correct projective implication for the target utterance – that indicated by focus marking. And as long as we do not assume that projection of the content of the complement is conventionally triggered, there is no need to explain why that content fails to project: there is no expectation that it will project in the first place.

In utterances of factive sentences with narrow focus, identification of the Best Question is relatively straightforward. The Best Question is the Congruent Question, some subset of the alternatives set, determined by focus marking and the domain of the focus. We now turn to cases where determination of the Best Question becomes more complex.

4.3. Simplifying the question

Eliminating the assumption that a factive verb conventionally marks its complement as projective/presuppositional helps us out in cases like (6) above, where the complement indeed doesn’t project. But it obviously requires us to provide some account of cases where it does project. Perhaps the most difficult cases to account for without invoking conventional triggering are those involving discourse-initial or out-of-the-blue utterances of factive sentences with wide focus. We will argue here that in these cases, the tendency for the content of the complement to project (and we emphasize that this is a tendency and not an absolute rule) is the result of considerations of simplicity. In this section, we will discuss how a preference for simpler questions gives rise to a preference for a projective reading. In the
next section, we’ll discuss how this preference is reinforced by an additional preference for simple and plausible contextual assumptions.

Imagine that you pass two people on the street who are in conversation, and overhear just one sentence of their conversation:

(21) Joe doesn’t know that Martha’s supposed to get the minimum wage.

Assume that the sentence is uttered as a single intonational unit, and there are no indications of narrow focus. I assume that on hearing this, you would be likely to attribute to the speaker the belief that Martha is supposed to get the minimum wage. Why?

I will assume that the intonation pattern, combined with your lack of information (as an overhearer) about anything to do with the conversation, will lead you to assign wide focus to the utterance: you will treat it as if it is all new. Wide focus in effect fails to constrain the CQ for an utterance. Following Rooth, the focal alternatives set for a wide focus sentence is simply the set of all possible propositions. This alternatives set corresponds to what Roberts 1998/2012 calls The Big Question: What is the way things are? A complete answer to that question will be a complete description of the actual world; but any proposition will provide a partial answer to it. Domain narrowing will be provided by the current common ground: presumably, the set of alternatives will exclude any propositions already being treated as false. But then the focal alternatives set indicated by the utterance provides no narrower a set of alternatives than the common ground itself.

We propose that in the absence of any indicated narrowing of the range of alternatives, the interpreter has the option of adopting as the CQ for the utterance the most specific question (i.e. question with smallest set of alternatives) that is answered by the utterance, namely, the polar question associated with the content of the utterance. So, utterance of Jane sang with wide focus may be assigned the CQ (expressible as) Did Jane sing?, as may utterance of Jane didn’t sing. And similarly, an utterance of sentence (21) with wide focus may be associated with the question Does Joe know that Martha is supposed to get the minimum wage?

Why this question? Well, first, the interpreter can assume that the intended CQ is not any question that could be signalled by narrow focus. If it were, the speaker would have used the appropriate intonation pattern. Second, we are assuming a case where the interpreter has no independent evidence or information that might suggest any other question. For example, the utterance in (21) could be used to address the question:

(22) Why is Joe paying Martha so little?

But this question introduces the presupposition that Joe is paying Martha very little, a presupposition which the interpreter, in this case, has no warrant for attributing to the speaker. A reasonable interpreter

---

11 I assume that this is also what happens when you read an example sentence presented with no context in a linguistics paper, unless some intonation pattern is indicated.
should avoid attributing assumptions to the speaker without evidence. Taking the speaker to intend to address only the narrow polar question is does not (initially) involve such attribution of assumptions.

But now, what is that question for example (21)? That is, what precisely are the alternatives it contains? For simplicity, let’s use a diagram to represent them. I abbreviate the proposition that Martha is supposed to get minimum wage as \( MW \).

\[
\begin{array}{c|c}
\text{Affirmative} & \text{Negative} \\
\hline
\text{Joe knows } MW & \text{Joe doesn’t know } MW \\
\end{array}
\]

Think of the large rectangle as representing all those options (possible worlds) consistent with what the interlocutors are currently treating as given: their common ground. The alternatives represented here divide those possibilities – or possible worlds – into two sets: those in which Joe knows \( MW \), and those in which Joe does not know it.

