
Presupposition Projection and Main Content

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1 Introduction

The problem of *projection* has attracted much attention from linguists. In addition to constituting a kind of enigma, it has exposed the collaboration or (sometimes) tension between semantics and pragmatics. Put simply, projection corresponds to a set of observations which share a common feature: operators like negation, interrogation or possibility modals seem to affect only a part of the semantic content of a sentence. For instance, in (1a) there are two pieces of information, the *main content* and the *presupposition*. The former is the proposition that Paul does not smoke and the latter the proposition that he has been smoking. When the sentence is negated, as in (1b), the presupposition remains untouched whereas the main content is negated. (1c) illustrates the same configuration with an expressive (Potts 2005). The proposition that the speaker's neighbour is stupid is not questioned but remains in effect. In (1d), the speaker's hesitation conveyed by *well* (Ajmer & Simon-Vandenberg 2003:1124) escapes the possibility modal.

- (1) a. Paul stopped smoking.
b. Paul didn't stop smoking.
c. Did my stupid neighbor buy a new car?
d. It might be the case that, well, Paul is a sort of double agent.

Although projection is not limited to presuppositions (Potts 2005), it is most frequently studied on the basis of presupposition triggers like

stop, *know*, *only*, *too* or clefts. In this context, the main question has been to derive the projection properties of complex sentences such as (1b) from those of elementary sentences like (1a). This *projection problem* (Langendoen & Savin 1971) has received several solutions, which we will not review. We will only note two aspects of this research domain, which are directly relevant to our concerns.

First, the role of context and pragmatic interpretation has been highlighted on several occasions. In general, it seems that projection does not occur whenever it would lead to an implausible interpretation. Two well-known examples are the hypothetical status of the presupposition in an *if*-clause, as in (2a), and certain so-called *factive* verbs, as in (2b), copied from Karttunen (1971: ex. (25c)).

- (2) a. If Paul has ever smoked before, then he has stopped.
 b. If I discover later that I have not told the truth, I will confess it to everyone.

Concerning (2a), if the presupposition that Paul has smoked projected, it would create a conflict with the *if*-clause, since the same proposition, that Paul has been smoking before, would be both entertained by the speaker (projection) and contemplated as a simple possibility (*if*-clause). Similarly, with (2b), projection would create a conflict with the possibility that the speaker does not know for sure that she has not told the truth (*if*-clause), see (Stalnaker 1974). This may sound pretty trivial, except for the fact that, in such cases, the projection does not ‘resist’ but gives way, thus avoiding an interpretation problem.

Second, as already apparent from (1c, d), projection is not limited to standard examples of presuppositions. It occurs also with what Potts characterizes as *conventional implicatures*. It is not clear whether projection is the common symptom of a set of actually different mechanisms or rather an homogeneous and general mechanism, whose manifestations are modulated by more local differences (lexical semantic content, for instance).

In this paper, we discuss a recent approach to projection (Simons et al. 2011, 2017, Beaver et al. 2017), which argues for the latter perspective, making projection essentially a side-effect of the management of the *Question Under Discussion* (QUD) à-la Roberts (2012). We call this theory the *QUD-based approach*.

Summarizing, the QUD-based approach predicts that a presupposition projects (= is not affected by a truth-inversion/suspension operator) if and only if either (i) it does not address the current topic of conversation (the QUD) or (ii) has no *Obligatory Local Effect*. The

intuition behind this equivalence can be described as follows. For (i), when a piece of information does not address the QUD, it is somehow ‘kept off the track’, that is, kept at a distance from the main flow of discourse. In this respect, it is not impacted by operators like negation, question, or possibility modals, which target precisely the main information. The Obligatory Local Effect, introduced in (Tonhauser et al. 2013), corresponds to the fact that a projective piece of information is captured by a belief operator. For instance, a sentence like *Mary thinks that Paul stopped smoking* implicates that Mary believes that Paul does not smoke but also that he has been smoking before. In other terms, the belief operator captures the presupposition of the complement clause. When some content has no Obligatory Local Effect, this means, roughly speaking, that it can be detached from the main flow of discourse without major damages, most notably without affecting the truth-conditional status of a sentence. This idea, highlighted in Potts’ (2005) book, but anticipated by Frege, can be illustrated by non-restrictive relative clauses. So, in *Mary thinks that Paul, who is her neighbor, stopped smoking*, the fact that Paul is Mary’s neighbor is not necessarily part of Mary’s belief state. Here the intuition is that, when a piece of information is not obligatorily captured by a belief operator, it can ‘float around’ and, as a result, escape the truth suspension/inversion operators.

In this paper, we argue that this view is only partially correct. Our precise reasons for this claim are stated in the relevant sections, but we can motivate our reservations from a more general point of view. The QUD-based approach is, to a large extent, a radical pragmatics approach, that is, it makes presupposition projection essentially revolve around the interpretation of speakers’ intentions as to the discourse topic. While emphasizing the role of pragmatics has been an influential and successful trend in theoretical linguistics for years, it seems that the time has come for a more balanced view, which makes room for *learning* linguistic usages. People certainly react to contexts and adjust their contribution to discourse interaction, but they no less certainly learn *preferences* of usage. When these preferences are ‘strong’, that is, strongly context-independent, they can conflict with ‘soft’, that is, context-dependent, pragmatic pressures. In that case, delineating the equilibrium between the different forces cannot always be done in a crisp and clear way, by applying elegant principles to derive a robust solution. We have to accept the possibility that things are murkier than one may wish. With respect to presupposition projection, we argue that lexical preferences (strong), discourse attachments (strong) and QUD-relevance (soft) interact in a number of ways, some of which we describe

in the last section (4).

The structure of the paper is as follows. We present the QUD-based approach in Section 2, before discussing it in Section 3. In Section 4, we advocate a different approach, based on a distinction between *at-issue content* and *main content*. We will use English as our reference language but turn occasionally to French when it provides interesting contrasts between lexemes or constructions.

2 Projection under the QUD-based Approach

The QUD-based approach is partly grounded on the following idea: a piece of information can project only if it is not interpreted as relevant to the QUD, that is, to a set of plausible alternatives among which the participants in the linguistic exchange seek to discriminate.¹ For instance, in (3), answers A1 and A2 entail that the responder believes that Paul broke the window pane. A2 answers the question via the presupposition that Paul broke the pane, a possibility which is analyzed at length by Simons (2007). Examples like (4) are even more interesting because they suggest that projection does not occur in certain configurations where the presupposition is relevant to the QUD (did Paul break the pane?). It is crucial to note that assuming that the presupposition projects in (4-A) below results in a somewhat infelicitous answer, insofar as the speaker not noticing that Paul was around is an irrelevant fact, with respect to the explicit QUD. Changing the context can make this fact relevant under a projective interpretation, as illustrated in (5), where the answer aims at alleviating the responsibility of the responder.

(3) Q: Who broke the window pane?

A1: It's Paul.

A2: Anna noticed it's Paul.

(4) Q: Is it Paul who broke the window pane?

A: I didn't notice that Paul was around.

(5) Q: Is it Paul who broke the window pane? I thought I had asked you to keep an eye on the little scamp!

A: I'm sorry, I didn't notice he was around.

In contrast to (2b), (4) does not make the belief set of the speaker inconsistent when the presupposition projects. Instead, in that case,

¹We assume the standard definition of alternatives as exhaustive mutually exclusive possibilities ($A_i \Rightarrow \neg A_j$ for every $i \neq j$ in the set of alternatives). The implementation of this constraint depends on the ontology at hand. For instance, in a classical modal frame with a set of worlds W , a set of alternatives is any $\mathcal{A} \subset \mathcal{P}(W)$ such that the members of \mathcal{A} (information states) are pairwise incompatible.

the main content would be either partly irrelevant to the explicit QUD or relevant to a different QUD. This shows that, at least in some cases, there is an interaction between the QUD and presupposition projection. In the QUD-based approach, this interaction is extended to projection in general and systematized in a way that makes examples like (3) and (4) particular cases of more general principles. For simplicity, we will divide our presentation of the approach into two parts, following mainly the neat expositions given in Beaver et al. (2017) and Simons et al. (2017).

2.1 QUD and Focus

The QUD can be characterized formally as a set of restricted alternatives. The restriction comes from the available contextual cues, which allow one to exclude theoretically possible but otherwise implausible answers. For instance, with a question like *Who paid for the car?*, the QUD is any set of alternatives of the form *X paid for the car*, where *X* is a plausible candidate, given the context. For instance, *X* could be a member of the family, a friend, a business partner, or a group thereof, etc. The most recent QUD is called the *Current Question*. So, the Current Question is by definition a set of plausible alternatives.

The *focus* is a set of unrestricted alternatives (no plausibility restriction applies). For QUD and focus to be *congruent*, it is required that the focus be a superset of the QUD (Beaver & Clark 2008). This accounts for the fact that dialogs like (6) can be felt as odd. As with (4), we can ‘repair’ the exchange by assuming that a different QUD is accessible. For instance, if Paul has a reputation of being a destructive child and is likely to have broken the pane, the answer is interpreted as correcting the possible belief that Paul broke the window and the question might sound rhetorical.

(6) Q: Who broke the window pane?

A: Paul broke [a vase]_F.

The central feature of the relation between QUD and focus is the *Current Question Rule* of Beaver & Clark (2008), expressed in (7). (7.2) is straightforward: it prevents a question to be already resolved.² (7.1) accounts for the fact that, in general, questions ‘presuppose’ that some answer is true.

²The status of rhetorical questions is not a problem under this view. They can be considered as special speech acts, where the goal is not to get information but to elicit a public assertion, or as more or less strongly biased questions, where the prior probability distribution of answers for the speaker favors certain elements of the set of formally possible answers.

(7) *Current Question Rule*

1. The Current Question must contain at least one true alternative.
2. The Current Question must contain at least two alternatives which are not true or false in the common ground.

The Current Question Rule interacts with focus as follows. When (i) the set of alternatives determined by focus is congruent with an explicit or reconstructed Current Question and (ii) a subset of alternatives is excluded (by negation, for instance), the Current Question Rule still requires that one alternative be true, which amounts to projecting an existential presupposition. For example, in (8), in addition to the standard correspondence between Q1 and A, the Current Question could be Q2. Assuming that A has a form $\neg([\text{Paul}]_{\mathbb{F}} \text{ came})$, the expression in the scope of the negation is congruent with a Current Question of the form $\{X : X \text{ came to the meeting}\}$, for any contextually plausible agent X . The Current Question conveys the existential presupposition $\exists X (X \text{ came to the meeting})$. The proposition that Paul didn't come eliminates those alternatives in which Paul came, thus constituting an answer to the Current Question. The negation does not eliminate the existential presupposition, since the latter depends on the Current Question (recoverable from the focus structure and the context), not on the answer.

(8) Q1: Who didn't come to the meeting?

Q2: Who came to the meeting?

A: $[\text{Paul}]_{\mathbb{F}}$ didn't come.

For simplicity, in what follows, we will ignore the distinction between QUD and Current Question (the most recent QUD). Unless otherwise indicated, the QUD will always be the Current Question.