There is, though, an asymmetry between the two alternatives. The affirmative alternative includes only worlds in which \( MW \) is true. The negative alternative includes both worlds in which \( MW \) is true, but Joe happens not to know it; and worlds in which \( MW \) is false (in which case Joe necessarily does not know it). So we might better represent these alternatives with the diagram in (24):

\[
\begin{array}{c|c|c}
\text{Affirmative} & \text{Negative} \\
\hline
\text{MW} & \text{MW} & \sim\text{MW} \\
\text{Joe knows } MW & \text{Joe doesn’t know } MW \\
\end{array}
\]

Recall that we are in a situation where the surface form of the utterance fails to provide clear clues to the listener as to the alternatives amongst which the speaker intends to differentiate with her utterance. The listener is thus taking the option of constructing the narrowest question which is answered by the asserted content as the CQ for the utterance. We propose that in this process of constructing the CQ, there is a preference to choose the simplest question compatible with any surface constraints. The utterance in (21) is an answer to the question in (24), but is also an answer to the refinement of (24) shown in (25).

\[
\begin{array}{c|c}
\text{Affirmative} & \text{Negative} \\
\hline
\text{MW} & \text{MW} \\
\text{Joe knows } MW & \text{Joe doesn’t know } MW \\
\end{array}
\]
(25) is a refinement of (24) which we arrive at by eliminating the asymmetry noted above, i.e. by eliminating from the negative alternative all worlds at which $MW$ is false. Now the alternatives differ only with respect to one parameter: the truth of $Joe$ knows $MW$. Note further that in doing this, we have in effect simply restricted the domain of the original question, the standard procedure for retrieving the CQ from the focal alternatives set. In this case, the domain of the question is restricted to worlds at which $MW$ is true; alternatively, the only answers under consideration are answers which entail that $MW$ is true.

Question (25) is not only intuitively simpler than question (24): by the criterion of *Pareto Simplicity* (Simons & Kummerfeld, in prep.), it is also formally simpler, in the following sense:\(^{12}\):

**Pareto Simplicity:** Q1 is *Pareto Simpler* than Q2 iff any proposition $p$ which is a partial or complete answer to Q2 is also a partial or complete answer to Q1; and there exists some proposition $q$ s.t. $q$ is a complete or partial answer to Q2 but not to Q1.

Put more simply, we say that Q1 is simpler than Q2 just in case there are strictly more propositions which can resolve Q2 than Q1. In our example, (25) is Pareto Simpler than (24) because the proposition $\sim MW$ (“It is not the case that Martha is supposed to get minimum wage.”) answers (24) but not (25).

We thus propose the following as a *ceteris paribus* principle:

**Question Simplicity:** All other things being equal, the interpreter will select as Congruent Question for an utterance the Pareto Simplest question made salient by the utterance.

Now go back to our original scenario, where you overhear the utterance of (21) with no additional context. The proposal we have made is as follows:

i. Wide focus on the sentence provides no clues to constrain the intended alternatives beyond restriction to the current common ground.

ii. The interpreter has the option to take the intended alternatives to be the polar question answered by the utterance.

iii. In the case of a sentence with main verb *know*, as in (21), the “basic” polar question has a salient refinement, one in which the domain of the question is restricted to worlds in which the complement is true. This question is by default adopted as the intended CQ.

If by this procedure the speaker is taken to intend to distinguish between the alternatives represented in (25), then the speaker will be understood to be treating $MW$ as assumed background information: this is

\(^{12}\) This definition is somewhat simplified from the definition developed in Simons & Kummerfeld. Where the definition above makes reference to partial or complete answers to Q, the original definition utilizes the notion of a *discriminating proposition*: $p$ is a discriminating proposition for a question Q just in case either (i) $p$ or $\sim p$ is a complete or partial answer to Q or (ii) $p$ or $\sim p$ is a nontrivial part of a conjunction which is a partial answer to Q. Justification of this more complex definition would take us too far afield for current purposes.
content shared by the two alternatives under discussion. Hence, when the speaker asserts (21), she implies that she accepts \( MW \) as true.\(^{13}\)

We have here presented the selection of the Pareto Simpler question as if it were a nonce pragmatic calculation that the interpreter carries out each time she hears a wide focus utterance of a sentence with main verb \( know \). And this may be the case. But it is also possible that this pragmatically preferred reading is a pragmatically derived lexical default, a point we will return to briefly in the conclusion.