2.2 QUD and Projection

In (Simons et al. 2011), it was argued that a piece of information p can project whenever the question whether p is not intentionally relevant to the QUD. The definition in (Beaver et al. 2017) is different and we will focus on the latter, because it clarifies the claims in (Simons et al. 2011) on at least one crucial point. The authors use the notion of *Obligatory Local Effect*, introduced in previous work (Tonhauser et al. 2013) and illustrated in (9). In (9), the belief that Bill has been smoking, which is the presupposition of the clause *Bill has stopped smoking*, is necessarily attributed to Jane. Generalizing, we observe an Obligatory Local Effect whenever a projective content is obligatorily attributed to the agent of

a belief operator. The original definition in (Tonhauser et al. 2013) is reproduced in (10)

- (9) Jane believes that Bill has stopped smoking.
(Tonhauser et al. 2013: ex. (38a))

(10) *Obligatory Local Effect*

A projective content m with trigger t has obligatory local effect if and only if, when t is syntactically embedded in the complement of a belief-predicate B , m necessarily is part of the content that is targeted by, and within the scope of, B .

In contrast to (9), a sentence like *Jane believes that the stupid Bill has stopped smoking* does not entail that Jane believes that Bill is stupid (the local effect is not obligatory). The Obligatory Local Effect is a component of the constraint on projection. In a nutshell, a piece of information projects if and only if it does not address the QUD or is not subject to the Obligatory Local Effect. In the following constraint on projection, condition 1 makes sure that the non-projecting content has at least minimal relevance to the QUD, by preventing it from being compatible with all the alternatives in the QUD. We abbreviate the projection constraint in the *Projection Equation* (11.3).

(11) *Projection Constraint*

A piece of information projects if and only if:

1. it does not entail that some possible answer to the QUD is false, or
2. it has no Obligatory Local Effect.
3. *Projection Equation*:

$\text{Projection} \equiv \text{QUD-Irrelevance} \vee \neg\text{OLE}$.

If a presupposition trigger gives rise to a presupposition with Obligatory Local Effect, the Projection Equation predicts that, in a projective environment, such as negation, interrogation, embedding possibility modal construction, projection will not occur if the presupposition is interpreted as relevant to the QUD. We already saw an illustration of this mechanism with (4). The possibility that Paul was or was not around eliminates certain alternatives. If Paul was not around, he cannot have broken the window pane. If he was around, it eliminates alternatives in which he was too far to have broken the pane.³ Intuitively, the answer in (4) is biased towards a negative factual or epistemic judgment: Paul didn't break the pane or, at least, the speaker has no evidence that it might be the case.

³The second possibility calls for a more liberal, probabilistic, view, which we adopt in Section 4.2.

Finally, we come to focus structures where presuppositions project systematically. In the case of factive verbs, Beaver et al. (2017) and Simons et al. (2017) use again the QUD-based approach to predict projection whenever the focus structure is as in (12). The set of alternatives has the form {Paul knows that p : p is a proposition}. Whatever the restrictions on the set of plausible propositions are, they must include the fact that they are *knowable*, which entails that they are true. So, in the case of (12), the proposition that Mary solved the problem is considered as true, and, in this respect, ‘projects’.

(12) Paul doesn’t know that [Mary solved the problem]_F.

3 Discussion

The QUD-based approach provides a tight connection between projection and the management of information in discourse. In the spirit of Stalnaker (1974), it offers an alternative to purely lexical theories, which see presupposition projection as a mere effect of lexical instructions attached to presupposition triggers.⁴ In contrast to Stalnaker, it adopts a broader perspective because it deals with conventional implicatures as well, and because it accounts for non-projection. In this section, we discuss in turn the Obligatory Local Effect and the predictions of the QUD-based approach with respect to presupposition triggers.

3.1 The Obligatory Local Effect and Anaphoric Triggers

It is intuitively clear that many lexemes trigger information that (i) does not address the QUD and (ii) is not presented as being common ground. Such lexemes fall into the general category of conventional implicatures, as identified in (Potts 2005). Given the Projection Equation (11.3), we would expect that, if conventional implicatures robustly project, as suggested in (Jayez 2015, Beaver et al. 2017), they also robustly escape the Obligatory Local Effect or are not relevant to the QUD. Beaver et al. (2017:281) also consider the case of presupposition triggers that lack Obligatory Local Effect and mention in this regard anaphoric triggers.

Before discussing this point, let us note that the literature on such matters is confusing. What has been labeled *conventional implicatures* by Grice includes certain anaphoric triggers, a fact which has been mostly overlooked. Grice (1975, 1978) classified *therefore* and *but* as conventional implicature triggers. In this subsection, we look at some consequence, concession and additive triggers, like *therefore*, *as a re-*

⁴However, we doubt that, in the current state of the literature on presuppositions, such theories exist.

sult, so, however, yet, too, etc. Summarizing, we show (i) that all these triggers are very probably presupposition triggers and not conventional implicature triggers in the sense of Potts (2005) and (ii) that they raise a problem for the QUD-based approach. More precisely, we show that the mentioned discourse markers, like a number of presupposition triggers, (i) are anaphoric, (ii) can be backgrounded, (iii) clearly tend to project and, in addition, (iv) have Obligatory Local Effect and (v) can address the QUD, even if they project. We briefly explain these five points in turn, mentioning *too* only for the last two points, since its status as a presupposition trigger is already well-established.

(i) It is markedly odd to use *therefore, yet*, etc. without referring to an antecedent provided by the previous discourse or the context. So, all these items are anaphoric.