In any case, it is important to bear in mind that the principle of Question Simplicity is merely a ceteris paribus preference. If there is evidence that the speaker intends to address a different question, or that the speaker does not assume \( MW \), then the speaker will not be taken to intend (25) as the CQ for (21). The same considerations that militate against taking \( know \) and its ilk to conventionally presuppose their complements similarly militate against treating Question Simplicity as a non-overridable principle.

5. **Beyond the congruent question: the role of context and the QUD**

So far, we have discussed utterances and their Congruent Questions without paying much attention to the larger context in which those utterances occur. Now it’s time to broaden our attention to include contextual factors.

5.1. **Context from a QUD perspective**

Following Roberts 1996/2012 and Büring 2003, we assume that coherent discourse can be modeled as structured by sequences of questions: Questions Under Discussion. Some utterances serve to raise questions – interrogatives do so explicitly, but assertions can do so implicitly – while other utterances are used to address those questions. One way to address a question is to make an assertion which provides either a partial or complete answer to it. Another is to raise a sub-question of the original. For example, if we are trying to find out what fruit Joey likes, someone might reasonably ask, *Does Joey like apples?* It is a requirement for coherent discourse that once a question has been raised in some way, subsequent utterances must address that question.

In Roberts’ model, questions that have been raised become part of the conversational scoreboard. More precisely, the scoreboard includes a record of the *QUD stack*: the set of questions currently under discussion. Coherence requirements guarantee that these questions will be logically related to one

\(^{13}\) One might worry that this involves doing exactly what we said above that a speaker should avoid, i.e. attributing assumptions to the speaker without warrant. But the claim here is that the use of the \( know \) sentence precisely does provide warrant for attributing this assumption to the speaker: the speaker will know that the simplest question derivable as CQ for her utterance is one which entails \( MW \), and so knows that if she does not want to be understood to be addressing this question, she should use a different form, or provide some other signal that she does not assume \( MW \).
another, typically with lower questions constituting super-questions of higher ones. The most recently introduced question – the one at the top of the stack – we will refer to as the QUD.

The CQ associated with a particular utterance corresponds to the “narrow” alternatives amongst which the speaker distinguishes in making her utterance. But often, the CQ is distinct from the actual question or topic which the interlocutors are exploring, i.e. the QUD. While the CQ is determined primarily “from below” by linguistic features of the utterance (although not exclusively so, as we saw in the previous section), the QUD is determined primarily “from above,” by prior utterances and by discourse goals. While CQs are associated with single utterances, a QUD is associated with a segment of discourse, and can be thought of as the topic which that segment of discourse addresses. Where an explicit question is asked, it always becomes the QUD for the next segment of discourse.

In the absence of context, the CQ of a (discourse-initial) utterance becomes the QUD for that utterance and the segment of discourse which contains it. Where the QUD is provided by the discourse, the CQ must be relevant to the QUD, but may differ from it. This constraint is central in the account of coherence. It is also the central idea we will make use of in what follows.

5.2. Connecting the CQ to the QUD

Consider the following scenario: Lawrence, Alexis and Chloe have just had lunch together. Lawrence and Alexis are a couple, with a shared car. Alexis came to lunch in that car, while Lawrence and Chloe arrived separately. Alexis, though, was running late and, contrary to her usual habit, parked the car in a nearby paying lot, instead of using the free street parking, as she and Lawrence typically do. As they wrapped up lunch, Lawrence volunteered to go fetch the car and pick up Alexis and Chloe at the restaurant, to give them both a ride home. Lawrence has now been gone for longer than expected. The following dialogue ensues:

(26) Chloe: Why is it taking Lawrence so long to get here?
    Alexis: [with sudden realization] He doesn’t know the car’s parked in the paying lot!

---

14 In this simple model, it is assumed that only one super-question is under discussion at a time, hence all questions on the stack should stand in a sub-question relation to it. We might allow that sometimes multiple super-questions will be under discussion simultaneously: for example, we might simultaneously raise the question of what fruit Joey likes and of what fruit Katie likes. But this additional complication is not relevant to the current discussion.

15 We are exploring the idea that clausal constituents of complex sentences, which have their own focus marking, may be associated with their own CQs; we set this issue aside here.

16 The model described here differs from that in Roberts 1996/2012, where the CQ for an utterance, if it differs from the QUD, becomes the new QUD for the utterance, and must be accommodated into the QUD stack.