(ii) If we adopt Potts' (2005) idea that presuppositions are presented as being in the common ground, in contrast to conventional implicatures, which are presented as new, examples like those in (13a, b) suggest that the triggers under review behave like presupposition triggers. (13ab) reproduce a pattern used by Potts (2005: ex. (2.41)) in order to show that conventional implicatures are *antibackgrounding*, i.e. they resist previous mention in the discourse. No effect of this type is observed with *therefore* (13b). In (13c, d) the consequence and concession relations are relativized to the antecedent of an *if*-conditional, exactly as the presupposition of (2a) or similar examples. Altogether, (13) suggests that the discourse markers under consideration are presuppositional. This could be expected under a view of presupposition triggers as elements that describe their antecedent in a particular way. For instance, *stop smoking* refers to a previous state described as satisfying the property of smoking. This is the gist of the *anaphoric* theory of presupposition (van der Sandt 1992, Geurts 1999). With *therefore*, for example, one refers to a proposition which somehow entails the proposition expressed by the sentence or clause to which *therefore* adjoins: *therefore P'* refers to some *P* such that *P'* is a consequence of *P*.

- (13) a. ??Paul is the committee chairman. As a result, Paul, **who is the chairman**, cannot be a counselor.
- b. Being the committee chairman is not compatible with being a counselor. Paul is the chairman, **therefore** he cannot be a counselor.
- c. If, really, being the committee chairman is not compatible with being a counselor, Paul, who is the chairman, cannot, **as a result**, be a counselor.
- d. If, really, being the committee chairman is not compatible with being a counselor, I am surprised that Paul is the chairman and **yet** also a counselor.

(iii) The contents that correspond to the consequence or concession relation are *not* part of the main content. Compare their status with that of *because*, which is genuinely part of the main content. In (14a, b) the causal relation between the two propositions is negated or questioned. In (14c, e) the consequence or concession discourse relation associated with *so* or *yet* escapes the negation or question operator, which bears only on the propositions connected by the discourse relation.

- (14) a. I don't think that Paul resigned because he didn't get along with his boss.
- b. Did Paul resign because he didn't get along with his boss?
- c. I don't think that Paul didn't get along with his boss and, so, resigned.
- d. Did Paul disagree with his boss and, so, resign?
- e. Did Paul disagree with his boss and, yet, decided to stay?

(iv) The mentioned discourse markers have Obligatory Local Effect. In (15), the only possibility to make the markers escape the belief operator is to interpret the sentences as coordinating two beliefs of Mary (*Mary believes that p and as a result/yet she believes that p'*), but this does not fit with the syntactic structure, which is a coordination of two complement clauses under the belief operator (Mary believes that A and B).

- (15) a. Mary thinks that Paul is the committee chairman and, as a result, cannot be a counselor.
- b. Mary believes that Paul is the committee chairman and, yet, is a counselor.

Additive markers like *too*, *again* or *still* behave similarly. In a context where Susan and Paul have been given a problem to solve, (16b) sounds contradictory because Mary's thoughts include the fact that

Susan solved the problem, see (Tonhauser et al. 2013: ex. (46a)) for a similar case.

- (16) a. Mary doesn't know that Susan has solved the problem. She thinks that Paul solved it.
 b. #Mary doesn't know that Susan has solved the problem. She thinks that Paul solved it too.

(v) This part is slightly trickier. Imagine the following situation: two physicists discuss some problematic observation about two particles, p_1 and p_2 . The physicists cannot determine what happened to the particles. They only know that the disintegration of either one automatically causes the disintegration of the other. The two answers in (17) are felt as odd or are reinterpreted as metalinguistic. In the latter case, the responder corrects the questioner by signaling that the use of *therefore* or *too* is inappropriate, due to the non-satisfaction of the presupposition (that p_1 disintegrated). This is normally only possible through a special prosodic focus marking, such as a rise in pitch and loudness on *therefore* or *too*, see Beaver et al. (2017: ex. (19)) and Jayez (2015), Simons et al. (2017) for similar examples. In the former case, the oddness of the answers comes from the fact that the presuppositions tend to project, which is not compatible with the final assertions. In (17-A1), the negation must apply to the main content, giving the reading 'I don't think that p_2 disintegrated'. If *therefore* did not project, it would be affected by the negation, giving the -complex but normal- reading 'I don't think that p_2 disintegrated as a result of p_1 disintegrating because, in fact, neither p_1 nor p_2 disintegrated'. Since *therefore* and *too* have Obligatory Local Effect and their presupposition is relevant to the QUD ('What is the responder's opinion about p_1 and p_2 ?'), the dualized version of Projection Equation (11.3), i.e. $OLE \wedge QUD\text{-relevance} \Rightarrow \text{non-projection}$, predicts that it should not project. It is not clear how the projection constraint (11) deals with such cases. The fact that *too* and similar markers robustly project is not a novel observation, see Jayez (2015) for discussion and references. The data sketched here reinforce the possibility that it is not a limited phenomenon.

- (17) Q: p_1 probably disintegrated and p_2 followed, do you agree?
 A1: #Well, I don't think that, therefore, p_2 disintegrated. Neither one did.
 A2: #Well, I don't think that p_2 disintegrated too. Neither one did.

3.2 Projection

Projection Equation (11.3) predicts in particular that projection does not occur when the presupposition addresses the QUD. Some observations have been mentioned as direct counter-examples to this claim. They are listed below.