17 This example is a variant on one originally due to Daniel Drucker (U. of Michigan). Many thanks to him for the example.
(26) would plausibly be spoken with intonational prominence within the final NP, indicating narrow focus on that phrase. (Lawrence does, after all, know that the car is parked, just not where it is parked.)

Given this focus assignment, the focal alternatives set for Alexis’s utterance would be a set of propositions of the form: Lawrence doesn’t know that the car is parked in l, where l is some location. That is, the focal alternatives set corresponds to the question: What location l is such that Lawrence does not know that the car is in l?¹⁸

At this point, Chloe, as interpreter, has two related interpretative tasks. She must decide what domain restriction (if any) to assume in constructing the CQ from the focal alternatives set; and she must consider how the CQ fits into a reasonable strategy of inquiry for answering her explicit question, which constitutes the QUD for the current segment of discourse. Even before deciding on the former, there is one simple possibility for the latter: the answer to the CQ just is the answer to the QUD.

Now we have the following idea: Chloe recognizes that Alexis is answering her question by telling her which location is such that Lawrence does not know that the car is parked there. Note that prior to the utterance, there need be no common knowledge between Chloe and Alexis as to where the car is parked or might be parked: perhaps Chloe doesn’t drive and really has no specific ideas about where cars get parked in this area. So this is a case where the intended domain of the CQ may be extremely unclear. What is clear, though, is the following: Chloe must construct a relation between the CQ – some subset of the focal alternatives set -- and her question, the QUD. How would answering the question about what parking location Lawrence doesn’t know about answer the QUD? Most straightforwardly, if the car in fact is in that location but Lawrence isn’t looking for it there. Consequently, Chloe must understand Alexis to be implying that the car is in the paying lot, and that Lawrence is delayed because he lacks this information. Hence, the projective reading of the complement.

The proposal here, then, is that the speaker is understood to be committed to the truth of the complement of know because it is only given this assumption that the strategy of inquiry her utterance involves becomes rational. In particular, if Alexis answered as she did without herself knowing where the car was parked, she would fail to address the QUD.¹⁹ In other words, this is the best assumption for the interpreter to attribute to the speaker in order that the strategy of inquiry the speaker has adopted can be seen as rational. The projective reading in this case does not arise directly from the CQ itself, but from the construction of a plausible rationale for the raising of the CQ in the context of the explicit QUD.

¹⁸ On the Beaver & Clark account, there is a second possibility for the alternatives set, which excludes negation from the construction of the alternatives. In that case, the alternatives set would correspond to the question: Where does Lawrence know that the car is? For reasons of space, we do not run through the account for that case.

¹⁹ The explanation given here could be replicated with no reference to the CQ or a strategy of inquiry: Chloe assumes that Alexis intends to answer her question; what Alexis has said constitutes an answer only if the car in fact is in the paying lot; hence Chloe assumes that Alexis believes this. By framing the analysis in terms of relations between questions, we maintain uniformity in the overall account.
Now let’s consider a complication. Attributing to Alexis the belief that the car is in the paying lot is not in fact the only way to make her assertion relevant to the QUD. Suppose the following were the case: The car is not in the paying lot, but Lawrence falsely believes that it is, and is looking for the car there.\(^{20}\) Then it is indeed the case that he doesn’t know that the car is in the paying lot, and his not knowing does explain why he is taking so long. But note that in order for Chloe to construct this explanation of Alexis’s utterance, she would have to somehow infer that although Lawrence does not know that the car is in the paying lot, he does believe it, and to construct further inferences about Lawrence’s actions on the basis of this. Alexis, though, provides no grounds for inferences about Lawrence’s beliefs. This then would be a much more complicated and much less certain inference path to expect Chloe to follow. In this sense, the assumption discussed earlier – that the car is in the paying lot – is the best assumption for Chloe to attribute to Alexis.

We’ve seen here, then, that projection of the content of the complement of the attitude verb may be due to quite general processes of creating relevance in discourse. And this in turn will provide an explanation of the observations in 4.2.3. above, showing that in some cases the complement of a non-factive verb is understood as a commitment of the speaker. To see this, consider a variant of our example (26):

\[
(27) \quad \text{Chloe: Why is it taking Lawrence so long to get here?} \\
\quad \text{Alexis: [dryly] He didn’t believe that the car’s parked in the paying lot.}
\]

By reasoning very similar to that described above, Chloe will conclude that the car is parked in the paying lot; otherwise, this non-belief would be irrelevant to answering her question.\(^{21}\)

To the extent that projection is a consequence of general processes of relevance creation in discourse, rather than to lexical features of specific items, we will expect to find projection cross-cutting lexical distinctions such as factivity.