- (18) Q: Does Paul have a strong will?
 A: Well, he didn't quit smoking for instance.
 (Adapted from Jayez 2010)
- (19) Q: Did you go shopping?
 A: I didn't realize that the store was closed today.
 (Koev 2017: ex. (15))
- (20) Q: Which neighbor kid keeps ringing John's doorbell and running away?
 A: John is beside himself with frustration. He hasn't figured out it's Billy.
 (Peters 2016: ex. (32))
- (21) Q: When did Finland become independent?
 A: It must have been after the Bolsheviks came to power in Russia but before Lenin died in 1924.
 (Karttunen 2016: ex. (28))

In this sequence of examples, the various relevant presuppositions seem to address the QUD and nonetheless project. However, some qualification is in order. Concerning (19), the intended interpretation of the answer is somewhat unclear. Does it mean (a) 'I went shopping because I had not realized the store was closed' or (b) 'I could not go shopping because the store was closed'? In case (b), the presupposition ('The store was closed today') addresses the QUD but the main content seems to be partly irrelevant and it is not clear whether the interpretation is quite natural. In case (a), the projected presupposition is not relevant to the QUD because the latter is something like 'did you try to get something at the store' and *not* 'did you get something at the store' (this would be case (b)). To get a more convincing example, one could modify the dialog in (19) as in (22), where the two pieces of information in A contribute an explanation for the complex event mentioned in Q: the responder accounts for her going to the store by the fact that she did not think that the store was closed (main content) and for her quick return by the fact that the store is closed (presupposition).

(22) Q: Why on earth did you do a round trip in ten minutes with the car?

A: I had not realized the store is closed today.

(21) too is problematic as a purported counterexample. The two presuppositions do not address the QUD in themselves, as evidenced by the oddness of (23).

(23) Q: When did Finland become independent?

A: #The Bolsheviks came to power in Russia and Lenin died in 1924.

To make sense of (21), the temporal relations have to be taken into account, but they are part of the main content and do not project. In (24), the existence of a complex event where, first, the Bolsheviks came to power and, afterwards, Finland became independent, is negated. So, the general form of such examples is $\neg AFTER(e_1, e_2)$ and what possibly projects is just e_1 or e_2 .

(24) It is not the case that Finland became independent after the Bolsheviks came to power in Russia.

It is in general difficult to construct counterexamples based on negative operators. However, there is a natural class of counterexamples illustrated in (25). The general idea behind such examples is to have a dialog where the responder accounts for some fact by contemplating the possibility for an agent of being aware of some pleasant or unpleasant state of affairs.⁵

(25) Q: Why is Paul happy/depressed?

A1: He might have realized that Mary is going to marry/leave him.

A2: Did he realize that Mary is going to marry/leave him?

So, it seems that the systematic connection between addressing the QUD and not projecting is, at best, a statistically dominant feature, but not an intrinsic characteristic of projection phenomena. Three other kinds of objection have been raised against the QUD-based approach.

The first one concerns the interpretation of dialogs like (26). Simons et al. present that example as an illustration of the fact that a non-addressing QUD content can project. The presupposition that raw vegetables are edible is not an explanation of the responder's surprise and, as a result, it can project. Karttunen (2016) notes that replacing *know* by *believe* or *think* gives exactly the same result because the proposition that one can eat raw vegetables is common ground (in our

⁵The A2-type answers are subquestions in the sense of Roberts (2012).

culture) and will project no matter what. He argues that the original example does not in itself provide support to the authors' thesis. Elaborating on this, let us consider (27-A1). Since the proposition that the earth is flat is irrelevant to the QUD, it should project, which, of course, creates a conflict with the common ground proposition that the earth is not flat. So, the difference between (27-A1) and (27-A2) is correctly predicted. However, in order to demonstrate that the prediction depends exclusively on the non-relevance to the QUD and not, for instance, on a strong preference for projection with *know*, one has to show that, when the embedded clause *does* address the QUD, non-projection is systematically, or at least preferentially, observed for the same verb. This type of problem leads us to the next question, which concerns the class of verbs called *factives*.

(26) Q: What most surprised you about the first graders?

A: They didn't know that you can eat raw vegetables.

(Simons et al. 2011: ex. (15))

(27) Q: What most surprised you about the first graders?

A1: #In contrast to many children of the same age, they didn't know that the earth is flat.

A2: In contrast to many children of the same age, they didn't believe that the earth is flat.

Karttunen (1971) had identified a subclass of *semi-factive* verbs where projection is less systematic than with emotive factives (*regret*, *be surprised that*, etc.) or epistemic factives (*know*, *realize*, etc.). Semi-factives include for instance *observe*, *see*, *be aware*, *notice*, *remember*. There is a rather sharp contrast between full factives and semi-factives in certain types of configuration mentioned in the QUD-based approach.

(28) Q: Was Paul at work yesterday?

A1: Probably not. His boss did not observe/see/notice he was in his office.

A2: Probably not. His boss (is not aware/doesn't remember) he was in his office.

A3: ??Probably not. His boss doesn't know/regret he was in his office.

A4: Probably yes. His boss didn't realize he was in his office.

In contrast to A1 and A2, where the most likely interpretations exclude projection, projection is obligatory with A3 and A4, resulting in a hardly interpretable answer in A3.⁶ It is difficult to reconcile this kind

⁶See also examples (38) and (39) in (Peters 2016).

of observation with the reasoning proposed by Simons et al. (2011: ex. (24)) that, in an appropriate context, projection can be blocked with ‘*x* does not know that *p*’ because, if *p* was the case, *x* would know it.⁷ Although the inference makes perfect sense, it cannot override the preference for projection with full factives. French is interesting because it marks the difference in projection with mood and register. In (29), the indicative version A1 is strongly deviant whereas the subjunctive version A2 is possible but quite formal.⁸ The subjunctive marking is clearly related to ignorance or uncertainty, as attested by cognate constructions like *que je sache*_{PRES-SUBJ}, meaning *to my knowledge, as far as I know* and *pour autant que je sache* (lit. ‘as much as I know_{PRES-SUBJ}’). This is a well-known association in many languages (Godard 2013, Giannakidou 2016) and it is striking that languages like French exploit it to *conventionalize* projection for full factives, which indicates that projection cannot be reduced to pragmatics.

(29) Q: Est-ce que Paul était au travail hier?
 INTERROG-MARKER Paul was at work yesterday?
 ‘Was Paul at work yesterday?’

A1: *Je ne sais pas qu’il était
 I EXPL-NEG know-PRES-IND not that he was
 dans son bureau.
 in his office.
 ‘I don’t know he was in his office.’

A2: Je ne sache pas qu’il était
 I EXPL-NEG know-PRES-SUBJ not that he was
 dans son bureau.
 in his office.
 ‘I have no evidence that he was in his office.’

The last problem concerns the ‘knowability’ property of the complement of factives. First, one might argue, like Karttunen, that such a property involves some circularity. If we can only know knowable, hence true-to-fact, contents, the veridical character of such attitudes seems to derive from the very concept of knowing, independently from the linguistic term. Otherwise, we would have to assume that the relation between truth and knowledge is conventionalized in language, which would amount to saying that *know* presupposes the truth of the

⁷Note also that the reasoning makes crucial use of the main content.

⁸The subjunctive is also possible in the embedded clause with semi-factives and excludes projection: *Je n’ai pas observé qu’il [ait été]_{PAST-SUBJ} dans son bureau*, ‘I didn’t observe he was in his office’.

known content, and drive us back to the phenomenon we are supposed to explain. If language just provides a label for the concept of knowing, and this concept entails the truth of the object of knowledge, we have to posit a difference in some dimension between knowing and observing, seeing, etc., possibly on the basis of semantic differences between the verbs, a program which has yet to be carried out, see (Turri 2013) for a related problem.

4 The Role of the Main Content

Taking stock, we have seen that the QUD-based approach faces two kinds of problems: (i) The attempt to predict projection on the basis of the absence of Obligatory Local Effect is not (entirely) successful (see *too* and similar discourse markers) and (ii) the claim that QUD-addressing content cannot project is not supported by certain observations.

However, rejecting the QUD-based approach altogether is not the move we would recommend, because the approach offers two important ideas that advance our understanding of projection. There is indeed a strong connection between Local Effect and projection as well as between QUD-addressing and projection properties. In this section, we propose to diagnose the source of the difficulties of the QUD-based approach and to reconfigure it accordingly, in order to preserve the major insights on which it is based.

4.1 When is Projection ‘Obligatory’?

The operators that apply to sentences containing presupposition triggers and make projection manifest (negation, interrogation, possibility modals) can target two different types of semantic form. For convenience, we represent the main content-presupposition combination as a pair of the form $\langle \text{main content, presupposition} \rangle$. When a trigger combines with its complement (modulo argument structure) or target (for modifiers), there are basically two possibilities: either the ‘logical’ form (= combinatory potential) of the trigger puts semantic constraints on the main content or it does not.⁹ To illustrate, consider the forms associated with *stop*, *know*, *only* and *too* as NP modifiers. Superficially, they are similar, i.e. they are functional lambda-terms expecting a property (P) or a proposition (p) at some point and returning a (possibly quantified) main content-presupposition pair where the property or proposition occurs on the left and on the right. So, they have a general form: $\dots \lambda X \dots \mathcal{Q} \langle \phi(X), \psi(X) \rangle$, where X is of type P or p and \mathcal{Q}

⁹We follow here Jayez (2015) but we modify his criterion of *separation*.

is a (possibly empty) sequence of quantifiers. We present the forms in a simple (syntax : semantics) categorial format.

- (30) a. **stop**: $(NP \setminus S) / VP : \lambda P \lambda x . \exists t \langle \text{after}(t, \neg P(x)), \text{before}(t, P(x)) \rangle$
 b. **know**: $(NP \setminus S) / \text{that-S} : \lambda p \lambda x . \langle \text{is-certain}(x, p), p \rangle$
 c. **only-NP**: $(S / VP) / NP : \lambda x \lambda P . \langle \forall y ((y \neq x) \Rightarrow \neg P(y)), P(x) \rangle$
 d. **too**: $NP \setminus (S / VP) : \lambda x \lambda P . \langle P(x), \exists y (y \neq x \wedge P(x)) \rangle$.

On closer look, the structure for *too* is different because there is no constraint on P in the main content part. The constraint $\exists y (y \neq x \wedge P(x))$ is in the presupposition part. We get a similar picture with a discourse marker like *therefore*, for which the consequence constraint is in the presupposition part (31).

- (31) **therefore** : $S / S : \lambda p . \langle p, \exists p' \text{ Consequence-of}(p, p') \rangle$

Empirically, it seems that non-projection is difficult whenever the main content part does not contain any particular semantic constraint.¹⁰ If this is on the right track, we would expect that, if there are triggers that lack any information ‘about’ the main content, they strongly tend to project. Indeed, such triggers exist and can help us to clarify the notion of aboutness we need.

A particularly striking case concerns *hic et nunc particles* (HNPs) studied for French in (Dargnat 2019). HNPs are those discourse markers that refer to circumstantial information only available at utterance time, such as mental events affecting the speaker, external events or discourse events. They signal mainly emotional reactions or epistemic stages of the speaker, action scheduling, hesitations and reformulations. They have specific prosodic features, which help identify them automatically in speech corpora (Dargnat, Bartkova, & Jouvét 2015). Standard examples are *Aïe!*, *Ouille!* (*Ouch!*), *bon* (\approx well), *hein* (\approx right?), *tu parles!* (*You bet!*), *Zut!* (*Oops!*), etc. HNPs fall in the more general category of *use-conditional* items, that is, items that must be characterized by their usage, not by their contribution to the truth conditions of the sentence (Gutzman 2015).

Like most conventional implicature triggers, HNPs systematically project but, in addition, they cannot be embedded in a non-immediate perspective, in contrast with some expressives, like those in (32). In this respect they could be considered as Anti Local Effect items, which occupy the endpoint of the scale shown in Table 1.