We turn finally to the examples in section 4.2.2. above, all cases where the content of the factive complement fails to project. As we noted there, these are all cases where that content is currently under discussion: more specifically, where the current QUD is about that content. Consider again example (9), repeated here:

\[
(9) \quad \ldots I haven’t tried this with wombats though, and if anyone discovers that the method is also wombat-proof, I’d really like to know. (Beaver Bellybutton, ex.(32))
\]

As suggested above, the first clause of this segment raises the question Does the method work with wombats? Therefore any interpretations of the continuation which attribute to the speaker the assumption

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\(^{20}\) This observation due to David Manley, p.c.

\(^{21}\) This observation due to Ezra Keshet. The reasoning involved in this case will not be identical, because the focus marking of Alexis’s utterance in (27) is likely to differ from her utterance in (26). The latter is unlikely to be uttered with narrow focus on the final NP; more plausibly, with focus over the entire complement of believe. So the explanation differs in some details, but not significantly.
that the method works with wombats is ruled out. We would not argue, though, that in these cases projection of the content of the complement is suppressed; rather, there are no indicators for projection in the first place.

6. Conclusion

In this paper, we've argued that the projection behavior of the complements of factive predicates – and perhaps of nonfactive attitude predicates too – can be explained by reference to the questions which sentences containing these predicates are understood to address. We have argued that this type of account explains the observed variability in projection behavior, as well as the sensitivity of projection to conventional marking of the intended question.

An important element in this proposal is the clear distinction between two different discourse-questions: the Congruent Question, determined primarily by the surface form of the utterance; and the Question Under Discussion, determined by the intentions and discourse goals of the participants. The construction of projective interpretations sometimes arises from the structure of the CQ itself; but sometimes from the need to attribute particular assumptions to the speaker in order to properly relate the CQ signalled by surface form to the QUD.

The account proposed here falls under the broad heading of pragmatic accounts of projection. As noted, one of the most difficult issues for any pragmatic account to accommodate is the observation that the complements of certain attitude verbs -- know, discover, realize and so on -- seem to be given projective readings by default: when these verbs occur in sentences lacking narrow focus and with no contextual indications in either direction, the tendency is for the complement to be understood as a commitment of the speaker. This seems problematic for heavily pragmatic accounts of projection (such as is suggested by, for example Boer & Lycan 1976), which would seem to require considerable inference on the part of the interpreter about the intentions of the speaker. On the other hand, if we take default readings as evidence for conventionality of projection behavior, we face the challenges outlined earlier in this paper.

Here, we have proposed an intermediate position. We have suggested that for utterances of know sentences with wide scope focus, a ceteris paribus preference for simple questions results in the construction of a CQ which entails the truth of the complement proposition. This result is a consequence of the particular structure of polar questions associated with attitude predicates which, like know, entail the truth of their complements i.e. the majority of factive predicates. Hence the observation that all such predicates have “default” projective readings.

In section 5.3., we presented the derivation of this default reading as if it involved a nonce pragmatic inference on the part of the interpreter. But of course, a pragmatically competent language user will know (implicitly) that this is the normal way of interpreting sentences of this form in the absence of indications to the contrary. While this may be a normal use, it is not a convention in the sense of Lewis 1969. For a relation between a form and its meaning to be conventional in Lewis’s sense, it must be the case that the meaning could just as well have been otherwise. We have argued, however, that the normal (ceteris paribus) use of factives to imply commitment to the truth of the complement is a consequence of a preference for simple questions. Assuming that that preference is not itself conventional, but driven by
some basic features of psychology or rationality, then the projective reading of factives is not
conventional either: other alternatives are not equally (pragmatically) good. The norm of using factive
sentences in this way is rather a convention of use in the sense of Morgan 1978: a norm associated with a
particular form, for reasons based in general pragmatic considerations. Because the norm has this
foundation, it can also be over-ridden when other general pragmatic considerations or other linguistic
conventions indicate a different intended interpretation. But because the norm is associated with a
particular form, it need not be “calculated” on each occasion of use.

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