¹⁰We ignore here the metalinguistic cases, where one manipulates the focus, as noted in Section 3.1(v).

- (32) a. A l'époque, Paul pensait que son fichu métier
 At that time Paul thought that his damn job
 finirait par le tuer.
 would end up by him kill-INF.
 'At that time, Paul thought that his damn job
 would end up killing him.'
- b. #A l'époque, Paul pensait que son métier
 At that time Paul thought that his job
 finirait par le tuer merde!
 would end up by him kill-INF shit!
 'At that time, Paul thought that his damn job
 would end up killing him shit!'

Table 1. A (very partial) scale of projection

Category	Main Content	Presup.	Conventional Impl.	HNP
Obl. Loc. Eff.	—	Yes in general	Variable	No
Projection	—	Variable	Robust	Obligatory

In order to illustrate more concretely the inner workings of HNPs, we describe the case of the particle *quoi* in sentence-final position. *Quoi* signals that the speaker has no better option than to use the sentence to which the particle is adjoined. This is illustrated in (33).

- (33) Et puis je commence à chanter des trucs un peu hyper cul-cul
quoi et genre euh j'écris le texte et je le regarde je le lis je dis
 putain mais c'est trop cul-cul **quoi** (...) Mais mon dieu la meuf
 c'est une psychopathe **quoi**
 (Izia Higelin, interview on France Info, 11 July 2012)
 'Next, I start singing things that are a bit corny QUOI and like
 uh I write the lyrics I look at them and I say fuck! it's too corny
 QUOI Oh my God, the chick, she is a psychopath QUOI'

It is often associated with an implicature of reluctance: although the speaker is not spontaneously willing to say that p , for instance because she is afraid of sounding blunt, rude or somehow offensive, she nonetheless resolves to do so because she is unable to find a more adequate characterization. One might assimilate *quoi* to a standard conventional implicature trigger, assigning to it a structure like (34), where we use a triple \langle main content, presupposition, conventional implicature \rangle and a scale σ of relative adequacy for propositions.

- (34) **quoi**: $S \setminus S : \lambda p . \langle p, NIL, \forall p' (p \geq_{\sigma} p') \rangle$

However, this puts *quoi* on a par with expressives like *the damn N*, evaluative/epistemic adverbs like *fortunately* or *unexpectedly*, or German epistemic modal particles like *ja*, *doch*, etc. (Karagjosova 2003), and fails to capture its *hic et nunc* specificity. Actually, although *quoi* is syntactically a sentential adjunct, it is not a direct modifier of the proposition expressed by *S*, and, so, is not reducible to (34) or similar forms. *Quoi* communicates that the speaker *decides* to use the clause she uses and does not draw attention to the content of the clause per se but to the *process* of selection of the clause. This is what makes *quoi* an HNP, an element which refers to an event of mental elaboration in the spatio-temporal immediate vicinity of an utterance. More generally, having HNPs bearing on utterance-proximal events accounts for a pervasive intuition in the literature on interjections, namely that interjections encode reactions to the situation and not (just) judgments (Ducrot 1984, Wharton 2003, Świątkowska 2006).

We assume that HNPs are associated with ‘objective’ updates. Standard updates are usually partitioned into different types. The main content is associated with an update of the information state representing the common ground, the non-main content with an update of another type of information state. These differences can be related to different intentions, an intention to influence the addressees and make them modify the common ground vs. an intention of publicizing some piece of information, speaker-centered (expressives, evaluative adverbs) or not (non-restrictive relative clauses, presuppositions).¹¹ HNPs do not correspond to communicative intentions. They are not ‘invisible’, though. They are part of the linguistic code and can be processed by addressees but they are not conventionally associated with a communicative intention, although intentions of obtaining some effect can be inferentially ascribed to a speaker in a given context. In terms of update, HNPs are comparable to external events, observable phenomena produced and possibly controlled by the speaker, accessible but not addressed to the hearers. We propose that HNPs give rise to automatic updates of the common ground, like any other mutually manifest event and can be described by their conditions of use (which keeps them in the category of conventional markers).¹²

¹¹We remain agnostic as to whether a rendition in terms of particular (non-propositional) updates (see e.g. Murray 2014) or communicative intentions, along the lines of Ginzburg (2012), is to be preferred.

¹²To wit, for *quoi*, the semantics would be: $\lambda p.(p, NIL, utter(speaker, p, t_u) \wedge BEL(speaker, \forall p'(p \geq_S p')))$, where t_u is utterance time. The conventional implicature includes the action of voicing p at utterance time as well as a belief about the relative value of p .

To sum up, there are at least two cases. (i) A part of the meaning of the form affects the main content and non-projection can occur, (ii) the meaning does not affect the main content and non-projection is strongly restricted or virtually impossible (HNPs).

4.2 Skipping the Main Content?

In this section, we argue that some of the difficulties noted for the QUD-based approach stem from an absence of distinction between the *at-issue* content and the main content. As its name indicates, the *at-issue* content corresponds to that part of the content which addresses the QUD. It is perfectly true, as already acknowledged in (Ducrot 1972), that the presupposition can address the QUD. More importantly, it is perfectly true, contra Ducrot, that the presupposition can be in such cases the more important piece of information (Simons 2007), as in (3-A2), repeated below. Finally, it is also perfectly true that, in many cases, a presupposition that addresses the QUD does *not* project because this would conflict with the most plausible interpretation of the conversational exchange, as in (4).

(3) Q: Who broke the window pane?

A1: It's Paul.

A2: Anna noticed it's Paul.

(4) Q: Is it Paul who broke the window pane?

A: I didn't notice that Paul was around.

However, in Section 3.2 we mentioned some examples where the presupposition is *at-issue* and projects. We can account for them in exactly the same terms as for (4): assuming that the presupposition projects delivers the right interpretation. At first sight, this suggests that all that matters is pragmatics. Whether projection or non-projection is preferred depends on which one contributes to the most plausible scenario for addressing the QUD. In fact, this simple approach has to be seriously qualified.

First, as noted in Section 3.2 with respect to Karttunen's (1971) observations on factives, lexical preferences can complicate the picture and pragmatics does not override them. Second, as argued in (Jayez 2015) from a different perspective, QUD-addressing is subject to Ducrot's (1972) *Linking Law* (*loi d'enchaînement* in French), which says, roughly speaking, that one cannot attach a constituent to the presupposition *alone* through a causal or opposition discourse relation, or, equivalently, that one cannot 'shunt' the main content with such relations. For example, whereas (35a) is a perfectly normal sentence where not having

caviar (the main content) is explained by the price of caviar, (35b) is obscure and cannot mean that Paul had caviar because he liked it.

- (35) a. Paul stopped having caviar for breakfast because it's expensive.
 b. #Paul stopped having caviar for breakfast because he liked it.

The function of any relevant answer to the QUD is to influence the probability of some subset of alternatives. In the spirit of Ducrot, we assume that, whatever the contextual conditions are, (i) the main content *must* play some role in this process and (ii), in contrast, this involvement is not obligatory for the non-main content, in particular the presupposition. This difference is apparent in examples like (36). Answer A1 entails that the responder is not subscribed and presupposes that she was subscribed four years ago. The presupposition is not relevant to Q. It is not felt as totally irrelevant (a *non sequitur*) because it could address a potential question (when did you stop your subscription?) about a super-topic (the general status of the addressee's subscription). However, it is not connected to the explicit topic (the existence of a current subscription) or any other explicit piece of information and constitutes a sort of supplement. Replacing A1 with *I am not subscribed* is possible without altering the question-answer relation. A2 is more difficult to interpret because, although the presupposition addresses the QUD, the main content is not easily related to Q. A possible interpretation is that, for some reason, the responder adds a supplemental indication of her state of mind about the situation, but this could be perceived as peripheral with respect to the QUD. A3 sounds irrelevant. The presupposition addresses the QUD but the main content hangs around without contributing to making a possible answer to the QUD more or less plausible.¹³

- (36) Q: Are you currently subscribed to the journal? It would get you a discount for the proceedings.
 A1: I stopped my subscription four years ago.
 A2: I am glad I am not subscribed.
 A3: #My friends don't know/know I am subscribed.

¹³Spelling out what 'plausible' means requires that one develop a notion of (probabilistic) dependence. Probabilistic dependence could be analyzed for instance in the framework of *confirmation theory* (Fitelson 2001), which states that p is positively (resp. negatively) relevant to p' with respect to some function ϕ over probabilities iff $\phi(\Pr(p), \Pr(p')) > 0$ (resp. < 0). Classic examples for ϕ include $\Pr(p'|p) - \Pr(p')$ or the log-likelihood difference $\log(\Pr(p|p')/\Pr(p|\neg p'))$. We will not discuss the different limit conditions and possible options here.

(37) *Generalized Linking Law* (GLL)

If a constituent A is attached to another constituent Q by a Question-Answer relation, the main content of A must be relevant to a subset of the alternatives associated with Q.

This asymmetry between main content and non-main content distinguishes between a purely pragmatic approach, which would predict –correctly– that the network of probabilistic dependencies varies with context, and a semantic approach, which makes room for context, but posits a fundamental asymmetry between main content and non-main content. What are the consequences for projection? Along the lines of Ducrot and given the GLL, the main content is always at issue (relevant to the QUD) and, given the Projection Equation (11.3), never projects. The presupposition can address the QUD. In that case, it can project or not, depending on the plausibility preferences (pragmatics), the lexical constraints (semantics, see the case of full factives) and the general requirement that the main content must address the QUD (GLL). In particular it is possible for a presupposition to address the QUD and project when the main content-presupposition combination is relevant to the QUD, see the examples discussed in Section 3.2. However, when a non-main content content does not address the QUD, it *must* project because there is nothing to interfere with the default projective behavior of non-main content. So, at-issueness determines the necessity of non-projection, not the necessity of projection: QUD-irrelevance entails projection but QUD-relevance does not entail non-projection.

5 Conclusion

In this paper, we have provided a critical examination of a recent and influential theory about projection, the QUD-based theory. Our goal in carrying out this task was not to evaluate the theory in itself but rather to contribute to an analysis of pragmatics-driven approaches, which the QUD-based approach illustrates in a powerful and articulate way.

We have reached the conclusion that the main claim of the QUD-based approach, i.e. an equivalence between non-projection and QUD-addressing, has to be weakened and replaced by an entailment from not addressing the QUD to projecting. In other terms, the content which does not address the QUD *must* project and that which addresses the QUD *can* project, depending on a set of (sometimes complex) factors.

In doing so, we have retained a fundamental insight of the QUD-based theory, the importance of context and, more precisely, of the relation to the QUD in predicting projection. In a nutshell, a presup-

position projects or not according to what the most plausible QUD-addressing scenario is. We have also claimed (Section 4.1) that projection is strongly preferred or obligatory whenever the trigger makes no specific contribution to the main content in addition to the minimal compositional structure (see the case of HNPs analyzed in Section 4.1). Taken together, this aspect and the equivalence between not-addressing the QUD and necessarily projecting suggests that semantic material that has no direct (addressing) or indirect (via lexical content) access to the QUD projects most of the time. More work is needed to assess the robustness of this hypothesis. This entails, in particular, extending the empirical observations to include more complex conversational exchanges and a richer notion of QUD, see (Ginzburg 2012).

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